MEETING REPORT

ANNUAL GENERAL MEETING 2024

16th Asian Forensic Sciences Network

Annual Meeting & Symposium

And

12th the Asia Pacific Medico-legal Agencies Network

Annual General Meeting & Workshop

August 26th – 30th, 2024

At Chumpornkhet Udomsak Building

Royal Thai Navy Convention Hall

Thanon Arun Ammarin, Wat Arun, Bangkok Yai, Bangkok

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Meeting Agenda

16th Asian Forensic Sciences Network Annual Meeting & Symposium

and

12th the Asia Pacific Medico-legal Agencies Network Annual General Meeting & Workshop

Between 26th – 30th August 2024

26th August 2024 at Royal Thai Navy Convention Hall, Bangkok

Programs				
Time/Location	Pre-conference Workshop			AFSN Board Meeting Wichai Prasit Meeting Room 1
	APMLA Chom Chonlatee Room	DNAWG Chao Phraya Grand Ballroom	TXWG Pho Sam Ton Auditorium	
08.00 - 09.00	Registers			
09.00 - 10.00	The Istanbul Protocol and the Investigation and documentation of torture and Ill-treatment Prof. Duarte Nuno Vieira	In the process of organizing the program	Drugs & driving/ Hair drug analysis – analysis, reporting and interpretation	
10.00 - 10.20				
10.20 - 10.30				
10.30 - 12.00				

Programs				
Time/Location	**Pre-conference Workshop**			**AFSN Board Meeting Wichai Prasit Meeting Room 1**
	APMLA Chom Chonlatee Room	**DNAWG Chao Phraya Grand Ballroom**	**TXWG Pho Sam Ton Auditorium**	
12.00 - 13.00	**Lunch**			
13.00 - 14.00	The application of Forensic Radiology in identification and death investigation		In the process of organizing the program	AFSN Board Meeting
14.00 - 15.00 15.00 - 15.10	Integration of forensic medical role in DVI response teams			
15.10 - 16.20	Appearing as an expert witness in court - Preparation - Medico-legal report - Not going beyond your area of expertise Rules of evidence			

Programs				
Time/Location	Pre-conference Workshop			AFSN Board Meeting Wichai Prasit Meeting Room 1
	APMLA Chom Chonlatee Room	DNAWG Chao Phraya Grand Ballroom	TXWG Pho Sam Ton Auditorium	
16.20-17.00				The renewal signing ceremony of The MOU between CIFS, Thailand and NFS, the Republic of Korea
17.00-20.00	**Welcome dinner On Angsana Cruise (17.00-20.00)**			

The schedule is subject to change as appropriate.

27th August 2024 at Chao Phraya Grand Ballroom, Royal Thai Navy Convention Hall, Bangkok

Time	Programs
08.00 - 09.00	**Registers**
09.00 - 09.40	**Keynote Speakers 1** Prof. Duarte Nuno Vieira "Strengthening Forensic Medicine and Forensic Sciences: Which Forensic System for the 21st Century"
09.40 - 10.20	**Keynote Speakers 2** Prof. Noel Woodford "Quality Management for Forensic Medical and Scientific Services –Why it matters"
10.20 - 10.30	**Coffee Break**
10.30 - 11.10	**Keynote Speakers 3** Dr. Simon Walsh "Forensic Technology – A Focus on the Future"
11.10 - 11.50	**Keynote Speakers 4** Assoc. Prof. Dimitri "The challenges of Drug analysis in forensic cases"
11.50 - 12.30	**Keynote Speakers 5** Dr. Simon Elliott "Changing landscape of DOA and other drug trends"
12.30 - 13.30	**Lunch**
13.30 - 14.30	**Opening Ceremony****
14.30 - 14.40	**Coffee Break**
14.40 - 15.20	**Keynote Speakers 6** Dr. Justice Tettey "The Global problem of drug abuse: analysis and perspectives"

Time	Programs
15.20 - 16.00	**Keynote Speakers 7** Prof. Jose A. Lorente "DNA & human rights: facing the challenges of the XXIst century"
16.00 - 16.40	**Keynote Speakers 8** Dr. Panjai Woharndee "How forensic and technology become a magical wand for humanitarian works: The CIFS experience"
16.40 - 17.20	**Keynote Speakers 9** Dr. Bruce Budowle "The Value of DNA Databases and Necessary Support of Legislation"
17.20 - 19.00	AFSN Board retreat with WG chair and vice **Pho Sam Ton Auditorium**
19.00 - 21.00	**Official dinner at Chao Phraya Grand Ballroom** **Keynote Speakers 10** Dr. Angeline Yap "The Journey of AFSN through 15 years"

The schedule is subject to change as appropriate.

27th August 2024, from 13.00 to 16.00 at Wichai Prasit Meeting Room 1 + Online (Zoom)

IFSA Executive Committee Meeting

28th August 2024 at Royal Thai Navy Convention Hall, Bangkok

Programs	
Time/Location	**Separate into 10 WG Rooms**
08.00 - 09.00	**Registers**
09.00 - 10.20	Division of Academic Presentation Topics by Each WG
10.20 - 10.30	**Coffee Break**
10.30 - 12.00	Division of Academic Presentation Topics by Each WG
12.00 - 13.00	**Lunch**
13.00 - 14.30	Division of Academic Presentation Topics by Each WG
14.30 - 14.40	**Coffee Break**
14.40 - 16.20	Division of Academic Presentation Topics by Each WG
16.20 - 18.20	**WG Business meeting**

The schedule is subject to change as appropriate.

29th August 2024 at Royal Thai Navy Convention Hall, Bangkok

Programs	
Time/Location	**Separate into 10 WG Rooms (Morning Section)**
08.00-09.00	**Registers**
09.00-10.20	Division of Academic Presentation Topics by Each WG
10.20-10.30	**Coffee Break**
10.30-12.00	Division of Academic Presentation Topics by Each WG
12.00-13.00	**Lunch**
13.00-13.40	**At Chao Phraya Grand Ballroom** **Keynote Speakers 11** Dr. LI Zhihui **"The evaluation framework of evidence value in forensic science"**
13.40-15.00	**Closing Ceremony and AFSN Annual General Meeting** **At Chao Phraya Grand Ballroom**
15.00-15.10	**Coffee Break**

The schedule is subject to change as appropriate.

30th August 2024 at Royal Thai Navy Convention Hall, Bangkok

Programs	
Time/Location	**Laboratory tour at CIFS, Thailand**
08.00 - 09.00	**Registration and Grouping** **(For Pre-Registered Participants Only)** Royal Thai Navy Convention Hall
09.00 - 09.50	Departure to CIFS Thailand, Mueang District, Pathum Thani Province (2 Buses)
10.00 - 12.00	Laboratory tour at CIFS, Thailand 1. Autopsy Room, Forensic Pathology Section 2. Laboratory, Firearms and Physical Evidence Section 3. Laboratory, Forensic Chemistry Section 4. Laboratory, Division of Forensic DNA 5. Laboratory, Fingerprint Identification Section **Break for food and drinks at approximately 10:40 - 10:50**
12.00	Return to Royal Thai Navy Convention Hall

The schedule is subject to change as appropriate.

Opening Remark

16th Asian Forensic Sciences Network
Annual Meeting & Symposium
and
12th the Asia Pacific Medico-legal Agencies Network
Annual General Meeting & Workshop

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Dear Minister of Justice, Permanent Secretary of Justice, Deputy Permanent Secretary of Justice, esteemed executives of the Ministry of Justice, AFSN and APMLA Board members, keynote speakers, and all honourable guests,

On behalf of the organizing committees of the "16th AFSN Annual Meeting and Symposium and the 12th APMLA Annual General Meeting," we would like to express our sincere gratitude to Police Colonel Thawee Sodsong, Minister of Justice, for kindly honouring us by presiding over the opening ceremony today.

The Thai Central Institute of Forensic Science is dedicated to enhancing the credibility and recognition of forensic science standards both nationally and internationally. In line with this commitment, the institute joined as a founding member of the Asian Forensic Sciences Network (AFSN) in 2008. The aim is to foster collaborative forensic science development across Asian countries through academic conferences and symposiums, providing a platform for exchanging knowledge among specialised experts and forensic scientists in various fields to continuously improve the competencies of forensic personnel.

Also, the Central Institute of Forensic Science plays a proactive role as a co-founding member of the Asia-Pacific Medico-legal Agencies Network (APMLA), an organisation which has been established to enhance cooperation between forensic science and related disciplines. The primary objective is to prepare for mass disaster responses and to promote the quality of

medico-legal services, contributing to social peace and an efficient justice system. The network was officially established in 2012.

Participating in the AFSN and APMLA meetings aligns with the Institute's strategy and mission. This collaboration supports knowledge exchange, the development of international standards, and the enhancement of international cooperation, which ultimately elevates justice, humanity, and human rights protection at both national and international levels.

On this occasion, we would once again like to extend our heartfelt thanks to the Minister of Justice, the Permanent Secretary of Justice, the Deputy Permanent Secretary of Justice, the esteemed executives, keynote speakers, and all honorable guests. We look forward to continued cooperation together in future endeavours.

Thank you.

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Opening Speech

16th Asian Forensic Sciences Network

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Director-General of Central Institute of Justice / The executives from the Ministry of Justice / The AFSN committee and the APMLA committee/ The honored speakers and all distinguished guests/

It is a great pleasure for me to be here to give an opening remark on behalf of the Ministry of Justice of Thailand today.

I wish to extend my warmest welcome to all honorable delegates participating in the "16th Asian Forensic Sciences network (AFSN)" and the 12th Asia-pacific medico legal agencies network (APMLA), which is represented by the institute members and experts from the countries that have been recognized for the highest level of Forensic Science and Forensic medicines in Europe and the United States, more than 30 countries participated.

As it is saying, "when the truth is revealed, evil will disappear", which in the pursuit of facts and evidence, known as "the search for truth", is a fact.

Forensic science and Forensic medicine are facts that are solid in credibility and confidence, requiring scientific, medical, and technological knowledge to be proven and. It is essential for the restoration of the rule of law, the reform of the country, the judicial process, and the enforcement of laws to be strong, effective, rapid, and without delay, to reduce social inequality and unfairness.

Thailand's constitutional law, the highest in the national judicial reform category, provides for more than one unit of Forensic science to provide people with an alternative service of proof.

The challenge of the future is to see through the collaboration of the network. It is time to open the Asia-Pacific Institute Of Forensic Sciences and Forensics, which includes the experience and expertise of Forensic Science and Forensic medicine, scientific technology, scientific methodology and research materials, to help with investigations and judicial procedures for the benefit of the countries in the Asia-Pacific region, with a population of 60% of the world's population estimated to be approximately 4.7 billion. To provide people with access to the evidence using alternative scientific principles, starting with the major challenges such as human rights, humanitarian, protection of the public from crime, torture, extrajudicial killings, extrajudicial killings, proof of death in prison, death in a situation of armed disputes or natural disasters. Confidence to the public using the services and to prove the guilt or innocence of the parties to the judicial process to be fair. Additionally, the Asian Forensic Science Network has divided forensic science experts into 10 specialized groups, covering all branches of forensic science. This is done to enhance the quality and standards of knowledge exchange in these specific areas, ultimately leading to increased confidence in the justice process.

This academic conference is therefore an important opportunity for us to see progress.

In the field of Forensic science and Forensics, which will help to improve the quality of reliability.

The current time is well-suited to launch the 16th Asian Forensic network and the 12th Asia Pacific network and the 12th Asia Pacific network and the 12th Asia Pacific network and the conference of the state organizations in Forensic medicine services.

Thank you.

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Keynote speaker background

Professor Duarte Nuno Vieira is a renowned forensic scientist from Portugal, well-known for his expertise in forensic medicine, autopsy practices, and human rights. He has held prominent positions, such as the President of the Portuguese Institute of Legal Medicine and Forensic Sciences and the President of the International Academy of Forensic Sciences.

His work has significantly contributed to advancing forensic science methodologies, particularly in utilizing imaging technology for autopsies and establishing international standards for forensic procedures.

Professor Duarte Nuno Vieira

THE PRESIDENT OF THE NATIONAL INSTITUTE OF FORENSIC MEDICINE AND FORENSIC SCIENCES OF PORTUGAL AND THE PRESIDENT OF THE INTERNATIONAL ACADEMY OF FORENSIC SCIENCES.

Professor Duarte Nuno Vieira also plays a key role in investigating war crimes and human rights violations for the United Nations and the European Union. In addition to his research and leadership, he is a renowned educator, having trained a new generation of forensic experts, and has been instrumental in the development of forensic science at the international level. He has received numerous awards and continues to have a significant influence in the fields of justice and human rights.

Keynote speaker backgound

Professor Noel Woodford is a forensic pathologist trained in both Australia and the United Kingdom, and he also holds a Master's degree in Medical Law.

Professor Noel Woodford

DIRECTOR OF THE VICTORIA INSTITUTE OF FORENSIC MEDICINE AND PROFESSOR OF FORENSIC MEDICINE AT MONASH UNIVERSITY.

Professor Woodford is a member of the Royal College of Pathologists of Australasia and the Royal College of Pathologists UK. He is also a member of the Forensic and Legal Medicine Faculty of the Royal College of Physicians of the United Kingdom.

He has published several articles in academic journals on forensic pathology, particularly on the use of CT scanning in autopsy and sudden death in young adults.

Keynote speaker background

He is an expert in forensic biology and DNA analysis. He has played a crucial role in developing complex DNA testing techniques and has led investigations into serious criminal cases. In addition, Dr. Walsh has published numerous works and has received the Public Service Medal (PSM). He is also a teacher and advisor at several universities, having a significant influence on the field of forensic science both in Australia and internationally.

Dr. Simon Walsh

A renowned forensic scientist and senior executive of the Australian Federal Police (AFP).

Dr. Simon Walsh has published extensively, focusing on DNA analysis and the application of forensic science in criminal cases. He has played a crucial role in developing techniques for interpreting DNA mixtures, leading to the creation of new guidelines used in laboratories worldwide. Additionally, he has supported the use of forensic science in human rights cases, such as investigations into war crimes.

Keynote speaker background

Associate Professor Dimitri Gerostamoulos

HEAD OF FORENSIC SCIENCE AND CHIEF TOXICOLOGIST AT THE VICTORIA INSTITUTE OF FORENSIC MEDICINE.

He is a toxicologist and pharmacologist with a PhD in forensic toxicology and an honors Bachelor of Science degree from Monash University. He is a member of the Society of Forensic Toxicologists (SOFT), the Forensic and Clinical Toxicology Association of Australasia (FACTA), and the Australian and New Zealand Forensic Science Society (ANZFSS). He currently serves as the President of the International Association of Forensic Toxicologists (TIAFT) and is the founder of the RCPA Science Division.

Keynote speaker background

With 30 years of experience in forensic toxicology, he is an independent consultant in forensic toxicology and the managing director of Elliott Forensic Consulting Ltd and Toxicology UK Ltd. Previously, he served as the Director of Global Forensic Science at Abbott (2017-2018) and was the founder and managing director of Forensics Ltd (ROAR Forensics, later renamed Alere Forensics) in Malvern, United Kingdom. Additionally, he worked as a clinical scientist at Birmingham City Hospital for over 10 years,

Dr. Simon Elliott

Chairman of the Board of Directors of Elliott Forensic Consulting Toxicology UK Ltd and Chairman of the Election Committee of TIAFT.

Dr. Elliott has published over 90 articles and book chapters and serves as an editor for several academic journals. He has also been a speaker at numerous national and international conferences and has appeared as an expert witness in various courts. Additionally, he provides consultancy to the World Health Organization (WHO) and the WHO Expert Committee on Drug Dependence, as well as to the United Nations Office on Drugs and Crime (UNODC).

Keynote speaker background

Dr. Justice Tettey

Chief of the Drugs Laboratory and Scientific Services at the United Nations Office on Drugs and Crime (UNODC).

Dr. Tettey holds a Bachelor's degree in Pharmacy from the University of Science and Technology in Ghana, as well as a Master's and PhD in Pharmacy from the University of Strathclyde in Glasgow, United Kingdom. He has over 30 years of experience in drug control and international drug management, with publications on various topics such as international drug policy, pharmaceutical analysis, and synthetic drug markets. He is a member of the Royal Society of Chemistry in the United Kingdom and was awarded an honorary law degree from the University of Dundee in 2019 in recognition of his contributions to forensic science.

Keynote speaker background

He is an expert in forensic science and industrial medicine. After completing his PhD with honors, he pursued postdoctoral studies in Germany and the United States at the University of California, Berkeley, and the FBI Academy.

Professor Jose A. Lorente

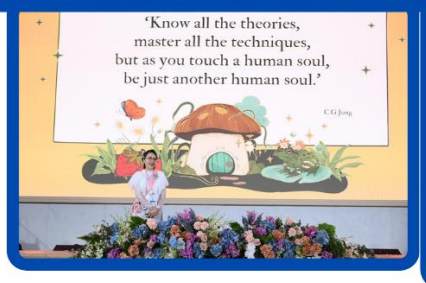
PROFESSOR OF FORENSIC SCIENCE AT THE UNIVERSITY OF GRANADA, SPAIN, AND DIRECTOR OF THE LABORATORY FOR GENETIC IDENTIFICATION AND HUMAN RIGHTS (LABIGEN).

In 1999, Professor Lorente founded the "Phoenix Program" in Spain, the first project for genetic identification of missing persons. In 2004, he initiated and became the scientific director of the DNA-PROKIDS project, an international initiative for identifying missing children. This project has been highly successful, identifying and reunifying over 3,500 children with their families. Additionally, he leads the DNA-ProORGAN project, which combats human trafficking by tracing the origin of transplanted organs through genetic identification.

Keynote speaker backgound

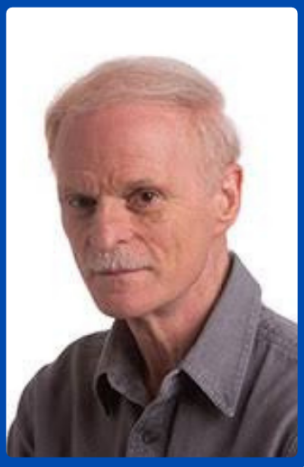
Dr. Panjai Woharndee

DIRECTOR OF THE FORENSIC SCIENCE SERVICES DIVISION, CIFS, THAILAND AND MEMBER OF APMLA.



Her department is responsible for legal investigations, including autopsies, crime scene investigations, clinical forensic medicine, forensic radiology, and forensic psychiatry services. The Institute of Forensic Science plays a crucial role in providing comprehensive forensic services within the justice system, human rights, and humanitarian work. Additionally, Dr. Panjai is involved in management duties, including daily operations, policy planning and budgeting, procurement, and human resource management, as well as building domestic and international collaboration networks. She was also elected as the President of the Asia Pacific Medicolegal Association (APMLA) for two consecutive terms.

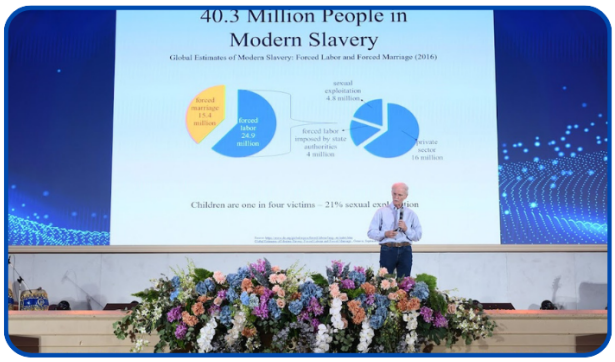
Keynote speaker background



He completed his PhD in Genetics in 1979 from Virginia Polytechnic Institute and State University and received a postdoctoral research fellowship from the National Cancer Institute at the University of Alabama, where he conducted research on genetic risk factors associated with various diseases, including insulin-dependent diabetes, melanoma, and acute leukemia.

Dr. Bruce Budowle

FORMER DIRECTOR OF THE HUMAN IDENTIFICATION CENTER AND PROFESSOR AT THE UNIVERSITY OF NORTH TEXAS HEALTH SCIENCE CENTER.



From 1983 to 2009, Dr. Budowle worked at the FBI laboratory, where he conducted research and developed methods for forensic biology analysis. He played a key role in establishing the foundation for genetic analysis in forensic science, including the development and setting of genetic parameters for relevant population groups. Dr. Budowle has published over 750 articles and presented more than 880 times at national and international conferences. He has also testified in over 300 criminal cases in the areas of molecular biology, statistics, and quality assurance. Dr. Budowle was instrumental in developing quality assurance standards for forensic DNA work and was one of the pioneers of the national DNA database, CODIS, which compiles DNA profiles of criminals and unsolved cases.

Keynote speaker background

Dr. Angeline Yap

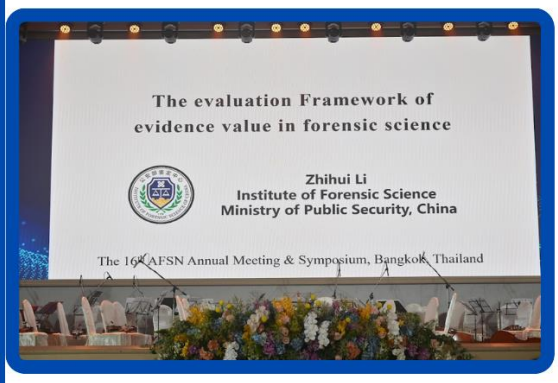
DIRECTOR OF THE MEDICAL SCIENCE INSTITUTE, SINGAPORE.

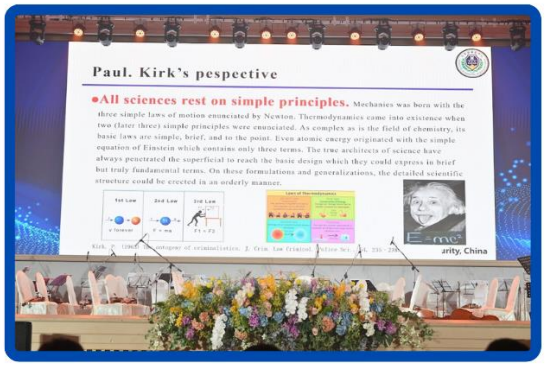
Dr. Angeline Yap is a renowned figure in the field of forensic science, particularly for her work with the United Nations Office on Drugs and Crime (UNODC). She has been involved with the Health Sciences Authority (HSA) in Singapore, where she plays a key role in forensic investigations. Dr. Yap has contributed to the development of international guidelines, including the identification and analysis of synthetic substances affecting the cannabinoid system, as part of her collaboration with the UNODC.

Keynote speaker background

Dr. Zhihui Li

DEPUTY DIRECTOR OF THE FORENSIC SCIENCE INSTITUTE, MINISTRY OF PUBLIC SECURITY.





Dr. Zhihui Li is a prominent figure in forensic science, holding a senior position at the Forensic Science Institute, Ministry of Public Security. With expertise in various fields of forensic science and a strong academic background, he has played a key role in the development of forensic methodologies and has been involved in high-profile cases. His work also includes contributions to policy development and international collaboration in the field of forensic science.

Meeting Content

Abstract

1. Oral Presentation

1.1 Title: Forensic perspectives of Child Abuse in India-a concern

Authors: Prof. (Dr.) Adarsh Kumar

Organization: AIIMS, New Delhi

Country: India

Abstract: India has one of the largest populations (~444 million) of children in the world. Protection of children by the state is guaranteed under Article 21 of the Indian constitution, and mandated since India is signatory to the UN Convention on the Rights of the Child. Child sexual abuse laws in India have been enacted as part of the nation's child protection policies and therefore 'Protection of Children Against Sexual Offences Act' (POCSO) came into force in 2012. As per latest NCRB report in 2019**,** 1,48,185 crimes against children were reported which meant that each day over 400 such crimes are committed in the country.

The age of the child has also been defined under different acts as different e.g Indian Factories Act as 14 years, Juvenile Justice Act as 16 years earlier and now 18 years. Younger children are at greater risk of abuse than older children. Early diagnosis is most important for further prevention of all kinds of abuse. Evaluation of a child with suspected abuse by a multidisciplinary team comprising of Paediatrician, Child psychiatrist, Forensic Medicine Expert, Medical Social Service Officers/Workers is need of hour which has given rise to concept of placing "One Stop Help Centre". In case of suspected death of a child role of forensic medicine expert becomes even more crucial in unearthing various evidences. The talk will dwell deeper into these aspects and share experience of handling variety of such interesting cases.

Key Words: Child abuse, Sexual abuse, POCSO, Forensic Medicine

1.2 Title: Virtual Autopsy VS Conventional Autopsy : a comparative study

Authors: Prof. (Dr.) Amar Jyoti Patowary

Organization: North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), An Autonomous Institute under Ministry of Health and Family Welfare, Govt. of India

Country: India

Abstract: Image-guided or virtual autopsy or Virtopsy is a comparatively new technique which consists of internal examination of dead bodies using computed tomography (CT) and magnetic resonance imaging (MRI) without opening the body. It also allows the reconstruction of a three-dimensional image of the cadaver and analysis of the same by using slicing / sectioning using different tools and filters, thereby helping in answering main forensic questions without dissection.

A study was conducted in department of Forensic Medicine, NEIGRIHMS where a total of 100 cases were studied and the findings are compared in regards of conventional autopsy and virtual autopsy to assess the efficacy of Virtual autopsy with PM-CT as a diagnostic tool in determining the findings during medicolegal autopsy in comparison to Conventional autopsy.

The analysis of the data reveals that the Virtual autopsy is as good as conventional autopsy in a few selected cases and is even better than the conventional autopsy in terms of bony injuries, haemorrhages / collections in cavities etc.

However, the body is to be subjected for external examination by human eyes only in our setup in absence of surface scanner to note the wearing garments and all.

Keywords: PM CT, digital autopsy, virtopsy

1.3 Title: Development and Comparison of a Novel Multimedia Tool for Obtaining Informed Consent from Survivors of Sexual Offences.

Authors: Dr. Anamika Nath, Mr. Rama Krishna Rachakonda, Prof. Dr. Pradip Kumar Thakuria.

Organization: Deptt. of Forensic Medicine, Tezpur Medical College and Hospital, Assam

Country: India

Abstract: Background

While multimedia tools for obtaining informed consent have been extensively studied in the context of surgeries, chemotherapy, and clinical trials, their use has not been explored for medico-legal examinations of survivors of sexual offences. This study aimed to develop an innovative multimedia tool to obtain informed consent and assent from survivors of sexual offences and compare its effectiveness with traditional consent-taking procedures.

Methods

A cross-sectional study was conducted involving survivors of sexual offences as participants. They were divided into two groups: one received a conventional consent document, while the other received an additional multimedia tool. The multimedia tool included a video with animations, audio, and narrations in both English and Assamese. Participants' understanding and satisfaction with the consent process were assessed.

Results

Among the 50 participants, 46% were children, with the majority aged 11-20 years. Only five participants had completed or were pursuing higher secondary education, while 66% were either illiterate or had only primary education. Additionally, 86% of participants belonged to a lower socioeconomic status. In the first group, 76% consented/assented to the medico-legal examination, whereas all participants in the second group did so. The second group exhibited higher levels of understanding (84%) and personal satisfaction (80%).

Conclusion

The multimedia tool for obtaining informed consent shows promising results in the context of medico-legal examinations. It is survivor-friendly, helps alleviate fear, and provides a better understanding of the medico-legal examination process.

1. Demonstrator, Department of Forensic Medicine, Tezpur Medical College, Assam, India.
2. Freelance architect and VFX Engineer, Hyderabad, India.
3. Professor and Head, Department of Forensic Medicine, Tezpur Medical College, Assam, India.

1.4 Title: Professionals' Attitude regarding a Psychosocial Approach to Sexual Violence Investigation; A Qualitative Study on Officers Reporting to a Medico-Legal Unit covering 6 Police Areas in Sri Lanka

Authors: C.M.A. Gunathilaka, N.D.N.A. Mendis, Sachini Akuretiya

Organization: Department of Forensic Medicine and Toxicology, Faculty of Medicine, University of Colombo, Colombo

Country: Sri Lanka

Abstract: Introduction:

Investigation following sexual violence is rather traumatic and upsetting for the survivors. The empirical evidence shows the lack of published data to determine the knowledge and attitude of professionals toward a psychosocial approach in a sexual violence investigation. This qualitative study intended to ascertain the attitude of stakeholders (Law enforcement officers, Legal professionals, Medico-legal professionals, and Scientific professionals) toward the psychosocial approach in sexual violence investigation.

Methods:

The sample size was 8 including 2 participants (one male and one female) representing every stakeholder category reported to a Medico-Legal unit in Colombo, Sri Lanka. Semi-structured interviews were conducted with purposive sampling. Interviews were audio recorded, transcribed, and evaluated using thematic analysis.

Results:

Lack of awareness of a psychosocial approach and personal beliefs about adopting a psychosocial approach was one major theme drawn in the analysis of the results. The stakeholders had biases and myths that made them pre-judgemental the second theme was the Limitations of practicing a psychosocial intervention. Time allocated was a crucial limiting factor followed by the lack of awareness of a psychosocial approach.

Conclusion:

Professionals were detached from the psychosocial approach due to a lack of awareness and long-term exposure has caused case desensitization.

Keywords: Sexual violence, Psychosocial approach, Law enforcement officers, Legal professionals, Medico-Legal professionals, Scientific professionals

1.5 Title: Management of unidentified and unclaimed bodies: a comparison of model from four countries in the Asia Pacific Region

Authors: Lay See Khoo, Poh Soon Lai, Sheue Feng Siew, Mohamad Azaini Ibrahim

Organization: National Institute of Forensic Medicine, Hospital Kuala Lumpur

Country: Malaysia

Abstract: Managing mass fatality incidents or disasters involving multiple deaths are not uncommon among forensic practitioners. In fact, management of unidentified or unknown bodies is also a vital component of the day-to-day mortuary work practice. The unidentified and subsequently unclaimed bodies have always been a "silent mass disaster," a problem that needs to be tackled within the forensic community and raises the global issue of ethics, law, and human rights. Unidentified bodies' in Malaysia make up an average of 4.02% of all death cases where a total postmortem examination was performed which is comparable with other developing countries within 4–10% which can go up to 25%**.** Moreover, unstandardized procedures in all mortuaries in different states and districts in Malaysia have worsened the scenario even with guidelines in place. This study aims to address the issues surrounding unidentified and unclaimed bodies including body disposal from a social and legal perspective using case study methodology by comparing four different countries in the Asia Pacific Region through document analysis and interview methods. One of the major findings is evident in 3 out of the 4 models, whereby there is a considerable gap in consolidating the missing person report and information to match with the unidentified bodies received in forensic institutions in an attempt to enhance the identification process which ultimately intends as a closure for the family members. It is also timely to think out of the box beyond dental records and DNA profiling to improve the identification rate for skeletonized remains through means of anthropology biometrics comparison. With the limited literature published surrounding this domain, it is hoped that the suggestions and recommendations to standardize the management of unidentified and unclaimed bodies can benefit many forensic institutions and public mortuaries in this region.

Keywords Unknown · Unidentified · Unclaimed · Body disposal · Management of the dead

1.6 **Title:** Case Series : Clinical Forensic Medicine Aspects of Childhood Bullying

Authors: Made Ayu Mira Wiryaningsih, Yudy

Organization: Indonesian Association of Forensic Medicine

Country: Indonesia

Abstract: Introduction:

Child abuse is an underestimated problem in many countries, including Indonesia. Amongst the many types of child abuse, bullying has become a problem that requires a multidisciplinary approach. Data collected by the Indonesian Child Protection Commission (KPAI) and the Federation of Indonesian Teachers' Unions (FSGI) shows that the type of bullying children often experience are physical (55.5%), verbal (29.3%), and psychological (15.2%).

Objectives:

The purpose of this study was to review the clinical and medicolegal aspects of childhood bullying cases.

Method and Results:

This study is a case series using retrospective data of three child victims of bullying. All victims were males aged 8-14 years old, while their abuses were males from the same school. Two cases were examined in a public hospital and one at a private hospital. Not all cases were accompanied with a police inquest. Two cases showed moderate injuries, while one case showed minor injuries.

Discussion and Conclusion:

The Hospital’s Emergency Room is an important entry point to healthcare for child victims, which requires an early recognition of suspected child abuse, as shown in these three cases. Addressing childhood bullying requires cooperation from diverse sectors, including health, education, welfare and criminal justice.

1.7 **Title:** Multidisciplinary Approach in Victim-Oriented Case Management of Violence Against Women and Children

Authors: Nadia Ulfah Faddila

Organization: Perhimpunan Dokter Forensik Indonesia / PDFI (Indonesia Association of Forensic Medicine)

Country: Indonesia

Abstract: Management of victims of violence against women and children extends beyond the confines of examination rooms. Forensic and psychiatric examinations of victims are performed to gather evidence in the form of physical injuries, psychological trauma, or biological samples found on the victim's body as a basis for proving the crime. Regrettably, criminal acts frequently result in a prolonged deterioration of the victim's quality of life and impede their ability to acquire an education, cultivate positive social connections with their surroundings, and safeguard their physical and mental health. Victims of violence against women and children may endure substantial adverse consequences, including but not limited to unintended pregnancies, repeated abortion attempts, academic attrition, malnutrition, and stunting. Victim-oriented case management requires the collaboration of multidisciplinary and cross-sector teams to provide a comprehensive approach to victim care. To ensure thorough and victim-oriented treatment implementation, continuous coordination and periodic evaluation should be conducted in collaboration with government institutions responsible for women's and children's protection, health, education, social and religious services, public hospitals, police departments, prosecutors, legal partners, psychologists, and social workers.

Keywords: Children, Multidisciplinary approach, Victim-oriented, Violence, Women

1.8 Title: Evaluation of In-Hospital Mortality in Indira Gandhi Memorial Hospital

Authors: Zahuva Abdulla, Rifdha Ibrahim, Nadha Hussain, Haris Ibrahim, Salva Ahmed, Dr. Rijen Shrestha, Dr. Zeyba Ahmed

Organization: ISchool of Medicine, Maldives National University

Country: Maldives

Abstract: This study explores the in-hospital mortality at Indira Gandhi Memorial Hospital (IGMH). Despite an overall decrease in the death rate in Maldives, the health sector faces significant challenges including the growing rates of non-communicable diseases and rapid spread of communicable diseases. Our research aims to explore the causes of death and associated factors that influence the in-hospital mortality of patients admitted to IGMH. This quantitative retrospective study uses secondary data sourced from HINAI from 1st January 2022 to 31st December 2022**.** The data consisted of 407 predominantly Maldivian patients, with an almost equal male-to-female ratio. The findings revealed that respiratory conditions were the leading cause of death, accounting for nearly half of all deaths, contrary to previous national statistics and WHO data, which highlight cardiovascular diseases as the primary cause. Sepsis with multiple organ dysfunction syndrome (MODS) was the predominant immediate cause, accounting for more than half of the deaths with the majority being secondary to respiratory infection. Additionally, the findings show a significant correlation between length of stay and cause of death, with patients dying from respiratory diseases having the longest in-hospital stay, which emphasizes the need to focus healthcare efforts on improving the respiratory health of patients.

1.9 Title: Craniofacial Identification Expanding the Scope of Use Beyond Identification; Two Case Study of Reconstruction of Bullet Trajectory

Authors: Sohyung Park, Wonjoon Lee, Junghye Lee

Organization: Postmortem Investigation Division, National Forensic Service

Country: Republic of Korea

Abstract: This case study highlights how the three-dimensional (3D) tools for craniofacial identification including craniofacial reconstruction (CFR) can also be applied to forensic medical service as well as forensic identification. In cases of gunshot wounds, visual demonstration showing bullet trajectory can be useful for better communication between forensic pathologists and non-medical judicial agencies and the court. Reconstruction by three-dimensional multi-slice computed tomography (3D-MSCT) can be a good visualization tool; revealing the exact projectile localization and characteristics of bone fractures more pleasantly than autopsy photos can. However, such reconstructed images are still simply bone images and there are still some limitations in understanding ballistics, especially for the head which has a complex anatomical structure. CFR technology can make possible the implementation of more advanced reconstructed 3D images by intricately combining external appearance and internal 3D anatomical structures, thus revealing intracorporeal bullet trajectory effectively, beyond just demonstrating 3D reconstruction of gunshot wounds. We present two cases of gunshot wounds to the head involving the death of police officers. To provide better forensic medical service to help non-medical judicial agencies and the deceased's family understand the ballistics, we applied CFS technology to reconstruct the gunshot wound with bullet trajectory. The reconstructed images were helpful to fully understand the ballistics and for their death investigation.

Key words: forensic; craniofacial reconstruction; autopsy; forensic pathology; forensic ballistics; wounds, gunshot

1.10 Title: Role of State Sector in Preventing and Management of Child Sexual Abuse in Sri Lanka

Authors: Amararatne RRGS, Ruwanpura PR, Vidanapathirana M

Organization: PGIM, University of Colombo

Country: Sri Lanka

Abstract: Office of the Chief Judicial Medical Officer Colombo, Institute of Forensic Medicine and Toxicology, Sri Lanka, Office of the Consultant Judicial Medical Officer, Medicolegal Unit, Teaching Hospital Karapitiya, Galle, Sri Lanka, Department of Forensic Medicine and Office of the Dean, Faculty of Medicine, Uva Wellassa University, Badulla, Sri Lanka

According to UN report on Violence Against Children (VAC) 2016 in Child sexual abuse (CSA)the abuser is usually a "Relative"(>50%). However, In Sri Lanka (SL), in CSA, the abuser is usually a "Non-relative" (80%) while incidents usually occur (>50%) at home. Therefore, initially,we have identified the "Root Causes/Risk factors"of CSA such as (1) Individual (2) Family, (3)Community and (4) Societylevels.

In the prevention of CSA, Global Strategies such as (1) UN SDGs, (2) UN Special Representative of the Secretary-General on VAC, (3) UNICEF's strategies of ending VACs and (4) WHO 07strategies of "INSPIRE" (2016) are also being used.

In the management of the clinical cases of CSA, the national guidelines for the Management of Child abuse and neglect in Sri Lanka are followed. (1) Admits the abused child to a ward and initiates multidisciplinary approaches. (2) To prevent re-victimization conducts a "Clinical Case Conference (CCC)" among Paediatrician, Psychiatrist and JMO. (3)All the victims are mandatorily referred to a Psychiatrist, VOG, Venereologist, and Consultant JMO. (4) For psycho-social management and prevention of "Secondary Victimization" conducts an "Institutional Case Conference (ICC)" (5) Abuser management by way of rehabilitation. (6) Protection from cyber abuse by using an app called Internet Watch Foundation (IWF).

1.11 Title: A DIALOGUE ON THE LEGISLATION: EVOLUTION OF ANTI-RAPE LAWS IN PAKISTAN THROUGH THE LENS OF SEXUAL & GENDER BASED VIOLENCE

Authors: Dr. Summaiya Syed-Tariq

Organization: Office of the Police Surgeon Karachi, Health Department, Government of Sindh

Country: Pakistan

Abstract: Background and Aims:

Culturally embedded strong patriarchal norms, victim-blaming, the Two-Finger-Test, revenge rape and low conviction rates, have all been the hallmark features of sexual violence making news in Pakistan. Mukhtaran Mai, the Sui Rape case, Zainab of Kusoor and the Motorway gang-rape served as introspective moments for the country to fight back this menace through an effective and impartial legislation. We aim to study the evolution of the Anti-Rape laws through the decades and recent developments in handling survivors and victims of SGBV.

Methods:

A systematic secondary research into the rape laws which Pakistan inherited in **1947**, with additions and deletions over the decades, till present day. The materials used in this study include the legislative documents including rules and guidelines, newspapers and scholarly articles on the topic.

Discussion-Conclusions:

The Anti-Rape (Inv & Trial) Act **2021** ensures a victim-centric and gender neutral approach, greatly improving the definition of rape to vaginal, anal and buccal penetration. Object and marital rape have been included. Trial time limited to four months.Special Courts, trained police and medicolegal officers and prosecutors are an integral requirement for effective implementation of this Act.

Keywords: Sexual Violence, Anti-Rape Laws, Marital Rape, Virginity Testing, DNA.

1.12 Title: Gender Based Violence on minors: Strengthening the Justice arm.

Authors: Dr Vina Vaswani, Professor, Department of Forensic Medicine

Organization: Yenepoya deemed to be University, Deralakatte, Mangalore

Country: India

Abstract: Gender based violence (GBV) finds its roots in a patriarchal society which breeds inequality and injustice. This results in human rights violation and forms a barrier to social, socioeconomic and politico-legal participations. In some low and middle income countries like India, the GBV becomes a norm and power inequality results in propagation of violence by passive acceptance of the authority. When GBV happens in children, they are left to the mercy of their parents to bring them to hospital. Since many girls are excluded from schools at a very young age or when they start menstruating, the safety net of close friends and class teacher who at times deciphers the change in behavior of the child is lacking.

This presentation discusses GBV in India, which is in epidemic proportions and is seen in various forms throughout the life of a woman - from womb to tomb. The presentation revolves around prevention of abuse in children and strengthening of support services and forensic advocacy with policy makers. Istanbul protocol mentions about physical violence, sexual harassment, sexual violence including rape, psychological abuse, forced sterilizations. Much of the abuse is at the hands of close family members or known persons. Our experience in handling victims of GBV has shown us a combination of more than one type of violence and distinction of type is not always satisfactory.

There is a strong wish in many families to have a son, and hence female fetuses are aborted. Although in India there is a deterrent by way of the "Pre-conception and Pre-natal Diagnostic Techniques Misuse Prevention Act", the sordid business of sex determination followed by abortion has been driven underground and is thriving. Evey year more than **500,000** females are aborted which is like genocide proportion

Abuse is more common in girl children. When a child is brought to casualty with signs of unexplainable injuries, the first step is to inform the police, making the case medico-legal. Parents vanish with the child, not wanting to have to face the police. This precludes a significant number of abused children from safety net of medical care.

Forensic doctors have to be proactive in investigating GBV, documenting the history as well as the findings and working towards empowering girls. It is through forensic leadership that equity and justice to minor girls can be realized.

1.13 Title: Understand your risks: developing better practices in medicolegal death investigation (MLDI)

Authors: Linda Iles

Organization: VIFM

Country: Australia

Abstract: Common risks apply across all MLDI jurisdictions, but local factors determine the level of risk for each facility. Robust peer review systems and standard operating procedures (SOPs) are key elements of best practice in MLDI. Controls for some of the key risks identified at the VIFM will be discussed, with an in depth focus on peer review and specific SOPs developed as corrective responses to adverse events.

1.14 Title: Management of unclaimed unidentified bodies.

Authors: Maiko Yoshida

Organization: Chiba University

Country: Japan

Abstract: Japan faces challenges in its death investigation system, which could be described as still developing. Key factors contributing to this evolving situation include an exceptionally low autopsy rate (around 1% for all deaths and 10% for unnatural deaths), a system heavily influenced by law enforcement. During times of disaster, these issues are further exacerbated. In the case of the 2011 Great East Japan Earthquake, ~90% of the bodies were identified based on nonobjective means such as facial features, which resulted in misidentification at least in 20 cases. Lack of collaboration with other countries, especially during disasters, could be another factor that hinders improvement. As one of the challenges to make changes for this, our institution began the practice of identification using PMCT for unidentified bodies at autopsy because our strength is being equipped with CT in the autopsy room and having a full-time forensic radiologist to analyze it. Our experience has reached 42 cases so far, and we initially concluded that image-based identification was beneficial when dental findings or fingerprints were unavailable for comparison, and there were no family members available for DNA testing. We want to share this experience on this occasion.

1.15 Title: Significance of scene evaluation and inspection with modern scientific approaches in mass disaster

Authors: Kyung-moo Yang

Organization: National Forensic Service

Country: South Korea

Abstract: On April 29, 2020, a fire broke out in a warehouse in a local city (Icheon). 38 workers died in this accident. I personally went to the fire scene and assessed the situation. I suggested that it would be a good to conduct an inspection and emergent toxicological analysis on the corpses whose face and fingerprints were intact, and to conduct an autopsy on the seriously burnt corpses. We performed inspection with emergent toxicology on 24 corpses in first day. 18 autopsies with PMCT scan and emergent DNA analysis were performed in next 4 days, including 3 corpses with low CO level in the blood after emergent toxicology. The autopsy revealed that several deaths from multiple injuries (due to falls). Also, we could find the owners of separately discovered charred extremities through PMCT and DNA testing. What we learned from this experience is that it is important for forensic pathologist to participate early in the scene and provide opinions, that there is a need to expand the role of forensic pathologist in mass disasters to the area of inspection, and that somewhat new scientific approaches including PMCT scan, emergent toxicology and DNA analysis are very useful in mass disaster.

1.16 Title: unknown/unclaimed bodies - practical

Authors: Dr Prateek Rastogi

Organization: Kasturba Medical College Mangalore, Manipal Academy of higher education, Karnataka

Country: India

Abstract: -

1.17 **Title:** Applicability of hand prints in identification

Authors: Dr Shilpi Rastogi

Organization: Yenepoya homoeopathic medical College and hospital, Yenepoya University, Mangalore, Karnatake

Country: India

Abstract: -

1.18 **Title:** -

Authors: Sameera A Gunawardena

Organization: Faculty of Medicine, University of Colombo

Country: Sri Lanka

Abstract: -

1.19 Title: The impact of Asian Tsunami 2004 on redefining the concept of Management of Dead in mass disasters – South Asian story of two decades

Authors: Clifford Perera, Stephen Cordner

Organization: Professor of Forensic Medicine, Dept. of Forensic Medicine, Faculty of Medicine, University of Ruhuna, Galle

Country: Sri Lanka

Abstract: Management of a mass disaster in contemporary standards is a multidisciplinary effort and the forensic pathology as a specific field has a definitive and non-delegatory task to perform.

The first decade of the 21st century will go down in history as an era of major disasters, which occurred in all corners of the world from 9/11 disaster to London bombings, from Asian Tsunami to hurricane Katrina, from earthquakes in India, Iran, Pakistan, China and Haiti to cyclones and floods in Bangladesh and Myanmar and many low grade countless events witnessed in other Asian and African counties.

The management of dead in a mass disaster is a medico-legal emergency for a forensic pathologist and he/she must be a valued partner of the preparation and activation of an emergency plan dealing with multiple fatalities of a major disaster.

In a disaster situation survivors are given priority over deceased in any health care system. However as the survivors have a right for health care assistance, the deceased also have the right for proper identification and dignified disposal. In the current context a mere disposal of dead is not advisable after a major disaster as many other physical, psychosocial, religious and cultural issues related to them and survivors need to be resolved urgently. The whole process of handling deceased appropriately in a post-disaster period to minimize the impact of above issues is comprehensively termed as “management of dead”. The Asian Tsunami 2004 was the first major opportunity to rehearse the effectivity and the application of this concept.

It should be remembered that proper management of dead is one of the main pillars of a successful disaster response. It has gained marked significance during Asian tsunami 2004. The post Asian Tsunami events made a paradigm shift in the conceptual model

and the activity level of forensic pathologists throughout the affected region by creating opportunities to work interactively for a prolong period and share experiences and resources through various professional networks. This paper intends to analyze deeply the impact of the concept of management of dead in a mass disaster and its ramifications in south Asian context over the last decade.

Key words: Asian tsunami, mass disaster, dead, management, forensic pathologist

- APMLA Meeting Summary -

	APMLA AGM Minutes	Wednesday 28 AUGUST 2024
	APMLA Chair Dr Panjai Woharndee Director Forensic Science Service Central Institute of Forensic Sciences Bangkok Thailand	**Welcome to APMLA Annual General Meeting** Dr Woharndee thanked the APMLA Management Committee members and Work Group Leaders for their work over the past year. The APMLA Work Groups hosted two webinars with multiple speakers, each attracting more than 80 attendees. The webinar topics were ***Repatriation of human remains*** in March 2024 and ***Clinical Forensic Medical Responses to Sexual Violence*** in May 2024.
	Business Meeting Dr Rijen Shrestha APMLA Secretary	Quorum Established Apologies from Dr Summaiya Syed-Tariq, Pakistan; Dr Nguyen Duc Nhu, Vietnam and Dr Philip Golpak, Papua New Guinea
	Minutes of previous APMLA AGM **14-16 June 2023, Hanoi Vietnam** Circulated to members by email	Move to accept Minutes Proposed by Dr Vina Vaswani Seconded by Professor A. Patowary Minutes accepted
Applications for membership:	**Correspondence** 1.Forensic Medicine and Toxicology Unit, Department of pathology, Faculty of Medicine, Prince of Songkhla University, Hat Yai, Thailand 2.Forensic Pathology Service Sultan Ahmad Shah Medical Centre International Islamic University Pahang Darul Makmur, Malaysia 3.Department of Forensic Medicine Chiba University, Japan 4.Tezpur Medical College, Tezpur, Assam, India	1: Application approved by Executive Committee February 2024 2. Application approved by Executive Committee in March 2024. 3. Application approved by Executive Committee in May 2024 4. Application approved by Executive Committee in June 2024 New APMLA member organisations endorsed and welcomed

	Letter of thanks to Udo Krenzer ICRC Regional Forensic Manager Asia Pacific for workshop at 2023 APMLA meeting and signing of ICRC/APMLA Memorandum.	Letter of thanks to Dr Nguyen Duc Nhu Director National Institute of Forensic Medicine, Hanoi Vietnam for hosting the 2023 APMLA meeting.
Election of APMLA Management Committee		
	Former APMLA Management Committee	**Chair**: Dr Panjai Woharndee (Thailand) **Deputy Chair:** Professor Noel Woodford (Australia) **Secretary:** Dr Rijen Shrestha (Maldives) **Management Committee Members** • Professor Morio Iino (Japan) • Dr Nguyen Duc Nhu (Vietnam) • Professor Adarsh Kumar (India) • Dr Hafizam Bin Hasmi (Malaysia) • Dr Valentinus Yudy (Indonesia

Election **Election supervised by APMLA Secretary Dr Rijen Shrestha** **New APMLA Management Committee** Chair: Professor Noel Woodford Dpty Chair: Dr P. Woharndee Secretary: Dr Rijen Shrestha Professor Morio Iino Dr Nguyen Duc Nhu Dr Hafizam bin Hasmi Dr Valentinus Yudy Dr Sohyung Park **Workgroup Leaders** **Dr Hafizam bin Hasmi** *Management and Identification of Missing Persons -* *Secondary identifiers* **Dr Vina Vaswani** *Clinical Forensic Medicine* *Forensic Nursing* **Dr Kyung-moo Yang** *Forensic Pathology: Management of Infectious Diseases in Mortuary Facilities.*	**Nominations for four (4) Management Committee positions up for election:** • **Chair** • **Deputy Chair** **Management Committee members (2) Held by:** • Professor Morio Iino (Japan) • Professor Adarsh Kumar (India)	**Call for nominations for Chair** *Dr Hafizam Hasmi nominated Professor Noel Woodford. *Seconded by Professor Morio Iino No other nominations. Professor Woodford accepted the nomination. **Nominations for Deputy Chair** *Professor Morio Iino nominated Dr Panjai Woharndee for Deputy Chair *Dr Sriyantha Amararatne seconded the nomination. No other nominations. Dr Panjai Woharndee accepted the nomination. **Call for nominations for first Committee Member role.** *Dr Rijen Shresth nominated Professor Morio Iino *seconded by Professor Noel Woodford No other nominations Professor Iino accepted the nomination. **Call for nominations for second Committee Member role.** * Dr Salmah Arshad nominated Dr Sohyung Park *Seconded by Dr V. Cordero * Professor Morio Iino nominated Professor Adarsh Kumar *Seconded by Dr Rijen Shrestha Professor Adarsh Kumar withdrew eliminating need for a vote and Dr Park accepted the nomination.

Professionalising the Mortuary Technician role: radiology and bio-safety. *PMCT:Webinar –* Dr Liz Manning to coordinate.		
Other Business 1.Confirmation of 2025 Meeting in Seoul, South Korea – Dr Sohyung Park NFS Korea	The 2025 combined APMLA/AFSN Meeting will be hosted by the Korean National Forensic Service in Seoul. NFS Forensic Pathologist Dr Sohyung Park provided a presentation on initial planning. At this stage the meeting is likely to be held at a facility near the Incheon Airport to avoid traffic delays for attendees.	
2. APMLA Website	Dr Panjai Woharndee who manages the APMLA website, advised that that APMLA website content will be updated. Photos from the August 2024 meeting will be posted. It was agreed that the APMLA application form would be added to the site.	
3. Planning discussion for coming year	There was discussion on a range of topics to investigate over the coming year. As a result of this discussion, it was agreed to form two new Work Groups – one for **Forensic Pathology** and another for **Forensic Nursing** (which crosses Forensic Pathology and Clinical Forensic Medicine) but will sit under Clinical Forensic Medicine. The **Forensic Pathology Workgroup** will be led by Dr Kyung- moo Yang. Topics to be covered under this workgroup will include: • Risk Management for Infectious diseases in Mortuary Facilities • Professionalising the role of the Mortuary Technician. • PCMT – Forensic Radiology Workgroup topics will be addressed through a range of approaches which may include identification and dissemination of existing best practice guidelines, consultation with member organisations, webinars, and workshops (in association with the 2025 meeting).	

4. Final remarks **APMLA Chair Professor Noel Woodford**	Professor Woodford encouraged APMLA member representatives to consider actively contributing to Workgroup activities. He thanked Dr Panjai Woharndee for her wonderful work in Chairing the APMLA since December 2021. During her tenure the APMLA signed an MOU with the Forensic Unit of the ICRC and forged a collaborative and ongoing relationship with the AFSN. The APMLA first held its annual meeting alongside the AFSN in Jakarta in 2022, did so again this year in Bangkok, and will meet together again next year in Seoul. Professor Woodford thanked Dr Woharndee and the CIFS for hosting this year's combined meeting which attracted some 700 forensic practitioners from across the region with a wide ranging and interesting program. This successful event was hosted while the CIFS was moving to a new facility – so in all a remarkable effort by Dr Panjai and the CIFS staff ! Professor Woodford said that he was glad that Dr Woharndee will continue her APMLA involvement as Deputy Chair and APMLA Website Host. He also thanked Dr Liz Manning for her contribution to APMLA activities and administration. " *I look forward to working with the APMLA Management Committee over the coming year".*

Forensic Medicine Workgroup (FMWG)

Abstract

1. Oral Presentation

1.1 Title: Vaginal and Uterus Lacerations in Domestic Violence: Case Report

Authors: Sari Nur Indahty Purnamaningsih

Organization: Forensic Science of Programme Airlangga University

Country: Indonesia

Abstract: Introduction: The World Health Organization (WHO) recognizes physical violence against women as one of the main forms of intimate partner violence which has become a global issue. Physical violence in intimate partner relationships can be defined as mild or severe physical aggression.

Case Report: A consultant was received by a doctor from the Emergency Department at Dr Soetomo Hospital Surabaya on Monday, December 4 2023 at 03.23 WIB for a 42 year old female patient with suspected physical violence and/or cases of domestic violence. The victim was referred from Anwar Medika Sidoarjo Hospital. According to the victim's statement, the victim was hit on the head, stomped on the stomach and stabbed in the vagina by her husband. The victim admitted that he had been separated for more than a year but had not yet divorced. The examination was carried out on Tuesday, December 5, 2023, at 04.42 WIB

Conclusion: The Domestic Violence Law prohibits anyone from committing physical, psychological, sexual violence and domestic neglect against people within their household. In this case the wound causes illness or temporarily hinders the victim's work. "

1.2 Title: Lethal Hemorrhage Followed by Laparoscopic Cholecystectomy; Could it Be Complicated by Chronic Methamphetamine Use

Authors: Sohyung Park, Goeun Lee

Organization: National Forensic Service

Country: South Korea

Abstract: This case study portrays a case of unexpected death after laparoscopic cholecystectomy due to acute calculous cholecystitis, with a possibility of being complicated by chronic methamphetamine use. This study also highlights how significant death investigation is for prevention and public health. The deceased received a laparoscopic cholecystectomy following acute calculous cholecystitis, and expired on the fourth day after the surgery. The medical record revealed that during the operation, dissection was not easy due to the pathology of the gallbladder. Postmortem examination revealed lethal bleeding due to unligated cystic artery on the surgical site. The pathology of the gallbladder and the surgical site showed ischemic change as well as acute inflammation. As investigation progressed, a past history of chronic methamphetamine use later became known, which could explain the pathology of the gallbladder to make dissection of the Calot's triangle hard. The authors suggest that forensic pathologists and clinicians should have a concern in regards to the long term effect of chronic methamphetamine use as a potential harmful threat to public health.

1.3 Title: Artificial Intelligence for screening human bones from morphological characteristic

Authors: Miss PINPAKA SUCOTCHADAT and Mr. CHATCHAI MANGKORNSANGKAEW

Organization: Central Institute of Forensic Science, Thailand

Country: Thailand

Abstract: A bone classification system using artificial intelligence project was developed to alleviate the shortage of experts in bone analysis technology.

In 2021, the researchers collected 302 simages of skulls, mandibles, and vertebral using a 3D scanner, and were imported into Teachable Machine (TM), a tool used to create and train deep learning neural networks on the internet and developed a web application : Deep Learning-based Bone Analysis System (DLBAS). The performance classification results of the deep learning neural network of showed an average accuracy of 97.8%, while the accuracy of gender identification was 95.6%.

In 2022-2023, the researchers imported 6,901 2D images of various types of bone into Teachable Machine (TM) for further training. The test results showed that the bone classification model with 15 classes had an average accuracy of 92.41%. For classifying left and right with 33 classes had an average accuracy of 67.58%, and for classifying skull and mandible with 7 classes had an average accuracy of 92.86%.

For this project, it was found that the reliability and accuracy of the deep learning neural network's performance in learning depend on a sufficient number of images, proper images preparation and appropriate class designation are also crucial.

1.4 Title: Policy for examining victims of child abuse in West Sumatera, Indonesia

Authors: Insil Pendri Hariyani

Organization: Indonesian Association of Forensic Pathologist

Country: Indonesia

Abstract: Introduction: In Indonesia, an integrated service center for the empowerment of women and children (P2TP2A) was established, one of whose tasks is to address the problem of violence against women and children. Case report: A 3 year old boy was abused by his stepfather. His stepfather beat him while his biological mother was out of the house for work. Abrasions, bruises and swelling found in the head, chest, stomach and limbs. The cause of death was blunt force to the belly which resulted in a lacerated spleen and severe bleeding in the abdominal cavity. Discussion: Even though P2TP2A already exists in every province or city, the number of cases of child abuse in West Sumatra is increasing every year. One of the causes is the lack of funds to implement policy to eradicate child abuse including examination costs. The West Sumatera provincial government has not yet issued a policy regarding funding for examinations of child abuse victims, so the victim's family must pay the examination costs themselves if the examination is carried out at a public or private hospital.

1.5 Title: An interdisciplinary forensic method for unidentified human remains identification and missing persons tracking in Thailand: Case Reports

Authors: Miss Nattida Srinak and Mr. Wissarut Thanomsub

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: In Thailand, the number of unidentified human remains (UHR) and long-term missing persons (LTMP) is rising every year. Currently, there are approximately 3000 UHR and 2300 LTMP in the Central Institute of Forensic Science (CIFS) database. The UHR identification method requires a holistic approach that takes into consideration all available scientific and contextual evidence. There are various forensic approaches for human identification. However, the suitable identification methods depend on the stages of decomposition and the peri- or post-mortem trauma of UHR. Visual recognition, comparison of fingerprints and DNA, ante-mortem and post-mortem data, and forensic anthropology are the methods that are often used for identifying human remains.

The case reports show the interested cases that use an interdisciplinary forensic method for UHR identifying and then comparing the data from UHR with the antemortem data of LTMP. For example, the missing person who has been missing for 8 years and the unidentified human remains with a large facial wound. They are a big challenge for UHR identifying and LTMP tracking. The case reports present the success of using various forensic profiling methods that are available for forensic human identification in Thailand.

1.6 Title: Intra uterine fetal death (IUFD) due to hyper coiling of the umbilical cord: a case report.

Authors: dr. Mohammad Ardhian Syaifuddin Sp.FM, dr. Suripto

Organization: Indonesian Association of Forensic Pathologists (PDFI)

Country: Indonesia

Abstract: Forensic pathologists sometimes are requested clinical/ anatomical postmortems in order to find the cause of death, as stated in the Indonesian Health Ministry Regulation, number 38, year 2022, about medical services for legal purposes. A hyper coiled cord is a condition which the etiology is unknown but a severe case may lead to intra uterine fetal death (IUFD). A clinical postmortem is conducted to a 20-week female fetus, with IUFD, suspected due to fetal hydrops. Signs of physical trauma and congenital conditions are not present. The hydrops condition is unclear as well as the effort to extract sample to seek anemia fetalis, as the baby is showing signs of putrefaction after she had died 3 days prior to delivery, followed by approximately a week of frozen storage. The umbilical cord showing signs of coiling as the umbilical coiling index (UCI) is 0,88 coil/cm. As no other physical anomaly was found, we decided that the cause of death is a severe hyper coiling of the umbilical cord, which might lead to fetal-maternal hypo-perfusion.

1.7 Title: Detection of Diatoms in Drowning Cases by Real-Time PCR Technique

Authors: Aranya Kreethachat

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: The Diatom test is an important method to support the determination of the cause of death from drowning. It is highly beneficial in cases of decomposed bodies where it is not possible to determine conclusively whether the individual died from drowning or not due to the destruction of drowning-related pathological features. The objective of this research was to compare the Diatom test methods from drowned bodies using two techniques: Polymerase chain reaction (PCR) and SYBR Green real-time (RT-qPCR) from lung and liver tissues of 85 samples, employing primers designed for the chloroplast/chlorophyll apoprotein of Euglena gracilis.The study found that the Polymerase chain reaction (PCR) method detected diatoms from tissue samples in 25 cases and did not detect in 60 cases. On the other hand, the SYBR Green real-time (RT-qPCR) method detected diatoms in tissue samples in 36 cases and did not detect in 49 cases. Utilizing the Chi-square test to test the hypothesis, it was found that the SYBR Green real-time (RT-qPCR) method could detect diatoms from tissue samples significantly more than the Polymerase chain reaction (PCR) method.

1.8 Title: Linking Defensive Injuries to Crime Scene Investigations in Homicides: Implications for Offender Profiling Research

Authors: Li Yang, Sun Qifan, Ji Anquan, Nie Hao, He Guanglong

Organization: Institute of Forensic Science of China (IFSC)

Country: China

Abstract: To study the statistical significance between the characteristics of defense to injury, such as initiative, passivity, strength, and other factors related to the on-site analysis of homicide cases, in order to provide a basic basis for the on-site analysis of forensic medicine professionals. The location and number of defense injuries in 150 violent crime cases were classified and counted. Using different statistical methods, the relationship between characteristics of defense injury and factors such as gender, age, fatal injury, weapon, and criminal motivation was analyzed. The study finds that: 1. There was no significant difference between gender and defense, as well as active and passive abilities. Male hands were more prone to defense injuries. 2. Upper arm injuries can occur simultaneously with defense injuries of the back of the hand and forearm, forming a related defense injury. 3. Sexual motivation can lead to a significant increase in the number of thigh defense injuries and the number of cases. 4. When offenders are minors, the frequency and proportion of strong defense increases. 5. The process of death can affect active and passive defense, and the number and proportion of cases of active defense among victims of neck injury are both increased. Active defense behavior is more likely to reflect a younger age of victim than offender; Strong defense behavior is more likely to occur in the process of underage offenses committed by minors with insufficient control ability.

1.9 Title: Application of Finite Element Method in Injury Biomechanics

Authors: Dr. Wei Zhibin

Organization: Institute of Forensic Science of China (IFSC)

Country: China

Abstract: The finite element method (FEM) is a numerical simulation analysis method linked with modern computer technology. Human tissues and organs can be modeled in three dimensions and discretized into elements to ultimately form a finite element model. With given boundary conditions, loads, and material properties, it simulates the stress and strain of human tissues when subjected to external forces.The FEM has two major functions in injury analysis: "assisting in analyzing the mechanism of injury" and "visually presenting the mechanism of injury." This study demonstrates the advantages of finite elements in injury analysis by introducing two simulation cases. Case one: Based on actual case information, a numerical simulation of a depressed skull fracture is conducted, analyzing the mechanism of injury from a biomechanical perspective, proving that the FEM can serve as an auxiliary technique for injury analysis, and has advantages such as visualization and quantification. Case two: Numerical simulation of rib fractures caused by boxing and chest compression is performed, and the distribution and morphological characteristics of rib fractures in these two scenarios are compared according to the simulation results. Moreover, the mechanism of rib fractures is analyzed from the biomechanical perspective of stress and strain, and the simulation results of this study are supported by literature, once again proving the value of the FEM in injury analysis. In addition, the study also discusses the challenges of using the FEM for injury simulation, such as the initial parameters.

1.10 Title: Multidisciplinary Approach in Victim-Oriented Case Management of Violence Against Women and Children

Authors: Nadia Ulfah Faddila

Organization: Forensic and Medicolegal Department, Serpong Utara Public Hospital

Country: Indonesia

Abstract: Management of victims of violence against women and children extends beyond the confines of examination rooms. Forensic and psychiatric examinations of victims are performed to gather evidence in the form of physical injuries, psychological trauma, or biological samples found on the victim's body as a basis for proving the crime. Regrettably, criminal acts frequently result in a prolonged deterioration of the victim's quality of life and impede their ability to acquire an education, cultivate positive social connections with their surroundings, and safeguard their physical and mental health. Victims of violence against women and children may endure substantial adverse consequences, including but not limited to unintended pregnancies, repeated abortion attempts, academic attrition, malnutrition, and stunting. Victim-oriented case management requires the collaboration of multidisciplinary and cross-sector teams to provide a comprehensive approach to victim care. To ensure thorough and victim-oriented treatment implementation, continuous coordination and periodic evaluation should be conducted in collaboration with government institutions responsible for women's and children's protection, health, education, social and religious services, public hospitals, police departments, prosecutors, legal partners, psychologists, and social workers.

2. Poster Presentation

2.1 Title: Determining The Causes Of Abusive Head Trauma In Newborns : A Case Report

Authors: Yudha Erik Prabowo, Wiwin Ida Nur Sri Wahyuni, Ahmad Yudianto

Organization: Forensic Science Airlangga University

Country: Indonesia

Abstract: Background: Infant head trauma is a significant cause of all newborn deaths. Etiology was birth trauma, accidental mechanical trauma, and abusive trauma.

Case Presentaion: The newborn corpse was taken to the Forensic Department for an autopsy. Body length was 49 cm and weight 4400 grams. Were found signs of decomposition, the subcutaneous bleeding on the top of the head and the front of the left side of the head. The cerebrum and cerebellum was decay with a liquid consistency, gray color with some reddish. Were found line fracture on the roof of the skull on the left side.

Discussion: The positive float test indicates the baby was a live at the birth. Absence of cephalhematoma,subgaleal hemorrhage, bridging vein bleeding, unidentified line fracture, multiple bruises, and unclear wounds exclude birth trauma. On external examination was found bruises and abrasion on scalps and cheeks. The autopsy findings subgaleal hemorrhage on the top, front of the left side and roof of the skull's fracture. Lung, gastric, and middle ear floating tests were positive and meconium was found.

Conclusion: The cause of death is head trauma and the baby is stillbirth

2.2 Title: 4-Hydroxyproline, sarcosine and heparan sulfate are the potential biomarkers for categorizing suicide and non-suicide deaths

Authors: Witchayawat Sunthon, Thitiwat Sopananurakkul, Churdsak Jaikang,Yutti Amornlertwatana

Organization: Metabolomics Research Group for Forensic Medicine and Toxicology, Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University

Country: Thailand

Abstract: The categorization of suicide, homicide, accident and natural death requires more evidence and specific biomarkers. Metabolomics is a novel omics technique used to identify biomarkers for post-mortem investigations. This study aimed to investigate potential biomarkers for categorizing suicide and non-suicide deaths. Heart blood samples (n=90) were collected from suicide cases (n=45) and non-suicide deaths (n=45). Blood metabolites were identified by proton nuclear magnetic resonance. Twenty-two metabolites showed significant differences between the suicide and non-suicide groups ($p<0.05$). Decreased levels of 4-hydroxyproline and sarcosine, and increased levels of heparan sulfate help in identifying suicide cases. The AUC values were 0.72, 0.72 and 0.71, respectively. Intriguingly, sarcosine and 4-hydroxyproline levels were closely correlated with suicides involving a history of psychiatric problems (AUC=0.96 and 0.82, respectively). In suicides without a history of psychiatric issues, heparan sulfate level was significantly elevated (AUC=0.71), while the 4-hydroxyproline level was decreased (AUC=0.70). 4-hydroxyproline, sarcosine, and heparan sulfate have the potential to determine suicide as the manner of death. Sarcosine and 4-hydroxyproline seem to be valuable biomarkers for determining suicide associated with psychiatric issues. Furthermore, the specificity and sensitivity of these biomarkers for distinguishing between suicide and non-suicide deaths need to be validated through large-scale studies.

2.3 Title: Autopsy findings in colorectal cancer with liver metastasis: a case report

Authors: Wiwin Ida Nur Sri Wahyuni, Ahmad Yudianto

Organization: Forensic and Medicolegal Airlangga University Surabaya

Country: Indonesia

Abstract: Introduction: Colorectal cancer is the third most common cancer worldwide, approximately 10% of all cancer cases and is the second leading cause of cancer-related deaths. In Indonesia, the incidence of colorectal cancer in 2022 reached 34,189 (8.6%) cases. The liver is the most common site of colorectal cancer metastasis because the intestinal mesenteric drainage enters the hepatic portal vein system.

Case presentation: Investigators dispatched a 45-year-old man to the hospital. On external examination was found the blood vessels on the mucous membrane of the upper and lower eyelids appears widened, fingertips and nails of the four limbs appear bluish. Both are show features from asphyxia syndrome.

Discussion: On internal examination was found an enlarged liver with uneven shape, a humped impression, obtuse angles, hard solid consistency, and fatty liver. Dilated blood vessels were found on the surface of the large intestine. On organs section, a mass was found in the large intestine with a hard, dense, and lumpy consistency. On the results of the anatomical pathology examination, was found extensive bleeding in the colon and adenocarcinoma metastasis in the liver.

Conclusions: The cause of death was due to malignancy in the colon which spread to the liver resulting in suffocation

2.4 Title: Stab wound by the violence with hematopneumothorax bilateral : A case report

Authors: Fadhly Azis, Ahmad Yudianto, Wiwin Ida Nur Sri Wahyuni

Organization: Forensic and Medicolegal Universitas Airlangga Surabaya

Country: Indonesia

Abstract: Introduction: A stab wound is an injury caused by stabbing objects that have sharp edges on the body. Stab wounds can be distinguished from iris wounds based on their length and size wound depth. When measured, the puncture wound has the depth of the wound which is longer than the length injuries and are characterized by a relatively well-defined traumatic separation of tissues.

Case Presentation: A 29-year-old man was brought to the Hospital, he was stabbed and hit in the upper right chest and right back by the victim. Normal vital signs with GCS 456. Thorax x-ray found Hematopneumothorax bilateral of the lung appearance. Injuries" and are characterized by a relatively well-defined traumatic separation of tissues.

Discussion: On external examination was found oval wounds, sharp edges, angles, soft tissue, and lung tissue base, the length was 2 cm on the right chest and 3,5 cm on the right back. The lung was found hemopneumothorax, the treatment is by installing a WSD (Water Sealed Drainage). WSD is the act of installing a tube/hose in the thoracic cavity that is connected to a bottle to remove air, blood, or fluid.

Conclusion: Stab wounds to the thorax have the potential to cause hematopneumothorax

2.5 Title: Understanding Unidentified Bodies in South Korea: A Six-year Experience

Authors: Goeun Lee, Chang Un Choi, Kyung-moo Yang, Won-Joon Lee

Organization: National Forensic Service Seoul Institute

Country: Republic of Korea

Abstract: Identification of deceased individuals is a critical component of forensic pathology, essential for human rights and criminal investigation. However, despite investigations and advanced forensic techniques, many decedents remain unidentified. This study aims to present the characteristics of unidentified bodies and the identification methods used in South Korea, providing suggestions on the challenge faced. Data were collected for 174 cases that remained unidentified after autopsy between 2017 and 2022 at the National Forensic Service Seoul Institute, South Korea. The majority of unidentified decedents ware males (82.0%) and aged between 40 and 60 years old (60.4%). Of the unidentified bodies, 90.2% were found in a decomposed state or without soft tissue, and 35.6% were found immersed in water. The manner of death was undetermined in 82.2% of cases. DNA analysis was performed on all cases, with additional methods including forensic odontology (64.3%), forensic anthropology (53.4%), facial reconstruction (19.5%), and geographic origin estimation (21.8%). Despite ancillary examinations, limitations based on preservation state and a lack of comparative data hinder successful identification. This study highlights the statistical characteristics of unidentified bodies and the challenges in their identification in South Korea, suggesting the necessity for the systemic database both unidentified decedents and long-term missing individuals.

2.6 Title: Dentine biomarkers aid in personal identification: distinguishing between underlying disease and healthy persons

Authors: Chaniswara Hengcharoen

Organization: Department of forensic medicine, Chiang Mai University

Country: Thailand

Abstract: Sex, age, nationality and height are main point for the personal identification process. In decomposed condition or skeletal remains are limited condition for personal identification. Underlying diseases may help confirm in these conditions. NMR – Based metabolomic can identify specific biological markers related to the diseases. It uses a small sample and does not destroy the sample. The teeth have rigid structures and only used for sex and age identification. The objective of this study was to find specific biological marker related to diseases which help to identify people in the limited condition. The teeth samples were collected from individuals with underlying diseases (n = 11) and a healthy control group (n=14). Two hundred and eight metabolites were determined in dentine. Univariate statistical analyses separated the metabolic profiles of underlying disease and healthy group. Nine potential biomarkers namely glycerol, trimethylamine, acetate, pyruvate, betaine 3-hydroxyisovalerate, propylene glycol, cholesterol, and 2-hydroxybutyrate could separate the groups. These results suggested that dentine metabolites provided underlying disease biomarker and may be useful for personal identification.

2.7 Title: 1H-NMR-Based Bone Metabolomics Signature for Sex Identification

Authors: Thitiwat Sopananurakkul, Witchayawat Sunthon, Churdsak Jaikang, Yutti Amornlertwatana

Organization: Metabolomics Research Group for Forensic Medicine and Toxicology, Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200 Thailand

Country: Thailand

Abstract: Bone is a static tissue and the most likely to remain intact through decomposition processes. Sex is an important factor for person identification. Debris bone samples have limited utility and need effective methods for identification. Proton - nuclear magnetic resonance spectroscopy (1H-NMR) uses a small sample and does not destroy the bone samples. The aim of this study was to identify sex in bone by using NMR metabolomic signature. Bone samples were collected from Male (n = 35) and Female (n = 6). The samples were digested and lyophilized before analysis with 1H-NMR. The results found that there are 7 specific regions for sex determination at chemical shift positions 1.17, 2.02, 2.22, 2.74, 2.80, 3.50, and 8.19. The intensity of the chemical shifts at 2.22, 2.74, and 2.80 was higher in females than in males ($p<0.05$). Conversely, the intensity at positions 2.02, 3.50, and 8.19 was higher in males than in females ($p<0.05$). The chemical shift position at 2.80 is the best for sex identification (AUC=0.919). In conclusion, the NMR-based bone metabolomics signature has potential for determining sex. Further large-scale studies are needed to validate the specificity and sensitivity of these biomarkers for distinguishing between male and female.

2.8 Title: Bromadiolone Poisoning: A Fatal Case of Homicidal Ingestion

Authors: I Ketut Heru Suryanegara

Organization: Forensic Science of programme Airlangga university

Country: Indonesia

Abstract: Bromadiolone is an active ingredient of many newer rodenticides available on the market, for the reason that it is highly fatal for rodent species. Because of its easy availability, it is becoming the poison of choice for committing suicide or homicide. Bromadiolone inhibits vitamin K(1)-2,3 epoxide reductas and thus the synthesis of vitamin K and subsequent clotting factors II, VII, IX and X. In this report, we present a case of bromadiolone-induced homicide in a 25-year-old woman years in melon juice given by her ex-husband, wherein the patient exhibited distinct clinical examinations and symptoms. We then carried out an external examination, autopsy, histopathology and toxicology. Moreover, the patient's blood sample exhibited a noteworthy bromadiolone concentration of 2.62 µg/kg. Autopsy in cases of suspected bromadiolone poisoning is always a challenge to the forensic pathologist especially when there is no or obscure history. The clinical features and postmortem findings may resemble natural death due to haemorrhagic diathesis.

2.9 Title: The Diatom Test: Proving Death by Drowning

Authors: Setya Aji Priyatna

Organization: Forensic Science of Airlangga University

Country: Indonesia

Abstract: Background: Drowning is a type of asphyxiation caused by fluid entering the respiratory tract. The diagnosis of drowning death presents substantial obstacles in the field of forensic medicine, especially when the victim's body is discovered in a decomposed state. The study of deteriorated remains typically yields no distinguishing features. Laboratory examinations of bone marrow specimens are frequently regarded as the most trustworthy means of substantiating the concept of antemortem drowning, as they are less vulnerable to contamination by post-mortem submersion.

Case Report: A body was discovered by a fisherman and initially misidentified as a doll. The deceased person was discovered reclined, naked, and entangled in the roots of a mangrove tree. The witness then fled the mangrove area and informed the security officer stationed at Ria Kenjeran Beach about the retrieved corpse. At the Hospital, forensic identified the deceased individual based on a Visum et Repertum (VeR) application letter. Investigations were conducted externally, internally, and in the lab. The acid destruction test for bone marrow on the left femur yielded a positive diatom result.

Conclusion: The diatom test is a popular forensic technique for determining the exact scene of an accident and establishing drowning as the primary cause of death.

2.10 Title: The application of a new type of ultrasound tissue processing device in forensic pathology technology

Authors: Yang Lijun ； Li Min (corresponding author) ； Chu Jun (corresponding author)

Organization: The Physical Evidence Appraisal Institute of Suzhou Public Security Bureau, Suzhou

Country: China

Abstract: To explore the effect of a new type of ultrasound tissue processing device on the intact of organs fixation and HE staining in forensic pathology.The new ultrasound tissue processing device significantly shortens the fixation time of intact organs in forensic pathology， and the HE staining effect is comparable to that of traditional forensic pathology methods. It is worth promoting and applying in the field of forensic pathology.

2.11 Title: A preliminary study of the damage and death induced by methamphetamine in adult rats

Authors: LIU Dong-shun,YANG Zhi-yong,JIANG Yan-wei,HAN Peng

Organization: Institute of Forensic Science Tianjin Public Security Bureau

Country: China

Abstract: Objective To study the mutual effect on death process if the mouse drugged by methamphetamine and sustained the trauma at the same time. Method Divided male adult mice to three groups, drugged group, trauma group, drugged and trauma group. Firstly to create drugged model on mouse ; secondly the trauma group will be broken legs on both side and collected blood on orbit venous (blood loss injury), injected methamphetamine solution by abdominal cavity, to increase volume from1.5mg/ (kg) each time until majority of mice was dead。 Result One mouse was dead when the methamphetamine solution reached 11 mg/kg; trauma group survived at the same time ; six mice which had drugged and broken legs were dead when the methamphetamine solution reached 11 mg/kg; 10 mice which be collected orbit venous blood were dead when the methamphetamine solution reached 11mg/kg. Conclusion The mouse death rate of drugged and trauma group was higher than drugged group or trauma group, the blood loss effect of taking orbit venous on death process was more serious than broken leg group.

- FMWG Meeting Summery -

FMWG Business Meeting Report

The annual general meeting of the Forensic medicine Workgroup was held to review the performance of the past year and to continuously plan future activities. This year, several significant initiatives were implemented that helped enhance international collaboration in the Forensic medicine, including expanding membership and establishing a forum for academic experience exchange.

Activities Conducted

One of the key activities prioritized by the Forensic Medicine Workgroup is expanding its membership to include a diverse range of related professional fields. We invited forensic anthropologists and Forensic Dentistry to participate in the "Bring Your Own Case" forum, which provided an opportunity for experts from various countries to present case studies and share their experiences in forensic work. This year, the forum was held on March 20, 2024, featuring speakers from three countries—Thailand, Indonesia, and Malaysia. A total of 96 participants from various countries registered for the event, demonstrating significant interest and recognition in international academic knowledge exchange.

Additionally, the Forensic Medicine Workgroup participated in a joint meeting with China's forensic medicine workgroup, held from June 12–13, 2024. This meeting served as a collaborative session between China's forensic medicine workgroup and the International Digital Forensic Workgroup (DFWG). Participants from various Asian countries, including Thailand, Indonesia, Malaysia, and South Korea, attended, with some joining virtually. The conference featured 15 keynote speakers who shared their knowledge and experiences across various aspects of forensic medicine.

Future Plans

For the upcoming year, the Forensic Medicine Workgroup plans to organize three additional "Bring Your Own Case" forums to provide members with continuous opportunities for discussion and knowledge exchange in forensic medicine. The scheduled events are as follows:

1. November 2024 – Hosted by Thailand

2. March 2025 – Hosted by China

3. June 2025 – Hosted by the Philippines

Additionally, we plan to participate in a forensic conference in China, with the date and time to be announced later. There is also an ongoing initiative for an international forensic service exchange program, which aims to promote learning and the sustainable advancement of forensic knowledge.

Another key activity is participation in the APMLA Training Program, a regional training initiative focused on developing essential forensic skills. Lastly, we will attend the AFSN 2025 Annual Meeting, scheduled for September 2025 in South Korea. Participation in these events will provide valuable opportunities to expand collaborative networks and enhance forensic standards both regionally and internationally.

Conclusion

This annual meeting of the Forensic Medicine Workgroup was not only a platform for reporting past activities but also a venue for fostering collaboration and systematically planning future initiatives. These efforts will contribute to the continued advancement of the forensic medicine profession.

Digital Forensics Workgroup (DFWG)

Abstract

1. Oral Presentation

1.1 Title: Data Collection on ASIC Cryptomining: The Determination of Data Condition based on Network States and Network Protocol Type

Authors: Hanania Aida Mohd Hilmi @ Mohd Nor, Muhammad Rashid Redha Mohd Tahir

Organization: CyberSecurity Malaysia

Country: Malaysia

Abstract: The preservation of cryptomining data has become a crucial element in managing evidence materials during raid operations and further analysis. With the increasing prevalence of cryptomining activities, law enforcement and forensic investigators need reliable methods to collect and analyze data from cryptomining machines. The collection of data on this ASIC cryptomining client pool depends on the network conditions applied to this cryptomining machine. Thus, we show the data on the ASIC cryptomining machine's client pool through different states of network status and network protocol type. The significance of this study will provide a detailed overview of the data conditions that can be obtained from the client pool with the network states based on best practices in digital forensics. This will facilitate investigations into cases related to cryptomining.

1.2 Title: Psychological Impact of Online Loans: Survey Analysis and Digital Forensic Perspectives

Authors: Mahmud Nasrul Habibi, Ditya Riski Taher, Cantaka Sasikirana Suko Kautsar

Organization: Airlangga University

Country: Indonesia

Abstract: This study investigates the psychological impact of online loans through a comprehensive survey and analyzes the findings from a digital forensic perspective. With the proliferation of online lending platforms, many individuals face significant financial distress, adversely affecting their mental health. The research employs a survey method, collecting data from 200 respondents in Indonesia who have utilized online loan services, aiming to understand their experiences, psychological impacts, and coping mechanisms.

The survey results reveal that a substantial number of respondents experience heightened levels of stress, anxiety, and depression due to excessive loan burdens and aggressive debt collection practices. Additionally, digital forensic analysis uncovers frequent misuse of personal data and security vulnerabilities, further exacerbating the psychological strain on borrowers. This study underscores the necessity for stringent regulatory measures and robust monitoring of online loan providers to prevent predatory practices and data exploitation.

Enhancing financial and digital literacy among consumers is also crucial for mitigating these adverse effects. The findings advocate for a multidisciplinary approach, involving psychologists, digital forensic experts, and policymakers, to develop effective strategies that safeguard consumers' financial and psychological well-being.

1.3 Title: Method for Cleaning HDD Platters Adhered with Material from Melted Parking Ramp for the Magnetic Head

Authors: Guo Lili

Organization: Division of Digital Forensics, Institute of Forensic Science, P.R.C

Country: China

Abstract: In this article, the author explores the challenges of repairing hard disk drives (HDDs) that have been scorched in a fire. Some damaged drives can be restored by replacing essential components such as the circuit board, magnetic head, and hard disk chamber, and by cleaning the dirty platters. However, a significant challenge arises when the head parking ramp, which melts at high temperatures, adheres to the disk platters. The author investigates the chemical composition of the head parking ramp materials and identifies a chemical agent capable of dissolving it without corroding the platters or harming the data. Through a series of experiments, the feasibility of this dissolving agent is confirmed, and a detailed method and procedural steps for the dissolution process are outlined. The effectiveness of this method is ultimately validated through practical applications on actual fire-damaged HDDs, successfully retrieving the stored data.

1.4 Title: Solutions for Cracking private passwords

Authors: Zhang Yaoguo、Bao Menghu、Kang Yanrong

Organization: Institute of Forensic Science of China

Country: China

Abstract: With the rapid development of technology, smartphones have become an essential part of our daily lives. These devices store a vast amount of personal and sensitive information, making them crucial in criminal investigations and legal proceedings. However, extracting evidence from smartphones can be a challenging task, especially when it comes to unlocking encrypted data. The importance of mobile phone forensics cannot be understated, as it plays a vital role in solving crimes and ensuring justice is served. As encryption methods become more sophisticated, cracking passwords and accessing locked devices have become increasingly difficult, posing a significant challenge for law enforcement agencies and forensic experts. In light of these challenges, researchers are continuously developing new techniques and method to enhance mobile phone forensics and overcome the obstacles presented by encryption. This article shares an idea of cracking the password of a mobile phone, focusing on cracking the password of the internal safe of the mobile phone.

1.5 Title: Social Media Forensics

Authors: Nursyadiq Saian, Loqman Yusoff

Organization: Malaysian Communications and Multimedia Commission (MCMC)

Country: Malaysia

Abstract: In the digital age, network facilities and services are pivotal for communication but also susceptible to misuse. This study focuses on digital forensic analysis of online communications and device artifacts from online social media platforms to detect evidence of misconduct under Section 233 of the Communications and Multimedia Act. The research examines offenses such as cyberbullying, threats, harassment, and the dissemination of offensive or false information. Through meticulous manual searches and expert analysis, the study delves into online interactions and digital footprints, highlighting the critical role of expert analysis in uncovering evidence to support law enforcement and legal proceedings. This research underscores the ongoing need to cultivate forensic expertise and establish robust regulatory frameworks to effectively combat the misuse of digital communication technologies and safeguard online environments. Understanding these dynamics allows stakeholders to better protect individuals from online harm and uphold the integrity of digital communications.

1.6 Title: Recovering Critical Moments: Case Studies in Codec-Based Video Frame Recovery

Authors: Do Joon Jung

Organization: National Forensic Service

Country: Republic of Korea

Abstract: -

1.7 Title: Digital Forensics and UFED Cellebrite: Key Technologies in Modern Investigations for Mobile Devices in Investigations and Data Extraction

Authors: Agung Ahmad Sulton Saputra

Organization: Indonesian National Police

Country: Indonesia

Abstract: Digital Forensics is a subset of forensic science that centers on the identification, collection, study and demonstration of digital devices. The purpose of Digital Forensics is to assist in the investigation of crimes such as the spread of malware, identity theft, online fraud and hacking. Digital forensics is also often used to restore lost or deleted data for the benefit of the investigation process. Digital footprints that have been found are admissible in court to support legal proceedings. As well as maintaining regulatory compliance and security audits. By analyzing crime trends and providing security recommendations, Digital Forensics can prevent future crimes. With the development of information technology, cyber crimes such as Phishing, Carding, Ransomware, Identity Theft, SIM Swap, Skimming, Online Fraud, Site and Email Hacking, Data Forgery, Illegal Content, OTP Fraud, Cyber Terrorism, Cyber Espionage, and Plagiarizing other people's sites are increasing. Ufed Cellebrite is a digital forensic tool to extract and analyze data from mobile devices such as phones, tablets, memory, and simcards. Functions of extracting data from mobile phones, tablets, memory and simcard devices, restoring deleted or lost data, decrypting encrypted data, analyzing forensic data and creating forensic reports.

1.8 Title: A Review on Bitcoin Illegal Transaction Detection Based on Machine Learning

Authors: JIANG Xianbo, YAN Shengdong, XING Guidong, KANG Yanrong

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: This article thoroughly reviews machine learning in detecting illegal Bitcoin transactions, analyzing 72 papers on data preparation, feature engineering, and classification algorithms. Despite promising results, challenges remain. Dataset construction is flawed due to selective transaction data usage and scarce, skewed labeled data, affecting model training. Research on feature engineering primarily examines Bitcoin's transaction data and network structure, overlooking sources like IP addresses and network traffic, hindering comprehensive anomaly detection. Classification algorithm challenges lie in a lack of innovation, with a focus on existing algorithm application and comparison. These algorithms, designed for offline backends and effective in specific datasets, have not been integrated into practical Bitcoin transaction systems. Future research should aim to adapt these algorithms for real-world transaction environments to improve illegal transaction detection system practicality and effectiveness.

1.9 Title: Unveiling WhatsApp Identity Mismatch: A Forensic Investigation Case Study

Authors: Meenakshi Mahajan, Asheesh Maihla

Organization: Directorate of Forensics Services Himachal Pradesh

Country: India

Abstract: Mobile phone Forensic, a vital component of digital forensic investigations that involves the data acquisition, examination, and interpretation of digital evidences from mobile devices. The mobile phone has become the integral part of every individual which is being used for communication as well as majority of the daily tasks. Digital forensic scientists deal with the mobile exhibits of suspects involved in criminal activities. Over the past several years, many applications have replaced the place of SMS messaging and have developed in transmitting and storing the plain-text data to an encrypted version. One of the most widely used smartphone apps for communication, for both legal and criminal activity, is WhatsApp. WhatsApp introduced end-to-end encryption of communication in early 2016, years after the introduction of WhatsApp application. However, the 6-digit verification code also termed as short code is required to register and login the account and is received via SMS on the associated number of the WhatsApp account. Further, the two-step optional verification feature was added by WhatsApp to enhance the security to access one's WhatsApp account. The particular study is A Case study on a WhatsApp identity mismatch observed and unveiled during the examination of mobile device of suspect.

1.10 Title: Video Analytics in Digital Forensics

Authors: Muhammad Azree Bin Yahaya, Nor Salwani Binti Ja'afar, Muhammad Zuhairi Bin Abdullah, Muhammad Afrizal Bin Abdul Ghani

Organization: Digital Forensics Department, CyberSecurity Malaysia

Country: Malaysia

Abstract: In the current world, technology play in nearly every aspect of daily life, extremely influencing how we interact, work, and solve problems. As people's lives become more and more digitized, video analytics has become a crucial tool in digital forensics. An in-house technology developed to enhances the accuracy and efficiency of evidence collection, processing, and interpretation in video analysis. Advanced techniques such as object and facial recognition, motion detection, and behaviour analysis are very useful for identifying suspects or reconstructing events are implemented in this software. Furthermore, the technology can manage a large datasets while maintaining data integrity to ensure the admissibility of evidence in court of law.

1.11 Title: Application of Crash Data and Video Analysis in Traffic Accident Reconstructions

Authors: TAO Chi-hang

Organization: The Government Laboratory Hong Kong

Country: Hong Kong, China

Abstract: Crash Data Retrieval (CDR) tool and Event Data Recorder (EDR) tool for retrieving data from accident vehicles nowadays becomes a powerful, indispensable and efficient tool for traffic accident investigations, which provided comprehensive vehicle information, such as status of accelerator pedal, brake pedal, steering angle, etc. prior to the accidents. Moreover, vehicle data retrieved from accident vehicles lacked visual video / image information of other vehicles and pedestrians prior to the accidents. In Hong Kong, the imported vehicles are not mandatorily required to have been installed with EDRs. However, there are still quite a number of vehicles equipped with EDRs registered in Hong Kong. The Government Laboratory (GL) has been providing crash data analysis service in Hong Kong since 2015, and had accumulated experience in analyzing vehicle crash data together with accident video footage. In this presentation, a number of traffic accidents having been investigated by GL through crash data analysis coupled with video footage analysis will be presented. The importance of correlating and synchronizing the events between them shall be highlighted.

1.12 Title: Importance and Usability of EDR Data in Traffic Accident Analysis

Authors: Jonghyuk Kim, Songhui Kim, Woojeong Jeon

Organization: National Forensic Service

Country: Republic of Korea

Abstract: In traffic accident analysis, the vehicle's driving data before the accident is very important, and most vehicles are equipped with the EDR, Event Data Recorder in the airbag control unit. EDR records data such as vehicle speed (km/h), engine speed (RPM), accelerator pedal displacement (%), whether the brake pedal was pressed(on/off), and steering wheel angle(deg) for 5 seconds before the collision, and is very helpful in revealing the cause of the traffic accident. In this presentation, we will cover the importance and usability of EDR data through an introduction to EDR and examples of using EDR data to identify the cause of traffic accidents.

1.13 Title: Equipment Traceability Forensics Basic Dataset Construction Method

Authors: Hou Xinyu, Xie Lanchi, Li Zhigang, Li Zhihui, Song Huaqing, Li Wei

Organization: Institute of Forensic Science, Ministry of Public Security, China

Country: China

Abstract: Tracing and forensics of videos and images taken by smartphones is a new requirement and direction in the field of forensic science after the authenticity, originality and integrity of digital images. It not only has a strong scientific research significance, but also has extremely important practical significance in cracking down on illegal and criminal activities. This article describes the basic requirements for building a dataset. First of all, it can be verified on mainstream smartphones, leaving a certain amount of room for expansion, and the data needs to be iteratively carried out. Secondly, the data collection process is authentic and reliable, and the non-original lens should be clearly labeled. Third, the dataset cannot contain sensitive information such as special signs and citizen information. Fourth, the sampling setting should be reasonable, comprehensive, and close to practical application. The construction of the dataset was guided by practical application, combined with the outstanding demand for image traceability in the field of forensic science in recent years, and the step-by-step construction method was carried out, and the front and rear cameras were sampled using the photo function of smartphones and WeChat APP. It is hoped that the content of this paper can provide a reference for relevant theoretical research and practical application.

1.14 Title: Digital Evidences for Vehicle Forensics

Authors: Aisyah Binti Mohamad Hafizul,Sharifah Nurul Asyikin Binti Syed Abdullah,Jayhanraaj A/L Jeeva

Organization: CyberSecurity Malaysia

Country: Malaysia

Abstract: In this presentation, I aim to raise awareness about the importance of Event Data Recorders (EDRs) in vehicle forensics and their potential to aid future investigations. EDRs, often referred to as "black boxes," are installed in modern vehicles to capture critical data such as vehicle speed, engine throttle position, brake usage, and seatbelt status. This information is crucial for reconstructing events leading up to vehicular incidents.

By highlighting the benefits and challenges associated with EDR data analysis, I emphasize the need for effective collaboration among forensic experts, automotive manufacturers, and law enforcement agencies to ensure the integrity and admissibility of this evidence.

Understanding the capabilities and limitations of EDRs is essential for forensic investigators like myself. With increased awareness and knowledge, we can leverage this technology to enhance road safety, improve incident reconstruction, and support accountability in legal proceedings, ultimately making a significant impact on future vehicle forensics.

1.15 Title: Digital Forensic Working Group: Malaysian Chapter

Authors: Muhammad Zulkifly bin Mohd Isa; ,Nurul Husna binti Mohamad Nor Hazalin

Organization: Royal Malaysian Police,CyberSecurity Malayia

Country: Malaysia

Abstract: "Kumpulan Kerja Forensik Digital of Malaysia" (Digital Forensic Working Group) was established in 2017 to spearhead advancements in digital forensic investigations among digital forensics practitioners in Malaysia. Our organization is dedicated to enhancing cybersecurity through rigorous forensic analysis, cutting-edge research, and collaborative initiatives. We strive to provide comprehensive support in digital forensics fields to law enforcement and private sectors in Malaysia in combating cybercrime. By fostering partnerships and collaborations, we leverage shared expertise and resources to stay ahead of emerging threats.

1.16 Title: Enhancing First Responder Efficiency in Digital Forensics: Best Practices and Technological Advancements

Authors: Muhammad Faridzul Bin Sukarni

Organization: CyberSecurity Malaysia

Country: Malaysia

Abstract: The role of first responders in digital forensics is critical in the early stages of cybercrime investigations. Their ability to properly secure and analyze digital evidence can significantly influence the outcomes of forensic examinations and subsequent legal proceedings. This paper explores the evolving responsibilities of first responders in the digital forensic landscape, emphasizing the importance of immediate, precise actions to preserve the integrity of digital evidence. We review current best practices, including the use of standardized protocols and procedures to minimize the risk of evidence contamination or loss. Furthermore, the paper highlights recent technological advancements, such as automated forensic tools and artificial intelligence applications, which enhance the efficiency and accuracy of initial data acquisition and analysis. By integrating these tools with traditional methods, first responders can improve their effectiveness in a variety of digital environments, from corporate networks to personal devices. The findings underscore the necessity of continuous training and education for first responders, ensuring they remain adept at handling the complexities of modern digital evidence. This comprehensive approach aims to empower first responders with the knowledge and tools needed to navigate the challenges of digital forensic investigations, ultimately contributing to more robust and reliable forensic outcomes.

1.17 Title: Application of Orthogonal Polynomial Fitting in the Analysis of Formant Dynamics of Mandarin Triphthongs

Authors: Kang Jintao（康锦涛）, Li Jingyang（李敬阳）

Organization: IFSC

Country: China

Abstract: This study investigates the application of orthogonal polynomial fitting method in the study of formant dynamics of four mandarin triphthongs by leveraging their speaker-discriminatory potentials. The first four formants were extracted from spontaneous speech materials. Two different methods (general polynomials and Legendre polynomials) of modeling formant trajectories of the 4 triphthongs from 80 male speakers were used to compute coefficients as input to a random forest classifier. Besides, original values (averages and raw data) of these formant frequencies were also input to the above classifier as benchmarks. The results indicate that Legendre polynomial coefficients outperform the general coefficients in the random forest classifier, while the mean values perform the least effectively. As for different formant frequencies, high-frequency formants (F3 and F4) exhibit a greater discriminatory power compared to low-frequency formants (F1 and F2) in all four triphthongs. Furthermore, formants from the triphthong [iau] are better at distinguishing speakers than other 3 triphthongs.

1.18 Title: Application of a Novel Frame Interval Timer for Frame Rate Verification in Speed Determination from Video Footage

Authors: WONG Fai George, TAO Chi-hang, TAM Cheok-ning

Organization: The Government Laboratory of Hong Kong

Country: Hong Kong, China

Abstract: In Hong Kong, many vehicles have been installed with dashboard cameras which are small video recording devices. Dashboard cameras serve as silent witnesses which capture pedestrian and vehicle movements on the road. Video footage recorded by dashboard cameras provide valuable and indispensable information on how traffic accidents occurred. In the Government Laboratory of Hong Kong (GL), over 500 video footage pertaining to traffic accidents were analyzed annually for speed determinations in traffic accident investigations. The average speed of a vehicle between selected landmarks was determined by choosing relevant image frames extracted from the questioned footage and using the distance-time equation (Speed = distance ÷ time). The accuracy of the time elapsed between the selected image frames in the questioned footage is ascertained by recording a control footage with a calibrated frame interval timer by the relevant dashboard camera for subsequent frame rate verification. Recently, GL has designed and made a new frame interval timer with a time resolution of 1 millisecond. In this presentation, the design of this novel frame interval timer as well as its application in traffic accident investigations will be presented.

1.19 Title: On-site Digital Evidence: Addressing Rise Technology Crime Case in Thailand

Authors: Miss Nisapha Khasrithong

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: Nowadays the trend of technology-related crime in Thailand is increasing and often involving electronic devices to commit the crime for example running online gambling websites, create child pornography media, corruption in government procurement, etc. But sometimes electronic devices themselves become targets in criminal activities such as fraud application on mobile phone, scamming (romance scam, gang call center), etc. Therefore, digital examiners should have up-to-date knowledge and skills in detecting and verifying data that related to the nature of offense in electronic devices. Digital evidence that is often found in technology crime case includes mobile phones, tablets, computers, notebooks, CCTVs, servers, data on cloud and media storage. With the advance in technology as a results that electronic devices have exponentially increased data storage space. For this reason, on-site preview digital evidence at crime scene by using forensic tools is extremely important in term of eliminating extraneous evidence. On-site preview procedure is in accordance with the guideline of ACPO and other relevant international standards to ensure that the digital evidence that collected at the scene is reliable and admissible in court.

1.20 Title: What We Research About File Carving Tech & How We Use it in the Data Recovery Field

Authors: Xu Chao Ming (Chief Scientist)

Organization: XLY Salvationdata Technology INC.

Country: China

Abstract: This article generally talks about one of the effective technologies that can help the investigator recover as much as possible data from various files——File Carving.By proposing the common reasons that may cause data loss: hardware malfunction, logical failure, manual operation, and malicious attacks, and the challenges that would be faced by forensic experts in performing data recovery jobs such as data being scattered, file fragmentation, hard to obtain the file features, and overwritten file. Hereby we offer the principle of file carving with 4 steps: find the file signature, file repairing, fragment reorganization, and file reconstruction, accompanied by the patented algorithm of SalvationDATA that will be used in file carving technology will accurately source out the fragmented files and well accomplished the data recovery job with various files like images, compression, video, database, and documents.

2. Poster presentation

2.1 Title: Vehicle Speed Analysis from Black Box: Case Study

Authors: Duangsamorn Choodeejan, Amornrat Lekwichai

Organization: Department of Special Investigation

Country: Thailand

Abstract: Black box data from collided vehicle were sent to Digital Forensic Section, Central Institute of Forensic Science for vehicle speed analysis. These two files have different configuration of the devices, such as frame rate (frame/second), duration, including hash value. Metadata of both video files were examined prior calculated the vehicle speed. Formula v=s/t was used to calculate the vehicle where V is the speed (km/h), S is the distance (meters), T is the duration (seconds). After examined, the result shown that vehicle speed values from both files were not significantly different. Therefore, it can be concluded that the configuration of the black box has no affected on the vehicle speed calculation. However, the acceleration value of the video file (Video speed up) must be included in the calculation of compensation.

2.2 Title: Mobile Applications Scam: Case Study

Authors: Amornrat Lekwichai, Duangsamorn Choodeejan

Organization: Central Institute of Forensic Science, Department of Special Investigation

Country: Thailand

Abstract: Mobile phone applications scam or fraud through mobile applications It involves using a seemingly legitimate application to trick or steal information from users. This is a common pattern, such as

Fake apps, apps with malware, apps that collect money without your knowledge, phishing, etc.

Currently, Thailand is faced with a large number of fraudulent applications. Each year there are more and more victims. Lost a huge amount of money It is considered a top problem that must be resolved and prevented.

Department of Special Investigation and Central Institute of Forensic Science, both are agency under the Ministry of Justice. There are digital forensic laboratory a responsible for analyzing digital evidence. In this article, we present an example of mobile phone forensic in case of mobile application scam. Both in the Android and iOS operating systems in the case of fraud through mobile applications. The victims lost a large amount of money in their account. From the analysis results many evidence of fraud were found in various forms, such as sending fraudulent links through various channels such as SMS and chat applications, etc.

2.3 Title: Mobile phone artifacts from data extracted by Forensic TX 1 Imager .

Authors: Duangsamorn Choodeejan, Amornrat Lekwichai, Pattararat Homkrajang, Suthawinee Limsuwan, Thanpong Insorn

Organization: Department of Special Investigation, Central Institute of Forensic Science

Country: Thailand

Abstract: The Tableau Forensic TX1 Imager is a digital forensic and data investigative device specialized in computer forensic examination by lawyers and metallurgy scientists to examine devices such as HDDs and solid state drives. (SSD) without compromising the verification data has been found to be of critical importance in digital science investigations. Digital forensic examiners can efficiently and accurately extract digital forensic data based on ongoing research to improve the efficiency and usability of mobile devices, and investigate further can be verified. This study focuses on mobile phone artifacts including android and iOS operating system that acquired data by TX1 imager device.

- DFWG Meeting Summery -

Report on the 16th Asian Forensic Sciences Network (AFSN) Annual Meeting

Digital Forensic Workgroup (DFWG)

On August 28-29, 2024, at the Royal Thai Navy Auditorium, Bangkok, Thailand

Participants included digital forensic examiners from various countries across Asia and beyond, such as Singapore, China, Timor-Leste, Indonesia, Malaysia, India, Korea, Uzbekistan, and Thailand.

1. Solutions for Cracking private passwords

Authors: Zhang Yaoguo、 Bao Menghu、 Kang Yanrong

With the rapid development of technology, smartphones have become an essential part of our daily lives. These devices store a vast amount of personal and sensitive information, making them crucial in criminal investigations and legal proceedings. However, extracting evidence from smartphones can be a challenging task, especially when it comes to unlocking encrypted data. The importance of mobile phone forensics cannot be understated, as it plays a vital role in solving crimes and ensuring justice is served. As encryption methods become more sophisticated, cracking passwords and accessing locked devices have become increasingly difficult, posing a significant challenge for law enforcement agencies and forensic experts. In light of these challenges, researchers are continuously developing new techniques and method to enhance mobile phone forensics and overcome the obstacles presented by encryption. This article shares an idea of cracking the password of a mobile phone, focusing on cracking the password of the internal safe of the mobile phone.

Summary: There are five methods for password cracking

1. Technological Program

- Third-party tools for password recovery
- Download Modes for Android and DFU Mode for iOS
- Bypassing passwords using brute force techniques

- Face Unlock

- Fingerprint unlocks

2. Technology Program

- Fingerprint Simulation Unlocking

- AI facial photo Unlocking

3. Manual Solutions

- Guessing passwords based on birthdates, ID numbers, or phone numbers

- Gesture passwords, with common patterns such as L, N, Z, and C

4. Internal password of mobile phone

- Passwords manually entered and stored within various applications on the device

5. Internal password of mobile phone

- Stored passwords within the device, such as Password Vault or iCloud Keychain

2. Data Collection on ASIC Cryptomining: The Determination of Data Condition based on Network States and Network Protocol Type

Authors: Hanania Aida Mohd Hilmi @ Mohd Nor, Muhammad Rashid Redha Mohd Tahir

The preservation of cryptomining data has become a crucial element in managing evidence materials during raid operations and further analysis. With the increasing prevalence of cryptomining activities, law enforcement and forensic investigators need reliable methods to collect and analyze data from cryptomining machines. The collection of data on this ASIC cryptomining client pool depends on the network conditions applied to this cryptomining machine. Thus, we show the data on the ASIC cryptomining machine's client pool through different states of network status and network protocol type. The significance of this study will provide a detailed overview of the data conditions that can be obtained from the client pool with the network states based on best practices in digital forensics. This will facilitate investigations into cases related to cryptomining.

ASIC crypto mining machines support multiple digital currencies. This topic focuses on collecting data to compare the differences between static and dynamic internet network configurations when the network is on or off. A **static IP** configuration has the advantage that the settings remain unchanged even after restarting the machine, whether the network is on or off. Additionally, it allows access to certain information in the mining pool. On the other hand, a **dynamic IP** configuration assigns a new IP address every time the machine restarts. In the long run, this may result in restricted access to mining pool data, depending on the mining pool server's duration and the hardware and software configurations of the mining machine.

Data from Mining Pool:

Private and Public IP Address	Session
Mac Address	User Profile
Crypto wallet Address	Farm Address

Load Paper: https://www.cybersecurity.my/data/content_files/48/2435.pdf

3. Application of a Novel Frame Interval Timer for Frame Rate Verification in Speed Determination from Video Footage

   Authors: WONG Fai George, TAO Chi-hang, TAM Cheok-ning

In Hong Kong, many vehicles have been installed with dashboard cameras which are small video recording devices. Dashboard cameras serve as silent witnesses which capture pedestrian and vehicle movements on the road. Video footage recorded by dashboard cameras provide valuable and indispensable information on how traffic accidents occurred. In the Government Laboratory of Hong Kong (GL), over 500 video footage pertaining to traffic accidents were analyzed annually for speed determinations in traffic accident investigations. The average speed of a vehicle between selected landmarks was determined by choosing relevant image frames extracted from the questioned footage and using the distance-time equation (Speed = distance ÷ time). The accuracy of the time elapsed between the selected image frames in the questioned footage is ascertained by recording a control footage with a calibrated frame interval timer by the relevant dashboard camera for subsequent frame rate verification. Recently, GL has

designed and made a new frame interval timer with a time resolution of 1 millisecond. In this presentation, the design of this novel frame interval timer as well as its application in traffic accident investigations will be presented.

4. Application of Crash Data and Video Analysis in Traffic Accident Reconstructions
   Authors: TAO Chi-hang

Crash Data Retrieval (CDR) tool and Event Data Recorder (EDR) tool for retrieving data from accident vehicles nowadays becomes a powerful, indispensable and efficient tool for traffic accident investigations, which provided comprehensive vehicle information, such as status of accelerator pedal, brake pedal, steering angle, etc. prior to the accidents. Moreover, vehicle data retrieved from accident vehicles lacked visual video / image information of other vehicles and pedestrians prior to the accidents. In Hong Kong, the imported vehicles are not mandatorily required to have been installed with EDRs. However, there are still quite a number of vehicles equipped with EDRs registered in Hong Kong. The Government Laboratory (GL) has been providing crash data analysis service in Hong Kong since 2015, and had accumulated experience in analyzing vehicle crash data together with accident video footage. In this presentation, a number of traffic accidents having been investigated by GL through crash data analysis coupled with video footage analysis will be presented. The importance of correlating and synchronizing the events between them shall be highlighted.

5. Unveiling WhatsApp Identity Mismatch: A Forensic Investigation Case Study
   Authors: Meenakshi Mahajan, Asheesh Maihla

Mobile phone Forensic, a vital component of digital forensic investigations that involves the data acquisition, examination, and interpretation of digital evidences from mobile devices. The mobile phone has become the integral part of every individual which is being used for communication as well as majority of the daily tasks. Digital forensic scientists deal with the mobile exhibits of suspects involved in criminal activities. Over the past several years, many applications have replaced the place of SMS messaging and have developed in transmitting and storing the plain-text data to an encrypted version. One of the most widely used smartphone apps for communication, for both legal and criminal activity, is WhatsApp. WhatsApp introduced

end-to-end encryption of communication in early 2016, years after the introduction of WhatsApp application. However, the 6-digit verification code also termed as short code is required to register and login the account and is received via SMS on the associated number of the WhatsApp account. Further, the two-step optional verification feature was added by WhatsApp to enhance the security to access one's WhatsApp account. The particular study is A Case study on a WhatsApp identity mismatch observed and unveiled during the examination of mobile device of suspect.

6. Digital Forensics and UFED Cellebrite: Key Technologies in Modern Investigations for Mobile
   Devices in Investigations and Data Extraction

   Authors: Agung Ahmad Sulton Saputra

Digital Forensics is a subset of forensic science that centers on the identification, collection, study and demonstration of digital devices. The purpose of Digital Forensics is to assist in the investigation of crimes such as the spread of malware, identity theft, online fraud and hacking. Digital forensics is also often used to restore lost or deleted data for the benefit of the investigation process. Digital footprints that have been found are admissible in court to support legal proceedings. As well as maintaining regulatory compliance and security audits. By analyzing crime trends and providing security recommendations, Digital Forensics can prevent future crimes. With the development of information technology, cyber crimes such as Phishing, Carding, Ransomware, Identity Theft, SIM Swap, Skimming, Online Fraud, Site and Email Hacking, Data Forgery, Illegal Content, OTP Fraud, Cyber Terrorism, Cyber Espionage, and Plagiarizing other people's sites are increasing. Ufed Cellebrite is a digital forensic tool to extract and analyze data from mobile devices such as phones, tablets, memory, and simcards. Functions of extracting data from mobile phones, tablets, memory and simcard devices, restoring deleted or lost data, decrypting encrypted data, analyzing forensic data and creating forensic reports.

7. Psychological Impact of Online Loans: Survey Analysis and Digital Forensic Perspectives

   Authors: Mahmud Nasrul Habibi, Ditya Riski Taher, Cantaka Sasikirana

This study investigates the psychological impact of online loans through a comprehensive survey and analyzes the findings from a digital forensic perspective. With the proliferation of online lending platforms, many individuals face significant financial distress, adversely affecting their mental health. The research employs a survey method, collecting data from 200 respondents in Indonesia who have utilized online loan services, aiming to understand their experiences, psychological impacts, and coping mechanisms.

8. Digital Evidences for Vehicle Forensics

   Authors: Aisyah Binti Mohamad Hafizul

In this presentation, I aim to raise awareness about the importance of Event Data Recorders (EDRs) in vehicle forensics and their potential to aid future investigations. EDRs, often referred to as "black boxes," are installed in modern vehicles to capture critical data such as vehicle speed, engine throttle position, brake usage, and seatbelt status. This information is crucial for reconstructing events leading up to vehicular incidents.

By highlighting the benefits and challenges associated with EDR data analysis, I emphasize the need for effective collaboration among forensic experts, automotive manufacturers, and law enforcement agencies to ensure the integrity and admissibility of this evidence.

Understanding the capabilities and limitations of EDRs is essential for forensic investigators like myself. With increased awareness and knowledge, we can leverage this technology to enhance road safety, improve incident reconstruction, and support accountability in legal proceedings, ultimately making a significant impact on future vehicle forensics.

9. Enhancing First Responder Efficiency in Digital Forensics: Best Practices and Technological Advancements

Authors: Muhammad Faridzul Bin Sukarni

The role of first responders in digital forensics is critical in the early stages of cybercrime investigations. Their ability to properly secure and analyze digital evidence can significantly influence the outcomes of forensic examinations and subsequent legal proceedings. This paper explores the evolving responsibilities of first responders in the digital forensic landscape, emphasizing the importance of immediate, precise actions to preserve the integrity of digital evidence. We review current best practices, including the use of standardized protocols and procedures to minimize the risk of evidence contamination or loss. Furthermore, the paper highlights recent technological advancements, such as automated forensic tools and artificial intelligence applications, which enhance the efficiency and accuracy of initial data acquisition and analysis. By integrating these tools with traditional methods, first responders can improve their effectiveness in a variety of digital environments, from corporate networks to personal devices. The findings underscore the necessity of continuous training and education for first responders, ensuring they remain adept at handling the complexities of modern digital evidence. This comprehensive approach aims to empower first responders with the knowledge and tools needed to navigate the challenges of digital forensic investigations, ultimately contributing to more robust and reliable forensic outcomes.

10. Video Analytics in Digital Forensics

Authors: Muhammad Azree Bin Yahaya, Nor Salwani Binti Ja'afar

In the current world, technology play in nearly every aspect of daily life, extremely influencing how we interact, work, and solve problems. As people’s lives become more and more digitized, video analytics has become a crucial tool in digital forensics. An in-house technology developed to enhances the accuracy and efficiency of evidence collection, processing, and interpretation in video analysis. Advanced techniques such as object and facial recognition, motion detection, and behaviour analysis are very useful for identifying suspects or reconstructing events are implemented in this software. Furthermore, the technology can

manage a large datasets while maintaining data integrity to ensure the admissibility of evidence in court of law.

11. Recovering Critical Moments: Case Studies in Codec-Based Video Frame Recovery

Authors: Do Joon Jung, Ji Woo Lee, Ji Hun Kim, Seong Ho Lim, Oc-Yeub

In this presentation, we introduce three cases using codec-based video frame recovery. This technique recovers video frames using codec information, even when files are partially overwritten or incomplete. The first case is related to a car dash cam's memory card. These cameras often use a format-free method to prevent fragmentation. If recording is interrupted, resulting in incomplete files, video frame recovery can reconstruct event details from these files. The second case is about recovering CCTV footage from a fire scene. The CCTV system used proprietary video formats, only playable with specialized software. Due to an abnormal shutdown, index information was not recorded, making the video unplayable. Video frame recovery extracted frames, allowing us to identify the moment the fire started. The third case is related to a password-protected CCTV backup video. Although the files were password-protected, the frame data was unencrypted. Video frame recovery reconstructed the frames. Furthermore, by using a debugger, we modified the CCTV viewer software to bypass the password dialog, allowing playback without requiring the password. These cases demonstrate the effectiveness of video frame recovery in digital forensics, especially for incomplete video files or password-protected video files.

12. On-site Digital Evidence: Addressing Rise Technology Crime Case in Thailand

Authors: Miss Nisapha Khasrithong

Nowadays the trend of technology-related crime in Thailand is increasing and often involving electronic devices to commit the crime for example running online gambling websites, create child pornography media, corruption in government procurement, etc. But sometimes electronic devices themselves become targets in criminal activities such as fraud application on mobile phone, scamming (romance scam, gang call center), etc. Therefore, digital examiners should have up-to-date knowledge and skills in detecting and verifying data that related to the nature of offense in electronic devices. Digital evidence that is often found in technology crime

case includes mobile phones, tablets, computers, notebooks, CCTVs, servers, data on cloud and media storage. With the advance in technology as a results that electronic devices have exponentially increased data storage space. For this reason, on-site preview digital evidence at crime scene by using forensic tools is extremely important in term of eliminating extraneous evidence. On-site preview procedure is in accordance with the guideline of ACPO and other relevant international standards to ensure that the digital evidence that collected at the scene is reliable and admissible in court.

Poster Presentation

1. Vehicle Speed Analysis from Black Box: Case Study

   Authors: Duangsamorn Choodeejan, Amornrat Lekwichai

   Black box data from collided vehicle were sent to Digital Forensic Section, Central Institute of Forensic Science for vehicle speed analysis. These two files have different configuration of the devices, such as frame rate (frame/second), duration, including hash value. Metadata of both video files were examined prior calculated the vehicle speed. Formula v=s/t was used to calculate the vehicle where V is the speed (km/h), S is the distance (meters), T is the duration (seconds). After examined, the result shown that vehicle speed values from both files were not significantly different. Therefore, it can be concluded that the configuration of the black box has no affected on the vehicle speed calculation. However, the acceleration value of the video file (Video speed up) must be included in the calculation of compensation.

2. Mobile Applications Scam: Case Study

   Authors: Amornrat Lekwichai, Duangsamorn Choodeejan

   Mobile phone applications scam or fraud through mobile applications It involves using a seemingly legitimate application to trick or steal information from users. This is a common pattern, such as Fake apps, apps with malware, apps that collect money without your knowledge, phishing, etc. Currently, Thailand is faced with a large number of fraudulent applications. Each year there are more and more victims. Lost a huge amount of money It is considered a top problem that must be resolved and prevented. Department of Special

Investigation and Central Institute of Forensic Science, both are agency under the Ministry of Justice. There are digital forensic laboratory a responsible for analyzing digital evidence. In this article, we present an example of mobile phone forensic in case of mobile application scam. Both in the Android and iOS operating systems in the case of fraud through mobile applications. The victims lost a large amount of money in their account. From the analysis results many evidence of fraud were found in various forms, such as sending fraudulent links through various channels such as SMS and chat applications, etc.

3. Mobile phone artifacts from data extracted by Forensic TX 1

   Authors: Duangsamorn Choodeejan, Amornrat Lekwichai, Pattararat

The Tableau Forensic TX1 Imager is a digital forensic and data investigative device specialized in computer forensic examination by lawyers and metallurgy scientists to examine devices such as HDDs and solid state drives. (SSD) without compromising the verification data has been found to be of critical importance in digital science investigations. Digital forensic examiners can efficiently and accurately extract digital forensic data based on ongoing research to improve the efficiency and usability of mobile devices, and investigate further can be verified.

This study focuses on mobile phone artifacts including android and iOS operating system that acquired data by TX1 imager device.

DFWG Business Meeting

1. Uzbekistan has joined the DFWG network as a new member.
2. The People's Republic of China will host the annual academic conference for network members.
3. A Special Administrative Region will host the Inter Lab project for vehicle speed verification using CCTV footage.
4. Malaysia will host an online academic conference (topic yet to be determined).

DNA Workgroup (DNAWG)

Abstract

1. Oral Presentation

1.1 Title: Research on the Integrated Solution for Individual Identification and Body Fluid Identification

Authors: Sun Qifan, Wang Zhe, Zhao Yixia, Hu Sheng, Sun Hui, Ji Anquan

Organization: MPS's Key Laboratory of Forensic Genetics, Institute of Forensic Science, Ministry of Public Security (MPS)

Country: CHINA

Abstract: DNA and RNA are two kinds of biological macro-molecules, which play different roles in living organisms. At present, the aim of individual identification is mainly realized by STR typing through the detection of DNA, while the importance of RNA is also being explored gradually and used to solve some specific forensic problems, such as the determination of the origin of biological evidence tissue attributes. In this paper, we have developed a co-extraction reagent which can extract DNA and RNA simultaneously from trace biological samples. We also developed a one-step mRNA body fluid identification assay kit which can realize the identification of five types of body fluid samples commonly seen in forensic scenes. Using the DNA/RNA mixture extracted from the co-extraction reagent, we can perform the STR typing by commercial individual identification kit, and conduct the body fluid identification through the one-step mRNA kit, realize the purposes of individual identification and body fluid identification simultaneously.

1.2 Title: Evaluation of piRNA profiling for forensic body fluids identification

Authors: Yixia Zhao, Sheng Hu, Anquan Ji

Organization: Institute Of Forensic Science Of China

Country: CHINA

Abstract: Body fluids are a category of biological evidence, and accurate identification of forensic body fluids provides critical contextual for crime scene reconstruction, trial and sentencing. RNA profiling has emerged as one of the most widely studied methods for discriminating forensically relevant biological samples. Piwi-interacting RNAs (piRNAs) are a class of non-coding RNA molecule 24-32 nt in length.Sequences mapping to piRNAs have been reported in human seminal fluid plasma as well as in blood plasma, saliva, and urine,which indicates that its potential in forensic science is worth exploring.In this study, the relative expression levels of nine different piRNAs (piR-33043、 piR-33151、 piR-57125、 piR-31662、 piR-31068、 piR-31925、 piR-43771、 piR-43773、 piR-55521) were analyzed by real-time PCR, with 120 samples from 5 types of forensically relevant biological samples (peripheral blood, menstrual blood, saliva, semen and vaginal secretion).The evaluation results of Genorm, NormFinder, BestKeeper software and ΔCt showed that RNU6b was the most stable gene among the three internal reference genes:RNU6b, 5S-rRNA and hsa-miR-320c. The results of comparisons between groups and principal component analysis (PCA) indicated that the nine piRNAs have different discriminating abilities for the five body fluids. Especially, three piRNAs (piR-33151, piR-31662 and piR-31925) showed an unexpected ability to distinguish between saliva and vaginal secretion, based on this, we established support vector machine (SVM) classification model with the self-validation accuracy of 100%. Stability test also indicated that these piRNAs could still be detected in samples dried indoors for 12 months or UV irradiation for 48 hours. Our study shows that there are significant differences in the expression of piRNAs in body fluids, and we also provides a reliable and accurate classification model for distinguish between saliva and vaginal secretion.

1.3 Title: Individual identification and phenotype inference based on hair shaft proteome profile

Authors: Lei Feng, Anquan Ji

Organization: Key Laboratory of Forensic Genetics of Ministry of Public Security, Institute of Forensic Science

Country: CHINA

Abstract: Hair shaft is often found at crime scenes. For example, perpetrators naturally shed hair in various cases, or in cases of sexual assault or injury, external force pulls hair to break. As a lack of effective detection technology for hair shaft, it is underused forensically and its value is underutilized.

The hair shaft is robust and persist in the environment. It is rich in protein, accounting for more than 90%. Hair shaft proteome contains rich genetic information, one form is the abundances of specific proteins, and the other is, single amino acid polymorphisms (SAP) in the protein sequence. Mass spectrometry can quantify protein or peptide amount and detect the genetically variant peptides (GVPs) that contain SAPs.

The RMPs for 10 individuals calculated with SAP genotype frequency range from 2.62 × 10-3 to 2.07 × 10-10 (median = 4.88 × 10-6).

1.4 Title: Development of Mini STR Set for STR Mixture Study using Droplet Digital PCR Technology

Authors: Un Na Koh, So Eun Lee, Rita Fakhr and Si-Keun Lim

Organization: Department of Forensic Sciences, Sungkyunkwan University

Country: South Korea

Abstract: STR (Short Tandem Repeat) profile analysis is the most reliable method used for individual identification. When two or more DNA sources contributed to the mixture, generating a full STR profile of the minor contributor becomes challenging. In general, it is known that minor alleles are not detected at minor : major = 1:10 ratio or higher in conventional PCR methods. This is mostly encountered in sexual assault cases, where the male contributor is masked by the dominant female profile. In this study, ddPCR (Droplet Digital PCR) technology is applied instead of the conventional PCR in the PCR amplification step for STR profiling. ddPCR has the advantage of amplifying DNA in about droplets, therefore a relatively small percentage of DNA can be amplified, overcoming the stochastic effect of the conventional PCR. ddPCR amplification was performed by designing mini STR set (AMEL, CSF1PO, D21S11, D8S1179, D7S820, D16S539, vWA, D18S51, D5S818, D13S317, and FGA) for the analysis of mixed samples in the following ratios: 1:1, 1:5, 1:10, 1:15, and 1:20. As a result, minor alleles were called even at a ratio higher than 1:10. The results of the experiment confirm that mixture analysis with ddPCR technology can overcome the limitations of existing methods.

1.5 Title: 9th AFSN Inter-Laboratory DNA Exercise

Authors: Boon Kiat Ng*, Jia Jie Long, Juliana Sim, Felicia Goh, Brenda Ng, Nurul A'in Binte Mohamed Kassim, Christopher Kiu Choong Syn

Organization: DNA Profiling Laboratory, Biology Division, Applied Sciences Group, Health Sciences Authority, 11 Outram Road, Singapore 169078

Country: Singapore

Abstract: In the previous AFSN Inter-Laboratory DNA Exercises organised by the Biology Division of Health Sciences Authority (HSA), Singapore, insights from various downstream DNA analysis processes of DNA extraction to data interpretation were uncovered. Focusing upstream, the sample collection process, which is a critical process influencing optimal DNA analysis, is of interest this year. The efficacy of DNA recovery from samples depends largely on the swabs, swabbing methods, and parameters employed by the operator. With the support of Thermo Fisher Scientific, this year's 9th exercise sought to investigate the sample collection process with both the 4N6FLOQSwabs™ and the laboratory's routine swabs, as utilized by each participant laboratory with their swabbing methods and parameters. Four identical diluted blood samples stained on a non-porous substrate were provided to participant laboratories. Instructions were given to swab two samples using the provided nylon 4N6FLOQSwabs™, and two samples using the laboratory's routine swabs. Each laboratory then proceeded with their routine downstream processes of DNA extraction, quantification, amplification, and capillary electrophoresis. Finally, results from this study will be shared within the AFSN community: namely, 1) inter-laboratory comparisons and 2) intra-laboratory comparisons between the various swab types as coupled with the laboratory's routine methods.

1.6 **Title:** An Assessment of Quality Framework Practices in DNA Laboratories

Authors: Juliana Sim, Grace Law and Dr. Lui Chi Pang

Organization: Health Sciences Authority

Country: Singapore

Abstract: In today's world, accurate and reliable forensic testing is critical for ensuring public safety and upholding the administration of justice. Forensic DNA laboratories must establish validated methods, employ suitably qualified personnel, utilize advanced instrumentation and reliable consumables, and adhere to international standards for a robust laboratory quality assurance system. However, challenges such as budget and manpower constraints, rapid and evolving changes within the DNA area, and the demand for faster turn-around-time by law enforcement agencies can hinder laboratories in maintaining these standards. Despite these obstacles, DNA laboratories can still develop and uphold a rigorous quality assurance system in forensic sciences. We will be presenting results of a survey on the quality framework in the Biology discipline within AFSN member institutes, focusing on personnel competency, equipment and consumables, chain of custody, analysis, interpretation, reporting, procedures, protocols, and quality management. By gathering comprehensive information on current practices, our aim is to raise awareness, identify areas for improvement, and provide recommendations to enhance the quality of DNA testing in our member institutes. The survey findings will help to contribute to the overall improvement and maintenance of accurate and reliable practices among DNA laboratories in the AFSN.

1.7 Title: Accelerating Justice: Reducing Case Backlogs through Enhanced DNA Evidence Screening

Authors: PLTCOL SHEILA MARIE T ANGUSTIA

Organization: -

Country: Philippines

Abstract: In forensic laboratories, the backlog of unprocessed DNA evidence poses a significant challenge to the justice system and puts a strain on available resources. This presentation will delve into the adoption of specific policies aimed at streamlining DNA case management by enhancing the screening processes, ultimately aimed at effectively reducing these backlogs.

Key strategies in these policies include the classification and prioritization of DNA cases based on the probative value of the evidence. By focusing resources on cases with the highest probative value, forensic laboratories can ensure that the most crucial evidence is processed first. This approach not only speeds up the resolution of high-priority cases but also ensures that forensic results are of higher quality.

Implementing these strategies has shown several positive outcomes. Notably, it has led to faster case resolutions, which is critical for the timely delivery of justice. Moreover, the quality of forensic results has improved, providing more reliable evidence for judicial proceedings. These enhancements support the timely and fair adjudication of cases, contributing to the overall effectiveness and efficiency of the judicial system.

1.8 Title: Wisdom Tooth: A Minefield of High Quality DNA.

Authors: Ashwani Bhardwaj, Meenakshi Mahajan

Organization: Directorate of Forensics Services, Himachal Pradesh

Country: India

Abstract: The biological matrices viz. blood, hair, tissue, body secretions, bone, teeth, etc., are being used as a source for DNA profiling to establish identity. Out of them, the bones and teeth are preferred matrices in highly decomposed unidentified remains. But, there are instances of failures in generation of DNA profiles from tooth samples due to tooth decay. The laboratory examination revealed that the tooth sampled along with the mandible or the whole skull has resulted in either low quantity DNA or highly degraded DNA, leading to the failure of DNA profiling. In this study, a comparison of the quality & quantity of DNA from different types of teeth, i.e., incisors, canines, premolars, molars & partially erupted wisdom teeth was done through real-time PCR and STR typing. And this study revealed that the wisdom tooth yielded significantly better quality and quantity of DNA for DNA profiling in comparison to the other types of teeth samples. This study further gives insights to explore the relation of delayed root development of wisdom tooth with quality of DNA.

1.9 Title: Evaluation of DNA Typing Procedures for Human Remains Identification

Authors: Pagaran, Angelica P., Gallardo, Bea G., Delfin, Frederick C., De Ungria, Maria Corazon A., and Calacal, Gayvelline C.

Organization: DNA Analysis Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman

Country: Philippines

Abstract: DNA testing is one of the most validated tools for identifying human remains. However, genotyping remains to be a challenge when bone samples are exposed to warm and humid conditions accelerating body decomposition and DNA degradation over time. Bone type selection and use of an efficient DNA extraction method are crucial steps in generating reliable DNA profiles particularly when analyzing older and severely degraded remains.

Underscoring the importance of adequately establishing identities in forensic investigations, this study aims to evaluate robust and time-efficient DNA extraction methods using representative samples typically encountered in casework. DNA was initially extracted from 200 mg bone powder (n=3) using five methods, employing a combination of a demineralization step followed by organic (PCI/Microcon) or solid-phase purification techniques (DNA IQ, Promega or QIAQuick kit, Qiagen). Four of the methods recovered full profiles (80-100%) with concordant alleles in ≤1-month postmortem samples. However, when applied to a 5-year postmortem case, partial profiles (≤80%) were generated in only 2 methods. Further validation using 10 additional samples with varying conditions is underway to verify and improve genotyping results. Guided by these findings, we can analyze a wider spectrum of forensic cases where only bone samples are the only source for identification.

1.10 Title: The DNA Test And Analysis of A Hydatidiform Mole Formed During Pregnancy As A Result of Rape: A Case Report

Authors: Zhang Jing, Wang Chenming, Li Chunxiao

Organization: Public Security Bureau of Dezhou

Country: CHINA

Abstract: Hydatidiform mole (HM), also known as vesicular mass, refers to villous trophoblast hyperplasia and villous interstitial edema after pregnancy. It is bubble-like, and the bubbles are connected to each other in strings. It is named after the shape of grapes.Hydatidiform mole is a benign trophoblast cell tumor which can be divided into the Complete Hydatidiform Mole(PHD), and the Partial Hydatidiform Mole (PHM). In practice, most of the moles were complete moles with high malignant transformation rate, while a few were partial moles with rare malignant transformation.In this paper, STR complex amplification technique was used to examine a case of abortion tissue caused by rape, and the DNA of a complete hydatidiform mole was obtained, and this evidence was used to lock the suspect, which played a key role in the detection and litigation of the case.

1.11 Title: 20 years of creating DNA databases for investigation and identifying people.

Authors: CHANIDAPA SRINONGWA

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: Since 2004, the Central Institute of Forensic Science has been developing the DNA database. The goal was to use it as a tool to support investigations into criminal and missing persons cases. The operation is in accordance with the ISO 17025/IEC 2017 standard. Currently, there are two databases that contain genetic material. The first crime scene database contains genetic material from 224,647 profiles. The second is a genetic material database for cases involving missing persons, which contains 5,353 profiles. In 2005, comparing DNA profile patterns in the database allowed for the detection and comparison of cases involving both people and objects. In the criminal cases category, there were 2,557 reports, and in the missing persons database, there were 170 reports. In addition, we provide information-searching services to other judicial agencies in more than 280 cases (from 2019 to 2023). In addition, the Central Institute of Forensic Science provides the agency with DNA genetic information search services. In relation to other judicial processes, there were more than 280 cases (from 2019 to 2023). The DNA database project continues to receive budget allocations every year. There are also efforts to push for laws related to DNA databases.

1.12 Title: Unboxing the Mystery: The Role of DNA Evidence in Solving a High-Profile Murder Case in Cebu City, Philippines (A Case Study)

Authors: Guilda Sheariah O. Besinga, April C. Madroño, Junaisah C. Omar-Sevillena, and Adelayed S. Barros

Organization: Philippine National Police Forensic Group

Country: Philippines

Abstract: The recent murder case in Cebu City, Philippines, has drawn significant attention due to its brutal nature and the effective use of forensic science in the investigation. The body of the victim was found inside a cardboard box on July 17, 2023, in Sitio Mohon, Barangay Tisa. Law enforcement quickly identified a key suspect through a combination of witness statements, CCTV footage, and crucially, DNA evidence.

Initial clues came from CCTV footage that captured the victim's movements with an individual and the testimony of a habal-habal (motorcycle taxi) driver who transported the victim to a specific residence. This was bolstered by the discovery of the victim's cell phone at the suspect's location and the suspect's subsequent confession during a police interview.

The linchpin of the investigation was the DNA evidence. This forensic breakthrough provided conclusive proof linking the suspect to the crime scene and the victim. DNA analysis in this case exemplified its power in criminal investigations, offering indisputable evidence that significantly strengthened the case against the suspect.

Integrating traditional investigative methods with advanced forensic science, particularly DNA analysis, demonstrates the importance of a comprehensive approach to solving crimes. This case highlights how technological advancements in forensic science can lead to more efficient and accurate resolutions, ensuring justice for victims.

1.13 Title: Korean STR population study using MPS and introduction of novel analysis program, 'seq2pattern'

Authors: Sungmin Kim, Taehee Um, Jin-ah Baek, Su Jeong Park

Organization: DNA Chemical analysis Division, Supreme Prosecutors' Office, Seoul, Korea

Country: Republic of Korea

Abstract: Human identification using massively parallel sequencing (MPS) data becomes a rising interest in forensic genetics. FBI has suggested using standardized and patternized format of long repetitive sequences in STR typing study with MPS, also, they have authorized uploading DNA profiles which have been produced with MPS technique 2021. With STR profile from MPS, more rigorous statistical ratio can be calculated in not only HID but analyzing mixed DNA profile.

In this study, we analyzed 1,600 Korean population STR with KplexSeq A-25. KplexSeq A-25 panel results can be get with fastaq format, we developed analyzing program named 'seq2pattern' which organize sequences to LUS and LUS+ format simply and easily. Seq2pattern can calculate matching probability with LUS, LUS+ of STR data including the pattern, and anyone can analyze MPS sequence data after easy and short training. Also, we found a novel pattern of Korean population during the study. It can improve capability of HID in Korean population.

In next study, we will make a guideline of forensic DNA analysis using MPS-STR frequency for HID and mixed DNA profile analysis, and review the possibility of the application for real case analysis with MPS.

1.14 Title: Construction of an eight-plex microbial markers fluorescence multiplex identification system for identifying saliva and vaginal fluid.

Authors: Sheng Hu, Liuxia Zheng, Shuntian Guo, Qifan Sun, Yixia Zhao, Anquan Ji, Jian Ye, Wenli Chen

Organization: Institute Of Forensic Science, China

Country: China

Abstract: Objective The aim of this study was to establish an eight-plex fluorescent complex system for identifying saliva and vaginal fluid based on microbial markers. Methods The specific microbial markers in saliva and vaginal fluid were screened based on specificity and abundance through the investigation of the literature. Stain samples of saliva, vaginal fluid were prepared, and total DNA was extracted. The multiple microbial markers fluorescence identification system was constructed by capillary electrophoresis, and the body fluid stain samples were used to test the specificity and sensitivity of the system. Results In this study, five salivary microbial markers (Neisseria subflava, Veillonella atypica, Streptococcus salivarius, Streptococcus oralis, Porphyromonas catoniae), and three vaginal fluid microbial markers (Lactobacillus crispatus, Lactobacillus gasseri, Bifidobacterium breve) were screened. An eight-plex microbial markers fluorescence multiplex identification system was constructed by capillary electrophoresis technology, and the specificity of the system were verified using 140 samples. The test results showed that microbial marker specificity of saliva and vaginal fluid is good. The detection sensitivity of saliva was 0.065 ng of total DNA, and that of vaginal fluid was 0.125 ng of total DNA. The total DNA extracted during the process of this system can simultaneously meet the needs of forensic short tandem repeat sequence typing. Conclusion The eight-plex microbial markers fluorescence multiplex identification system can identify saliva and vaginal fluid effectively and provide a new method for body fluid stain identification at crime scene.

1.15 Title: Development of SNP-based real-time PCR assay for narcotic and non-narcotic Papaver species distinction.

Authors: Department of Forensic Science, Sungkyunkwan University

Organization: Institute Of Forensic Science, China

Country: South Korea

Abstract: The distinction between narcotic and non-narcotic Papaver species has become important due to the surge in drug-related crimes. The existing discrimination methods, morphological and chemical analyses, have challenges which often lead to inaccurate and inconclusive results. To overcome these limitations, this study focused on developing single nucleotide polymorphism (SNP) markers in the region of two universal DNA barcodes: ITS2 and trnL-trnF. By comparing sequences for narcotic species (Papaver somniferum and Papaver somniferum subs. Setigerum) and non-narcotic species, two SNPs were identified for each DNA barcode respectively. Narcotic species include A and T while non-narcotic species include G and C. In addition, two SNPs were identified to differentiate the other narcotic species within ITS2: T and G for Papaver bracteatum, C and A for other poppy species. Therefore, a TaqMan® probe real-time PCR assay was developed to confirm the narcotic Papaver species. The successful results of this study would a provide more reliable and effective analysis that helps related investigations and strengthens the crackdown on illegal poppy cultivation or trafficking.

1.16 Title: Likelihood Ratios (LRs) from Probabilistic Genotyping vs Binary Interpretation; What are the differences?

Authors: Zulhilmi bin Husni, Siti Hajar binti Hussin and Nor Aidora binti Saedon

Organization: Department of Chemistry Malaysia

Country: Malaysia

Abstract: The application of LR can be seen in many fields of biological, information and social science. Fundamentally, LR is a measure of information that can be summarized in a single number; It is a way of accounting for all the evidence in favour of a particular hypothesis. LR is also the match statistic that is commonly used in DNA reporting. For some, explaining LR can be an intimidating task. This is probably due to the nature of LR which was originated from the Bayesian mathematical statistic. Nevertheless, many laboratories worldwide have opted the statistic of LR due to its reliability and accurateness in showcasing DNA evidence at court. However, with the rise of probabilistic genotyping in DNA profile interpretation, a new breed of LR is born and displaying differences from LR calculated from binary interpretation. The principals and nuances between probabilistic genotyping LR and binary interpretation LR shall be presented and discussed in detail.

1.17 Title: One-pot direct loop-mediated isothermal amplification (LAMP) with immunochromatographic strip (ICS) for detection of human saliva and expectorated spatter

Authors: ZHakrae Lee, Yu-Jin Oh, Ye-Bin Kim, Ye-ju Kim, Si-Keun Lim

Organization: Sungkyunkwan University

Country: Republic of Korea

Abstract: Screening saliva and expectorated spatter in the crime scene is important in forensic investigations, such as murder, sexual assault, and other crimes. Streptococcus salivarius methionine aminopeptidase gene (MetAP) and Major Histocompatibility Complex, Class II, DR Alpha (HLA-DRA)-targeted loop-mediated isothermal amplification (LAMP) combined with Immunochromatographic strip (ICS) was developed to be used on-site. Met-AP primer was labelled with TAMRA and HLA primer was labelled with FAM. Forward-inward primer (FIP) of HLA and MetAP were both labelled with biotin and Loop-forward (LF). Multiplex ICS was developed with one anti-biotin control line and two test lines; anti-TAMRA and anti-FAM antibody respectively, which allowed detection of HLA-DRA at test line 1 and MetAP at test line 2. Direct lysis was used which detected amplificated DNA without extraction and purification. 10x Primer mix was prepared for the LAMP assay (2μM each of F3 and B3, 4μM each of LF and LB, 16μM each of FIP and BIP). LAMP assay was conducted at 65℃ for 30 minutes and ICS for 10 minutes. The workflow requires less than 45 minutes and does not require any specialized equipment. For further studies, one-pot instrument will be designed which is optimal for the on-site usage.

1.18 Title: Forensic Genetics in Non-Human Species: Development of STR Rice Identification Panel (STRIP)

Authors: Lorna H Santos, Ann Maureen C. Malonzo, and Loida M. Perez

Organization: Philippine National Police

Country: Philippines

Abstract: Forensic genetics has traditionally been associated with human identification and criminal investigations, primarily analyzing human biological materials to establish connections between items and identify their sources. However, this focus often overlooks the vast array of associative evidence, including botanical, microbial, and animal materials. Genetic analyses of these non-human materials can significantly aid investigators by providing species identification, indicating the population origin of samples, and establishing genetic identities between samples. Rice, a vital global staple crop, faces challenges such as food fraud, crop contamination, and intellectual property disputes, necessitating accurate and reliable identification methods. By employing Short Tandem Repeats (STR) as genetic markers, we developed a robust method for identifying and authenticating Philippine rice cultivars. Our objective was to create a dependable system to support plant varietal protection efforts in line with Philippine regulations. It also aims to develop consensus methodologies, supporting allelic databases and standardized statistical analyses for data exchange among laboratories. The forensic DNA model developed in this study offers a promising approach for protecting rice varieties and can be adapted for other high-value crops.

1.19 Title: DNA-Prokids

Authors: Jose A.Lorente

Organization: -

Country: -

Abstract: -

2. Poster Presentation

2.1 Title: A study on the separation of sperm cell using a centrifugal separation device in sexual assault cases

Authors: Gangnam Jin, Jungyoun Lee, Euree Ahn, Yoonjung Cho, Soyeon Lee, Manil Kim, Eungsoo Kim

Organization: National Forensic Service

Country: Republic of Korea

Abstract: Accurate differentiation between male sperm cells and female epithelial cells in sexual assault cases is crucial step in obtaining the DNA profile of the perpetrator. Conventional method such as differential extraction (known as differential lysis) has been utilized for the separation of sperm cells and female epithelial cells, However, this method is labor-intensive, prone to sample cross contamination, and may result in the loss of sperm cells.

In order to address these limitations, we aimed to separate sperm cells and epithelial cells using centrifugal separation with a disc-shaped device containing two filters, each with pore size capable of capturing each cell type separately.

Each filter containing captured cells was placed into separate tubes for DNA analysis. As a result, DNA profiles of male and female were obtained separately. These DNA profiles were consistent with those obtained using the conventional differential extraction method.

2.2 Title: Enhancing Eastern Asian Ancestry Prediction with Machine Learning Models Trained on Y Chromosomal Short Tandem Repeats Haplotypes

Authors: Haeun You, Sohee Cho, Sojung Lim, Soong Deok Lee

Organization: Institute of Forensic and Anthropological Science, Seoul National University Medical Research Center

Country: South Korea

Abstract: Ancestry prediction is crucial in forensic investigations when a direct suspect match is unavailable. However, current forensic ancestry inference panels often lack differentiation among East Asian populations. To address this issue, we developed machine learning models trained on a massive dataset of 10,154 Y-chromosomal short tandem repeat (Y-STR) haplotypes from Asian individuals. Our findings revealed clear genetic differences between East Asians and their neighboring Southwest Asians, with East Asian populations exhibiting a tendency towards northern and southern differentiation. The developed models achieved high accuracy, exceeding 80%, with the XGBoost model exhibiting the optimal performance. This study contributes to a better understanding of the genetic variation among East Asian populations and proposes a promising approach for inferring the origin of an unknown sample based on a massive scale of Y-STR data.

2.3 Title: Massively Parallel Sequencing in Forensic Genetics: A Bibliometric Insight

Authors: Yuen Yee Chi, Muhammad Farid Azlan Halmi, Biling Anak Peter Raig

Organization: Department of Chemistry Malaysia

Country: Malaysia

Abstract: Massively parallel sequencing (MPS), also known as next-generation sequencing (NGS) or high-throughput sequencing (HTS), represents a significant advancement in forensic science. This study assesses the knowledge structure of this molecular technique in the domain of forensic genetics since its' release in 2005. A total of 1,095 publications were retrieved from the Web of Science (WoS) Core Collection, employing related keyword searches. Of the total scientific publications, 23,262 total citations were found, with 21.24 average citations per publication. The United States of America dominated the research and is currently the leader in this knowledge domain with the most publications, followed by The People's Republic of China. Visualization analysis for mapping research trends based on co-occurrences of keywords was done using VOSviewer revealing six core clusters of research themes comprising; 1) general development validation of MPS; 2) forensic microbiome; 3) ancestry inference; 4) DNA methylation profiling; 5) mitochondrial DNA (mtDNA) sequencing and 6) post-mortem molecular autopsy. The development and application of microhaplotype panels and DNA methylation are gaining increasing interest in forensic analysis. This work is useful to strategically inform future research priorities of forensic science and potentially facilitate collaboration to advance the field.

2.4 **Title:** Identification of contributors from a mixed DNA profile by calculating the percentage contribution and peak height ratio

Authors: Police Captain Paweena Mukda, Police Lieutenant Colonel Nonglak Sinkhan, and Police Colonel Hathaichanoke Boonyarit

Organization: Biochemistry Sub-division, Institute of Forensic Medicine, Police General Hospital, Royal Thai Police

Country: Thailand

Abstract: DNA profiling is a potent tool in forensic science, especially in solving challenging crime cases. In criminal cases, circumstantial evidence collected from sexual assault cases generally involves a DNA mixture profile. This can pose significant challenges in terms of result analysis and interpretation. This study demonstrated the deconvolution process of the DNA mixture profile using percentage contribution and peak height ratio. The DNA mixture was created using a 4:1 ratio of blood and semen. The deconvolution technique results revealed the true contributors compared to the reference profile. Furthermore, we employed GenoProof Mixture 3 software for statistical calculations, focusing on the likelihood ratio (LR) to support the true contributors. The DNA mixture profile was analyzed using a fully continuous model. The LR was 4.81E+25, indicating extremely strong evidence. However, the DNA evidence is more complicated due to multiple contributors and low quantities of DNA. Therefore, forensic DNA scientists should be considered when encountering DNA mixture profiles.

2.5 Title: Effects of Fingerprint Enhancement Techniques on Forensic DNA Recovery

Authors: Xiaoyang Li, Yong Sheng Lee, Susan Chua, Ying Yin Loh, Sabrina Binte Mustaffa, Alvin Kok Leong Khah, Sheryl Su Yun Seet, Nur Ayuni Binte Sulaiman, Christopher Kiu-Choong Syn

Organization: Health Sciences Authority

Country: Singapore

Abstract: Fingerprint analysis and DNA profiling are two commonly used methods by forensic examiners to identify persons of interest. Recently, studies have established the possibility of obtaining DNA and latent fingerprints from the same location after application of fingerprint enhancement techniques. Hence, DNA recovery can be performed following fingerprint analysis to maximize the value of evidence. However, it is unclear whether certain fingerprint enhancement techniques can potentially interfere with DNA recovery from particular surfaces. In this study, experiments were conducted to evaluate the effects of various fingerprint enhancement techniques on DNA recovery. Various items representing commonly encountered casework exhibits such as paper, metal sheet, duct tape, acrylic and trash bag were used to determine the impact of these enhancement techniques on DNA recovery. Results showed that the staining of DFO and ninhydrin on paper significantly impacted the DNA recovery leading to an average of 76% decrease in extracted DNA quantity and a 59% decrease in DNA profile percentages after fingerprint enhancement. In contrast, the other tested fingerprint enhancement techniques did not significantly impact DNA recovery. Hence, this study highlights the importance of selecting compatible fingerprint enhancement techniques for DNA recovery, therefore assisting crime investigators in maximizing the value of evidence.

2.6 Title: Chelex as an Alternative DNA Extraction Method

Authors: Fareez Keegan Bin Abdul Kadir, Annabel Suan Tay, Cecilia Si Si Ling, Nurul A'in Binte Mohamed Kassim, Shilen Ng, Susan Yueru Chua, Hang Yee Wong, Christopher Kiu-Choong Syn

Organization: Health Sciences Authority

Country: Singapore

Abstract: The Chelex extraction method, as a one-tube direct lysis approach, presents a cost-effective alternative to traditional DNA extraction protocols. In this study, we evaluated the efficiency of Chelex extraction compared to conventional Maxwell® FSC extraction on blood samples. We also examined the impact of different incubation conditions on DNA yield, and assessed the stability of the extracted DNA at 4°C storage and through repeated freeze-thaw cycles. Additionally, we explored the suitability of Chelex extraction for various casework samples, such as cigarette butts, hair, and touch DNA. Our findings provide valuable insights into the limitations of this method, as well as its potential for large-scale sample processing.

2.7 Title: Optimizing Bone Sample Analysis for Missing Person and Unidentified Body Examination through Massively Parallel Sequencing (MPS)

Authors: Chalampoo Wongworavivat,Nattida Srinak, Somruetai Satmun, Anillada Nettakul*, Worawee Waiyawuth (*Co-author)

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: Forensic investigations frequently rely on DNA analysis, and bone samples are a common source of evidence. However, DNA recovery from bones is difficult due to degradation and inhibitor presence. This study, based on previous research, attempted to optimize bone sample analysis for missing persons and unidentified body examinations.

Three bone types (femur, occipital bone, and petrous section of the temporal bone) were sampled from twelve bodies using two different methods: modified organic extraction and silica-based extraction. The analysis of genetic profiling through Short Tandem Repeat (STR) was performed by Massively Parallel Sequencing (MPS) techniques using Precision ID Library Kit and Precision ID GlobalFiler™ NGS STR Panel v2 on the Ion Chef™ System and Ion GeneStudio™S5 Prime System. The STR profiles were compared to prior results obtained using the GlobalFiler® PCR Amplification Kit.

The result show that MPS is a crucial technique for enhancing the STR analysis by providing more comprehensive genetic information. The petrous part of the temporal bone yielded the most promising results, followed by the femur and then the occipital bone. Furthermore, modified organic extraction is the most efficient technique for STR typing by MPS.

2.8 Title: Identifying the Unidentifiable: The Critical Role of DNA Analysis in the Mountain B Nightclub Fire Tragedy

Authors: Police Captain Supakorn Bunchongphoklang and Police Colonel Hathaichanoke Boonyarit

Organization: Insitute of Forensic Medicine, Police General Hospital, Royal Thai Police

Country: Thailand

Abstract: The Mountain B nightclub fire incident, which occurred on August 5, 2022, in Chonburi Province, Thailand, resulted in 26 deaths. The rapid spread of the fire, worsened by the use of highly flammable soundproofing materials and obstructed exits, initially killed 13 people, with an additional 13 victims succumbing to their injuries later during medical care. All 13 unidentified remains were sent to the Institute of Forensic Medicine, Police General Hospital, for autopsy. The severity of the fire rendered the remains unrecognizable, prolonging the identification process and delaying the release of their bodies. Blood samples were collected from all the victims for DNA analysis, along with 14 FTA® card samples from potential relatives. DNA profiles were generated for each individual. The identification process utilized autosomal STR markers and statistical evaluations to compare the DNA profiles of the victims with those of their family members. This comparison included calculating the paternity index (PI) and likelihood ratio (LR) to ensure accurate identification. Additionally, mitochondrial DNA analysis was used to assist in identifying one of the victim's maternal lineages. Consequently, all victims were successfully identified. This incident highlights the critical importance of DNA analysis in mass casualty events where conventional identification methods are inadequate.

2.9 Title: Improved Protocol for DNA Extraction from Bone Material Using the EZ2 Connect Fx Instrument

Authors: Mahzan bin Md Tab, Nur Fadzlina Binti Yahaya, Dayang Zarifah Ataillah Binti Awang Aemeran, Faten Najah Binti Mohd Kassim, Siti Hajar Binti Hussin & Nor Aidora Binti Saedon

Organization: Department of Chemistry Malaysia

Country: Malaysia

Abstract: Addressing the backlog and reducing turnaround time for Forensic DNA cases that involves biological evidence pose significant challenges. Automated instrumentations are mostly used in forensic laboratories to increase efficiency and capacity in the process of analysis. This study aimed to evaluate the improved methods of DNA isolation from bone materials with new protocol using automated EZ2 Connect instrument. The process involved different bone types including femur, sternum and ribs with different incubation periods. Two pre-treatment processes were applied; 2-hrs and 16-hrs incubation period and tested using the EZ2 Connect protocol. The findings showed that the DNA obtained from the 2-hrs incubation period were comparable with the 16-hrs (overnight), indicating that a shorter pre-treatment period is sufficient to produce optimum and reliable results. These results demonstrated that the 2-hrs incubation period with automated EZ2 Connect instrument protocol is highly adoptable to improve turnaround time for Forensic DNA cases especially in the Disaster Victim Identification (DVI). Also, the use of an automated method facilitated the effective accumulation of isolates and increased the chances of successful identification of unknown human remains.

2.10 Title: GENETIC CHARACTERISTICS OF 22 a-STR LOCI IN THE VIETNAMESE POPULATION

Authors: Nguyen Thi Lan Huong, Vuong Gia Bao, Mai Quang Truong

Organization: Forensic Medicine Center of Ho Chi Minh City HCMC

Country: Vietnam

Abstract: This study reported Short Tandem Repeat (STR) allele data from 4346 Vietnamese individuals across 22 autosomal STR (a-STR) loci: CSF1PO, FGA, TH01, TPOX, vWA, D1S1656, D2S1338, D2S441, D3S1358, D5S818, D7S820, D8S1179, D10S1248, D12S391, D13S317, D16S539, D18S51, D19S433, D21S11, D22S1045, Penta D and Penta E. Sample types included buccal swab, blood, hair, nail, tissue, tooth, bone. DNA extraction was performed using QIAamp DNA Mini Kit, QIAamp DNA Investigator Kit and Bone DNA Extraction kit. PCR reactions were carried out with the PowerPlex® Fusion System kit. The PCR products were subjected to capillary electrophoresis on ABI 3500 Genetic Analyzer. Electrophoretic results were analyzed using GeneMapper® ID-X software v1.4. Direct counting method and excel software were applied to determine allele frequency and forensic parameters. The allele distribution frequencies of 22 a-STR markers were established. The samples were in Hardy–Weinberg equilibrium. The combined probability of matching (pMcomb), combined power of discrimination (PDcomb), combined power of exclusion (PEcomb) and combined paternity index (CPI) achieved values of 6.224x10-27, 1, 0.999999998952507 and 8.481x108, respectively. The a-STR loci have high discriminatory power and polymorphic information, which demonstrates that a-STR has great potential for population biodiversity research, human identification, paternity testing, and forensic applications.

2.11. Title: LENGTH AND SEQUENCE HETEROPLASMY IN mtDNA D-LOOP REGION OF INDIVIDUALS FROM KINH POPULATION IN SOUTHERN VIETNAM

Authors: Nguyen Thi Lan Huong, Vuong Gia Bao, Mai Quang Truong

Organization: Forensic Medicine Center of Ho Chi Minh City

Country: Vietnam

Abstract: In forensic science, the control region of human mtDNA, located at position 16024-576, is extensively studied. However, high mutation rates in mtDNA can cause heteroplasmy which complicates the interpretation of mtDNA results. This work investigated the presence of heteroplasmy (length and sequence) in the hypervariable regions (HVI, HVII and HVIII) on D-loop segment of the mtDNA from 396 unrelated healthy Kinh individuals using standard Sanger sequencing method. All subjects displayed length and sequence heteroplasmies in the HVI, HVII and HVIII regions. From position 16180-16196, 15 patterns of polycytosine were observed (31.56%), whereas 55.81% of Kinh individuals were similar to the reference and 8 patterns (12.63%) didn't have polycytosine but were different from the reference. From position 303-315, 8 patterns were observed, whereas 7CT6C and 8CT6C were the most frequencies. From position 514-523, there were 4 motifs of (AC)n, including (AC)4 to (AC)7. From position 568-573, there were 6 samples (1.52%) with insertion of +2C, +3C, and +4C at np 573. In addition, there were 8 samples (2.02%) with sequence heteroplasmy, in which 7 positions were detected. Nomenclature of variants was established according to EMPOP guideline. The study provided a new perspective with important consequences in medical, evolutionary and forensic fields.

2.12 Title: POTENTIAL OF SCIENTIFIC EVIDENCE INFORMATION IN DETERMINING UNKNOWN CRIMINAL SUSPECTS OF HOMICIDE CASE USING DNA SAMPLES COLLECTED FROM THE VICTIM'S BOD (A case study of the homicide of MS, a female medical doctor served in a rural area)

Authors: Wahyudi, I., Anasti, S.P., Monasari, D., Wahyuningsih, R.D., Savitri, R., Swastika, R.A., Mahdalifah, Fauziah, R., Sugiarto, H., Priono, R., Hardianti, S.P., Anisa, V., Kuswardani, Yulihartono, P.H.

Organization: Department of Police Medicine of the Indonesian National Police (DNA Laboratory)

Country: Indonesia

Abstract: The use of DNA profiling to solve crimes has been well known globally, enhancing crime clearance rate in every country. However, a perfect, full DNA profile is seldomly obtained from evidence collected from the crime scenes due to low DNA concentration. Swab taken from the body of the victims could be considered as potential scientific evidence, especially to determine the involvement of unknown suspects in a homicide case. One year ago, on March 9th, 2023, MS, a female medical doctor served in rural area of East Indonesia Region, found dead at her home. Medical examination of the dead body was conducted at the Regional Police Hospital, hoping to find the cause and the time of the death. Several DNA samples were taken from the neck, nipple area, vagina, rectum, and nails using cotton swabs. 19 people suspected of being the perpetrators of the murder were detained and their buccal swab samples were taken for reference. DNA examination and analysis were carried out using default protocol of Globalfiler PCR amplification kit, 3500xL Genetic Analyzer, and Genemapper IDX software, where mixture DNA profiles were obtained from the nipple area swab samples. Part of the mixture DNA profile is matched to the female victim, while the other part of the mixture DNA profile is matched to one of the male suspects, KW. From the result, it can be concluded that swab taken from the nipple area is proven to be a potential DNA sample, providing useful information to uncover possible unknown homicide suspect as long as it is handled with care to avoid any contamination.

2.13 Title: A new method of collecting the shedding cells on the surface of clothing)

Authors: HAO Jinping

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: Case Samples, DNA Typing, Forensic Cell Enriching Device,

2.14 Title: DNA testing method for Papaver somniferum L.

Authors: Gao Shan,Zhang ying,DU Meng

Organization: IInstitute of Forensic Science, Ministry of Public Security, P.R.C

Country: China

Abstract: Papaver somniferum L., as the main source of drugs, has become one of the three major drug plants along with cannabis and coca.Therefore, China strictly controls poppy cultivation, and all cultivation is prohibited except for medicinal research.Poppy and its closely related species are extremely similar in plant morphology,and at the seedling stage, chemical substances such as morphine are extremely low and difficult to detect. Therefore, there are certain limitations in morphology and physicochemical testing.Researchers have developed SSR markers for poppy using Restriction association site DNA technology (RAD) and established a composite amplification system containing 8 poppy species specific SSR loci, which can distinguish poppy from other plants.

2.15 Title: A highly efficient pretreatment method for extracting high-quality DNA from aged human remains eroded by pigments

Authors: Mrs. Gao Linlin, Mrs. Fu Yanfang, Mrs.Zhang Mingya, Mr. Wang Xufeng

Organization: Institute of Forensic Science, Hangzhou Public Security Department

Country: China

Abstract: In the past, some DNA extraction methods have been reported for obtaining high-quality DNA from aged remains, as well as differences in DNA yield between cortical and cancellous bones. However, few studies have discussed an optical approach by comparing different pre-treatment methods for extracting high-quality DNA from aged remains eroded by pigments. In our study, STR profiles were obtained from bone debris produced by using an electric drill in the dense cortical regions of remains. The results showed that an efficient pretreatment method is very important for obtaining high-quality DNA from aged remains eroded by pigments.

- DNAWG Meeting Summery -

Executive Committee Meeting

The DNA Working Group (DNAWG) conducted elections for the Executive Committee for the 2025–2026 term. The election results are as follows:

- Chair: Health Sciences Authority (HSA), Singapore
- Vice Chair: Institute of Forensic Science (IFS), China
- Annual Meeting Secretary: National Forensic Service (NFS), South Korea
- Secretary 1: KIMIA, Malaysia
- Secretary 2: Central Institute of Forensic Science (CIFS), Ministry of Justice, Thailand

The work plan for 2024–2025 includes:

1. Quality Meeting (October–November 2024) – Establishing a quality management framework for the network.
2. 10th Inter-laboratory Comparison (July 2025) – Conducting proficiency testing among network laboratories.
3. Survey on Laboratory Processes and Contamination Issues – Assessing operational procedures and contamination risks in forensic DNA laboratories.
4. Webinar Sessions – Organizing online academic seminars based on network members' needs.

Summary of Presentations in DNAWG

Topic Development of Mini STR Set for STR Mixture Study using Droplet Digital PCR Technology

Presented by: Un Na Koh, Department of Forensic Sciences, Sungkyunkwan University, South Korea

Genetic profiling is one of the most reliable methods for individual identification. However, when DNA samples originate from multiple sources, obtaining a complete genetic profile of a minor contributor becomes challenging. In typical cases, minor alleles often go undetected when the minor-to-major DNA ratio is 1:10 or higher using traditional PCR methods. This issue is particularly common in sexual assault cases, where the male perpetrator's genetic profile is overshadowed by the female victim's DNA.

This study explores the use of Droplet Digital PCR (ddPCR) as an alternative to conventional PCR for DNA amplification in forensic STR mixture analysis. ddPCR offers significant advantages, as it amplifies DNA in tiny droplets, allowing for better detection of low-quantity DNA and minimizing stochastic effects commonly observed in traditional PCR methods.

The DNA amplification process using ddPCR was conducted with a custom mini STR kit targeting the following loci: AMEL, CSF1PO, D21S11, D8S1179, D7S820, D16S539, vWA, D18S51, D5S818, D13S317, and FGA

STR mixture analysis was performed at ratios of 1:1, 1:5, 1:10, 1:15, and 1:20. Results demonstrated that minor alleles could still be detected even at ratios exceeding 1:10.

The findings confirm that STR mixture analysis using ddPCR technology overcomes the limitations of conventional methods, offering a more effective solution for forensic DNA mixture interpretation.

Topic Tools for Human Remains Identification – A Comprehensive Approach to Improve Workflow Efficiency

Presented by: Daniel Power, Thermo Fisher Scientific, Australia

There are many factors to consider when identifying human remains, one of which is a comprehensive workflow process. Managing a holistic workflow can improve identification efficiency by reducing the time required and optimizing the handling of samples. This involves using purification reagents and STR amplification kits from Thermo Fisher Scientific's Applied Biosystems® along with capillary electrophoresis separation, as well as employing Ion Torrent NGS. These tools play a crucial role in achieving accurate identifications. Overall, Thermo Fisher Scientific's Applied Biosystems® comprehensive approach significantly enhances the human remains identification process, leading to accurate and reliable results.

Topic Evaluation of DNA Testing Process for Human Remains Identification

Presented by: Angellica P. Pagaran, DNA Analysis Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman, Philippines

DNA testing is one of the most reliable tools for identifying human remains, but it remains challenging when bone samples are exposed to warm and humid environments, which accelerate the decomposition of the body and degradation of DNA over time. The selection of bone type and the use of efficient DNA extraction methods are critical steps in generating reliable DNA profiles, especially when analyzing remains that are old and severely degraded.

Due to the importance of proper identification in forensic investigations, this study aimed to evaluate DNA extraction methods that are durable and time-efficient, using samples commonly found in forensic investigations. DNA was initially extracted from 200 mg of bone powder (n=3) using five methods, including demineralization followed by organic purification techniques (PCI/Microcon) or solid-phase purification techniques (Promega DNA IQ kit or Qiagen QIAQuick kit). It was found that four methods could generate complete DNA profiles (80-100%) with consistent alleles in samples collected within ≤1 month post-mortem. However, when

these methods were applied to cases of remains aged 5 years, only two methods yielded incomplete profiles (≤80%).

Further investigations are currently underway to assess the feasibility of additional methods using 10 more samples from different environments to confirm and refine DNA profile generation results. This study's findings will broaden the scope of forensic case analysis, especially in cases where bone remains are the only source for identification.

Topic Likelihood Ratios (LRs) - Probabilistic Genotyping vs Binary Interpretation

Presented by: Zulhilmi bin Husni, Department of Chemistry Malaysia, Malaysia

The application of Likelihood Ratios (LRs) can be found in various fields such as bioinformatics and social sciences. Essentially, LR is a measure of data that can be summarized in a single number, representing the calculation of all evidence supporting a particular hypothesis. LR is also a widely used matching statistic in DNA reporting. However, explaining LR can be challenging for some, as it is based on Bayesian Statistics. Despite this, many laboratories worldwide prefer using LR statistics due to its reliability and accuracy in presenting evidence in court. With the rise of probabilistic genotyping in DNA profile interpretation, new types of LRs have emerged, differing from the LRs calculated from binary interpretation.

Topic 9th AFSN Inter-Laboratory DNA Exercise

Presented by: Zulhilmi bin Husni, Department of Chemistry Malaysia, Malaysia

The DNA inter-laboratory exercise of the AFSN network, organized by the Biology Unit of the Health Sciences Authority (HSA), Singapore, revealed insights from various DNA analysis processes, from DNA extraction to data interpretation. This year, the focus was on the sample collection process, a critical step that significantly affects the efficiency of DNA analysis. DNA collection depends largely on the type of swab used, the method of collection, and the parameters employed by the operators.

For the 9th inter-laboratory exercise, the sample collection process utilized 4N6FLOQSwabs™ and the standard swabs used in the laboratories of the participating labs. Four

diluted blood samples of equal size were applied to non-absorbent surfaces and sent to the participating laboratories. Two samples used the 4N6FLOQSwabs™ and the other two used the standard swabs from the laboratories. Each participating laboratory carried out DNA analysis according to its regular procedures, including extraction, quantification, amplification, and capillary electrophoresis. The results of this study will be shared within the AFSN community, focusing on the comparison between laboratories and within laboratories, specifically comparing the types of swabs used alongside the standard operating procedures of each laboratory.

Topic DNA-Prokids

Presented by: Jose A. Lorente

The main objective of the DNA-Prokids project is to combat human trafficking, particularly the trafficking of children for illegal adoptions and forced labor, by utilizing DNA identification technology.

Reports indicate that 161 countries around the world are affected by human trafficking, especially child trafficking for illegal adoptions, forced labor, child soldier recruitment, and involvement in other illegal activities. The DNA-Prokids project aims to help identify missing and abducted children by using DNA databases to compare the DNA of unidentified children with potential relatives or guardians who are searching for their lost children. The project promotes the creation of DNA databases for both unidentified children and their related families, encouraging each country to develop their own databases and foster international cooperation to fight human trafficking. As of now, over 24,700 DNA samples have been collected from 8 countries, resulting in more than 3,800 successful identifications, including the discovery of over 280 illegal adoptions. The goal of the project is to reduce human trafficking and increase the chances of finding missing children through modern identification technology and strong DNA databases.

Topic Detection of Human Saliva and Cough Exudates Using One-Pot Direct Loop-Mediated Isothermal Amplification (LAMP) Combined with Immunochromatographic Strip (ICS)

Presented by: Hakrae Lee, Sungkyunkwan University, Republic of Korea

The detection of saliva and cough exudates at crime scenes is essential for forensic investigations, such as in homicide, sexual assault, and other crimes. In this study, a LAMP technique targeting the Streptococcus salivarius methionine aminopeptidase (MetAP) gene and the Major Histocompatibility Complex, Class II, DR Alpha (HLA-DRA) gene was developed, integrated with ICS strips for immediate use at crime scenes.

The MetAP primer was labeled with TAMRA, while the HLA primer was labeled with FAM. The FIP primer for both HLA and MetAP was biotin-labeled, and the Loop-forward (LF) primer was used. A multiplex ICS strip was developed, featuring a control band with antibodies against biotin and two test bands. Test Band 1 detects HLA-DRA, and Test Band 2 detects MetAP, using direct cell lysis to detect DNA without the need for extraction or purification.

A 10x primer mix was prepared for the LAMP test (F3 and B3 at 2μM each, LF and LB at 4μM each, FIP and BIP at 16μM each). The LAMP test was carried out at 65°C for 30 minutes, with an additional 10 minutes for ICS detection, making the entire process take less than 45 minutes and requiring no special equipment.

Topic Unraveling the Mystery: The Role of DNA Evidence in Solving a High-Profile Murder Case in Cebu City, Philippines (Case Study)

Presented by: Guilda Sheariah O. Besinga, Philippine National Police Forensic Group, Philippines

A recent murder case in Cebu City, Philippines, garnered significant attention due to its brutality and the effective use of forensic science in the investigation. The victim's body was discovered in a cardboard box on July 17, 2023, in Sitio Mohon, Barangay Tisa. Law enforcement officers quickly identified the primary suspect using witness statements, CCTV footage, and, importantly, DNA evidence.

The initial clue came from CCTV footage that recorded the victim's movements with an individual, and the testimony of a motorcycle driver who had taken the victim to a certain

location. This was further corroborated by the victim's mobile phone found at the suspect's residence and the suspect's confession during an interrogation. A key aspect of the investigation was DNA evidence, a significant advancement in forensic science, which provided irrefutable proof linking the suspect to the crime scene and the victim. DNA analysis in this case demonstrated the power of forensic investigation, offering undeniable evidence that strengthened the case against the suspect.

The integration of traditional investigative methods with advanced forensic science, particularly DNA analysis, underscored the importance of a comprehensive approach in solving crimes. This case highlights how advancements in forensic science can lead to more efficient and accurate case resolutions, ensuring true justice for the victim.

Topic Study of STR in the Korean Population Using MPS and the Introduction of a New Analytical Program 'seq2pattern'

Presented by: Sungmin Kim, DNA Chemical Analysis Division, Supreme Prosecutors' Office, Seoul, Korea

Human identification using data from Massively Parallel Sequencing (MPS) has gained attention in forensic genetics. The FBI has recommended using standard formats and long repetitive sequences for studying STRs with MPS. Furthermore, since 2021, the FBI has allowed the uploading of DNA profiles created with MPS techniques. DNA profiles from MPS can provide more accurate statistical ratios, not only for Human Identification (HID) but also for analyzing mixed DNA profiles. In this study, we analyzed STRs from 1,600 individuals in the Korean population using KplexSeq A-25. The results from KplexSeq A-25 were obtained in FASTQ format, and we developed an analytical program called 'seq2pattern.' This program can quickly and easily convert the data into LUS and LUS+ formats. The seq2pattern program calculates the probability of a match using STR data in both LUS and LUS+ formats, including sequencing patterns, allowing anyone to analyze MPS sequencing data after brief training.

In future studies, we will develop guidelines for forensic DNA analysis using MPS-STR frequency for human identification (HID) and mixed DNA profile analysis. Additionally, we will explore the feasibility of applying MPS in real-life cases.

Topic Development of an Eight-Plex Microbial Markers Fluorescence Multiplex Identification System for the Detection of Saliva and Vaginal Secretions

Presented by: Sheng Hu, Institute of Forensic Science, China

This study aimed to create an eight-plex microbial markers fluorescence multiplex identification system for detecting saliva and vaginal secretions. Specific microbial markers present in saliva and vaginal secretions were screened. Samples of saliva and vaginal secretion stains were prepared, and total DNA was extracted. A multiple microbial markers fluorescence identification system was developed using capillary electrophoresis, and the specificity and sensitivity of the system were tested with these samples.

In this study, five microbial markers in saliva (*Neisseria subflava*, *Veillonella atypica*, *Streptococcus salivarius*, *Streptococcus oralis*, *Porphyromonas catoniae*) and three microbial markers in vaginal secretions (*Lactobacillus crispatus*, *Lactobacillus gasseri*, *Bifidobacterium breve*) were selected for screening. The eight-plex microbial markers fluorescence multiplex identification system was developed using capillary electrophoresis technology. The specificity of the system was evaluated using 140 sample tests. Results showed that the specificity of the microbial markers for saliva and vaginal secretions was good, with the sensitivity of saliva detection at 0.065 ng and vaginal secretion at 0.125 ng. The DNA extracted during this process can be used to provide forensic DNA analysis results.

Topic 20 Years of Building a DNA Database for Investigations and Identifications

Presented by: Chanidapa Srinongwa, Central Institute of Forensic Science, Thailand

Since 2004, the Central Institute of Forensic Science, Thailand, has been developing a DNA database aimed at supporting criminal investigations and missing person cases. The operation is conducted in accordance with the ISO/IEC 17025: 2017 standards. Currently, there are two types of genetic data stored in the database. The first is a crime scene database, which holds genetic profiles from 224,647 samples. The second is a genetic database for missing person cases, with 5,353 profiles.

In 2005, the comparison of DNA profiles in the database enabled the identification and comparison of cases involving individuals and objects. Within criminal cases, there have been 2,557 reports, while the missing persons database has contributed to 170 reports. Additionally, over 280 cases (from 2019 to 2023) have benefited from the database service provided to other justice agencies. The DNA database project continues to receive annual budget allocations, and there are ongoing efforts to advocate for laws related to DNA databases.

Topic Development of an SNP-based Real-Time PCR Assay for Differentiating Between Drug and Non-Drug Papaver Species

Presented by: Songhui Nam, Department of Forensic Science, Sungkyunkwan University, South Korea

The differentiation between drug and non-drug Papaver species has become increasingly important due to the rise in drug-related crimes. Existing methods, including morphological and chemical analysis, often face challenges that lead to inaccurate or inconclusive results. To overcome these limitations, this study focused on developing SNP markers in two universally recognized DNA barcode regions: ITS2 and trnL-trnF. By comparing sequences from drug species (Papaver somniferum and Papaver somniferum subs. Setigerum) and non-drug species, two SNPs were identified in each DNA barcode region. Drug species were characterized by A and T, while non-drug species exhibited G and C. Additional SNPs were found within the ITS2 region, enabling differentiation between other drug Papaver species, with T and G for Papaver bracteatum, and C and A for other species. A TaqMan® probe real-time PCR assay was developed to confirm the identification of drug Papaver species. This successful study provides a reliable and efficient method of analysis, which will support investigations and enhance efforts to combat illegal cultivation and trafficking of drugs.

Topic Forensic Genetics in Non-Human Organisms: Development of Rice Species Identification Using STR (STRIP)

Presented by: Lorna H Santos, Philippine National Police, Philippines

Forensic genetics is commonly associated with human identification and criminal investigations. However, this focus often overlooks other forms of evidence, such as plant, microbial, and animal materials. Genetic analysis of these materials can significantly aid investigators by identifying species, tracing the origin of samples, and establishing genetic links between different samples. Rice, a staple food crop, faces challenges such as crop contamination and intellectual property disputes, necessitating accurate and reliable identification methods. This study developed a method using Short Tandem Repeats (STR) as genetic markers to effectively identify and confirm Philippine rice varieties. The goal of the research is to create a reliable system to support the protection of plant varieties under Philippine law. Additionally, the study aims to develop standardized methods, an allele database, and statistical analyses to facilitate data exchange between laboratories. The model developed in this study provides a promising approach for protecting rice varieties and can be applied to other high-value crops as well.

Topic Evaluating Quality Framework Practices in DNA Laboratories

Presented by: Juliana Sim, Health Sciences Authority, Singapore

In today's world, accurate and reliable forensic testing is crucial for public safety and supporting the justice process. DNA forensic laboratories need to implement validated methods, employ qualified personnel, use modern equipment and reliable consumables, and adhere to international standards to create a strong laboratory quality assurance system. However, challenges such as budgetary and staffing limitations, rapid advancements in DNA technology, and the growing need for faster responses from law enforcement agencies can hinder the maintenance of these standards. Despite these challenges, DNA laboratories can still develop and uphold strict quality assurance systems in forensic science.

A survey of quality frameworks in the biological sciences within AFSN member organizations focused on the capabilities of personnel, equipment, consumables, sample handling, analysis processes, data interpretation, reporting, procedures, protocols, and quality management. The survey aimed to raise awareness, identify areas for improvement, and provide recommendations to enhance the quality of DNA testing in member institutions. The findings will contribute to the improvement and maintenance of precise and reliable laboratory practices across AFSN DNA laboratories.

Topic Identification of Human Remains

Presented by: Laurence Devesse, QIAGEN, Germany

Identifying human remains provides closure for families searching for missing loved ones and delivers justice in cases where death was not accidental. In mass fatality events or historical remains identification, this process presents challenges due to the large number of victims and the degradation of biological material. Traditional Short Tandem Repeat (STR) analysis is limited in identifying relatives beyond the second degree, and degraded or environmentally impacted samples may not always yield complete DNA profiles.

To overcome these limitations and enhance human remains identification, the ForenSeq Kintelligence HT Library Prep Kit has been developed. This kit utilizes Single Nucleotide Polymorphism (SNP) markers, which are shorter than STR markers, making them more suitable for degraded DNA analysis. This presentation will showcase the power of combining 10,230 SNP markers from the original Kintelligence kit with an expanded multiplexing capability, enabling high-throughput applications. Additionally, a localized software solution has been developed to establish kinship between unidentified remains and reference family samples. Performance data will be presented for post-mortem (PM) and ante-mortem (AM) samples, sequenced using plex 12 and plex 36 configurations, allowing for kinship determination up to the third degree.

Fingerprint Workgroup (FPWG)

Abstract

1. Oral Presentation

1.1 Title: A comparative study of Sudan black and superglue methods for the enhancement fingerprints on grease contaminated non-porous surfaces.

Authors: Miss Pattayarat Srisangwarn, Mrs. Pentip Suttathum, Miss Unchalee Kongsrisook and Miss Peeraya Shaanle

Organization: Centran Institute of Forensic Science

Country: Thailand

Abstract: This study for comparative sudan black method and superglue method for enhancing fingerprints on grease contaminated non-porous surfaces. This study is used for finding the practical method for Fingerprint laboratory. Actually, superglue method is the world-wide method, easily use and cost effective. But sometimes this method is not proper for grease contaminated. So, the sudan black is the method that is used for enhancing grease contaminated fingerprint, but our laboratory is still not verified this method. Therefore, it is necessary to compare sudan black method with superglue method to get the better result.

From the result of this study shows that the sudan black method can be used to enhance fingerprint on grease contaminated non-porous surfaces for the example the grease or oily on snack package, grease contaminate on glass bottle. This method is suitable for bright surfaces because sudan black produces dark blue or black fingerprints. The sudan black method can be performed after being treated with superglue (Daluz, 2015), and in some cases, the use of superglue may not be suitable for detecting highly greasy fingerprints.

1.2 Title: Comparison of mortality trends in an urban Sri Lankan cohort before and after COVID-19 vaccination through forensic autopsies

Authors: Sameera Gunawardena

Organization: Department of Forensic Medicine and Toxicology, University of Colombo

Country: Sri Lanka

Abstract: The COVID-19 pandemic showed increased mortality rates worldwide due to the disease and healthcare disruptions. Vaccines were approved through fast-tracked authorization to curb fatalities, but concerns persist about their safety and efficacy. Using our institutional data on forensic autopsies between 2019-2022, we reviewed the mortality trends within a specified cohort before and after vaccination.

Among the 1951 (M:F=1337:614), cases that met the inclusion-exclusion criteria, cardiovascular deaths had the highest frequency while COVID-19 ranked third, mostly affecting females (55.8%). The monthly autopsy rate doubled during the post-vaccination period with the highest peak in August 2021. Reduction of COVID-19 deaths occurred approximately 7 months after the initiation of the vaccination program. Non-vaccinated individuals had a significantly higher COVID death rate (23.5% vs. 15.9% vaccinated, p=0.007), majority being females (58.9%). Among vaccinated individuals a higher proportion was seen with the Sinopharm BBIBP-CorV (17.9%). The proportion of cardiovascular deaths was higher in vaccinated individuals (48.3% vs. 40.6% non-vaccinated, p=0.037) particularly with the recombinant Covishield vaccine which showed a high percentage of cardiovascular and cerebrovascular deaths (72.5%).

This study reflects the gender disparity in vaccination and discusses the vaccine related factors on the changes in mortality trends during the COVID-19 pandemic.

1.3 Title: Rhizomucor miehei LIPASE NANOCONJUGATE AS A CANDIDATE FOR FORENSIC VISUALIZATION OF LATENT FINGERMARKS ON WET NON-POROUS OBJECTS

Authors: Nik Ihtisyam Majdah Nik Razi1, Naji Arafat Mahat1, Aida Rasyidah Azman1, Roswanira Abdul Wahab1, Habeebat Adekilekun Oyewusia2, Azzmer Azzar Abdul Hamid3,

Organization: 1Investigative and Forensic Sciences Research Group, Universiti Teknologi Malaysia 2Department of Science Technology, Biochemistry Unit, The Federal Polytechnic P.M. B 5351, Ado Ekiti, Ekiti State, Nigeria 3Research Unit for Bioinformatics and Computational Biology (RUBIC), Kulliyyah of Science, International Islamic University Malaysia

Country: Malaysia

Abstract: Fingermarks are crucial evidence in criminal cases, but their visualization on wet, non-porous objects is challenging due to degradation and the presence of toxic compounds in Small Particle Reagent. Candida rugosa lipase has been suggested as a fingermarks biosensor, but its narrow specificity towards lipids limits its application. This research investigated the feasibility of Rhizomucor miehei lipase (RML) immobilized onto multiwalled carbon nanotubes (RML-MWCNTs) using bioinformatic and laboratory proof of concept approaches. The results indicated that the binding energies ranged from -6.8 to -4.9 kcal/mole, and the distances between RML and its ligands (stearic-, docosanoic-, palmitic-, decanoic acids) were 2.2-2.9 Å. These findings are consistent with the establishment of robust hydrogen bonds in all complexes. The molecular simulation findings provided additional support for this hypothesis, as demonstrated by the stabilized root mean square deviation, root mean-square fluctuation, and radius of gyration plots. The feasibility of RML-MWCNTs was further validated by successfully visualizing latent fingermarks on glass slides that were submerged for 14 days, demonstrating identifiable fingermarks from both male and female individuals, even without reagent optimization. Therefore, the practicality of using RML-MWCNTs as a promising option for eco-friendly fingermark visualization technology seems to be justified. Immersed latent fingermarks; Rhizomucor miehei lipase, bioinformatics, fingermarks quality.

1.4 Title: Fingerprint analysis using deep learning

Authors: Kyuyoung Lim, Youngil Seo

Organization: National Forensic Service

Country: SOUTH KOREA

Abstract: In modern society, the amount of data has exploded, and as hardware that can process large amounts of data and programming languages that can implement artificial intelligence have been developed, artificial intelligence such as deep learning is being used in various fields.

Deep learning can learn from large amounts of data on its own to extract common features and use this to perform functions such as pattern recognition, object detection, and time series data analysis.

In this study, we propose a method to extract features of fingerprint images using various deep learning models and analyze fingerprints based on these. For this purpose, we trained the model using a large fingerprint dataset and evaluated the performance of the proposed method through various experiments.

2. Poster Presentation

2.1 Title: Understanding Unidentified Bodies in South Korea: A Six-year Experience

Authors: Goeun Lee, Chang Un Choi, Kyung-moo Yang, Won-Joon Lee

Organization: National Forensic Service Seoul Institute

Country: Republic of Korea

Abstract: Identification of deceased individuals is a critical component of forensic pathology, essential for human rights and criminal investigation. However, despite investigations and advanced forensic techniques, many decedents remain unidentified. This study aims to present the characteristics of unidentified bodies and the identification methods used in South Korea, providing suggestions on the challenge faced. Data were collected for 174 cases that remained unidentified after autopsy between 2017 and 2022 at the National Forensic Service Seoul Institute, South Korea. The majority of unidentified decedents ware males (82.0%) and aged between 40 and 60 years old (60.4%). Of the unidentified bodies, 90.2% were found in a decomposed state or without soft tissue, and 35.6% were found immersed in water. The manner of death was undetermined in 82.2% of cases. DNA analysis was performed on all cases, with additional methods including forensic odontology (64.3%), forensic anthropology (53.4%), facial reconstruction (19.5%), and geographic origin estimation (21.8%). Despite ancillary examinations, limitations based on preservation state and a lack of comparative data hinder successful identification. This study highlights the statistical characteristics of unidentified bodies and the challenges in their identification in South Korea, suggesting the necessity for the systemic database both unidentified decedents and long-term missing individuals.

2.2 Title: Synthesis of Magnetic Fluorescent Silicon Composite Materials For Latent Fingerprints Detection

Authors: Shuoyun Wei, Meimei Cui, Liying Ma

Organization: Gansu University of Political Science and Law

Country: China

Abstract: As one of the most common trace evidences at the crime scene, fingerprints can be used for individual identification. Most of the fingerprints left at the crime scene are invisible latent fingerprints, which need to be revealed and extracted by technical means. Although the traditional latent fingerprint visualization technology has made great development over the years, it still has limitations in the aspects of non-destructive visualization、 contrast 、 anti-background interference and toxicity. In this paper, the magnetic fibrous mesoporous silicon dioxide nanocomposites were synthesized by a hydrothermal method and high-temperature calcination, and then the carbon dots were introduced in the surface by a one-pot hydrothermal method. The as-prepared fluorescent nanocomposite has a core-shell structure and good monodispersity. Under UV light of 365 nm, the nanocomposite material could emit bright blue fluorescence. The latent fingerprints developed on various substrates by the magnetic fluorescent nanocomposite material exhibited the highly clear ridge patterns of fingerprints and the detailed minutiae regardless of background interference. In addition, the material could be easily recycled with an external magnetic field and aviod dust flying. The results show that the nanocomposite material have the advantages of high contrast、 high sensitivity、 good selectivity and wide application range of objects, and can provide new methods for latent fingerprints detection.

2.3 Title: Study on the Practical Application and Technical Tactics of “In-situ Fingerprint and Palm Print Extraction & Investigation APP”

Authors: Jie Zhang, Bihan Zhang

Organization: Tianjin Municipal Public Security Bureau

Country: China

Abstract: This paper focuses on a study on the practical application and technical tactics of “In-situ Fingerprint and Palm Print Extraction & Investigation APP”. In order to constantly strengthen the construction and application of fingerprint technique informatization, Tianjin Municipal Public Security Bureau has researched and developed the “In-situ Fingerprint and Palm Print Extraction & Investigation APP” which can be used to extract all kinds of fingerprints and palm prints left on the crime scene by means of the online public security bureau’s direct shooting at the mobile terminal. Then, the advanced algorithm will be operated to conduct the automatic fingerprint and palm print comparison within the fingerprint maps database and the immediate feedback of comparison result will be submitted to the crime scene investigator’s mobile terminal, in which way, the victim’s fingerprint and palm print will be quickly excluded for the convenience of searching and identifying the criminal suspect. Based on the quick comparison & feedback, the fingerprint technique informatization can be better applied to realize an excellent performance in the actual combat. By virtue of abundant practical experience in the actual combat, we have summarized several types of technical tactics related to the specific application of the “In-situ Fingerprint and Palm Print Extraction & Investigation APP”, and we are open to your sharing and exchange.

- FPWG Meeting Summery –

Fingerprint Workgroup Business Meeting

By Dr. Ma Rongliang, Chairman of FPWG from Institute of Forensic Science, Ministry of Public Security, People's Republic of China

Due to the low number of members present, the business meeting was canceled. However, discussions were held among attendees regarding challenges and future plans. It was proposed to hold online meetings and consider changes to the committee.

Challenges Identified

1. Limited budget support makes it difficult to organize in-person meetings.
2. Advancements in modern forensic techniques, such as electronic evidence and CCTV footage, have reduced the significance of fingerprint analysis in criminal investigations.

Future Plans Until the Next Annual Meeting

1. Regular meetings will continue, along with additional activities.
2. Based on discussions among meeting attendees and workgroup members, it was proposed to share best practices both online and offline, including:
    a. Challenging fingerprint examination cases
    b. New forensic examination techniques
    c. Collection of fingerprint evidence at crime scenes
    d. AFIS techniques
    e. Future directions
3. An academic meeting will be held in China, potentially in collaboration with other workgroups.
4. Review of the FPWG Terms
5. Changes in the WG Committee, with some members being replaced.

Expected Guest Speakers

1. Prof. Christophe Champod, Director of CFS, Lausanne University, Switzerland – "The New Expression of Conclusion in Pattern and Impression Evidence by Probability and Likelihood Ratio"
2. Prof. Claude Roux, Director of CFS, UTS, Australia – Topic on the Advancement of Fingerprint and Forensic Science

Additionally, other distinguished figures such as Prof. Pierre Margot and Prof. James Robertson are expected to speak on crime scene investigation techniques.

Benefits Gained from the AFSN Conference

The conference provided an opportunity to exchange knowledge on fingerprint examination within the network.

- Ms. Peeraya Jarnlee from Thailand presented a comparison between Sudan Black and Superglue methods for detecting latent fingerprints on non-porous surfaces contaminated with grease. The study found that Sudan Black is highly effective for detecting fingerprints on such surfaces compared to the Superglue method. This information has been adapted for laboratory use and incorporated into the fingerprint group's standard operating procedures for detecting latent fingerprints on non-porous surfaces with grease contamination.

- Miss Nik Razi from Malaysia introduced the NanoBio-Based Reagent ๑ (NBR๑) for enhancing fingerprint visibility. This reagent was researched and developed for detecting latent fingerprints on wet non-porous surfaces, compared with the Small Particle Reagent (SPR) method. The study showed that NBR๑ produced clear fingerprint impressions while also being non-toxic to humans. However, the preparation process for this reagent is relatively complex.

- Dr. Ma Rongliang, Chairman of FPWG, provided insights into fingerprint examination methods in China.

Crime Scene Investigation Workgroup (CSIWG)

Abstract

1. Oral Presentation

1.1 Title: Analysis Of Glass Fracture Patterns Indicates The Manner Of Death

Authors: Panarat Sritus, Wasinee Kheereelak, Theerissara Mungruengsakaul, and Sudarat Fueangmeekun

Organization: Central Forensic Science Operation Section

Country: Thailand

Abstract: In this case, a man, 29 years old, was found with a gunshot wound on the balcony of his residence. The sole witness, his wife, initially reported the incident as a suicide. Upon investigation, we found the evidence including the dead body with wounds and glass fragments, a spent cartridge inside the room, a tear in the curtain, and a bullet hole in the sliding glass door. Detailed analysis of the bullet hole on the sliding glass door and the glass fracture patterns indicated the direction of bullet which was inconsistent with initial testimony from his wife. Based on these findings, the crime scene investigators aimed to collect evidence that would identify a suspect and confirm the manner of death. After being confronted with the pattern analysis of the glass fracture and other evidence, the wife confessed to having shot her husband from within the room while he was on the balcony.

1.2 Title: A Brief History Of Bloodstain Pattern Analysis In Korea

Authors: Young-il Seo, Kyuyoung Lim

Organization: National Forensic Service

Country: South Korea

Abstract: Until 2005, forensic scientists in Korea mainly conducted bloodstain pattern analysis (BPA) research through literature. In 2005, Captain Choi Yong-seok of the Korean National Police Agency trained in BPA and crime scene reconstruction in the US and Canada, implementing these techniques in Korea. In 2006, he initiated a BPA course within the National Police Agency, featuring experts like Ross Gardner and Patrick Laturnus.

Choi's team in Daegu began analyzing crime scene bloodstains. In 2008, Choi founded the Korean Association for Bloodstain Pattern Analysis, with IABPA President LeeAnn Singley delivering a congratulatory speech. The National Forensic Service started BPA analysis and research in 2009. A terminology committee formed in 2010 translated key terms and textbooks, which were used in a crucial murder trial that year.

In 2011, a BPA working group was created to standardize guidelines. Collaborative experiments between the National Forensic Service and the police on blood droplet velocity and spatter were presented at IABPA conferences in 2011, 2012, 2019, and 2023. In 2012, BPA was pivotal in solving a Daejeon murder case. The National Forensic Service established a BPA lab in December 2022.

1.3 Title: Unboxing The Mystery: The Role Of Csi In Solving A Cebu City Murder (A Case Study)

Authors: Guilda Sheariah O. Besinga, April C. Madroño, Junaisah C. Omar-Sevillena, and Adelayed S. Barros

Organization: Philippine National Police Forensic Group

Country: Philippines

Abstract: A recent murder case in Cebu City, Philippines, has garnered significant attention due to the effective and comprehensive crime scene investigation that led to the identification and apprehension of the suspect. The victim's body was discovered inside a cardboard box on July 17, 2023, in Sitio Mohon, Barangay Tisa. The investigation combined traditional police work and modern technology to piece together the events leading to the crime.

Key evidence was gathered through meticulous backtracking of CCTV footage, which captured the victim's movements and interactions with an individual who later became the prime suspect. The surveillance footage was crucial in mapping the victim's last known whereabouts and linking them to the suspect's residence. A habal-habal (motorcycle taxi) driver also provided vital testimony, confirming he had transported the victim to the suspect's location.

Further strengthening the case, investigators found the victim's cellphone at the suspect's residence, corroborating other evidence pointing to the suspect's involvement. A detailed examination of the crime scene and interviews with witnesses and family members of both the victim and the suspect provided a comprehensive understanding of the timeline and circumstances surrounding the crime. The DNA analysis also provided conclusive proof linking the suspect to the crime scene and the victim.

This case illustrates the importance of a thorough and systematic approach to crime scene investigation. The integration of surveillance technology, witness testimony, and forensic examination ensured that the suspect was accurately identified and brought to justice, highlighting the effectiveness of modern investigative techniques in solving complex cases.

1.4 Title: Investigation Of A Rare Nitrogen Asphyxiation Case In The Philippines: Assessing Domestic Violence, Suicide, And Autoerotic Asphyxia

Authors: PLTCOL RUBEN M APOSTOL JR, PCPT ARMAN B LLORENTE

Organization: Philippine National Police Forensic Group

Country: Philippines

Abstract: In the Philippines, a 53 year-old Caucasian male was found dead in a house he shared with his lover. His head was wrapped in a garbage bag and a hose connected to a nitrogen tank. The use of gaseous nitrogen as a suicide method is rare in the Philippines. Given his history of domestic violence with his Filipino partner and a recent argument in an unconventional setup of same-sex cohabitation, questions arise about whether his lover was responsible for his death or if it was a suicide. Additionally, could this be a case of autoerotic asphyxia? In the absence of specific autopsy findings and postmortem toxicological examinations, a thorough investigation of the scene and the circumstances surrounding the death is crucial.

1.5 Title: Application Of 3D Digital Document Technology Based On Ai Spatial Reconstruction Algorithm In Crime Scene Investigation

Authors: Dou Xiuchao, Jiang Xuemei

Organization: Institute of Forensic Science of China

Country: China

Abstract: In response to the difficulties in connecting the two-dimensional images collected from crime scenes with the reconstruction and analysis of crime scenes, we have developed a spatial modeling system for crime scene investigation. The system obtains multi-scale three-dimensional spatial data of crime scenes through devices such as drones, laser scanning devices. Based on these data, software can completes the 3D reconstruction of crime scenes automatically, forming a new method of recording, which clearly and truthfully records the crime scene. This measurable and traceable recording method can combine materials related to crime, such as videos, photos, and analysis. This can replace traditional methods by recording, drawing, and taking photos to record the information of the crime scene, and establish comprehensive and systematic 3D digital files of the crime scene.

This method will play an important role in criminal investigations. Experts can conduct remote investigations and analysis based on 3D digital files. Experts can also use software to create three-dimensional animations to simulate the process of crime based on the three-dimensional model and analysis of the crime scene. In addition, this method, combined with virtual reality technology, can also be used for technical training in the field of crime scene investigation.

1.6 Title: The Influence Of Cognitive Bias On The Occurrence Of Misjudged Case And Its Correction

Authors: Aurora Yao

Organization: Procuratorate of Yunnan province

Country: China

Abstract: Studies show that the main causes of misjudged cases are witness testimony error, police misconduct, forensic evidence error, innocent people admit guilt and so on.

countries have also introduced a number of regulation to reduce the occurrence of misjudged cases, such as privilege of silence, plead before the court, Even so, misjudged cases still happen. Why does a fairness litigation system not guarantee a correct judgment result?

The main reason is that the litigation system solves the problem of legal evidence collection and fair proof, and the judgment of whether the suspect is guilty or not is a process of judicial officers' judgment based on their own hearts, which has nothing to do with the fairness of the procedure, but is directly related to people's cognitive ability.

When people's cognitive ability is insufficient, it will lead to the deviation between people's judgment and objective facts, which will lead to the occurrence of misjudged cases.

The errors in the process of inner judgment can not be avoided by the justice of the external proceedings, and inner judgment can only reveal the wrong path and find a solution to the problem from the process of its own formation. This paper attempts to reveal the cognitive bias from the thinking process of the formation of misjudged cases and puts forward the methods to correct this thinking process.

1.7 Title: A Review Of Crime Scene Investigation Training Using Simulations And Role-Play In Undergraduate And Postgraduate Forensic Medicine Teaching In Sri Lanka

Authors: Sameera A Gunawardena

Organization: Department of Forensic Medicine and Toxicology, University of Colombo

Country: Sri Lanka

Abstract: The Department of Forensic Medicine and Toxicology of the University of Colombo (DFMT) has been using simulated crime scenes in training programs for over 10 years using mainly moulage, mannequins, body fluid substitutes, props and role-play. The case scenarios covered deaths related to hanging, shooting, rape homicide, blunt homicide, sharp-weapon trauma and skeletonized remains. We reviewed the efficacy of different strategies in conducting the simulation activities using feedback from the participants and resource persons.

The majority of participants rated the activities as highly enjoyable and agreed that the simulations provided a realistic experience of crime scenes. The ability to reconstruct the crime scene was the most successful learning outcome while the least successful was the evidence documentation and reporting. The quality of moulage enhanced injury analysis and scene interpretation while a minority found role playing to be distracting or misleading when done without a standard script. By standardizing the role play and inclusion of confederates it was possible to customize each simulation to suit different categories of participants and also provide actionable feedback.

Moulage using readily available materials and role-play with standardized scripts were found to be the most effective in simulated CSI training in low-resource settings.

1.8 Title: Diatoms As Silent Witnesses: Unveiling Drowning-Related Crimes

Authors: Surender Kumar Pal

Organization: Directorate of Forensics Services, Himachal Pradesh, Shimla Hills, Junga

Country: India

Abstract: In forensic pathology, unveiling the case mysteries of drowning related crimes remains a challenging issue for the forensic examiners. Diatoms, golden- brown algae, have been used extensively in solving such cases. The combination of autopsy findings and comparative analysis of diatoms recovered from the victim's body and the suspected drowning sites plays a crucial role in revealing the possible cause and site of death. Hence, the main focus of our study is to highlight the pivotal role of diatoms in deciphering drowning case complexities. We present findings from seven case studies involving victims recovered from various water bodies of Himachal Pradesh, India. The diatom test was performed on bone marrow extracted from sternum and femur alongside water samples from putative drowning sites, by using reverse aqua regia solution (15 ml HNO3: 5 ml HCl) for analysis. The outcomes of our study underscore the efficacy of diatoms in resolving drowning-related crimes, even in cases where autopsy findings alone prove inconclusive in determining the cause of death.

1.9 Title: Phosphide As A Predominant Toxin In Forensic Viscera Samples: A Retrospective Study

Authors: Rakesh Kumar, Meenakshi Mahajan

Organization: Directorate of Forensics Services, Himachal Pradesh

Country: India

Abstract: Himachal Pradesh, often referred to as the "fruit bowl of India," is renowned for its diverse and abundant production of fruits, including apples, pears, peaches, and plums. The agricultural practices in this region, particularly in fruit cultivation, involve the use of pesticides to protect crops from pests and diseases. However, the use of pesticides brings with it a range of issues, including health hazards and environmental impacts. Moreover, the distressing trend of farmers using pesticides for suicide highlights deeper socio-economic challenges in the agricultural sector.

This study presents a comprehensive analysis (2018-2023) of viscera samples for poison detection, conducted at Northern Range of Himachal Pradesh. The primary objective was to identify the most prevalent toxic substances involved in poisoning cases. Through, meticulous toxicological examination, the research identified Aluminium phosphide and Zinc phosphide as the most commonly detected poisons, frequently linked to both accidental and intentional poisonings. The findings are significant due to the widespread use of these substances in agricultural practices as fumigants and rodenticides. The analysis highlights the need for stringent regulatory measures to control the distribution and accessibility of these toxic agents. Additionally, it underscores the importance of enhancing public health strategies, including better mental health support and robust poison control programs. The study's results provide valuable insights for policymakers, healthcare providers, and public health officials, aiming to reduce the prevalence of poisoning and mitigate its impact on affected populations.

2. Poster Presentation

2.1 Title: Case Study On Fire Incident From Rechargeable Batteries Of Wheelchairs

Authors: Wasinee Kheereelak and Nisapha khasrithong

Organization: Central Forensic Science Operation Section, Central Institute of Forensic Science

Country: Thailand

Abstract: The crime scene investigators (CSI) team were informed of a fired room on the 5th floor of a condominium in Nonthaburi Province and had a dead body from the police officer. After the fire was extinguished, the CSI team found severe damage in the room, especially the living room. It should be noted that this room is the origin of fire. Moreover, it was found that some pieces of lithium-ion batteries connected to a charger and the wire were plugged into the electricity circuit in the living room. After investigating the surrounding area, it can be assumed that the cause of this case was batteries failure. In this case, the process of fire ignition originating from batteries, possibility of fire occurrence, origin of fire analysis, fire scene investigation procedure, and laboratory results were mentioned. This case study investigated the cause of the fire, collected the evidence in the scene and analyzed the results in accordance with NFPA921 and ASTM Standard. From the case study, it was shown that collection of sufficient evidence in the scene including the laboratory results can make clarify and reliable in the investigation.

2.2 Title: Sex Identification From Human Dentine Samples By Nmr-Based Metabolomics Profiling

Authors: Giatgong Konguthaithip1, Karune Verochana2, Tawachai Monum3, Yutti Amornlertwatana3, Churdsak Jaikang3*

Organization: Chiang Mai University

Country: Thailand

Abstract: Teeth are the most preserved tissue after death and are commonly sampled for forensic science investigations. Forensic metabolomic technique is a rapid and non-destructive method for individual identification. The objectives were identify the chemical substances contained to sex identification using proton nuclear magnetic resonance spectroscopy (1H-NMR) technique. The dentine powder was hydrolyzed using 0.6M hydrochloric acid at 100 °C for 24 h. Data were analyzed by the MetaboAnalyst 6.0 program. A total of 209 chemical substances were identified and 11 chemical substances could be separated males and females including 2, 3-diamonopropionic acid, 2-keto-6-aminocaproate, 3-hydroxy-L-aspartic acid, 6-methyluracil, creatinine, D-alanine, gamma-glutamylcysteine, lanthionine, L-Threonine, norophthalmic acid, phosphocreatine, phosphoserine, S-carboxymethyl-L-cysteine and S-ethyl-L-cysteine. Binary regression equation was formulated for sex prediction and it presented the accuracy value for 81%. In conclusion, the chemical profiles in human dentine can be used for sex identification. The reliable equation demonstrates high sensitivity and specificity for sex prediction in the Thai population.

2.3 Title: Investigation And Quantification Of Methylome Products Containing In Human Dentine By 1H-Nmr

Authors: Paknaphat Watwaraphat, Giatgong Konguthaithip, Tawachai Monum, Yutti Amornlertwatana, Karune Verochana and Churdsak Jaikang

Organization: Department of Forensic Medicine Chiang Mai University

Country: Thailand

Abstract: Methylome products occur by adding methyl groups into DNA or amino acids. The metabolites are potential biomarkers for age estimation in forensic science. Teeth is an endurable tissue and has remained in the explosion and decomposition process. This study aimed to use nuclear magnetic resonance spectroscopy (1H-NMR) techniques to quantify methylome products in the dentin layer. The second molar powder (n=70) was prepared and hydrolyzed. Then, methylome products were investigated and quantified by 1H-NMR. 3-Methylguanine, creatine, and N-methyl-L-glutamic acid were found to have the highest level presenting 15.74±14.58, 5.82±6.08, and 1.9±2.47 μM, respectively. These methylome products might be utilized for estimating sex and chronological age.

2.4 Title: Analysis Of The Current Situation And Process Of Determining The Degree Of Consequential Mental Harm Caused By Crime

Authors: Munkhnaran E, Dolgorsuren Ts

Organization: National Forensic Agency of Mongolia, Department of Forensic Medicine

Country: Mongolia

Abstract: Background

In Mongolia, the revised version of the Law on Forensic Investigation was adopted on December 23, 2022, providing a legal framework for determination of consequential mental harm due to crime[1].

Purpose

Analysis of the effect of exposure and the current state of consequential mental harm caused by crime.

Materials and methods

This study used a national sample of 464 cases. To evaluate the collected data, selected descriptive and snapshot statistical methods were applied.

Results

According to the new legal changes, a total of 464 cases were received to determine the extent and degree of consequential mental health and 28.4% (n=132) were not examined for various reasons. By gender, 63.6% (n=211) were female and 36.4% (n=121) were male.

The majority of cases 35.4% (n=164), were related to Article 12 of the Criminal Code or sexual violence. By age group, 38.4% (n=63) were 10-14 years old and 40.2% (n=66) were 15-19 years old. In addition, of the 193 cases of sexual violence, 182 (94.3%) were female and 11 (5.6%) were male.

Conclusion

In most cases where the grade of consequential mental harm is determined, the victims of sexual violence are female victims between the ages of 11 and 17.

2.5 Title: Characteristics Of Fatal Motorcycle Rear-End Crash With Trucks In Nonthaburi And Pathum Thani Provinces From January 1, 2022 To April 30, 2024

Authors: Jutamart.Y, Apawan.C, Supisara.T, and Kanik.C

Organization: Central Institute Of Forensic Science

Country: Thailand

Abstract: This study aims to investigate fatal traffic accidents involving motorcycle rear-end crash with trucks in Nonthaburi and Pathum Thani provinces between January 1, 2022 and April 30, 2024 by using parameters as the gender and age of motorcycle riders, the time of accidents, the engine size of the motorcycles, the condition of the motorcycles (modified or unmodified), the use of protective gear by riders, the type of accident (using Modified Accident Classification System (GDV)) for left hand traffic), The horizontal position of the collision between the front of the motorcycle and the truck and the external injury patterns of the riders. Data were collected from accident scene reports provided by the Institute of Forensic Science and analyzed statistically

The findings indicate that male motorcycle riders were more frequently involved in rear-end collisions with trucks, with the majority of accidents occurring among those aged 30-40 years. Accidents were equally distributed between daytime and nighttime. Most motorcycles involved had the engine size between 100-125 CC. No helmet was found at the accident scene, The condition of the motorcycles is varied, both modified and unmodified vehicles being involved. Right rear-end collisions with trucks were the most common. The head injuries were the most frequent among the riders, followed by thorax without shoulder body injuries.

2.6 Title: Daytime Laser Photography For Projectile Path Technique.

Authors: Mr. Anuwat Pilaphol, Miss Pattraporn Boonsri, Miss Apawan Apasiri Miss Ketgamol Kongsathan

Organization: Central Institute of forensic science

Country: Thailand

Abstract: Crime scene investigators will simulate events. After collecting sufficient information from the scene of the crime and other information related to the case, in cases involving firearms, there are many techniques for creating a path to show the trajectory of a projectile using a stretched rope or laser light. Photographing gunshot trajectories using laser beams has its own limitations, which requires shooting in low-light conditions to be able to capture the laser beam. The author presents a technique for applying ND filters and DSLR to capture images of laser beams during the daytime.

2.7 Title: Procedure Minidv Fired Recovery Method In Zantika Pub Case

Authors: Mr. Anuwat Pilaphol

Organization: Central Institute of forensic science

Country: Thailand

Abstract: A video camera that is exposed to heat from fire at crime scene will be damaged such as melting and deformation, but inside the video camera there may still be information that has legal value. The Zantika Pub fire on New Year 2009 caused enormous damage. Inspection of the fire scene determined cause of the fire. That is extremely difficult. The author collected video camera evidence from Zantika Pub to examine. Presenting a method for retrieving data from video footage that solves cases.

- CSIWG Meeting Summery –

Summary of Oral Presentation Topic 1

Topic: Analysis of Glass Fracture Patterns Indicates the Manner of Death

Presentation Date: August 28, 2024 (11:00–11:20 AM)

Presenter: Ms. Panarat Sritat, Forensic Scientist

Objectives / Details / Key Points / Issues:

This case study involves a gunshot death investigation. Authorities were notified by the investigating officer of a 29-year-old male victim who had been shot and was found on the balcony of his apartment, where he lived with his wife. The wife, who was the only witness, stated that the victim had committed suicide on the balcony.Upon examining the crime scene, the following evidence was found:Gunshot wounds and glass fragments on the victim's body

A firearm resting on the victim’s torso, with his right hand placed over the gun handle

A spent cartridge case on the kitchen floor Torn curtains Bullet holes on the sliding glass door

An analysis of the glass fracture patterns on the sliding glass door revealed characteristics similar to laminated glass (Laminated Glass), showing both radial fractures and concentric fractures. Additionally, it was observed that the inner hole (P1’), located inside the apartment, had a smaller diameter than the outer hole (P1), which was on the balcony side. The conical shape of the hole indicated that the bullet trajectory was directed from the kitchen toward the balcony, contradicting the wife's testimony.

Based on this inconsistency, forensic investigators collected evidence to determine whether the victim had died by suicide or homicide. Eventually, the wife confessed that she had shot her husband from the kitchen, firing toward the balcony, proving that the incident was a murder rather than a suicide.

Benefits / Comments / Recommendations / Solutions (if any):

The case study of the gunshot death provided valuable insights into the patterns of glass fracture, which can indicate the direction of bullet trajectory. This knowledge is beneficial for crime scene investigations and can significantly enhance the efficiency of investigative personnel.

Summary of Oral Presentation Topic 2

Topic: A Brief History of Bloodstain Pattern Analysis in Korea National Forensic Service, South Korea

Presentation Date: August 28, 2567 (11:00 – 12:00)

Presenters: Young-il Seo, Kyuyoung Lim

Objectives / Details / Key Points / Issues:

In 2005, a team of forensic scientists from Korea became interested in utilizing Bloodstain Pattern Analysis (BPA) for crime scene investigations, referencing training courses from the United States and Canada. Korea sent Second Lieutenant Choi Yong-seok, under the National Police, to receive training in BPA and crime scene preservation. Subsequently, in 2006, the government began implementing BPA and launched BPA training courses at the National Police, inviting Ross Gardner and Patrick Laturnus.

Choi Yong-seok's team applied BPA principles to analyze bloodstain patterns at crime scenes, initially in the city of Daegu. In 2008, he established the International Association of Blood Pattern Analysts (IABPA), with Ms. Lee Ann Singley delivering a congratulatory speech at its founding. In 2009, the Korea National Forensic Service began applying BPA techniques in bloodstain pattern analysis and started publishing extensive research. In 2010, research was released to the public along with the establishment of standard definitions for uniformity across various agencies. In the same year, the Korea National Forensic Service and the National Police also employed BPA techniques in case resolution.

In 2011, a joint committee between the Korea National Forensic Service and the National Police was established to set guidelines and standard operating procedures, ensuring efficient and standardized operations.

Benefits / Comments / Recommendations / Solutions (if any):

It is evident that Korea places great emphasis on the development of personnel and organizational capabilities to enhance operational efficiency. Accordingly, this strength can be leveraged to increase the number of skilled personnel, thereby further improving the overall effectiveness of forensic operations.

Summary of Oral Presentation Topic 3

Topic: A Review of Crime Scene Investigation Training Using Simulations and Role-Play in Undergraduate and Postgraduate Forensic Medicine Teaching in Sri Lanka

Presentation Date: August 28, 2024 (11:40–12:00)

Presenter: Sameera A Gunawardena

Objectives / Details / Key Points / Issues

The Department of Forensic Medicine and Toxicology (DFMT) at the University of Colombo has been utilizing crime scene simulations in training for over 10 years. The primary techniques used include: Simulated wounds,Mannequins,Substitutes for bodily fluids,Props and Role-playing exercises.The simulated cases cover various scenarios, including hanging deaths, gunshot incidents, homicide from sexual assault, blunt force trauma, sharp weapon injuries, and skeletonized remains. We reviewed the effectiveness of these simulation strategies based on feedback from participants and instructors.

Most participants rated the activity highly engaging and agreed that the simulations provided a realistic crime scene experience. The most successful learning outcome was the ability to create new crime scene scenarios, while documentation and reporting of evidence were rated as the least successful aspects. The quality of simulated wounds significantly enhanced injury analysis and case interpretation. However, a small number of participants felt that role-playing could be distracting or misleading without standardized scripts. By standardizing role-play scenarios and

incorporating supporting actors, we can tailor each simulation to suit different participant groups while also providing practical feedback.

The use of easily accessible materials for simulated wounds and scripted role-playing was found to be the most effective approach for conducting CSI training in resource-limited environments.

Benefits / Comments / Recommendations / Solutions (if any)

In Sri Lanka, medical professionals are often invited to crime scenes to conduct investigations. Due to the country's lack of advanced crime scene investigation techniques, training and workshops on crime scene processing have been introduced as a practical solution. This approach demonstrates effective resource utilization, such as repurposing discarded mannequins from stores for crime scene simulations, maximizing available materials for training.

Summary of Oral Presentation Topic 4

Topic: Investigation of a Rare Case in the Philippines – Hypoxia Due to Nitrogen: Possibilities in Three Scenarios – Domestic Violence, Suicide, and Autoerotic Asphyxiation

Presentation Date: August 28, 2024 (13:10–13:30)

Presenter: PLTCOL Ruben M Apostol Jr

Objectives / Details / Key Points / Issues

In the Philippines, a 53-year-old Caucasian male was found dead inside his home, which he shared with his partner. The victim’s head was covered with a garbage bag and connected to a nitrogen gas tank via a hose. The use of nitrogen gas as a suicide method is rare in the Philippines. Given the history of domestic violence between the victim and his Filipino partner, as well as a recent altercation within the unconventional dynamic of a same-sex relationship, questions arose regarding whether the partner was responsible for the victim’s death or if it was indeed a suicide. Additionally, the case raised the possibility of autoerotic asphyxiation, as there were no specific autopsy findings or postmortem toxicology results to provide definitive conclusions. A thorough

crime scene investigation and analysis of the circumstances surrounding the death were deemed crucial in determining the manner of death.

Benefits / Comments / Recommendations / Solutions (if any)

This case highlights the importance of establishing the facts surrounding the victim's death, beginning with an effective crime scene investigation and evidence collection. A comprehensive investigation must include: Crime scene examination and evidence preservation Interrogation and interviews with key individuals, such as neighbors, friends, and family members of both the victim and the partner Forensic laboratory analysis of samples collected from the victim A complete and thorough autopsy Only with meticulous forensic analysis can it be determined whether this case was a homicide, a suicide, or an accidental death due to autoerotic asphyxiation.

As forensic scientists and crime scene investigators, it is essential to be diligent in crime scene processing and evidence collection from both the crime scene and individuals involved. By systematically analyzing and interpreting evidence based on various hypotheses, investigators can accurately determine the cause and circumstances of death.

Summary of Oral Presentation Topic 5

Topic: Application of 3D Technology and Artificial Intelligence in Crime Scene Reconstruction

Presentation Date: August 28, 2024 (13:30–13:50)

Presenter: Dou Xiuchao

Objectives / Details / Key Points / Issues

Traditional crime scene data collection methods have several limitations, such as: Investigating crime scenes destroyed by explosions, Capturing high-angle images at traffic accident scenes ,Examining crime scenes in complex terrains. To overcome these challenges, modern technologies such as drones and 3D crime scene reconstruction cameras can be integrated into forensic investigations. These tools allow for faster, clearer, and more comprehensive crime scene

documentation. A crime scene simulation system has been developed to process 3D data, focusing on three key applications:

1. High-precision micro-scale modeling of forensic evidence

2. AI-powered crime scene reconstruction, providing fast and efficient virtual scene simulations

3. Aerial imaging, utilizing drone and satellite imagery combined with scene modeling to create accurate 3D crime scene reconstructions for analysis

Additionally, a training system has been developed using 3D virtual reality to create various simulated crime scene scenarios for forensic investigation training.

Benefits / Comments / Recommendations / Solutions (if any)

This case demonstrates the integration of modern equipment and AI technology into crime scene investigations, enabling faster, more accurate, and realistic forensic examinations. However, some limitations remain, such as: High-detail forensic evidence requiring precise modeling, Managing large-scale 3D models. The 3D crime scene reconstruction system is highly beneficial for forensic training, allowing investigators to simulate and practice crime scene analysis in various scenarios. However, virtual reconstructions may not fully replicate the depth and detail of hands-on, real-life investigations.

Summary of Oral Presentation Topic 6

Topic: The Influence of Cognitive Bias on the Occurrence of Misjudged Cases and Its Correction by Aurora Yao

Presentation Date: August 28, 2024 (14:10–14:30)

Presenters: Ms. Piyanuch Pankaew & Ms. Suphisara Thanrangka

Objectives / Details / Key Points / Issues

Research has shown that the primary causes of wrongful convictions include witness misidentification, police misconduct, forensic evidence errors, and false confessions. Many countries have implemented various regulations to reduce wrongful convictions, such as the right to remain silent and plea bargaining in court. However, wrongful convictions still occur, raising the question: “Why does a fair judicial system fail to guarantee accurate verdicts?”

From the study, the key issue is that while judicial processes focus on legal evidence collection and fair verification, the determination of guilt or innocence relies on the judgment of judicial officers, which is influenced by their cognitive biases rather than the fairness of the legal process. The cognitive factors affecting case judgment include: Perceptual limitations based on human cognitive capacity Influence of collective social perceptions Personal knowledge and experience constraints

Analyzing wrongful conviction cases in history, particularly in eras where confessions were the primary evidence, shows a tendency to equate confessions with conclusive proof of guilt. This shift led to confessions evolving from being potential evidence into the definitive proof of guilt, disregarding exceptions or mitigating circumstances, which contributed to wrongful convictions.

When cognitive perception is insufficient, it can lead to misinterpretations between judicial decisions and factual evidence, resulting in erroneous judgments. This study aims to reveal the cognitive biases that lead to misjudgments and proposes corrective strategies: Encouraging multidimensional thinking Strengthening logical reasoning in judicial decisions Visualizing thought processes to make cognitive patterns clearer Maintaining constant vigilance to minimize errors in legal decisions

Benefits / Comments / Recommendations / Solutions (if any)

This study examines the decision-making process in the judicial system, which involves multiple sectors. Certain aspects of the justice system rely on subjective reasoning, which may lead to flawed judgments. Identifying and addressing cognitive biases will help develop more impartial and evidence-based legal decision-making to improve the fairness and reliability of judicial processes.

Summary of Oral Presentation Topic 7

Topic: Unboxing the Mystery: The Role of CSI in Solving a Cebu City Murder (A Case Study)

Presentation Date: August 28, 2024 (13:50–14:10)

Presenters: Ms. Piyanuch Pankaew & Ms. Suphisara Thanrangka

Objectives / Details / Key Points / Issues

A recent murder case in Cebu City, Philippines, gained significant attention due to the efficient and thorough investigation, which led to the identification and arrest of the suspect. The victim's body was discovered inside a cardboard box on July 17, 2023, in Sitio Mohon, Barangay Tisa. The investigation combined traditional police work and modern forensic technology to reconstruct the sequence of events leading to the crime.

Key evidence was gathered through an extensive review of CCTV footage, which captured the victim's movements and interactions with individuals, later identifying the prime suspect. The CCTV footage played a crucial role in pinpointing the last known location of the victim and linking it to the suspect’s residence. Additionally, a habal-habal (motorcycle taxi) driver provided critical testimony, confirming that he had transported the victim to the suspect's location.

To further strengthen the case, investigators discovered the victim’s mobile phone at the suspect’s residence, reinforcing other evidence pointing to the suspect’s involvement. A detailed crime scene investigation, along with interviews of witnesses and family members from both the victim's and suspect’s sides, helped reconstruct a comprehensive timeline of the crime. DNA analysis further provided clear forensic evidence, linking the suspect to both the crime scene and the victim.

This case highlights the importance of detailed and systematic investigations. The combination of surveillance technology, witness testimonies, and forensic analysis ensured the correct identification of the suspect, leading to legal prosecution. It also demonstrates the effectiveness of modern investigative techniques in solving complex cases.

Benefits / Comments / Recommendations / Solutions (if any)

This case underscores the importance of meticulous and structured investigations for crime scene investigators. It also highlights the significance of integrating modern surveillance technology to enhance crime prevention and law enforcement efficiency. By applying these advanced techniques, investigators can improve their operational effectiveness and ensure a higher level of accuracy in criminal investigations.

Summary of Oral Presentation Topic 10

Topic: Blood Pattern Analysis (BPA), Collaborative Exercise 2024, Forensic Physics and Chemistry Laboratory

Presentation Date: August 29, 2024 (09:20–10:40)

Presenter: Mr. Phua Zai Rong, Crime Scene Investigation Workgroup

Objectives / Details / Key Points / Issues

The objective of this study is to explore bloodstain pattern analysis conducted by CSIWG members, including interpretation methods and various techniques used. The study also highlights different bloodstain patterns, interpretation approaches, and techniques utilized in BPA.

Results from the survey

1. Participants took 19 test sets (14 sets they had previously participated in and 5 sets for newcomers).
2. The test consisted of 5 images of scenarios (to describe characteristics, types, and interpret results) and 2 analytical questions (whether the events are continuous and whether it can be determined if there is one or multiple injured persons based on the evidence from the crime scene).
3. Participants had a bachelor's degree or higher in fields related to science and medicine, and 2 participants had previously completed the Basic BPA course.
4. Specific BPA standards/terminology were used as a guide for comparing answers for the test (not applicable to the Basic BPA course and ASB Terms).
5. Tools used for analysis included a 10x magnifying glass, calculator, and string. The scene from the test indicated blood patterns found at the top of the stairs and blood stains at the bottom of the stairs, so participants were asked to analyze this.
6. For each question in the test, participants were required to analyze results based on color, position, size, shape, and distribution.

Test Answers

Pattern 1 (Bloodstain on a vertical surface – tile)

Characteristics: Bloodstains with parent stain and lots of spines.

Type of Bloodstain: Projected pattern.

Interpretation: Blood flows down from a higher position due to a wound while the injured person is standing.

Pattern 2 (Bloodstain on a horizontal surface – tile)

Characteristics: Bloodstains from dripping, circular shape, with some droplets overlapping.

Type of Bloodstain: Drip pattern.

Interpretation: Blood from a wound or from an object that is stained with blood flows onto the floor.

Pattern 3 (Bloodstain on a horizontal surface – tile)

Characteristics: Elongated bloodstains, oval and elongated shape, caused by the swinging of a blood source.

Type of Bloodstain: Cast-off pattern.

Interpretation: Bloodstains result from the swinging of a tool or arm with blood on it.

Pattern 4 (Bloodstain on a horizontal surface – tile)

Characteristics: Bloodstains from dripping, circular shape.

Type of Bloodstain: Drip trail.

Interpretation: Blood from a wound drips onto the floor while walking up the stairs.

Pattern 5 (Bloodstain on a horizontal surface – cement floor)

Characteristics: Features a large cluster of blood droplets with uneven color intensity changes; small blood droplets (satellite stains) are scattered around the large droplet.

Type of Bloodstain: Wipe (a drip pattern was wiped).

Interpretation: Before the blood droplets dried, some movement caused the droplets on the floor to shift.

Scenario Created *In this incident, there is one injured person.

- A man was stabbed in the neck at the bottom of the stairs, resulting in a projected pattern on the wall [1].
- The perpetrator swung a bloodied knife, creating cast-off bloodstains [3].
- The injured man stood relatively straight and pressed his hand against the bleeding wound, resulting in a drip pattern [2].
- The injured man walked up the stairs, creating a drip trail [4].
- When he reached the top of the stairs, his blood dripped onto the floor, and he fell to the ground. Some movement on the floor caused the blood droplets to shift, creating a wipe pattern [5].
- He was later taken to the hospital.

Pattern 1 - Projected pattern created using a 1-milliliter syringe.

Pattern 2 - Drip pattern created using a dropper.

Pattern 3 - Cast-off pattern.

Pattern 4 - Drip trail created using a dropper.

Pattern 5 - Before the drip pattern dried, it was wiped away, creating a wipe pattern.

Problems Encountered

- **Classification by speed has long been abandoned due to significant limitations:**
    - The size of bloodstains is often very similar across different events.
    - Small bloodstains cannot immediately indicate that they are from a gunshot (or high-velocity impact spatters).
    - Medium-sized bloodstains cannot immediately indicate the severity of the injury.
- **Therefore, classification by speed is not recommended.**

Resources for Those Interested in Learning More About Bloodstain Pattern Analysis

- A 40-hour basic course offered by the International Association of Bloodstain Pattern Analysis (IABPA).

    - The course includes theoretical learning (available online), practical training, and exercises.
- This course is designed to help you understand the science underlying bloodstain pattern analysis and to prepare you with the skills and knowledge to evaluate learners through simulations of basic bloodstain patterns. If interested, you can contact me at: Phua_zai_rong@hsa.gov.sg.

Resources for Those Interested in Bloodstain Pattern Terminology Translation

- IABPA has bloodstain pattern terminology available in Chinese and Korean.

Benefits / Comments / Recommendations / Solutions (if any):

For forensic scientists and crime scene investigators, bloodstain pattern analysis is an important tool for reconstructing crime scenes. By examining bloodstains, investigators can establish links between events, physical evidence, and involved individuals. BPA can provide valuable insights into the sequence of events, helping improve crime scene investigations and forensic accuracy.

CSI Workgroup

1. Activities of the CSI Workgroup (2019–2023)

1.1 Organized the "Sequencing Events in Crime Scene Reconstruction" workshop at the 11th AFSN Meeting in Vietnam.

1.2 Introduced 3D technology for latent footwear impressions in crime scene investigations, requiring certification under ISO/IEC 17025.

1.3 In 2021, hosted a knowledge-sharing session on Firearms/Shooting Reconstruction with expert speaker Mr. Michael G. Haag.

1.4 Conducted research and developed a crime data platform in Chengdu, China, integrating crime investigation databases such as: Crime scene investigation systems, Fingerprint and footwear databases, DNA databases, CCTV databases and Electronic evidence databases. This platform enables comprehensive crime analysis, comparison, and justice facilitation. The guidelines derived from these studies will serve as a national-level crime investigation manual to enhance crime-solving capabilities.

1.5 In 2023, Mr. Phua Zai Rong conducted a "BPA Basic Course Leading to Basic BPA Qualifications in Pattern Recognition for Crime Scene Examination"—a 40-hour course held at KIMIA Institute, Malaysia.

1.6 In 2024, Faro 3D technology was proposed for use in crime scene reconstruction, applicable to cases such as traffic accidents, arson, and homicide investigations.

1.7 Encouraged ISO 17020 certification for crime scene investigation (CSI) in member countries that have not yet obtained accreditation. The CSI Workgroup initiated the Abraham AYSA International Criminal Investigative Training Assistance Program (ICITAP) Quality Workshop – QASC x CSIWG | ISO 17020, referencing Hong Kong's Accreditation of Crime Scene Investigation under ISO 17020:2012 Standard to prepare and support CSIWG members in obtaining ISO 17020 certification.

1.8 CSI Workgroup conducted Proficiency Testing Exercises in Bloodstain Pattern Analysis (BPA) for members from 2022 to 2024:

- 2022: Blood Pattern Analysis – 16 participants
- 2023: Blood Pattern Analysis and Footwear – 22 participants
- 2024: Blood Pattern Analysis – 19 participants

2. Election of 2025/26 committee

Position	Committee Members (2024)	Committee Members (2025)
Chairperson	Mr.Louis WM Koh	PLTCOL Ruben M Apostol Jr
Vice-Chairperson	Hazazi Bin Othman	Ms.Min Lin
	PLTCOL Ruben M Apostol Jr	Phua Zai Rong
Secretary	Ms.Min Lin	Yong-il Seo (1 year)
	Phua Zai Rong	DOU Xin Chao
		Meilany Joy R Ordono
Work Group Liaison	Meilany Joy R Ordono	Kannika Suthapojanarak (CIFS, Thailand)

3. Future Plans for CSIWG

3.1 CSI Workgroup Study Tour in June 2025 – Focusing on crime scene investigation processes and scene examination techniques for different types of cases (to be held in Beijing, China).

3.2 Participation in the 2025 Bloodstain Pattern Analysis Proficiency Test to enhance the knowledge and competency of forensic personnel and establish standards in this field.

3.3 CSI Workgroup training sessions in Singapore for members to develop forensic skills and techniques.

3.4 Each member country will translate Bloodstain Pattern Analysis (BPA) terminology from the International Association of Bloodstain Pattern Analysts (IABPA) into their respective national languages.

3.5 CSIWG members will collaborate and share expertise on crime scene examination, forensic photography, and BPA analysis to enhance forensic investigation capabilities across member countries

Illicit Drugs Workgroup (IDWG)

Abstract

1. Oral Presentation

1.1 Title: Synthetic drugs in East and Southeast Asia: latest developments and challenges

Authors: UNODC

Organization: UNODC

Country: Republic of Korea

Abstract: The 2024 UNODC report on synthetic drugs in East and Southeast Asia highlights significant developments and challenges in the region's drug landscape. Methamphetamine production and trafficking remain pervasive, with record seizures of 190 tons in 2023, primarily originating from the Golden Triangle. The use of both land and maritime routes for drug trafficking has increased, with organized crime groups adapting to law enforcement efforts. The report notes a rise in the seizure of non-controlled chemicals used in drug production in the region.

Ketamine seizures, although slightly reduced to 23.3 tons in 2023, continue to be a concern, with evidence pointing to expanded illicit production. The ecstasy market also saw record seizures, primarily trafficked from Europe. New psychoactive substances (NPS) are diversifying, with 91 new substances identified in 2023 alone.

The emergence of new synthetic drug products, such as "party lollipops" containing multiple substances, poses additional health risks. Despite large-scale seizures, the availability of methamphetamine remains high, with stable purities and decreasing prices, suggesting a resilient supply chain.

Overall, the report underscores the need for enhanced international cooperation and information generated from forensic analysis is vital.

1.2 Title: Forensic Diplomacy - AFP Forensics' International Engagement strategy

Authors: Andrew Parkinson

Organization: Australian Federal Police

Country: Australia

Abstract: -

1.3 Title: Project AMPLIO – Building drug profiling capability in Thailand and the Mekong and Australian Drug profiling insights

Authors: Dr Natasha Stojanovska, Forensic Drug Intelligence

Organization: Australian Federal Police

Country: Australia

Abstract: This presentation from the Australian Federal Police (AFP) Forensic Drug Intelligence (FDI) team will focus on Project AMPLIO and the outcomes achieved in strengthening the cooperative relationship between the AFP and the Office of Narcotics Control Bureau (ONCB). Project AMPLIOs purpose in enhancing the forensic drug profiling capabilities of the Narcotics Analysis and Technical Services Institute (NATSI) laboratory has supported initiatives to suppress drug trafficking impacting Thailand, the Greater Mekong Region and Australia. To date the Project AMPLIO has delivered purchasing of specialised equipment, mentoring and training of NATSI laboratory scientists and established pathways for increasing information sharing between participating agencies.

This presentation will also provide an overview of the current illicit drug trends observed at the Australian border, with a particular focus on drugs seizures from the Asia region. In Australia, drug profiling is directed towards drug types commonly seized in large quantities at the Australian border including cocaine, heroin and methamphetamine. It is acknowledged that over the past few years' active collaboration between AFP and Foreign LEA has played an important role in the disruption of drug trafficking to Australia from Southeast Asian countries. The sharing of forensic intelligence and initiatives such as Project AMPLIO will further enhance this cooperation.

1.4 Title: Drug Profiling - A powerful tool for sharing forensic intelligence on drug trafficking

Authors: Heeseung Kim

Organization: Supreme Prosecutors' Office

Country: South Korea

Abstract: In the Asia-Pacific region, methamphetamine is the most widely produced and distributed synthetic drug and rapidly expanding into West Asia and the Middle East. In order to block methamphetamine production and trafficking, strengthening law enforcement activities including increasing budget and police force are being made around the world. Most trafficking cases, however, involved trans-national drug crime organizations and sometimes domestic investigation is not enough to fight these organizations. One way to overcome these trans-national drug crimes is sharing forensic intelligence information. Drug profiling, performed in many countries within Asia-Pacific region, is a powerful tool for gathering forensic intelligence on drug production and distribution and further strengthen drug crime investigations if the proper profiling forensic intelligence is shared by countries. Forensic Intelligence network for drug Asia-Pacific (FIND-AP), which is being promoted as a cooperative project between UNODC and Supreme Prosecutors' Office of Korea, is a forensic intelligence sharing project between countries. It will produce immediate actionable intelligence that can overcome limitations on trans-national crimes, and become an important tool to reduce drug crimes in the region. In this presentation, we would like to introduce the FIND-AP project and discuss how to share drug profiling intelligence.

1.5 Title: Updates from SWGDRUG

Authors: Dr Angeline Yap

Organization: Applied Sciences Group, Health Sciences Authority, Singapore

Country: Singapore

Abstract: The Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) is an international group that meets every year to develop, revise, and publish recommendations and other tools/resources for the seized-drug community. SWGDRUG comprises international members representing different regional networks as well as members representing US regional networks and major scientific organisations. This presentation aims to update IDWG members on the new outreach programme, development of Supplemental Documents, and the revision of the Recommendations.

1.6 Title: UNODC International Collaborative Exercises (ICE) on Seized Drug Materials and Biological Specimens

Authors: WONG Yen Ling

Organization: UNODC

Country: Austria

Abstract: The UNODC International Collaborative Exercises (ICE) programme is an independent interlaboratory exercise in drug analysis which allows for national forensic drug and toxicology laboratories worldwide to continuously evaluate their own performance and assess the quality of their results. Participation in such collaborative exercises or proficiency tests is one of the essential elements for the implementation of a laboratory quality management system and ultimately accreditation. The options available for participation are in the analysis of drugs in Seized Materials (SM) and in Biological Specimens (BS, specifically urine). Since its inception in 1995, the ICE programme has supported the over 460 forensic institutions in 120 countries, including several from Asia. The short presentation highlights performance of participating laboratories in this region as well as recent developments in the implementation of the ICE programme.

1.7 Title: Application of portable Raman spectroscopy in the analysis of ecstasy tablets

Authors: NG CHOON HIANG

Organization: DEPARTMENT OF CHEMISTRY, PENANG BRANCH

Country: MALAYSIA

Abstract: Raman spectroscopy is listed as Category A technique in the SWGDRUG guidelines due to its high level of selectivity based on the structural information. This study was aimed to assess the performance of a portable Raman spectroscopy as an aid in analysing ecstasy tablets at the point of use. In this study, a total of 130 ecstasy tablet samples were analysed by Raman spectroscopy and characterised by gas chromatography-mass spectrometry (GC-MS). The accuracy, sensitivity, and specificity of Raman spectroscopy were then evaluated corresponding to the GC-MS results. Through the Raman spectroscopy and GC-MS, 3,4-methylenedioxymethamphetamine (MDMA) was found to have dominated the composition of ecstasy tablets obtained from case samples. Raman spectroscopy showed an accuracy of 85.4%, while the sensitivity and specificity were determined as 85.2% and 100%, respectively. No false positive of MDMA or other drug were reported. A combination of Raman spectroscopy and GC-MS results allowed for the discrimination of tablet samples up to 41 groups. To conclude, portable Raman spectroscopy is a non-destructive and rapid technique for targeted determination of ecstasy tablets and allows for on-site screening for suspected illicit drugs.

1.8 Title: Navigating the Emergence of Semi-Synthetic Cannabinoids: Analytical Challenges and Implications

Authors: Ong Mei Ching

Organization: Health Sciences Authority

Country: Singapore

Abstract: Semi-synthetic cannabinoids (SSCs) are substances that are synthesized from naturally occurring cannabinoids such as cannabidiol (CBD) or delta-9-tetrahydrocannabinol (THC). These substances include isomers of THC (e.g. delta-8-THC or delta-6a,10a-THC), THC acetate and the newly emerging hexahydrocannabinol (HHC). In the last few years, our laboratory has encountered SSCs in cannabis plant material as well as vape products. The analyses of these samples pose numerous challenges due to complex sample matrices, the issue of isomer differentiation as well as stability of the substances. These challenges in turn impact the accurate identification and reporting of the substances.

This presentation will discuss the above challenges and the strategies for addressing them. These strategies include investigation of different solvents for sample preparation, development of a complementary analysis workflow comprising different techniques and/or methods.

1.9 Title: Cannabis Infused Edibles

Authors: Nor Vickneswary binti Letchmanan

Organization: Chemistry Department of Malaysia

Country: Malaysia

Abstract: Cannabis is a plant which has medical benefits but illegal in countries such as Malaysia, China, Indonesia and many others. Over the past few years, cannabis has been used for recreational or medical purposes. Cannabis edible's market is increasing in value and worth billions of dollars due to it's medical benefits. This product has become more in demand because it is more lung friendly than smoking and can be consumed anywhere.

In Kimia Malaysia, cannabinoids infused edibles cases are seized by enforcement agencies such as Royal Malaysia Police (RMP) and Royal Malaysia Customs (RMC). Cases related to cannabis edibles has been increasing since 2020 during the Movement Control Order (MCO) and mostly seized by RMC. Cases sent to Kimia Malaysia are cookies, cakes, gummies, and chocolates are some of the cannabis edibles sent for analysis of the contents and what type of cannabinoids present in it. The common cannabinoids detected are delta-9-tetrahydrocannabinol (THC), cannabinol and cannabidiol.

This presentation will highlight the analytical methods used for analysing the edibles using Gas Chromatography Mass-Spectrometry. The attendees will gain useful insights on analysis performed on different edibles which contains different types of cannabinoids sent to Kimia Malaysia for analysis.

2. Poster Presentation

2.1 Title: Enhancing Chain of Custody Procedures for Drug Evidence in the Philippines: A Legal and Procedural Analysis

Authors: PCOL LOURDELIZA CEJES, PCPT KIMBERLY RAGMAC, PLT FENNY QUIJADA

Organization: Philippine National Police

Country: Philippines

Abstract: Enhancing Chain of Custody Procedures for Drug Evidence in the Philippines: A Legal and Procedural Analysis

This study critically examines the implementation of the Chain of Custody Rule within the Philippine context, focusing on its role in maintaining the integrity of drug evidence in legal proceedings. Drawing from legal references such as Section 21 of RA 9165 and RA 10640, as well as the Unified Manual in the Investigation and Prosecution of Illegal Drugs, the study emphasizes the importance of meticulous record-keeping and documentation at every stage of evidence custody. Key aspects of the Chain of Custody explored include the recording of authorized movements and custodianship of seized drugs, controlled substances, or laboratory equipment, from seizure to forensic analysis and court presentation. The study highlights the necessity of documenting transfer details, custodian identities, and final disposition, citing the precedent set in the PP vs. Sagana case (G.R. No. 208471). Furthermore, the study delves into the four fundamental links of the Chain of Custody: initial seizure and marking, turnover to investigating officers, forensic examination, and submission to the court. It identifies challenges, particularly in the third link, such as conflicting information and custodial responsibilities within forensic units. By analyzing current practices and legal precedents, this study aims to provide insights for enhancing Chain of Custody protocols, contributing to the reliability and admissibility of drug evidence in the Philippine legal system. The study includes more than 600 respondents, encompassing police officers, drug operating units, chiefs, investigators, and other relevant roles within the area of responsibility of Police Regional Office 10.

2.2 Title: Unravelling the Vape Enigma: Analyzing the Complexities of Illicit Substance Detection in vapes

Authors: Goh Ben Justin; Mohammad Yunus Bin Jasmani

Organization: Illicit Drugs Laboratory, Applied Sciences Group, Health Sciences Authority, Singapore

Country: Singapore

Abstract: E-Liquids and vapes were first encountered in our laboratory in 2015. Originally, the contents were mainly liquid based and comprised nicotine and/or cannabis related compounds such as CBD and THC. Today, the trend has evolved to include an increasing number of disposable vape pods containing cannabis oil which contain semi-synthetic cannabinoids (SSCs) like delta-8-THC, delta-8-THC acetate, and delta-9-THC acetate.

Nicotine-type e-liquids may present complex chromatographic profiles due to the presence of humectants like propylene glycol and glycerin in the matrix; this is compounded by potential adulteration with NPS such as MDMB-4en-PINACA or other illicit drugs like methamphetamine.

Cannabis oil type e-liquids may present complex matrices containing both natural and semi-synthetic cannabinoids. Confirmation of the respective cannabinoids necessitates the use of a combination of techniques such as GC-MS and LC-MS, or the use of derivatization, due to possible thermal degradation

This poster highlights the challenges posed by the analysis of nicotine-type and cannabis oil type vape devices and the analytical workflow employed by the laboratory to meet these challenges.

2.3 Title: Trend analysis of Korean drug epidemic by analyzing NFS results

Authors: Jiyeong Jo, Seul Ku, Soyoung Kyung, Suncheun Kim, Hyeyoung choi

Organization: NFS, Korea

Country: Republic of Korea

Abstract: Synthetic drugs are becoming popular in many countries, and the emergence of synthetic drugs with new structures is also accelerating. These drugs are rapidly spreading through highly developed logistics networks and the Internet, and as a result of this synergistic effect, the number of abusers is increasing and the substances of abuse are becoming more diverse. In order to observe the continuous emergence of new drugs and rapidly changing trendy substances, NFS started to overhaul its statistical system in 2022. The text obtained through the standardization of the method of reporting results and the unification of the notation of substance names was counted through VBA to identify trends in the prevalence of substances in Korea.

2.4. Title: Trend of New Psychoactive Substances found in seized samples in Malaysia

Authors: Dr.Vanitha Kunalan, Junianah Binti Mohd Jailani and Wan Najmuddin Bin Wan Ahmad

Organization: Chemistry Department of Malaysia

Country: Malaysia

Abstract: New Psychoactive Substances (NPS) are designer drugs that produced by synthetic methods and used as recreational drugs. These drugs are synthesised from precursor substances that are readily available. Like amphetamine type stimulant (ATS) drugs, NPS are a psychoactive stimulant but at the same time being able to circumvent existing legislation and hence are legal to possess in certain countries. It appears in various forms such as powdery substances, tablets, capsule and herbal products. UNODC Early Warning Advisory (EWA) classified these synthetic drugs fall into 15 broad categories. It was first identified in year 2012 in seized materials in Malaysia. From year 2012 to 2023, synthetic cannabinoids and cathinones are the first and second most common classes of NPS detected respectively. Since the year 2019, designer benzodiazepines is the third most common classes of NPS received. In this poster presentation the trend of NPS found in seized samples in Malaysia will be shared.

- IDWG Meeting Summery -

Report on the Conference Outcomes

The 16th Asian Forensic Science Network Meeting and Symposium

Between 26th – 30th august 2024 at Royal Thai Navy Convention Hall, Bangkok

Illicit Drug Workgroup (IDWG)

The 16th Asian Forensic Sciences Network (AFSN) Annual Meeting was held in Thailand from August 26-30, 2024, at the Royal Thai Navy Convention Hall in Bangkok. The conference brought together forensic science experts and practitioners from various fields across several ASEAN countries, including China, South Korea, the Philippines, Malaysia, Singapore, Indonesia, Vietnam, and Thailand.

Participation Statistics

The Illicit Drug Workgroup (IDWG) had approximately 46 participants from various countries across Asia, including Brunei, China, India, Indonesia, Malaysia, Mongolia, the Philippines, South Korea, Singapore, Sri Lanka, Timor-Leste, Vietnam, and Thailand.

Summary of the Conference

Wednesday, August 28, 2024

On Wednesday, August 28, 2024, there were a total of 9 oral presentations from 9 different countries and 3 poster presentations. The details are as follows:

Topic: Updates by UNODC

Presented by Dr. Justice Tettey

Dr. Justice Tettey, a speaker from UNODC, delivered a presentation on "International Scheduling Decisions Support for Forensic Laboratories (UNODC)." The presentation focused on the development and support initiatives provided by UNODC in combating drug use and crime. It highlighted efforts to enhance the readiness of forensic laboratories in addressing emerging drugs. UNODC supports this by providing reference standards, proficiency testing for laboratories, and facilitating knowledge sharing and technology transfer among forensic laboratories.

Topic: Prodrugs and more unusual aspects

Presented by Dr. Simon Elliott

Dr. Simon Elliott provided an insightful presentation on Prodrugs, which are compounds that themselves are not classified as narcotics but can metabolize into psychoactive substances or controlled drugs in the human body. He explained how certain prodrugs transform into New Psychoactive Substances (NPS) and illicit drugs, emphasizing the need for regulatory control.

Key examples of prodrug transformations include:

Lisdexamfetamine, Fenethylline, and Clobenzorex ⟶ Amphetamine

Benzphetamine ⟶ Methamphetamine

α-Phthalimidopropiophenone ⟶ Cathinone

1-Propionyl-LSD (1P-LSD) ⟶ LSD

Rilmazafone ⟶ Rilmazolam

Dr. Elliott stressed the importance of monitoring and regulating prodrugs, as they can serve as precursors to illicit drugs, complicating forensic investigations and drug control measures.

Topic: Validation: Practical aspects, experimental set-up, and interpretation

Presented by: Dr. Sarah Wille

Dr. Sarah Wille discussed that a well-established laboratory consists of method development, method validation, quality assurance, and accreditation, as follows:

Method development requires setting objectives and planning a validation plan based on method robustness. For example, drug analysis in hair extraction considers factors such as temperature during hair soaking, centrifugation speed, and sample weight to ensure accurate analysis without affecting results.

Dr. Sarah Wille described method validation, which is divided into two approaches:

(a) Qualitative method validation, which includes parameters such as selectivity, matrix effect, limit of detection, process sample stability, storage stability, incurred sample reanalysis (ISR), and carry-over effect.

(b) Quantitative method validation, which includes all qualitative parameters plus accuracy, limit of quantification (LOQ).

Dr. Sarah Wille explained quality assurance, which involves checking instrument suitability before analysis, implementing quality control during analysis, and conducting proficiency testing (PT test). Finally, she discussed accreditation, which requires preparing documentation for method development and validation, quality assurance, proficiency testing, method robustness, uncertainty estimation, risk assessment, verification, training, and the legal impact of forensic analysis.

Topic: Synthetic Drugs in East and Southeast Asia: Latest Developments and Challenges

Presented by: Inshik Sim

The 2024 UNODC report on synthetic drugs in East and Southeast Asia highlights significant advancements and challenges in the region. The production and trafficking of methamphetamine remain widespread, with 190 tons seized in 2023, primarily originating from the Golden Triangle. The use of both land and maritime routes for drug trafficking has increased, with criminal organizations adapting to law enforcement efforts. The report also notes a rise in seizures of unregulated precursor chemicals used in drug manufacturing.

Seizures of ketamine slightly declined to 23.3 tons in 2023, yet concerns remain regarding illegal production expansion. Ecstasy (MDMA) markets have seen record-high seizures, with most supplies trafficked from Europe. The variety of new psychoactive substances (NPS) continues to grow, with 91 new substances identified in 2023. A notable trend is the emergence of synthetic drug products like "Party lollipops," which contain multiple psychoactive substances, increasing health risks.

Despite large drug seizures, methamphetamine availability remains high, with consistent purity and declining prices, indicating a resilient supply chain. The report underscores the importance of strengthening international cooperation and forensic analysis-based intelligence to combat synthetic drug challenges in the region.

Topic: AMPLIO Project – Enhancing Drug Analysis Capabilities in Thailand and the Mekong Region & Insights into Australian Drug Analysis

Presented by: Dr. Natasha Stojanovska

The presentation by the Forensic Drug Intelligence (FDI) team of the Australian Federal Police (AFP) focused on the AMPLIO Project and its impact on strengthening collaboration between AFP and the Office of Narcotics Control Bureau (ONCB).

The objective of the AMPLIO Project is to enhance the drug analysis capabilities of the Narcotics Analysis and Technical Services Institute (NATSI), which supports drug trafficking suppression efforts affecting Thailand, the Mekong region, and Australia. To date, the project has provided specialized equipment, consultancy, and training for NATSI forensic scientists and has established pathways for enhanced information exchange between participating agencies.

The presentation also provided an overview of illicit drug trends observed at Australia's borders, particularly drug seizures originating from Asia. In Australia, drug analysis focuses on high-volume seized substances, including cocaine, heroin, and methamphetamine. Over the years, close cooperation between AFP and foreign law enforcement agencies has played a crucial role in disrupting drug trafficking routes from Southeast Asia to Australia. The exchange of forensic intelligence and initiatives like the AMPLIO Project will continue to support and strengthen these collaborative efforts.

Topic: Drug Analysis – A Powerful Tool for Forensic Intelligence Exchange on Drug Trafficking

Presented by: Heeseung Kim

In the Asia-Pacific region, methamphetamine is a widely produced and distributed synthetic drug, with its reach expanding into West Asia and the Middle East. To counter methamphetamine production and trafficking, global efforts have been focused on strengthening law enforcement, including increasing budgets and expanding police forces. However, most drug-related cases involve transnational criminal organizations, and domestic investigations alone are sometimes insufficient to combat these networks.

One effective approach to tackling transnational drug crimes is through forensic intelligence exchange. Drug analysis, conducted across multiple Asia-Pacific countries, serves as a powerful tool in collecting forensic data on drug production and distribution. The effectiveness of drug crime investigations can be significantly enhanced if forensic drug analysis data is shared internationally.

The Forensic Intelligence Network for Drug Asia-Pacific (FIND-AP) is a collaborative initiative between UNODC and the Korean Supreme Prosecutors' Office, designed to facilitate international forensic data exchange. This network generates actionable intelligence, helping to overcome challenges posed by transnational crime. It has become an essential tool in reducing drug-related crime in the region.

Topic: Update from SWGDRUG

Presented by: Dr. Angeline Yap

The Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) is an international group that holds annual meetings to develop, improve, and disseminate recommendations, tools, and other resources for the seized drug analysis community. SWGDRUG consists of members from various countries representing different regional networks, including representatives from U.S. regional networks and major scientific organizations.

This presentation aims to update IDWG members on new outreach programs, the development of supplementary documents, and improvements to existing recommendations.

Topic: The Use of Portable Raman Spectroscopy in Ecstasy (MDMA) Analysis

Presented by: NG CHOON HIANG

Raman spectroscopy is classified as a Category A technique in SWGDRUG guidelines due to its high specificity. This study aims to evaluate the effectiveness of portable Raman spectroscopy as a complementary tool for on-site analysis of Ecstasy (MDMA) tablets.

In this study, 130 Ecstasy tablets were analyzed using Raman spectroscopy and characterized by Gas Chromatography-Mass Spectrometry (GC-MS). The accuracy, sensitivity, and specificity of Raman spectroscopy were then assessed by comparing its results with those obtained from GC-MS.

The findings revealed that 3,4-methylenedioxymethamphetamine (MDMA) was the primary active ingredient in the analyzed Ecstasy samples. Raman spectroscopy demonstrated an accuracy of 85.4%, with sensitivity and specificity of 85.2% and 100%, respectively. No false positives were reported for MDMA or other substances. By combining Raman spectroscopy and GC-MS results, 41 distinct tablet groups were identified.

In conclusion, portable Raman spectroscopy is a non-destructive and rapid technique for identifying Ecstasy tablets and can be effectively used for drug screening at checkpoints.

Topic: Management of Semi-Synthetic Cannabinoid Emergence: Analytical Challenges and Considerations

Presented by: Ong Mei Ching

Semi-synthetic cannabinoids (SSCs) are substances synthesized from naturally occurring cannabinoids, such as cannabidiol (CBD) or delta-9-tetrahydrocannabinol (THC). These include THC isomers (e.g., delta-8-THC or delta-6a,10a-THC), THC acetate, and hexahydro cannabinol (HHC), which have emerged in recent years. Laboratories have detected SSCs in cannabis plant material and smoking-related products. The analysis of these samples presents several challenges due to the complex sample matrix, the issue of isomer differentiation, and the stability of the compounds, which affect the accurate identification and reporting of substances. This presentation discusses these challenges and strategies to address them, including studies on different solvents for sample preparation, the development of standard operating procedures, and analyses enhanced by diverse techniques and/or methods.

Topic: Cannabis-Infused Foods

Presented by: Nor Vickneswary binti Letchmanan

Cannabis is a plant with medicinal benefits but is illegal in many countries such as Malaysia, China, Indonesia, and others. In recent years, cannabis has been used for recreational or medicinal purposes. The market for cannabis-infused foods is rapidly growing, worth billions of dollars, due to its medical benefits. These products are in demand because they are more lung-friendly than smoking and can be consumed anywhere. However, they are often seized by authorities such as the Movement Control Order (MCO) and Malaysian Customs (RMC).

In Kimia Malaysia, cases involving cannabis-infused foods have been seized by law enforcement agencies like the Royal Malaysia Police (RMP) and Malaysian Customs (RMC). The number of cases related to cannabis-infused foods has increased since 2020 during the control period. The cases sent to Kimia Malaysia include cookies, cakes, gum, and chocolates, which are some examples of cannabis-infused foods sent for analysis to determine the composition and types of cannabinoids present. Common cannabinoids detected include delta-9 - tetrahydrocannabinol (THC), cannabinol, and cannabidiol. This presentation highlights the analytical methods used in food analysis with Gas Chromatography Mass Spectrometry and presents useful insights into the analyses conducted on various foods containing different cannabinoids that have been sent to Kimia Malaysia for testing.

August 29, 2024 (IDWG & TXWG Workgroup Share Session)

Tropic: Science Meets Law: Enhancing Your Forensic Work Through Legal Collaboration

Mr. Yang Ziliang, Director of the Legal Department from the Health Sciences Authority of Singapore, led the activity on the topic "Science Meets Law." This session focused on knowledge exchange regarding the collaboration between legal professionals from various agencies and providing support for forensic scientists in preparing to testify in court or assisting during testimony. He presented approaches for cooperation with legal experts from agencies to train forensic scientists in court testimony, such as creating mock courtrooms where forensic scientists can practice testifying using their own cases before going to court, observing senior officers' testimony in court, and having senior officers follow up on the testimony of their subordinates to identify weaknesses and improve themselves. Additionally, he provided guidance on answering questions from the court, prosecutors, and defense lawyers to ensure understanding of the forensic process and laboratory report results. Furthermore, Mr. Chotiphan Julphet, an expert investigator from the Office of the Narcotics Control Board (ONCB) of Thailand, gave a lecture on "Forensic Science and Drug Cases." He discussed the responsibilities of the ONCB, the forensic value in drug seizures, how to behave and respond as a court witness, how to write reports to support court proceedings, and presented case examples from the process of drug seizures (methamphetamine), press conferences, and transferring evidence to the laboratory. He also answered questions from seminar participants.

IDWG Business Meeting

1. **Approval of the 15th Meeting Minutes:**
    - Approval of the minutes from the 15th meeting held in 2022 in Kuala Lumpur, Malaysia
2. **IDWG Activities in 2023:**
    - **Workshop: Drug and toxicology analysis.**
        - A hands-on workshop on drug and toxicology analysis, featuring both theoretical and practical training, was held at the Health Sciences Authority (HSA). The workshop was conducted in both online and on-site formats. On-site participants came from three countries: Brunei, Malaysia, and the Philippines, while over 400 online participants joined from 28 countries.
    - **15th AFSN Meeting:**
        - The 15th Asian Forensic Sciences Network (AFSN) meeting was held in Kuala Lumpur, Malaysia. It featured 14 oral presentations and several poster presentations from 8 countries. Guest speakers were invited from the United Arab Emirates (UAE), the Australian Federal Police, and the UNODC. Collaboration among agencies made these presentations cost-free.
    - **Forensic Science Symposium:**

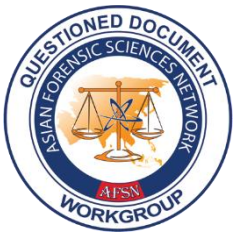
        - This online symposium was organized by the UNODC, with IDWG serving as a co-chair alongside AFSN, MSP, and DEA. The discussion covered three main topics related to forensic science.

3. **IDWG Activities and Achievements in 2024:**
    - **Online Seminar on Forensic Investigation:** This seminar was held to share knowledge and methods related to the use of Laboratory Information Systems (LIS). Experts from South Korea, Singapore, and Germany participated in the event.

- **Internal Training at Kimia Malaysia:** Training was conducted for personnel in Malaysia and was extended to HSA. Plans are in place to expand this training to other AFSN member institutions in the future

4. **Academic Publications:**
    - **Research Paper:** A published article summarizing the successes of AFSN over the past 15 years, including the significant role of IDWG activities.
5. **IDWG Board Elections for 2025-2026:**
    - **Voting:** The election was held for the positions of Chairperson, Vice-Chairperson, and Secretary for a 2-year term (2025-2026).
    - **Election Results:**
        - **Chairperson:** Dr. Vanitha Kunalan from Malaysia, Department of Chemistry
        - **Vice-Chairperson:** Dr. Ong Mei Ching from Singapore Health Sciences Authority
        - **Secretary:** Dr. Jiyeong Jo from the National Forensic Service, Republic of Korea
6. **Suggestions for Future Training and Seminars:**
    - **Training Topic Proposals:** Members suggested training on drug analysis, laboratory analysis, evidence management, and the use of digital tools in analysis.
    - **Case Studies from Each Country:** A proposal was made to exchange challenging or complex case studies from each country to enhance shared knowledge and experience.
    - **Seminars on New Technology:** Including the use of machine learning tools in chemical and drug analysis.


APMLA
TCEB
The 16th AFSN Annual Meeting & Symposium
26th - 30th August 2024
at Royal Thai Navy Convention Hall, Bangkok, Thailand
#THAILAND 2024



Questioned Document Workgroup (QDWG)

Abstract

1. Oral presentation

1.1 Title: Challenges in Chinese handwriting and signature examination

Authors: LI CHI KEUNG

Organization: Government Laboratory

Country: Hong Kong Special Administrative Region, PRC

Abstract: Chinese characters had been developed some 4,000 years ago and, with the growth of population, are used by over 1.3 billion people worldwide today. Document examiners who are not familiar with Chinese characters will inevitable encounter cases involving the examination of Chinese handwriting regardless of their locations. Document examiners have to participate in relevant proficiency testing (PT) programmes to demonstrate their technical competency in conducting Chinese handwriting examination. Government Laboratory (GL) of the Hong Kong Special Administrative Region has been organizing PT programmes in Chinese handwriting and signature examination in accordance to ISO 17043 requirements to assist document examiners in seeking development in Chinese handwriting and signature examination. There are extensive studies on the examination of English handwriting in the literature, while similar studies on Chinese handwriting are relatively limited. We are seeking to explore the obstacles and challenges for document examiners applying the principles of identification and elimination of authorship described in the literature to examine Chinese handwriting. This presentation describes the methodology and key features in Chinese handwriting and signature examination, and the PT programmes organized by GL.

1.2 Title: Assessing Subjectivity: The Use of Adjective Check List (ACL) in Analyzing Forensic Experts' Biases in Graphonomic Examination of False Signatures in Document Authentication

Authors: Mahmud Nasrul Habibi, Ditya Riski Taher, Cantaka Sasikirana Suko Kautsar

Organization: Airlangga University

Country: Indonesia

Abstract: The objectivity of forensic experts in analyzing signatures is crucial in ensuring the integrity of document authentication processes. However, the subjective biases that may influence forensic examiners during graphonomic examination pose significant challenges to the reliability of their findings. This study investigates the utilization of the Adjective Check List (ACL) as a tool for assessing subjectivity among forensic experts when examining false signatures in document authentication. The ACL, a psychometric instrument designed to measure subjective tendencies, provides a systematic approach to evaluate linguistic descriptors used by forensic examiners during signature analysis. Through a comprehensive literature review and empirical data collection involving surveys, interviews, and simulated signature analyses, this study aims to identify common subjective biases among forensic experts and assess the efficacy of the ACL in detecting and mitigating such biases. The findings of this research contribute to enhancing our understanding of the role of subjectivity in forensic examinations and propose strategies for promoting objectivity in document authentication processes.

1.3 Title: Microtrends Study on Document Forgery in three years (2021-2023): Insights from the Department of Chemistry, Malaysia

Authors: Wan Rahimah Wan Ahmad

Organization: Department of Chemistry Malaysia

Country: Malaysia

Abstract: Document falsification evolves alongside technological advancements. This study aims to identify prevailing trends in document forgery by analysing case reports received by the Document Examination Division of the Department of Chemistry Malaysia. These cases originate from various stakeholders, including enforcement agencies, private entities, and individuals. The micro-study focuses on data retrieval from analysis reports spanning three years, encompassing opinions, document types, and analytical methods. Notably, all examined materials are paper-based forgeries. The findings reveal signature forgery as a dominant form, occurring on checks, wills, and government officials forms, alongside fraudulent alterations made through printing processes. The rise of digital documents has led to declines in certain case types, presenting a new challenge for document examiners.

1.4 Title: COMPARISON OF ON-LINE SIGNATURES AND OFF-LINE SIGNATURES PRODUCED USING A DIGITAL PEN AND A PDA RESPECTIVELY

Authors: Mohamad Noor, Siti N. M., and Jones, Allison E.

Organization: 1. University of Central Lancashire, Preston, United Kingdom. 2. Department of Chemistry Malaysia (KIMIA Malaysia).

Country: Malaysia

Abstract: With the evolution of technology, the digital signatures have been commercially applied in daily transaction along with the normal, traditional handwritten signatures. However, the different lies in the nature of both types of signatures. Therefore, there is a need for Document Examiners to attend to the revolutionary approaches in dealing with such challenges. In this study, it is proposed that a digital signature produced by a PDA is an on-line signature and a normal handwritten signature produced by a digital pen is an off-line signature. The variations observed between specimen signatures of both devices confirmed that there are significant differences in the features between specimen signatures obtained using digital pen and PDA respectively. The signatures of the PDA are less reliable and less reproducible in comparison with the signatures of the digital pen. Hence, digital signatures produced by PDAs are not suitable to be used in comparison with normal handwritten signatures.

1.5 Title: UNODC International Collaborative Exercises on Security Document Examination (ICE-SecDoc)

Authors: WONG Yen Ling

Organization: UNODC

Country: NA

Abstract: The Laboratory and Scientific Services of UNODC assists Member States and the international community in having access to quality forensic science services and data in support of their efforts to counter drugs, crime and terrorism. The programme fosters the development of standardized training programmes and reference materials, as well as training activities to enhance the expertise and capacity of law enforcement officials and forensic experts. It also seeks to ensure that forensic institutions carry out their day-to-day activities in compliance with internationally accepted standards of practice. As part of the UNODC International Quality Assurance Programme (IQAP) intended to harmonize the quality of work produced by forensic personnel in different countries, LSS has developed a virtual learning environment for forensic document examination that hosts the International Collaborative Exercises in Security Document Examination (ICE-SecDoc).

1.6 Title: Survey results of how Document Examiners handle differences

Authors: Nellie Cheng, Ngor Yi Hui

Organization: Health Sciences Authority

Country: Singapore

Abstract: It is not uncommon that differences are found when handwritings are compared. As different document examiners may have different approaches in dealing with differences, the authors sent a survey to three networks namely European Network of Forensic Science Institutes/European Network of Forensic Handwriting Experts (ENFSI/ENFHEX), American Academy of Forensic Sciences (AAFS) Questioned Document Section, and Asian Forensic Sciences Network Questioned Document Workgroup (AFSN QDWG) to request input from document examiners. In this presentation, the authors will present the survey results on how the respondents deal with differences.

1.7 Title: Embracing Paperless Documentation in Document Examination

Authors: Tan Sock Kim, Ngor Yi Hui

Organization: Health Sciences Authority

Country: Singapore

Abstract: Since 2020, our laboratory has undergone a transformative shift towards a digital case record workflow, leaving behind traditional paper documentation and embracing a fully paperless system. This presentation will focus on our experience with paperless documentation in Document Examination. We will share on the various software tools that have played a crucial role in facilitating this transition, providing insights into how they have been utilized in streamlining our documentation processes.

1.8 Title: Forensic discrimination of digital offset and offset lithography printed documents using non-destructive techniques

Authors: Nirun Yasamoot*, Pichayada Katemake, Supaporn Noppakundilograt

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: This study discriminated a pair of industrial printed documents: digital offset (DO) or liquid electrophotography and offset lithography (OL) from the printing house because those documents are very similar and hard to identify by magnifying glass. The printed samples could be divided into two groups. The first group was printed using digital offset (DO): HP Indigo (liquid toner), with 600 dpi, on glossy art paper of 160 g/m2. The second group was prepared by offset lithography (OL): Heidelberg, using traditional oil-based, soy-based and UV-based paste inks, on the same type of paper. The original file used for printing was the same for both groups containing image and text areas. The non-destructive techniques included microscopic examination (200x to 700x), video spectral analysis (VIS, IR, UV, HSI, IRFC and UVFC) and Raman spectroscopy. Analysis shows that microscopic examination revealed a difference in screen dots in the DO and OL image areas. Besides, the text's edge sharpness obtained from both groups was also different. IR, UV, HSI, IRFC and UVFC illustrated the distinction in the image area of DO and OL, but not in the text area. Finally, Raman spectroscopy showed the difference in magenta, yellow, and black peaks between DO and OL.

1.9 Title: Recent Advancements in Forensic-Level Technology for Document Examination and Counterfeit Detection

Authors: foster + freeman

Organization: foster + freeman

Country: UK

Abstract: The fight against document fraud and counterfeiting is an ongoing battle. This presentation delves into the cutting edge of research exploring novel methods for forensic document examination and counterfeit detection.

We'll begin by exploring the current challenges faced by forensic document examiners. This includes difficulty in detecting sophisticated counterfeits, and analysing forged documents.

Next, we'll examine research technology advancements in this field, exploring emerging techniques for the analysis of intersecting lines, current generation passports, and ID card security laminates. We'll discuss how these methods can enhance accuracy and efficiency in detecting forgeries and identifying counterfeits.

The presentation will highlight specific research that showcases the impact of these advancements. We'll discuss the potential of these methods to revolutionise the field of forensic document examination

By attending this session, you will gain insights into:

The current limitations and challenges in forensic document examination.

Emerging research advancements in document examination and counterfeit detection.

The potential impact of these advancements on accuracy and efficiency.

Real-world applications of these research findings

1.10 Title: A Comparative Study of Screening Characteristics of Laser Printed Documents

Authors: HAN Xingzhou, LIN Jinlin, YU Xuezhou

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: Currently, laser printers in people's daily work and life is becoming increasingly popular, but also become a common means of criminals to commit crimes. For the inspection of color laser printing documents, document examiners in the traditional laser printing documents on the basis of examination, often use color "tracking code", but in recent years, in addition to the emergence of tracking code can be removed in addition to the software, for the examination of color laser printed documents has become a new subject for document examiners. In this paper, based on the perspective of mesh, color laser printed documents mesh characteristics of experimental research, respectively, on different brands, different models, as well as the choice of different resolutions of the image of the sample production, the same part of the print dot characteristics of observation and comparison, in order to explore the laser printer to print documents mesh morphology, mesh spacing, mesh area, mesh angle and other mesh characteristics of the law. The study shows that the dot characteristics of the same color laser printer with different printing time has relative stability, the same printer to print images of different resolutions of the screening characteristics of the difference is not obvious, different brands of different models of laser printers dot pattern, dot spacing, dot area, screen angle may be different, which dot pattern, screen angle characteristics in the identification of the "machine", "the same identification" has the same characteristics. Among them, the dot pattern and screen angle characteristics have high application value in identifying "the same determination of the machine". The research in this paper verifies the feasibility of using mesh features to distinguish laser printouts, and at the same time provides a new high-value feature test idea for color laser printout identification.

1.11 Title: The Preliminary Research of Depth of Chinese Signature Handwriting Indentation and Robot Writing Imitation

Authors: HAO Hongguang

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: The examination of signature has always been a challenging topic in Chinese handwriting examination due to the fewer handwriting strokes as well as its available features. Usually questioned document examiners (QDEs) focus on the static features of handwriting, such as pen movement (strokes formations), sequence of strokes, proportions et al, while the dynamic features are not obtained enough attention. In this study, the depth of indentation features by the same people were measured with analysis system under different conditions. The results indicates that the overall depth variation range is relatively stable under the same writing condition and from the same person. According to the data, the depth of indentation as a useful discriminating element can help QDEs to make accurate conclusion. Also the depth was used to examine the Robot Writing Imitation, and good result was obtained.

1.12 Title: The Alteration Documents Examination Using Desorption Electrospray Ionization-Mass Spectrometry Imaging (DESI-MSI) Technology

Authors: Qin Da[1], YUAN Yiting[2]

Organization: 1. Institute of Forensic Science, MPS, CHINA
2. Institute of Forensic Science of Anhui Public Security Department

Country: China

Abstract: Differences in handwriting composition are crucial for recognizing the existence of alterations in questioned document examination. The ambient ionization mass spectrometry is increasingly being recognized for its utility in detecting ink changes, due to its benefits such as high speed, rich information, minimal destruction of the sample. In this paper, the desorption electrospray ionization mass spectrometry imaging (DESI-MSI), a prominent technique within ambient ionization mass spectrometry, was used to examine the suspicious handwriting to determine whether the document was altered. The authenticity of the number "1", suspected of being added to change "2" into "12", was scrutinized. The Mass spectra of strokes of ink were obtained, and the suspicious “1” could differentiate from other numbers. Based on the MS data, the questioned part could be visualized through imaging, clearly demonstrating the evidence of tampering. Additionally, chemometrics were applied to cluster the handwriting composition data, aiding in the identification of the alteration fact. Compared with the traditional optical detection and spectroscopic method, DESI-MSI offered a more comprehensive analysis of the handwriting's material properties, showcasing its potential for practical application. This technique provides an innovative perspective for examining such cases.

1.13 Title: Optical and Spectral Analysis for Forensic Analysis of Photosensitive Inks in Questioned Documents

Authors: Yang Qiufeng, Han Xingzhou, Qin Da, Hao Hongguang

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: The photosensitive seal is a type of pre-inked stamp, and its ink can remain relatively stable for a certain period of time. Therefore, examining the ink is a method of identifying the sameness of the stamp.

This text outlines a study on the optical and spectral characteristics of 50 types of photosensitive inks available on the market. The study utilized several techniques, including fluorescence spectroscopy, microspectrophotometry, infrared spectroscopy, and Raman spectroscopy, to analyze the characteristics of these inks. By integrating these methods, the study intends to categorize the photosensitive inks, providing a foundation for the forensic identification of identical stamp impressions.

Furthermore, the research considers practical factors that may influence the precision of the results in case handling, such as the type of paper used for stamping, the thickness of the impression, storage conditions, and the duration of storage. By examining these variables, the study seeks to refine the accuracy of its findings.

This research not only equips forensic document examiners with scientific evidence and aid in the identification of photosensitive ink impressions but also establishes a groundwork for a database that differentiates various types of photosensitive inks, offering vital data support.

1.14. Title: Exploring the use of code-free machine learning platforms for analysing the background printing in passports.

Authors: Kouk Leong Jie

Organization: Immigration and Checkpoints Authority

Country: Singapore

Abstract: Identity Authentication and Document Analysis (IADA) is the document forensics division of Immigration & Checkpoints Authority (ICA), Singapore. Specializing in document examination and forgery trend analysis, IADA Branch also focuses on developing course curriculum for new officers and reviewing operational requirements for document security and forgery detection at checkpoints.

Can a no-code machine learning platform be beneficial for analyzing fraudulent passports? This presentation will explore IADA's study to use two free no-code ML platforms to detect offset printing in the background design of passports. The results of the study will be shared, along with discussions on the advantages, limitations, and potential for integrating these platforms into forensic processes.

1.15 Title: A Convenient Method for The Determination of Alkyl Ketene Dimer (AKD)Sizing Agent in Paper

Authors: Lian Zhe, Shi Gaojun, Li Zhihao, Zou Jixin

Organization: Institute of forensic science, MPS, China

Country: China

Abstract: A convenient method for the determination of alkyl ketene dimer (AKD) in paper was developed. The samples were hydrolyzed with NaOH or HCl, and extracted with dichloromethane. The organic solution was filtered and concentrated, and then analyzed on GC-MS. 30 types of paper in Chinese market were analyzed, and a serial of aliphatic ketone such as 16-hentriacontanone and 18-pentatriacontanone were detected. A mechanism has been proposed to explain how these specific ketones are formed, and an analytic technique of fatty acid ratio of raw AKD material has been established. The method is more suitable than existed ones, which is simpler and safer to forensic scientists for paper examination, comparison and manufacturer tracing. Moreover, this method is useful for paper age estimation.

2. Poster Presentation

2.1 Title: A Comparative Study on the Investigation of Version Characteristics and Temporal Attributes of Songti

Authors: CHEN Fushi

Organization: People‘s Public Security University of China, Institute of Forensic Science, MPS, CHINA

Country: China

Abstract: In the current forensic examination of documents, the focus on altered documents has primarily been on different printing characteristics and various fonts, with little attention paid to differences between font versions. This study collected 16 different versions of the SimSun font files and compared these versions within the scope of 3500 commonly used Chinese characters. By analyzing rendered Chinese character images and comparing scanned printed documents, we discovered significant differences between version 5 and earlier font versions. By correlating these differences with the release times of the respective font versions, it is possible to identify potential temporal attributes within the documents. This finding offers new insights and methods for criminal investigation and solving cases.

2.2 Title: Research on the differentiation of photosensitive printing oil based on microspectrophotometry

Authors: Duan Xingyu

Organization: People‘s Public Security University of China, Institute of Forensic Science, MPS, CHINA

Country: China

Abstract: The classification of printing oil is an important part in the field of forensic scientific document examination, and the classification of printing oil is of great significance in the examination of seal documents. In order to study the method of non-destructive and efficient classification of photosensitive printing oil types, the original spectral data of 50 different brands of photosensitive printing oil were taken as the control group, and three classification algorithms Resnet18, Resnet50 and Resnet101 were selected to determine the training set and test set at the ratio of 4:1, and the original data were classified. The results show that Resnet18 classification algorithm has the highest accuracy of distinguishing microspectral data, reaching 92.81%, which provides a certain reference for the application of deep learning algorithm in the field of photosensitive printing oil classification.

- QDWG Meeting Summery –

Report of the 16th Asian Forensic Sciences Network (AFSN) Conference

of the Questioned Documents Workgroup (QDWG)

held from August 28-29, 2024,

at Royal Thai Navy Convention Hall, Bangkok Thailand

The participants in the meeting included document examiners from countries in the Asian region and other countries, such as Singapore, China, the Philippines, Malaysia, India, Korea, Uzbekistan, and Thailand, among others.

Day 3 (Aug 28, 2024)

Time	Title	Authors
09.00-10.40	International Forensic Strategic Alliance (IFSA) workshop on building a quality culture in regional forensic science network (QASC)	
10.40-10.50	**Coffee break**	
10.50-11.10	UNODC International Collaborative Exercises on Security Document Examination (ICE-SecDoc)	Wong Yen Ling *(United Nations Office on Drugs and Crime (UNODC))*
11.10-11.35	Recent Advancements in Forensic-Level Technology for Document Examination and Counterfeit Detection	Richard Evans *(foster+freeman, United Kingdom)*
11.35-11.55	Forensic intelligence in questioned document examination – towards a model of proactivity and disruption	Andrew Parkinson *(Australian Federal Police, Australia)*
12.10-13.10	**Lunch**	
13.10-13.45	Challenges in Chinese handwriting and signature examination	Li Chi Keung (*Government Laboratory, Hong Kong Special Administrative Region, China*)
13.50-14.15	The Preliminary Research of Depth of Chinese Signature Handwriting Indentation and Robot Writing Imitation	Hao Hongguang, (Qin Da*) (*Institute of Forensic Science, Ministry of Public Security, China)*
14.20-14.40	Comparison of On-Line Signatures and Off-Line Signatures produced using a Digital Pen and a PDA respectively	Mohamad Noor, Siti Nur Musliha Mohamad Noor*, and Jones, Allison E (*1. University of Central Lancashire, Preston, United Kingdom. 2. Department of Chemistry, Malaysia (KIMIA Malaysia)*
14.40-15.05	Microtrends Study on Document Forgery in three years (2021-2023): Insights from the Department of Chemistry, Malaysia	Wan Rahimah Wan Ahmad *(Department of Chemistry, Malaysia (KIMIA Malaysia)*
15.10-15.20	**Coffee break**	
15.20-15.40	The Alteration Documents Examination Using Desorption Electrospray Ionization-Mass Spectrometry Imaging (DESI-MSI) Technology	Qin Da[1]*, Yuan Yiting[2] (*1. Institute of Forensic Science, Ministry of Public Security, China. 2. Institute of Forensic*

Day 4 (Aug 29, 2024)

Time	Title	Authors
09.15-09.35	A Comparative Study of Screening Characteristics of Laser Printed Documents	Han Xingzhou*, Lin Jinlin, Yu Xuezhou *(Institute of Forensic Science, Ministry of Public Security, China)*
09.35-10.00	Forensic discrimination of digital offset and offset lithography printed documents using non-destructive techniques	Nirun Yasamoot*, Pichayada Katemake, Supaporn Noppakundilograt *(Central Institute of Forensic Science, Thailand)*
10.00-10.25	Exploring the use of code-free machine learning platforms for analysing the background printing in passports.	Kouk Leong Jie *(Immigration and Checkpoints Authority, Singapore)*
10.40-10.50	**Coffee break**	
10.50-11.10	Optical and Spectral Analysis for Forensic Analysis of Photosensitive Inks in Questioned Documents	Yang Qiufeng, Han Xingzhou, Qin Da*, Hao Hongguang *(Institute of Forensic Science, Ministry of Public Security, China)*
11.10-11.25	AFSN QDWG CE 2024 results	Qin Da *(Institute of Forensic Science, Ministry of Public Security, China)*
11.25-12.00	Survey results of how Document Examiners handle differences	Nellie Cheng*, Ngor Yi Hui *(Health Sciences Authority, Singapore)*
12.10-13.10	**Lunch**	
13.10-13.50	Keynote speaker 11	
13.50-18.00	Closing Ceremony and AFSN AGM	

*: Presenting author

Summary of Presentation on August 28-29, 2024.

1. UNODC International Collaborative Exercises on Security Document Examination (ICE-SecDoc) (Wong Yen Ling)

The Laboratory and Scientific Services of UNODC assists Member States and the international community in having access to quality forensic science services and data in support of their efforts to counter drugs, crime and terrorism. The programme fosters the development of standardized training programmes and reference materials, as well as training activities to enhance the expertise and capacity of law enforcement officials and forensic experts. It also seeks to ensure that forensic institutions carry out their day-to-day activities in compliance with internationally accepted standards of practice. As part of the UNODC International Quality Assurance Programme (IQAP) intended to harmonize the quality of work produced by forensic personnel in different countries, LSS has developed a virtual learning environment for forensic document examination that hosts the International Collaborative Exercises in Security Document Examination (ICE-SecDoc).

2. Forensic intelligence in questioned document examination – towards a model of proactivity and disruption (Andrew Parkinson, AFP)

The use of forensic science in investigative work regarding the examination of questioned documents in a proactive manner and innovative new forms by the Australian Federal Police (AFP).

The Australian Federal Police (AFP) is the national law enforcement agency of Australia, responsible for enforcing federal laws and serving as a key agency of the Australian government. It plays a special role in investigating crimes and protecting the national security of the Commonwealth of Australia, focusing on the prevention, investigation, and disruption of serious, complex, and organized transnational crime, including terrorism. It ensures security measures at major airports and provides close protection for dignitaries, including the Prime Minister of Australia and foreign diplomatic representatives.

The AFP acts as Australia's representative in international law enforcement and policing and contributes to global United Nations peacekeeping efforts. The AFP is also a member of the

national intelligence network and works closely with the Australian Security Intelligence Organisation, the Australian Border Force, and the Australian Criminal Intelligence Commission. It has 33 offices worldwide (as of 2023). Its mission, goals, values, and vision are to protect the safety and interests of Australians, manage the highest impact of the criminal environment, and prioritize justice, trust, respect, accountability, integrity, commitment, and excellence.

The use of forensic science for investigative purposes (Forensic Intelligence, FORINT) involves utilizing data and expertise from various forensic disciplines to plan, gather, process, analyze, and disseminate results. This provides insights and supports decision-making, particularly in the context of documentation for utilization and targeting to identify threats to high-ranking officials and others.

Priorities:

- Individuals who are incarcerated and threats to high-ranking officials.
- Protection of high-ranking officials and diplomats.

Objectives:

- Case linkage.
- Network visualization.
- Identification.
- Threat assessment and recommendations.

National Threat Letter Database (NTLD): A repository for anonymous data related to threatening correspondence sent to high-ranking officials in Australia and other recipients.

Sources of Information: AFP, document examiners from various states across Australia, and investigators.

Benefits of NTLD:

- Connections between threatening letters spanning decades.
- Over 2,300 characters identified.
- Linkages between threatening letters sent from different states.
- Rapid results.

- 70% of characters in the NTLD are linked to other characters, with the outcomes being forwarded for further investigation in related areas.

3. Challenges in Chinese handwriting and signature examination (Li Chi Keung)

Chinese characters had been developed some 4,000 years ago and, with the growth of population, are used by over 1.3 billion people worldwide today. Document examiners who are not familiar with Chinese characters will inevitable encounter cases involving the examination of Chinese handwriting regardless of their locations. Document examiners have to participate in relevant proficiency testing (PT) programmes to demonstrate their technical competency in conducting Chinese handwriting examination. Government Laboratory (GL) of the Hong Kong Special Administrative Region has been organizing PT programmes in Chinese handwriting and signature examination in accordance to ISO 17043 requirements to assist document examiners in seeking development in Chinese handwriting and signature examination. There are extensive studies on the examination of English handwriting in the literature, while similar studies on Chinese handwriting are relatively limited. We are seeking to explore the obstacles and challenges for document examiners applying the principles of identification and elimination of authorship described in the literature to examine Chinese handwriting. This presentation describes the methodology and key features in Chinese handwriting and signature examination, and the PT programmes organized by GL.

4. The Preliminary Research of Depth of Chinese Signature Handwriting Indentation and Robot Writing Imitation (Hao Hongguang)

The examination of signature has always been a challenging topic in Chinese handwriting examination due to the fewer handwriting strokes as well as its available features. Usually questioned document examiners (QDEs) focus on the static features of handwriting, such as pen movement (strokes formations), sequence of strokes, proportions et al, while the dynamic features are not obtained enough attention. In this study, the depth of indentation features by the same people were measured with analysis system under different conditions. The results indicates that the overall depth variation range is relatively stable under the same writing condition and from the same person. According to the data, the depth of indentation as a useful

discriminating element can help QDEs to make accurate conclusion. Also the depth was used to examine the Robot Writing Imitation, and good result was obtained.

5. Comparison of On-Line Signatures and Off-Line Signatures produced using a Digital Pen and a PDA respectively (Mohamad Noor, Siti N. M., and Jones, Allison E.)

With the evolution of technology, the digital signatures have been commercially applied in daily transaction along with the normal, traditional handwritten signatures. However, the different lies in the nature of both types of signatures. Therefore, there is a need for Document Examiners to attend to the revolutionary approaches in dealing with such challenges. In this study, it is proposed that a digital signature produced by a PDA is an on-line signature and a normal handwritten signature produced by a digital pen is an off-line signature. The variations observed between specimen signatures of both devices confirmed that there are significant differences in the features between specimen signatures obtained using digital pen and PDA respectively. The signatures of the PDA are less reliable and less reproducible in comparison with the signatures of the digital pen. Hence, digital signatures produced by PDAs are not suitable to be used in comparison with normal handwritten signatures.

6. Microtrends Study on Document Forgery in three years (2021-2023): Insights from the Department of Chemistry, Malaysia (Wan Rahimah Wan Ahmad)

Document falsification evolves alongside technological advancements. This study aims to identify prevailing trends in document forgery by analysing case reports received by the Document Examination Division of the Department of Chemistry Malaysia. These cases originate from various stakeholders, including enforcement agencies, private entities, and individuals. The micro-study focuses on data retrieval from analysis reports spanning three years, encompassing opinions, document types, and analytical methods. Notably, all examined materials are paper-based forgeries. The findings reveal signature forgery as a dominant form, occurring on checks, wills, and government officials forms, alongside fraudulent alterations made through printing processes. The rise of digital documents has led to declines in certain case types, presenting a new challenge for document examiners.

7. The Alteration Documents Examination Using Desorption Electrospray Ionization-Mass Spectrometry Imaging (DESI-MSI) Technology (Qin Da[1], YUAN Yiting[2])

Differences in handwriting composition are crucial for recognizing the existence of alterations in questioned document examination. The ambient ionization mass spectrometry is increasingly being recognized for its utility in detecting ink changes, due to its benefits such as high speed, rich information, minimal destruction of the sample. In this paper, the desorption electrospray ionization mass spectrometry imaging (DESI-MSI), a prominent technique within ambient ionization mass spectrometry, was used to examine the suspicious handwriting to determine whether the document was altered. The authenticity of the number "1", suspected of being added to change "2" into "12", was scrutinized. The Mass spectra of strokes of ink were obtained, and the suspicious “1” could differentiate from other numbers. Based on the MS data, the questioned part could be visualized through imaging, clearly demonstrating the evidence of tampering. Additionally, chemometrics were applied to cluster the handwriting composition data, aiding in the identification of the alteration fact. Compared with the traditional optical detection and spectroscopic method, DESI-MSI offered a more comprehensive analysis of the handwriting's material properties, showcasing its potential for practical application. This technique provides an innovative perspective for examining such cases.

8. Embracing Paperless Documentation in Document Examination (Tan Sock Kim, Ngor Yi Hui)

Since 2020, our laboratory has undergone a transformative shift towards a digital case record workflow, leaving behind traditional paper documentation and embracing a fully paperless system. This presentation will focus on our experience with paperless documentation in Document Examination. We will share on the various software tools that have played a crucial role in facilitating this transition, providing insights into how they have been utilized in streamlining our documentation processes.

Key functions of the paperless system include:

- Organizing information systematically
- Case documentation can be consolidated or separated
- Collating and maintaining records efficiently

- Applying digital signatures to individual files
- Applying digital signatures to all files simultaneously

Introduction to Digital Workflow Transformation

As digital technology becomes increasingly integral to work processes, Digital Workflow Transformation is a crucial step for organizations and agencies. This transition enhances efficiency, reduces complexity, and improves accuracy in data management.

Traditionally, document management relied on large volumes of physical paper records, but in the digital era, scanning and storing documents electronically reduces paper usage, enabling quick search and seamless data sharing.

Dynamic Data Structuring

Digital technology allows for real-time adaptation of workflows to different circumstances, making processes more flexible and efficient.

Scanning of Exhibits

Advanced scanning technologies enable detailed documentation of exhibits, making them easily accessible for study and research through digital platforms.

Editing Physical Records

The transition to a digital system simplifies the modification and enhancement of existing physical records, ensuring they remain accurate and easily retrievable.

Data Visualization and Charting

Digital tools allow for streamlined data visualization, facilitating faster and more effective decision-making.

Organizing Digital Case Files

- Case details, document submission information, email records, case notes, and classification of various records
- Folder organization based on different file names and categories
- Collation of case notes, either separately or combined
- Digital signing of all files simultaneously

- Scanning and storing documents in a secure database

Utilizing Digital Workflows for Questioned Document Examination

By integrating Photoshop software, forensic experts can:

- Compare overlapping documents, signatures, and seals
- Highlight signatures in different colors for clarity
- Overlay Q1 and Q2 onto K for direct comparison
- Adjust opacity and darkness of handwritten text to reveal underlying content

Final Conclusion

- Select methods tailored to specific operational needs
- Evaluate multiple software options to identify the most effective digital documentation system

Note: A workflow system is a document management framework that facilitates approval and verification processes.

9. A Comparative Study of Screening Characteristics of Laser Printed Documents (Han Xingzhou, Lin Jinlin, Yu Xuezhou)

Currently, laser printers in people's daily work and life is becoming increasingly popular, but also become a common means of criminals to commit crimes. For the inspection of color laser printing documents, document examiners in the traditional laser printing documents on the basis of examination, often use color "tracking code", but in recent years, in addition to the emergence of tracking code can be removed in addition to the software, for the examination of color laser printed documents has become a new subject for document examiners. In this paper, based on the perspective of mesh, color laser printed documents mesh characteristics of experimental research, respectively, on different brands, different models, as well as the choice of different resolutions of the image of the sample production, the same part of the print dot characteristics of observation and comparison, in order to explore the laser printer to print documents mesh morphology, mesh spacing, mesh area, mesh angle and other mesh characteristics of the law. The study shows that the dot characteristics of the same color laser printer with different printing time has relative stability, the same printer to print images of

different resolutions of the screening characteristics of the difference is not obvious, different brands of different models of laser printers dot pattern, dot spacing, dot area, screen angle may be different, which dot pattern, screen angle characteristics in the identification of the "machine", "the same identification" has the same characteristics. Among them, the dot pattern and screen angle characteristics have high application value in identifying "the same determination of the machine". The research in this paper verifies the feasibility of using mesh features to distinguish laser printouts, and at the same time provides a new high-value feature test idea for color laser printout identification.

10. Forensic discrimination of digital offset and offset lithography printed documents using

non-destructive techniques (Nirun Yasamoot, Pichayada Katemake, Supaporn Noppakundilograt)

This study discriminated a pair of industrial printed documents: digital offset (DO) or liquid electrophotography and offset lithography (OL) from the printing house because those documents are very similar and hard to identify by magnifying glass. The printed samples could be divided into two groups. The first group was printed using digital offset (DO): HP Indigo (liquid toner), with 600 dpi, on glossy art paper of 160 g/m^2. The second group was prepared by offset lithography (OL): Heidelberg, using traditional oil-based, soy-based and UV-based paste inks, on the same type of paper. The original file used for printing was the same for both groups containing image and text areas. The non-destructive techniques included microscopic examination (200x to 700x), video spectral analysis (VIS, IR, UV, HSI, IRFC and UVFC) and Raman spectroscopy. Analysis shows that microscopic examination revealed a difference in screen dots in the DO and OL image areas. Besides, the text's edge sharpness obtained from both groups was also different. IR, UV, HSI, IRFC and UVFC illustrated the distinction in the image area of DO and OL, but not in the text area. Finally, Raman spectroscopy showed the difference in magenta, yellow, and black peaks between DO and OL.

11. Exploring the use of code-free machine learning platforms for analysing the background printing in passports. (Kouk Leong Jie)

Identity Authentication and Document Analysis (IADA) is the document forensics division of Immigration & Checkpoints Authority (ICA), Singapore. Specializing in document examination and forgery trend analysis, IADA Branch also focuses on developing course curriculum for new officers and reviewing operational requirements for document security and forgery detection at checkpoints.

Can a no-code machine learning platform be beneficial for analyzing fraudulent passports? This presentation will explore IADA's study to use two free no-code ML platforms to detect offset printing in the background design of passports. The results of the study will be shared, along with discussions on the advantages, limitations, and potential for integrating these platforms into forensic processes.

12. Optical and Spectral Analysis for Forensic Analysis of Photosensitive Inks in Questioned Documents (Yang Qiufeng, Han Xingzhou, Qin Da, Hao Hongguang)

The photosensitive seal is a type of pre-inked stamp, and its ink can remain relatively stable for a certain period of time. Therefore, examining the ink is a method of identifying the sameness of the stamp. This text outlines a study on the optical and spectral characteristics of 50 types of photosensitive inks available on the market. The study utilized several techniques, including fluorescence spectroscopy, microspectrophotometry, infrared spectroscopy, and Raman spectroscopy, to analyze the characteristics of these inks. By integrating these methods, the study intends to categorize the photosensitive inks, providing a foundation for the forensic identification of identical stamp impressions.

Furthermore, the research considers practical factors that may influence the precision of the results in case handling, such as the type of paper used for stamping, the thickness of the impression, storage conditions, and the duration of storage. By examining these variables, the study seeks to refine the accuracy of its findings.

This research not only equips forensic document examiners with scientific evidence and aid in the identification of photosensitive ink impressions but also establishes a groundwork for a database that differentiates various types of photosensitive inks, offering vital data support.

13. AFSN QDWG CE 2024 results (Qin Da)

Scenario:

Zhao Linlin reported a case claiming that a glassware company, which is his supplier, forged a delivery note to extort money, with the amount reaching over 9,000 yuan. Zhao Linlin stated that he did not receive the goods listed on the delivery note, and the signature “Liu Huijuan” in the customer's signature area is not signed by his company's cashier, Liu Huijuan. The investigators found that the involved receipt was a standard form, with the quantity of goods, price, and amount all printed. Only the signature “Liu Huijuan” in the customer's signature area was handwritten. Therefore, they collected some receipts that both parties confirmed to be genuine and handwriting samples of the signature from Liu Huijuan herself, requesting an identification of the the signature “Liu Huijuan” on the involved delivery note.

Item Description:

Q: The questioned delivery note.

K: The notes written by liu Huijuan, including:

K1-4: The delivery notes signed by liu Huijuan.

K5: A piece of paper written by liu Huijuan.

Select your response from the following list and insert the appropriate letters in the space. If the wording differs from the normal wording in your reports, please use your preferred wording at the Additional Comment.

The written conclusion:

A: Was WRITTEN by

B: Was PROBALLY WRITTEN by (Some degree of identification)

C: CAN NOT be IDENTIFIED OR ELIMINATED

D: Was PROBALLY NOT WRITTEN BY (Some degree of elimination)

E: Was NOT WRITTEN by

To what degree can it be determined if the known writers contribute the questioned document handwriting.

Q ☐ K

Additional Comment of this examination:

14. Survey results of how Document Examiners handle differences (Nellie Cheng, Ngor Yi Hui)

It is not uncommon that differences are found when handwritings are compared. As different document examiners may have different approaches in dealing with differences, the authors sent a survey to three networks namely European Network of Forensic Science Institutes/European Network of Forensic Handwriting Experts (ENFSI/ENFHEX), American Academy of Forensic Sciences (AAFS) Questioned Document Section, and Asian Forensic Sciences Network Questioned Document Workgroup (AFSN QDWG) to request input from document examiners. In this presentation, the authors will present the survey results on how the respondents deal with differences.

Survey Results on Methods for Managing Differences of Opinion Among Document Examiners

A questionnaire was distributed to members of three forensic document examination networks: European Network of Forensic Science Institutes/European Network of Forensic Handwriting Experts (ENFSI/ENFHEX), American Academy of Forensic Science (AAFS) Questioned Document Section, Asian Forensic Science Network Questioned Document Workgroup (AFSN QDWG) A total of 81 organizations responded to the questionnaire.

The survey aimed to understand common practices among forensic document examiners when observable differences arise in their findings. The responses revealed the following insights:

-32.1% of respondents stated that their conclusions could be drawn at any level that supports the degree of differences observed by examiners.

-90.1% agreed that a single difference alone is not sufficient to determine the probability of the same writer. The significance of that single difference must be considered equally alongside similarities.

-90.6% believed that whether a single difference can completely or partially determine authorship depends on the significance of the difference as much as the observed similarities.

-87.7% indicated that they assess both similarities and differences, and their final conclusions may support either common authorship or different authors.

Differences:

- When a single difference is observed, examiners must evaluate whether it is sufficient to conclude that the writings are from different authors.
- The level of significance of differences must be assessed, as not all differences carry the same weight.
- Whether the explanation for a difference is merely an assumption remains a subject of discussion.

General Practices:

-71.7% document and/or report the reasons for differences in casework.

-66.7% consider explaining the cause of differences as an application of professional expertise rather than mere speculation.

Conclusion:

1. When differences are observed, examiners must evaluate both similarities and differences, and the conclusion may vary depending on the strength of supporting evidence.

2. Some differences may be clear and significant.

3. Explaining the cause of differences is not speculation but rather an exercise of expert judgment.

15. A Comparative Study on the Investigation of Version Characteristics and Temporal Attributes of Songti (Chen Fushi) - Poster

In the current forensic examination of documents, the focus on altered documents has primarily been on different printing characteristics and various fonts, with little attention paid to differences between font versions. This study collected 16 different versions of the SimSun font files and compared these versions within the scope of 3500 commonly used Chinese characters. By analyzing rendered Chinese character images and comparing scanned printed documents, we discovered significant differences between version 5 and earlier font versions. By correlating these differences with the release times of the respective font versions, it is possible to identify potential temporal attributes within the documents. This finding offers new insights and methods for criminal investigation and solving cases.

16. Research on the differentiation of photosensitive printing oil based on microspectrophotometry (Duan Xingyu) - Poster

The classification of printing oil is an important part in the field of forensic scientific document examination, and the classification of printing oil is of great significance in the examination of seal documents. In order to study the method of non-destructive and efficient classification of photosensitive printing oil types, the original spectral data of 50 different brands of photosensitive printing oil were taken as the control group, and three classification algorithms Resnet18, Resnet50 and Resnet101 were selected to determine the training set and test set at the ratio of 4:1, and the original data were classified. The results show that Resnet18 classification algorithm has the highest accuracy of distinguishing microspectral data, reaching 92.81%, which

provides a certain reference for the application of deep learning algorithm in the field of photosensitive printing oil classification.

Summary

The classification of stamp inks is a crucial aspect of forensic document examination, particularly in verifying stamped documents. This study aimed to develop a non-destructive and efficient method for classifying photosensitive ink.

Original spectral data from 50 different ink brands were selected to form a training set and a test set at a 4:1 ratio, with original brand photosensitive ink serving as the control group. Three classification algorithms—ResNet18, ResNet50, and ResNet101—were tested. The analysis using ResNet18 achieved a 92.81% accuracy in distinguishing microspectral data, providing a reference for applying deep learning algorithms in photosensitive ink classification.

Experimental Setup

-50 photosensitive stamp samples were stamped in serial order (1–50) on the same A4 paper.

-The samples were exposed to natural conditions for one month.

-Full-color material positions were selected for measurement.

-A total of 2,500 spectral data points were collected through parallel measurements of the same ink 50 times.

-The spectrogram of the photosensitive ink samples is presented in Figure 1.

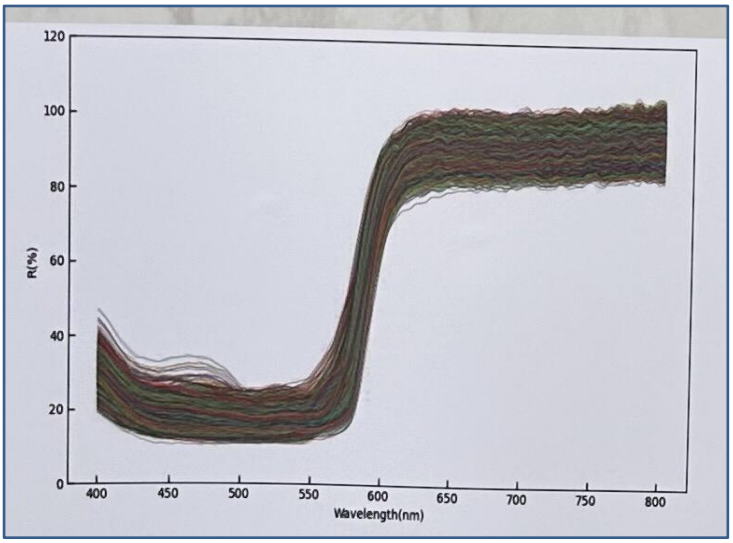


Figure 1: Reflectance Spectrum of Photosensitive Ink from 50 Brands

During the modeling process using ResNet18, ResNet50, and ResNet101, the spectral data were divided into a training set and a test set at a 4:1 ratio.The training set contained 2,000 spectral data points.The test set contained 500 spectral data points.The batch size was set to 32.The epoch count was set to 50 to achieve classification results, which are presented in Table 1.

Tab.1 Three kinds of Resnet network classification accuracy

Model	Batch size	Accuracy
Resnet18	32	92.81%
Resnet50	32	91.02%
Resnet101	32	90.62%

In this paper, we collected microspectrophotometric data from 50 commonly used photosensitive ink samples available on the market. We then applied ResNet18, ResNet50, and ResNet101 classification algorithms to classify these 50 ink samples.

Based on the spectral data variations, the classification accuracy of the three algorithms was 92.81% for ResNet18, 91.02% for ResNet50, and 90.62% for ResNet101, respectively (as shown in Table 1).

We can conclude that ResNet18 achieved the highest classification accuracy for microspectral data, reaching 92.81%, making it a suitable model for photosensitive ink classification. This study presents a non-destructive and precise method for identifying photosensitive ink types, which can complement traditional structural characterization and forensic document examination techniques for printed materials.

QDWG Business Meeting

Speaker : Nellie Cheng (QDWG Chair)

Meeting Agenda :

1. Members Update
2. Updates on 16th AFSN Annual Meeting and Symposium
3. Our work 2023-2024
4. Any other business

QDWG Steering Committee (SC) 2023-2025

1. Chair : Ms.Nellie Cheng (Health Sciences Authority, Singapore)
2. Vice-Chair : Mdm.Wan Rahimah (Department of Chemistry, Malaysia)
3. Vice-Chair : Dr.Han Xingzhou (Institute of Forensic Science, People's Republic of China)
4. Secretary : Dr.Qin Da (Institute of Forensic Science, People's Republic of China)
5. Secretary : Ms.Jovelyne Maggay (Philippine National Police Forensic Group, Philippines)
6. Member : Dr.Li Chi Keung (Hong Kong Government Laboratory, HKSAR, People's Republic of China)

This year, five SC members attended the meeting, and all of them also presented academic papers at the conference.

Members Update

- The current membership of the workgroup includes 20 organizations from 12 countries.
- A new member organization joined: Republican Center for Forensic Examination under the Ministry of Justice, Republic of Uzbekistan, with two designated members:
    1. Isomiddinov Fazliddin Fahriddinovich
    2. Rakhimov Orzu Bakhodirovich
- National Forensic Service, South Korea, requested to remove one of their two members, keeping only Tae Yi Kang while Ka Young Lee was removed.

Ms. Nellie Cheng encouraged countries that currently have only one representative to add a second member, as each country is allowed to have two representatives.

Updates on 16th AFSN Annual Meeting and Symposium

- 16 oral presentations were delivered (compared to 15 in 2023).
- 2 poster presentations were presented.
- Guest Speaker: Mr. Andrew Parkinson from Australian Federal Police (AFP), Australia, delivered a talk on

  Forensic Intelligence in Questioned Document Examination – Towards a Model of Proactivity and Disruption."
- More than 40 participants attended the meeting.

Our work 2023-2024

- June 17-20, 2024: Ms. Nellie Cheng attended the 15th ENFSI/ENFHEX Conference in Stockholm, Sweden, where she presented academic work and introduced QDWG to the ENFHEX community.
- International Forensic Strategic Alliance (IFSA) developed Minimum Requirements for Forensic Document Examination in June 2023, which has been translated into multiple languages. If any country wishes to translate or has completed a translation, they may inform Nellie Cheng.
- Ms. Nellie Cheng, together with Ms. Angeline Yap (Chair of AFSN), published an article titled "The Journey of the Asian Forensic Sciences Network through Fifteen Years" in the Forensic Science International journal. (https://doi.org/10.1016/j.forsciint.2024.112042)
- Institute of Forensic Science (IFS), China, conducted the 2024 Collaborative Exercise (CE) on the topic "Examination of Chinese Signatures", with participation from 10 organizations across 8 countries.

- QDWG Research Study on Handwriting

  - 7 organizations from 7 countries are participating.

  - The research process is divided into four stages, with different organizations responsible for each stage

    1.Handwriting Collection – DSS (Brunei) & KIMIA (Malaysia)

    2.Handwriting Feature Analysis – IFS (China), HKGL (HKSAR), NFA (Mongolia), & CIFS (Thailand)

3. **Data Analysis** – IFS (China) & HSA (Singapore)

4. **Writing of Paper for Publication** – HKGL (HKSAR) & HSA (Singapore)

The next step is to conduct a **virtual meeting** among the responsible organizations to continue **Handwriting Feature Analysis (Stage ๒)**.

Work plan 2024-2025

1. QDWG Handwriting Project
2. Collaborative Exercise (CE) 2025
3. China's Annual Symposium for Questioned Document Examiners ๒๐๒๕

4 . Survey of Quality Framework The Quality Assurance & Standard Committee (QASC) has conducted a survey titled "Survey of Quality Framework" addressed to the IDWG, DNAWG, and TXWG regarding the operational framework of each working group. The survey results were presented at the AFSN meeting, and QASC will invite QDWG to participate in the survey in 2025. The scope of the survey includes:

- Competency of Personnel
- Equipment & Consumables
- Collection, Analysis, Interpretation, Reporting
- Procedures, Protocols, Variations
- Quality Management

The timeline is set for the survey to be submitted in February, with the results presented in September at the AFSN meeting in 2025.

5. In the AFSN meeting in 2025, elections for the QDWG Steering Committee will be held for the term 2025-2027.

Trace Evidence Workgroup (TEWG)

Abstract

1. Oral presentation

1. Title: Application of Pearson Correlation Coefficient in Forensic Paint Evidence Comparison

Authors: Sun Zhenwen, Qiao Ting, Zhang Guannan, Yan Yuwen, Chang Ying, Zhou Zheng

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: This study explores the use of the Pearson Correlation Coefficient (PCC) method for the comparative analysis of forensic paint evidence in criminal investigations. The aim of the research was to enhance the accuracy and efficiency of comparing paint evidence, which helps in linking suspects to crime scenes.

The paint samples were collected from different automobile manufacturers and subjected to infrared spectroscopy testing to determine their spectral characteristics. Compared to the comparison of the presence or absence of absorption bands, their positions, shapes, and relative intensities in ASTM E2937-13, the PCC was employed to quantitatively analyze the similarities and differences between the spectral data of the paint samples. The results demonstrated a high degree of accuracy in matching paint samples. The PCC method proved effective in distinguishing between paint samples with subtle variations, thereby providing robust evidence for forensic analysis. Furthermore, the research conducted a statistical analysis to validate the reliability of the PCC method. The findings indicated that the PCC provides a robust statistical measure for paint evidence comparison, with a high correlation coefficient indicating a strong

relationship between the compared samples. The PCC method offers a scientific, objective, and reliable approach to analyzing and matching paint samples.

2. Title: Lead isotope measurement of primer gunshot residues and likelihood ratio predictions for forensic cartridge discrimination and individualization

Authors: Hongling Guo, Hongcheng Mei, Ping Wang, Can Hu, Jun Zhu

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: In gun related cases where the investigation of striation marks is impossible, such as unrecovered or deformed projectiles and cartridge casings, gunshot residues (GSR) deposited on the hands or clothes of the shooter and victim-related items can provide information to establish a link between the suspect, the firearms used and the victim. Since the formula of primers used by all cartridge manufacturers in China is identical, links based on the conventional morphological and compositional analysis of GSR are sometimes difficult to establish. However, the abundance of lead isotopes in primer components of lead styphnate varies significantly. In this paper, 44pGSR samples were tested by Pb isotope ratios of 206Pb/204Pb, 207Pb/204Pb, 208Pb/204Pb using laser ablation multicollector inductively coupled plasma mass spectrometry. Evaluation of the results using univariate likelihood ratio(LR) computations revealed that false positive and false negative rates of 0.53% and 0.00%, respectively, could be obtained using these three Pb isotope ratios. The results demonstrated that lead isotope ratio analysis of pGSR and LR predictions can provide a practicable method for forensic cartridge discrimination and individualization.

3. **Title:** Gunshot Residue Analysis Collaborative Exercise Year 2024

Authors: Farah Ad-din Nordin, Afidah Yahya

Organization: Department of Chemistry Malaysia

Country: Malaysia

Abstract: Collaborative exercise has become an annual activity for the Trace Evidence Work Group (TEWG) and for the year 2024, the collaborative effort on gunshot residue analysis was continued for members of TEWG to participate. A new set of questions were distributed amongst the participants and the outcomes will be shared during the symposium in Bangkok, Thailand. This year, there was an increase in the participation from TEWG members from last year where a total of 5 laboratories took part. It is hoped that through this exercise, a comprehensive study on practice and technical approaches used in gunshot residue analysis among the Asian region can be obtained and possibly contribute to the advancement of forensic science amongst the members. Members can also learn and exchange views from each other on the results shared by the organizer. So far, collaborative exercises have proven to be beneficial to all participating labs and they are offered for free. Gunshot residue analysis plays a crucial role in forensic investigations as it provides valuable information regarding the discharge of firearms and can help determine the proximity of a suspect to a discharged firearm. It can be an important link in the chain of evidence during investigation of shooting cases. The collaborative effort demonstrates the commitment of AFSN members to improving forensic techniques and fostering cross-country knowledge exchange especially in the field of gunshot residue analysis.

4. **Title:** Tracing Clues: The Power of Stable Isotope Analysis in Forensic Chemistry

Authors: Dongkye Lee

Organization: National Forensic Service

Country: Republic of Korea

Abstract: Stable isotope analysis in forensic science (chemistry) is gaining prominence as a powerful tool for tracing the origin of materials found at crime scenes, overcoming the limitations of traditional analytical methods. It is currently being utilized in various aspects related to forensic science. Representative examples include applications in food, toxicology, drug tracing, and origin tracking.

In this workshop, the fundamental principles of stable isotope analysis will be introduced, along with the ongoing analyses conducted by the National Forensic Service (NFS) in Korea. The advantages and disadvantages of stable isotope analysis through a more detailed examination of sample analysis processes will be discussed too. Additionally, it is crucial to debate whether stable isotope analysis in forensic chemistry holds comparable value to the genetic analysis widely used in forensic biology. Stable isotope analysis can yield highly reliable results for tracing the origin or assessing the identity of evidence related to mass-produced consumer goods. Despite its few limitations, the technique still represents a significant advancement over traditional compositional analysis methods.

5. **Title:** The First Collaborative Exercise for Forensic Tape Analysis

Authors: Chia Hong Hiang, Oh Suat Ping, Xie Huifang

Organization: Health Science Authority

Country: Singapore

Abstract: A variety of tapes are used in criminal cases such as drug trafficking and homicide cases to bind people, objects, and packaging. The purpose of the forensic tape examination is to determine if strips or fragments of tape recovered from crime scenes and the suspects were associated with one another or if they were dispensed from a single roll of tape. In forensic tape analysis, the questioned and known tapes are compared for their physical characteristics, such as colour, texture, polarising light patterns, and the physically fitting of the edges. The tape material and backing are chemically analysed with Fourier-Transformed Infra-Red (FT-IR) spectroscopy, Raman spectroscopy and Pyrolysis Gas Chromatography-Mass Spectrometry (Pyro-GS-MS). Elemental tools such as Scanning Electron Microscopy Energy-Dispersive X-Ray Spectroscopy (SEM-EDS), and Laser Ablation Inductively-Coupled Plasma Mass Spectrometry (LA-ICP-MS), and thermal analysis tools like Differential Scanning Calorimetry (DSC) are also complementary tools to characterise tape materials. The presentation reported the first tape collaborative exercise, which is administered by the Trace Evidence Working Group (TEWG) for the forensic laboratories in the Asian region, to understand the common practices and technical approaches employed in forensic tape analysis. The findings of this CE are presented and discussed in the 16th AFSN TEWG meeting.

6. **Title:** A study of the background levels of gunshot residues in Singapore and their transfer in simulated cases

Authors: Koh Sher Lin Charlynn, Ding Yuling, Justin Quek Zheng Jun, Leong Wai Ying, Alaric Koh

Organization: Health Science Authority

Country: Singapore

Abstract: While instrumental detection of gunshot residues (GSR) on individuals, objects and/or surfaces is a relatively straightforward process, the subsequent evaluation of the significance of the GSR detected is more complex. It typically requires consideration of the secondary transfer of GSR as well as an understanding of the background levels of GSR.

In Singapore, although strict firearm ownership laws are in place, a substantial proportion of the population still handles firearms during national service. These specific situations may contribute to differing occurrences of background GSR compared to existing overseas studies. Additionally, the need to understand the level of GSR in the police or military environment is further prompted by past firing incidents within these premises. Herein, we investigate the background levels of GSR in Singapore, sampling from the general population, police officers and military personnel, and at various locations, including police stations and military compounds. We also conducted several "mock arrest" simulations to investigate the extent of secondary transfer during an arrest. The findings will add to our insights into the random prevalence of GSR in the local context and the level of contamination during police operations, enabling more accurate interpretation of GSR analysis results in forensic investigations.

7. Title: Analysis of Inks from Commercially Available Marker Pens using Raman Spectroscopy

Authors: Thiam Peng Ang and Nurul Azlyn

Organization: Health Science Authority

Country: Singapore

Abstract: Tracing and evaluating the source of an unknown ink are crucial in investigations involving document forgery and identifying the writing instruments that created the writing. Forensic ink analysis may include (i) ink classification/identification, a process of ink discrimination that enables identification of the potential brand/model of the writing instrument producing the questioned ink; (ii) ink source association, comparisons of pertinent characteristics of the questioned and known inks to determine a common source of origin; and (iii) ink source evaluation, assessing the strength of ink evidence based on relevant ink databases.

In Singapore, marker pens are used to label packages for illicit drug smuggling and distribution, including plastic bags and paper envelopes. Analysis of inks found on the packages is increasingly requested by police to trace a common source. Raman spectroscopy, a non-destructive technique with minimal sample preparation, has proven effective in analysing and discriminating inks. Here, a local Raman ink database for marker pens is constructed, and classification of the ink spectra is done with visual examination and dimensionality reduction techniques. The effectiveness of the classifications in the database to provide useful source information is evaluated by known marker inks. Additionally, the outcomes of the ink comparison in past caseworks are also assessed using the constructed database.

8. **Title:** Forensic approaches for comprehensive fire debris analysis

Authors: Lee Kang Hua

Organization: Health Science Authority

Country: Singapore

Abstract: In atypical fires where ignitable liquid residues were not detected, partially burnt debris at the fire scene are still important sources of information and can serve to uncover pertinent forensic traces to aid in the investigation of the fire event. Analysing this physical evidence via a more holistic approach to determine the chemical composition and to understand their properties are crucial to ascertaining if they contained substances which could have contributed to the fires. For example, the evidence may reveal substances that emit spontaneously flammable gases or the presence of reactive mixtures that can result in fires under certain conditions. With the landscape of fire debris analysis evolving, there is a growing need for laboratories to employ a wider range of instrumental techniques to analyse the chemical composition of a diverse nature of samples recovered from fire scenes. Case studies including a burning parcel, a flash fire in a manhacole, and an industrial fire will be presented to illustrate the necessity of alternative chemical analyses in addition to conventional fire debris analysis methodologies to support fire investigations comprehensively.

9. Title: Gunshot Residue Analysis Using SEM-EDS on the Hands of Deceased Persons

Authors: Chalampoo Wongvoravivat

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: The technique of scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDS) has been a standard method used for Gunshot Residue (GSR) detection internationally. The Central Institute of Forensic Science, Thailand (CIFS), initiated its GSR service for the first time in 2005. However, due to equipment malfunction and budget constraints, the service was discontinued. Subsequently, in 2022, the GSR service was reinstated with new equipment and automatic analysis software. The GSR cases examined are divided into two categories: samples from crime scenes and samples from hands. This study aimed to analyze the characteristics of GSR particles found on the hands of deceased persons. The sample for gunshot residue (GSR) testing was conducted over 18 months with 40 cases of suicide, and GSR was found in all 27 cases, totaling 67%. Therefore, if samples are taken from the hands of deceased person who died from suicide, GSR may not be detected. Hence, finding GSR on the hands of a deceased person does not definitively indicate that they fired a gun, but rather suggests they may have fired a gun, been near a firing gun, or touched a gun that had been discharged.

10. Title: Case Review of iGSR analysis by SEM-EDS in the files of CIFS, Thailand

Authors: Mrs. Tassamon Kongyou

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: Gunshot residue (GSR) analysis is a specialized branch of forensic science that focuses on trace evidence left by suspected shooters. The detection of GSR serves as a confirmation of firearm discharge. Scanning electron microscopy (SEM) in combination with energy dispersive spectroscopy (EDS) has emerged as a powerful technique to identify inorganic gunshot residue (iGSR). Particle analysis can identify individual GSR particles through both morphological and elemental characteristics.

The Central Institute of Forensic Science provides GSR analysis services using SEM-EDS techniques. The analysis has been performed on approximately 100 cases (400 – 500 items) per year. This presentation is a review of the Central Institute of Forensic Scien ce's cases. GSR analysis by SEM-EDS is beneficial to investigations, law enforcement, and the justice system. It can provide valuable information that can help to corroborate witness statements, determine the sequence of events, and identify potential suspects, which can solve crimes and ensure justice.

2. Poster Presentation

1. **Title:** Exploration of Inferring the origin of soil with pollen information

Authors: Wang Ping, Guo Hongling, Mei Hongcheng, Hu Can, Zhu Jun

Organization: Institute of Forensic Science, Ministry of Public Security, China

Country: China

Abstract: Pollen analysis offers forensic evidence by associating individuals, objects, and locations through distinctive pollen assemblages. The pollen in soil was extracted by heavy liquid flotation method and identified under optical microscope. Soil samples were collected from Beijing, Inner Mongolia, Shandong, Fujian and Xinjiang in China including different regions, different climatic environments and different land use types. The results showed that the pollen assemblages in soil samples from different regions were obviously different at a large spatial scale, and the content of the same pollen was different within a small scale. In soil samples with different climate environments and different land use patterns, there were remarkable pollen combination characteristics or marker types due to differences in vegetation cover types, like the pollen of Ephedra and Tamarix in Xinjiang. This study can provide the basis of inferring for geographic information and the environment. The analysis of pollen types as forensic samples can be used for comparison and geolocation purpose, such as to be confirmed or rejected by pollen types or to be identified pollen from different carriers such as soil from soles to search dominant and/or marker pollen.

2. Title: Stable isotope analysis of C, H, O and N in finger nails from different areas in China

Authors: Hongcheng Mei, Jun Zhu, Can Hu, Hongling Guo, Ping Wang

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: In recent years, stable isotope analysis has emerged as an important technique in the field of forensic science. Employed to unravel long-standing criminal mysteries and pinpoint the geographical origins or habitual residences of unidentified decedents, this method has proven its value. To explore the isotopic traits found in human tissues across different regions in China, we meticulously analyzed four distinct isotope ratios ($\delta^{13}C$, $\delta^{15}N$, $\delta^{2}H$, and $\delta^{18}O$) from the fingernails of 24 individuals hailing from two separate cities: Xuanhan, situated south of the Qinling Mountains, and Xianyang, located to the north of this range. Our findings revealed statistically significant disparities in the $\delta^{13}C$, $\delta^{15}N$, $\delta^{2}H$, and $\delta^{18}O$ values of fingernails between these two urban centers ($p < 0.05$). By examining the $\delta^{13}C$ against $\delta^{15}N$ and $\delta^{2}H$ against $\delta^{18}O$ plots, it becomes readily apparent to distinguish individuals based on their city of residence. Moreover, the $\delta^{2}H$ and $\delta^{18}O$ values within fingernails exhibited a strong correlation with those found in local drinking water (with a Pearson coefficient of 0.926), suggesting that fingernail isotopic ratios could be reliably inferred from water sources. As part of an ongoing initiative, we are compiling a comprehensive database that records multi-element isotope values from various human tissues—such as fingernails, hair, and bone—across China's diverse landscapes. This growing repository is poised to become an increasingly formidable instrument in addressing questions about the provenance of anonymous corpses, the significant geographic movements of individuals throughout their lives, and their dietary practices, thereby providing critical insights into a myriad of complex cases in the years ahead.

3. Title: Quantitative characterization of chemical trace evidences combined X-ray diffraction patterns with Rietveled refinement method

Authors: Jili Zheng, Yajun Li, Hongling Guo, Zhanfang Liu, Jun Zhu

Organization: Institute of Forensic Science, Ministry of Public Security

Country: China

Abstract: Explosives (e.g. black powder, pyrotechnic composition, ammonium nitrate explosives), poisonable chemicals, minerals, metals and other unknown solids are typical chemical trace evidences. The main components of above are all in crystalline. Due to the wide range of applications, easy pre-processing and convenient analysis, X-ray diffraction (XRD) has become an efficient method to identify the evidences component. However, it is still in the qualitative stage, i.e. matching of the phase and lack of quantitative method to illustrate the content of each substance in mixtures. It may because the variety of evidence forms, complex composition, inconsistency of pre-processing or sampling methods. Quantitative characterization of trace evidence is a challenge that needed to be resolved in the fine analysis and comprehensive inspection of trace evidence in criminal scenes. It can provide a powerful tool for comparison and traceability of trace evidences.

In this paper, a quantitative method for trace evidences is described, including pre-processing method, diffraction sample preparation, instrument parameter settings and full spectrum fitting method. Firstly, collect the diffraction patterns according to the optimized instrument parameters. Then, accurately judge the crystal phase and amorphous phase components contained in the sample with other analysis methods, e.g. SEM/EDX. Subsequently, RIETVELD refinement method is used in which multi-dimensional factors such as structural parameters, peak parameters, instrument parameters are all included. The differences between the measured pattern and the calculation pattern is the target function and the optimization algorithm is used to obtain model parameter. After refinement fitting, the best structural parameters and other parameters including content of each component are all identified.

4. **Title:** Data Analysis of Gunshot Residue Detection on Vehicles Using SEM-EDS

Authors: Napaporn Chutragoon, Ronnachai Ittiwannapong, Waththanachai Arporn, Pajaree

Organization: Central Institue of Forensic Science

Country: Thailand

Abstract: Gunshot residue (GSR) detection on vehicles using scanning electron microscopy-energy dispersive X-ray spectroscopy (SEM-EDS) is a promising technique in criminal investigation. This method allows for examining GSR particles on the surface of vehicles, providing important evidence in vehicle-related crimes.The SEM-EDS technique utilizes high-resolution imaging capabilities and elemental analysis to identify and characterize GSR particles such as lead (Pb), barium (Ba), and antimony (Sb). By collecting data on the type of vehicles, distribution, and elemental composition of the particles, Data analysis can be conducted to determine the likelihood of the presence of GSR on vehicles. Detecting gunshot residue (GSR) on vehicles provides significant forensic advantages, offering crucial evidence in firearm-related criminal investigations. Furthermore, the ability to detect GSR on vehicles can act as a deterrent to criminal activities, emphasizing law enforcement's capability to trace and link suspects to crimes precisely.

5. **Title:** Persistence of Gunshot Residue Particles After Hand Washing: A Forensic Analysis

Authors: Napaporn Chuetragoon, Wathtanachai Arporn, Ronnachai Ittiwannapong and Pajaree Rattanapongs

Organization: Central Institue of Forensic Science

Country: Thailand

Abstract: According to crime statistics from the Crime Data Division the Royal Thai Police, there were 42,332 firearm-related crimes from October 1, 2022, to September 30, 2023. Where post-shooting, perpetrators often attempt to destroy evidence linking them to the incident , with the simplest method being washing hands. Therefore, the Firearms and Physical Evidence Laboratory of the Central Institute of Forensic Science, Ministry of Justice, to test for gunshot residue (GSR) remaining on washed hands in order to observe the particle size of the persistence of GSR. The tests involved firing a semi-automatic 9 mm handgun and a .38 revolver. After firing, the shooter washed hands three times, and GSR was collected for analysis using Scanning Electron Microscope (SEM) with Energy Dispersive Spectroscopy (EDS). The results, the persistence particle sizes were within the range specified by ASTM E1588:2020. When ranking, the highest number of detected particles were within the 1.001-2.000 micrometer range, 2nd in 0.5-1.000 micrometer range, and 3rd in 2.001-3.000 micrometer range. The tests revealed that after washing hands three times, the persistence of GSR in the top three size categories constituted 68% of the total particles detected.

- TEWG Meeting Summery -

Report on the Conference Outcomes

The 16th Asian Forensic Science Network Meeting and Symposium

Between 26th – 30th august 2024 at Royal Thai Navy Convention Hall, Bangkok

Trace Evidence Workgroup (TEWG)


APMLA
The 16th AFSN Annual Meeting & Symposium
26th - 30th August 2024
#THAILAND 2024

Wednesday, August 28, 2024

09:00 AM - 12:10 PM SCIENTIFIC SESSION (SPECIAL LECTURE)

Lecture on the topic "Terrorist Explosive Device Analytical Center – Overview" by Ms. Kimberly Reubush, Supervisor of the Trace Evidence Unit from the Terrorist Explosive Device Analytical Center (TEDAC), Federal Bureau of Investigation (FBI), United States.

The Terrorist Explosive Device Analytical Center (TEDAC) was established in 2003 with the objective of serving as an analytical unit for explosives and improvised explosive devices (IEDs) in terrorism-related cases, both within the United States and among international partner networks. TEDAC plays a crucial role in collecting and exchanging scientific and technical information on IEDs in collaboration with military intelligence agencies, law enforcement, investigative units, forensic organizations, scientific and technological institutions, as well as immigration, customs, and international agencies. Its mission is to prevent terrorism-related crimes involving the use of IEDs through comprehensive analysis and intelligence sharing.

The forensic examination units under TEDAC consist of the following specialized divisions: Latent Prints Unit (fingerprint analysis), DNA Unit (genetic analysis), Explosive Chemistry Unit (chemical analysis of explosives), Trace Evidence Unit (microscopic and material analysis), Toolmark Unit (examination of tool and weapon marks), Technical Exploitation Unit (analysis of electronic components), Hazardous Device Exploitation Unit (analysis of the composition and functionality of explosive devices), These units provide scientific data, forensic examination reports, intelligence information, photographic evidence, technical data, and

expert assessments on explosives to support law enforcement, military, and intelligence agencies in counterterrorism efforts.

To date, more than 4,500 cases involving latent fingerprints and DNA samples of suspects and related individuals have been identified through TEDAC's Biometrics Database. Over 90,000 latent fingerprint records have been shared with international agencies. More than 2,500 INTERPOL Blue Notices have been disseminated globally. There have been more than 150 terrorism-related cases, both domestic and international, in collaboration with TEDAC, including 75 cases handled by the FBI. And in 5 cases, suspects have been prosecuted in court based on forensic analysis from TEDAC.

TEDAC has developed an explosives database system under the name Explosive Reference Tool (EXPeRT), which serves as a database for storing, searching, and sharing information on explosives, case data, and security intelligence related to terrorism cases worldwide.

In 2014, the TEDAC (Terrorist Explosive Device Analytical Center) established the International Collection and Engagement (ICE) Program, which deployed FBI personnel, including Special Agent Bomb Technicians, Forensic Scientists, and Intelligence Analysts, to 87 countries worldwide. The purpose of this program was to gather and exchange academic and technological information related to improvised explosive devices (IEDs) and terrorism cases, providing support to local authorities in those countries.

In the process of analyzing evidence related to improvised explosive devices (IEDs) in terrorism cases, the procedure begins when the evidence is submitted to the TEDAC Forensic Lab. The Evidence Management Unit first registers the evidence into the system, with the submitting officer required to complete the TEDAC Item Submission Form. Once the evidence is received, any explosive devices are passed through an X-ray machine for safety checks to ensure that the device and its components are properly separated.

After registration, the evidence is sent to various laboratories for analysis, based on the request's objective. Each item is assigned a barcode tracking to enable tracking of its status in the system. Each laboratory records photos and details of the evidence before proceeding with scientific analysis. Once the analysis is completed, a report is prepared, and the evidence is returned to the requesting agency, as appropriate. TEDAC is also authorized to retain the evidence from a case, provided permission is granted by the requesting agency.

TIME: 13:10 - 14:10 SCIENTIFIC SESSION (SPECIAL LECTURE)

Topic: "Tracing clues: The Power of stable isotope Analysis in forensic chemistry" Speaker: Dr. Dongkye Lee from the National Forensic Services (NFS), Republic of Korea.

Stable Isotope Analysis is a chemical tool used in forensic science. This technique relies on measuring the ratio of isotopes (atoms of the same element with different numbers of neutrons) to understand the biological or chemical characteristics of a sample. It is commonly used for the analysis of elements such as Carbon (C), Nitrogen (N), Hydrogen (H), Oxygen (O), Strontium (Sr), and Sulfur (S). This technique is popular in forensic science, environmental research, and other sciences that need to verify the source. Case studies include: The discovery of methomyl in a bottle of soju of a deceased person, The detection of pesticide powder found on food stored in a refrigerator, The comparison of reflective film fragments, The identification of the type of correction tape, The isotope ratio in environmental samples in Korea (water and soil), The isotope ratio in the teeth of the Korean population.

By analyzing the isotope ratio in teeth, it is often used to study a person's dietary history, source of drinking water, or environmental changes they have been exposed to throughout their life.

TIME 14.10 – 14.40 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "Forensic approaches for comprehensive fire debris analysis" Speaker: Ms. Kang Hua Lee from the Health Sciences Authority, Singapore.

The use of forensic methods in analyzing fire debris to determine the cause and pattern of a fire plays a crucial role in criminal investigations related to arson or fire incidents. The analysis is conducted by the Health Sciences Authority (HSA), which receives samples from the Singapore Civil Defence Force (SCDF) and the Singapore Police Force (SPF). Tools such as chemical tests, SEM/EDS, FT-IR, Raman, GC/MS, GC/FID, GC/TCD, LC/MS, IC, and XRD are employed for analysis. Case studies include incidents such as fires at a polymer or plastic manufacturing plant, a fire in a container on a ship docked at the Pasir Panjang Terminal in Singapore, and a fire in machinery used for drying or preparing raw barley for animal feed.

TIME 14.40 – 15.10 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "Cause analysis of spontaneous combustion and explosion in self-made ammonium nitrate explosives" Speaker: Ms. Jili Zheng from the Institute of Forensic Science (IFS), People's Republic of China

the instability of ammonium nitrate compounds, which can be affected by contamination with other chemicals, improper storage conditions, or environmental factors. These factors can trigger unintended chemical reactions, potentially leading to an explosion. Research has shown that such incidents are often caused by improper handling or storage of ammonium nitrate, which, when exposed to heat, pressure, or contamination, may become volatile and lead to catastrophic events.

- Ammonium nitrate has the ability to absorb moisture from the air, especially in rainy or high-humidity conditions, which may affect the chemical properties and stability of ammonium nitrate.

- The reaction between ammonium nitrate and potassium chlorate in a closed environment, where these two substances should not be stored together, can result in the formation of ammonium chlorate (NH_4ClO_3), which may be unstable and pose an explosion risk.

- Ammonium chlorate is unstable at room temperature, and when it decomposes, it undergoes a reaction that releases heat, which can lead to an explosion or high temperatures.

- The accumulated heat inside the explosive, which may result from chemical reactions or the instability of compounds, leads to high temperatures that ultimately cause an explosion.

- Ammonium chlorate decomposes, and all the products will be in the form of gas, with no remaining chlorate ions after the decomposition.

TIME 15.30 – 17.00 BRING A CASE SESSION

The knowledge exchange among participants from each agency involved presenting interesting cases, methods of investigation, tools, technologies, challenges, obstacles, and reporting results. The details are as follows:

1) A case related to fire by Ms. Lee Kang Hua, Senior Forensic Scientist from the Health Sciences Authority (HSA), Singapore.

It was an analysis of a burned aluminum can sample, which contained a white solid substance, using various techniques including FTIR, RAMAN, SEM/EDS, and IC. The white substance was found to be hygroscopic. There was a discussion on the challenges of interpreting the analysis results, as the findings from each technique did not align, making it difficult to conclude the exact composition of the detected substance.

The network members shared academic information, methods, and technologies, as well as provided suggestions and feedback on the issue.

2) A case involving gunshot residue (GSR) analysis presented by Dr. Charlynn Koh, Forensic Scientist from the Health Sciences Authority (HSA), Singapore.

The case involved the analysis of a sample resembling a bullet using the SEM-EDS technique. There was an exchange of ideas regarding the challenges and obstacles related to the software used for auto analysis, which requires a significant amount of time for analysis when detecting more than 100,000 particles. Discussions included steps or guidelines that could stop the auto analysis software without waiting for the analysis to be completed. Additionally, there was a focus on which particles should be manually analyzed and which labs have experience in analyzing semi-automatic nail guns.

Network members exchanged academic information, methods, technologies, and suggestions on the issue. It was found that no laboratory had previous experience analyzing particles generated by semi-automatic nail guns. This led to the idea of experimenting by collecting particles from semi-automatic nail guns and comparing the results for future analysis.

3) Preliminary Study on Paint Database Project by Ms. Farah Ad-Din Nordin, Department of Chemistry Malaysia, Malaysia.

It is a study on the chemical and physical composition of automotive paints from different car brands in Malaysia using FTIR and digital microscopy techniques. The objective is to utilize automotive paint data to support investigations in traffic accident cases, car theft cases, or cases involving crimes where vehicles are used as transportation.

Network members collectively suggested that the study should increase the sample size to make the automotive paint database more comprehensive, covering a wider variety of car brands and paint types for forensic analysis.

TIME 17.00 – 18.20 TEWG BUSINESS MEEETING

The TEWG network held an election to appoint the new executive committee, as the previous committee's term had ended. The new committee members for the fiscal year 2024-2026 are as follows:

Chairperson: Mr. Lim Thiam Bon, Health Sciences Authority, Singapore

1st Vice-chair: Dr. Guo Hong Ling, Institute of Forensic Science, China

2nd Vice-chair: Dr. Dongkye Lee, Department of Forensic Chemistry, National Forensic Service, South Korea

Forensic Service, South Korea

1st Secretary: Ms. Farah Ad-din Nordin, Department of Chemistry, Malaysia

2nd Secretary: Ms. Lee Kang Hua, Health Sciences Authority, Singapore

The past achievements.

- On June 12, 2024, the TEWG network organized an online seminar titled "Automated GSR Analysis by SEM/EDS – Sharing Best Practices & Tips on Validation and Interpretation," hosted by the Chemistry Forensic Group and the Firearms and Physics Forensic Group from the Institute of Forensic Science. The purpose of the seminar was to allow forensic experts from member countries to exchange knowledge about gunshot residue (GSR) analysis using SEM/EDS techniques, including the process, methods for validating the technique, and interpretation of results according to ISO/IEC 17025 standards. The seminar was attended by 55 participants from 8 member countries: Singapore, Malaysia, the Philippines, China, South Korea, Indonesia, Timor-Leste, and Thailand.

- The TEWG network has been conducting inter-laboratory proficiency testing (Collaborative Exercise) since 2017, through 5 testing programs, which include fiber testing, paint testing, glass fragment testing, gunshot residue testing, and adhesive tape testing. The tests are conducted in rotation based on the needs of member countries. The details are as follows:

Testing Area	Year Conducted (B.E.)	Number of Tests	Number of Participating Laboratories	Year of Latest Test (B.E.)
Fiber	2017	6	5	2022
Glass	2018	2	4	2022
Paint	2019	1	5	2022
Gunshot Residue (GSR)	2022	2	6	2024
Tape	2024	1	5	2024

Plans for 2025 and the Future

1. Training and Education

- Organizing a knowledge exchange meeting for member countries on Environmental Forensics, focusing on the analysis of contaminants in soil and water sources. The meeting will be planned for 2 days and organized by the Institute of Forensic Science, China.
- Organizing a knowledge exchange meeting for member countries on Explosive Database, focusing on the analysis of explosives. The meeting will be organized by the Department of Chemistry, Malaysia.

2. Collaborative exercise

- Collaborative exercise on Glass testing, 3rd edition (3rd Glass Collaborative Exercise), organized by the Institute of Forensic Science, China.

3. Scientific Session for AFSN 2025

Members of the TEWG network collaboratively proposed academic knowledge exchange topics for the next AFSN meeting, with the following suggested topics:

- Holistic Approach in forensic trace analysis and interpretation
- Fire Debris Analysis
- Gas Analysis
- AI and forensic trace

Thursday, August 29, 2024

TIME 09.00 – 09.25 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "Analysis of Inks from Commercially Available Writing Instruments using Raman Spectroscopy" Speaker: Dr. Thiam Peng Ang from the Health Sciences Authority, Singapore

The use of Raman Spectroscopy in ink analysis began with the creation of a database for black Marker pens from various brands, including both single-tip and double-tip markers, with a total of 38 samples. The Raman spectra of all the inks were categorized into 5 groups based on their dye/pigment composition. It was also observed that double-tip markers typically produced different Raman spectra, and even markers from the same brand but different models showed variations in their Raman spectra. When an unknown marker sample was analyzed and its Raman spectrum compared with those from the 38 known marker samples, along with statistical analysis using PCA, the data could be grouped similarly.

TIME 09.25 – 09.50 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "Gunshot Residue Analysis Collaborative Exercise 2024" Speaker: Ms. Farah Ad-din Nordin from the Department of Chemistry, Malaysia.

The KIMIA Malaysia laboratory organized the 2024 Gunshot Residue Analysis Collaborative Exercise, testing PT Gunshot Residue (GSR) samples using Scanning Electron Microscope (SEM) and Energy Dispersive X-Ray Spectroscopy (EDS) techniques for 6 laboratories within the AFSN network. The exercise involved preparing PT samples, confirming the number of gunshot residue particles detected, and testing for stability. The results showed that 5 laboratories provided correct responses, while 1 laboratory provided incorrect results. Additionally, the exercise summarized information related to the sample testing, result analysis, parameter settings, and quality assurance for each laboratory.

TIME 09.50-10.15 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "A study of the background levels of gunshot residues in Singapore and their transfer in simulated cases" Speaker: Dr. Charlynn Koh is from the Health Sciences Authority (HSA) of Singapore.

The Forensic Chemistry and Physics Laboratory (FCPL) Applied Sciences Group of the Health Sciences Authority conducted a study on the background from general environments, military and police sectors, and the secondary transfer of Gunshot Residues (GSR). These factors are critical in the detection of GSR particles using Scanning Electron Microscope (SEM) and Energy Dispersive X-Ray Spectroscopy (EDS). Samples were collected from public areas, two military zones, and police areas, including samples from the hands of individuals and various environments such as elevator buttons, stair rails, soldiers' beds, bathrooms, office areas, equipment rooms, vehicles, etc. A total of 694 samples were collected. The results of the tests can be summarized as follows:

1. Background from the general environment: No characteristic gunshot residue (GSR) particles were found in the general population or public areas.

2. Background from military and police areas: Characteristic GSR particles may be present in individuals. These particles may be transferred to officers performing duties. A range of 1-6 GSR particles was found in military camps and police stations.

3. Secondary Transfer: A maximum of 1 characteristic GSR particle may be transferred during a resting period.

4. No residual characteristic GSR particles: No GSR particles were found after 24 hours.

TIME 10.25-10.50 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "Gunshot Residue Analysis Using SEM-EDS on the Hands of Deceased Individuals" Speaker: Ms. Chalampoo Wongvoravivat from the Central Institute of Forensic Science, Thailand

Introduction:

Gunshot Residue (GSR) analysis using SEM-EDS (Scanning Electron Microscopy - Energy Dispersive X-ray Spectroscopy) is a widely accepted forensic technique used to detect and analyze extremely small particles emitted from firearms during a gunshot. This method focuses on identifying particles that contain lead (Pb), barium (Ba), and antimony (Sb), which are key components of gunshot residue. GSR analysis is crucial in forensic science as it helps verify the occurrence of a gunshot, provides

evidence about the timing of gun use, and assists in reconstructing the event at the crime scene. Additionally, it can either support or refute witness testimony.

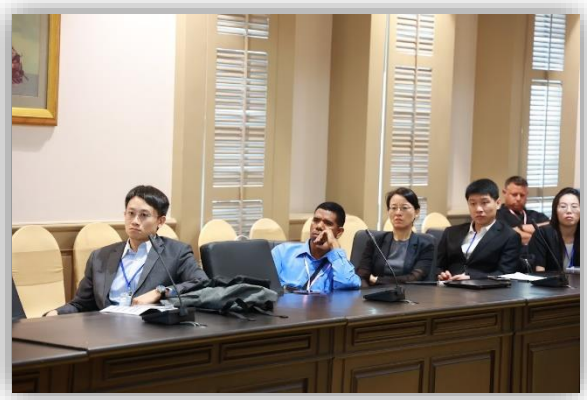
Objective:

This study aims to analyze the characteristics of gunshot residue particles found on the hands of deceased individuals, particularly in cases of suicide, over a period of 18 months.

Materials and Methods:

Sample Collection: Gunshot residue samples were collected from the hands of the deceased (both the dorsal and palmar sides) using carbon tape during the autopsy procedure at the Institute of Forensic Science.

SEM-EDS Analysis: The analysis was conducted using a TESCAN VEGA GMU SEM and an OXFORD Ultim Max 100 EDS detector, with the Aztec GSR software used for automated particle analysis.



The instrument settings were configured according to ASTM E1588-20, which is an established standard for gunshot residue analysis. This ensured that the equipment was operating in compliance with internationally recognized guidelines for detecting and identifying GSR particles.

Results:

The study examined 40 cases of suicides and found that 67% of the cases (27 out of 40 cases) had gunshot residue present.

- Gunshot residue particles were classified based on their chemical composition, such as particles with characteristic features (Pb-Sb-Ba), particles with matching components (Pb-Ba, Sb-Ba), and commonly found particles.
- In terms of physical characteristics, most of the gunshot residue particles were spherical, although some irregularly shaped particles were also found in certain cases.

Discussion and Conclusion:

The study found that in 33% of suicide cases, gunshot residue was not detected, which suggests that the presence of gunshot residue on a deceased person's hands cannot definitively confirm that the individual fired a gun. The absence of gunshot residue does not imply that suicide did not occur, as several factors may influence the accumulation and persistence of gunshot residue.

The analysis of gunshot residue using SEM-EDS cannot distinguish between suicide and homicide. Therefore, it is recommended to collect additional gunshot residue analysis data in the future to enhance the reliability of evidence in forensic processes.

TIME 10.50-11.15 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "Lead Isotope Measurement of Primer Gunshot Residues and Likelihood Ratio Predictions for Forensic Cartridge Discrimination and Individualization Speaker: Dr. Guo Hongling from the Institute of Forensic Science, People's Republic of China

Introduction:

The analysis of Gunshot Residue (GSR) is crucial for linking suspects, firearms, and victims in cases involving the use of firearms. A commonly used method is GSR analysis using techniques such as SEM/EDX (Scanning Electron Microscopy/Energy Dispersive X-ray Spectroscopy) and LA-ICP-MS (Laser Ablation Inductively Coupled Plasma Mass Spectrometry). These techniques can measure the lead isotope ratio found in GSR to differentiate and classify cartridge cases.

Objective:

This study aims to measure the lead isotope ratio in gunshot residues from cartridge cases of different manufacturers and models. It also seeks to use the Likelihood Ratio (LR) to predict the connection between the source of the gunshot residue in gunshot-related cases.

Method:

1. Sample Collection: Gunshot residue samples were collected from fired cartridge cases using a process to extract gunpowder residue from the shell casing.

2. Analysis Technique: The lead isotope ratio was analyzed using MC-ICP-MS (Multicollector Inductively Coupled Plasma Mass Spectrometry) combined with the LA-MC-ICP-MS (Laser Ablation-Multicollector ICP-MS) system to achieve the highest accuracy in isotope ratios.

3. Likelihood Ratio (LR) Evaluation: The LR was used to compare the source of gunshot residues by testing two hypotheses: H1 (samples come from the same source) and H2 (samples come from different sources).

Results:

1. The lead isotope ratios in gunshot residues collected from cartridge cases from different manufacturers and models showed differences that can be used to distinguish the origin of the gunshot residue.

2. Statistical analysis using P-value revealed no significant difference in the isotopic changes before and after firing.

3. The Likelihood Ratio (LR) values were used to assess the probability of the GSR samples. LR values greater than 10^4 supported hypothesis H1 (same source), while LR values less than 10^4 supported hypothesis H2 (different sources).

Case Study:

A shooting incident occurred in a hunting area in Shanxi Province, China, involving two suspects: one being the leader and the other being the driver. The evidence collected included lead residues from the victim's head, three bullet fragments from the driver, one bullet fragment from the leader, and a single shotgun pellet from the leader. The lead isotope analysis using LR (Likelihood Ratio) showed that the GSR particles from the bullet fragment from the leader closely matched the lead residues from the victim's head. This finding provided strong evidence that the leader was likely the shooter.

Conclusion:

Lead isotope ratio analysis is a valuable tool for distinguishing and identifying the source of gunshot residues. However, the limitations of using high-cost instruments and the complexity of the analysis necessitate further research to develop standards and improve the efficiency of its application in forensic science globally.

TIME 11.15-11.40 SCIENTIFIC SESSION (ORAL PRESENTATION)

Topic: "AFSN TEWG Tape Collaborative Exercise 2024" Speaker: Mr. Hong Hiang Chia, Health Sciences Authority, Singapore

The TEWG network is organizing a proficiency testing exercise for laboratories regarding adhesive tape analysis, with the Health Sciences Authority of Singapore as the main organizer. The timeline for the exercise is as follows: Mid-March 2024: Invitation for organizations to participate, Early April 2024: Registration period, Mid-May 2024: Sending the training samples for examination to the participating laboratories, Mid-July 2024: Submission of examination results, End of August 2024: Announcement of the results

The benefits of inter-agency proficiency testing are as follows:

1. Identifying and Comparing Tape Analysis Methods: Laboratories will have the opportunity to explore and compare their methods for tape analysis. Since each laboratory may have different approaches, they are required to examine the tape samples and present the methods they use.

2. Evaluating the Likelihood of Error in Tape Pairing Based on Dispenser Cuts: This testing aims to evaluate how likely errors might occur when identifying tape pairs based on the dispenser cut marks. It helps to assess the possibility of misidentifications when using dispenser cuts as evidence.

There are 5 laboratories participating from 5 countries as follows:

1. Institute of Forensic Science of China
2. Government Laboratory, Hong Kong SAR
3. Department of Scientific Services, Brunei
4. Department of Chemistry (KIMIA), Malaysia

5. National Forensic Service, South Korea

The steps for preparing test

samples consist of two sets of tapes: Black electrical tape and Clear tape

For Set 1, the known source tape (labeled as "K") is from a roll of Supreme brand electrical tape, and there are two additional tape strips to be examined, labeled Q1 and Q2. In this set, there is no need for a physical connection between the tapes. The task is to examine the relationship between the known source tape and the tapes to be examined.

For Set 2, the known source tape (labeled "K" followed by a number) is from a roll of Three Ye brand clear tape, and there are two additional tape strips to be examined, labeled Qa and Qb, which correspond to the same number as the known source tape (K). This set requires a physical connection between the tape strips, and the task is to check whether there is a relationship between the known source tape and the tapes to be examined.

For Set 1, the sample preparation is as follows: Three rolls of tape are used. One roll is Supreme brand tape, which serves as the known source (K). The Q1 sample comes from another roll of Supreme brand tape, and Q2 is taken from a different roll of TOYO brand electrical tape.

The summary of the methods used by various laboratories reveals that a wide range of techniques for examining electrical tapes were employed, with each laboratory adopting different approaches. Some laboratories focused on physical examination, while others relied on analytical instruments. The most common methods included physical inspection using macro/microscopic techniques and analysis using FT-IR. In addition to these, some laboratories also utilized specialized methods such as IRMS, XRF, and 3D scanning.

In response to the question about the relationship between K and Q1 , as we know, these tape samples come from different rolls, so there is unlikely to be a direct relationship. However, since they are from the same brand, they are manufactured using the same production process design. This means that many characteristics might be indistinguishable

From the responses, we can see that most laboratories use physical characteristic examination, such as width, surface, or fiber properties.

And from the image, for the characteristics observed by our laboratory:
For K, parallel lines were observed on the surface of the tape, and they were consistently found along the length of the unspooled tape, which was not observed in Q1.

For Q1 , the difference in fiber count can be explained by the uneven spacing of the filling fibers, which is not observed in K. Q2 shows that in this set, physical characteristics are more useful than chemical analysis for differentiation.

In set 2, the sample preparation is as follows: Multiple layers are directly cut from

the roll, then cut using a tape dispenser. The layers are peeled off to obtain two physically fitting strips. Three uneven halves are combined to create K, Qa, and Qb.

This is the method used by each laboratory for examination:

Visual inspection and microscopy: The most commonly used method, as in Set 1.

FT-IR: Also a commonly used method.

Other methods: Used less frequently due to fewer features to examine on clear tape compared to electrical tape.

Laboratory K5 focuses solely on visual inspection and microscopy and may consider using instrumental methods such as FT-IR in the future.

For K and Qa, there is no physical fit, and they come from the same roll, so they should be grouped by class. All laboratories, except K2, correctly concluded the physical fit for class grouping. Laboratory K4 went a step further by examining the production line marks in addition to the physical fit of the edges.

For the next pair, K and Qb, there is no physical fit, and they come from the same roll. Laboratory K2 used Py-GC-MS for separation, while laboratory K1 could not distinguish them using Py-GC-MS. I'm not sure why, it could be due to contamination during our sample preparation. Laboratories K3 and K5 found a physical edge fit. Laboratory K3 went further to examine if they could be linked by class characteristics, while K5 did not conduct further investigation

Summary:

The approaches used by the participating laboratories include visual inspection/microscopy and FT-IR, which are commonly employed methods. Tapes from the same brand can be difficult to differentiate chemically/elementally. Some physical characteristics may

sometimes offer more distinction. Differences in physical features, such as the number of fibers, might not be identifiable if the tape length is insufficient.

Physical comparison must be done carefully, as it may lead to false positives. Microscopic inspection of edges helps observe small gaps and overlaps, while production scratches can confirm the physical fit.

POSTER PRESENTATION

	Topic	Presenter	Organizations
1	Quantitative characterization of chemical trace evidences combined X-ray diffraction patterns with Rietveld refinement method	Jili Zheng	Institute of Forensic Science, China
2	Data analysis of gunshot residue detection on vehicle using SEM/EDS	Waththanachai Arporn	Central Institute of Forensic Science, Thailand
3	Persistence of gunshot residue particles after hand washing: a forensic analysis	Napaporn Chuetragoon	Central Institute of Forensic Science, Thailand

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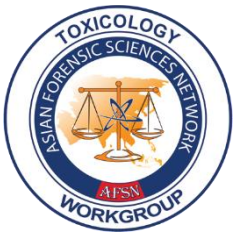


Toxicology Workgroup (TXWG)

Abstract

1. Oral presentation

1. Title: Cyanide VS Cypermethrin Who's killer?

Authors: Sanit chaiya, Tanasiri Yokchue

Organization: Central institute of Forensic Science)

Country: Thailand

Abstract: The purpose of this study was to study the effect of cyanide and cypermethrin in a dead man on a barber chair. According to the GC/MS characterization, not only detected cyanide but also detected cypermethrin in gastric content. Moreover, ketamine and norketamine were detected in clotted blood and hair sample that corresponding to his routinely take of ketamine. Base on this study, The structure of cypermethrin consists of CN group can be decomposed at high temperature, producing hydrogen cyanide to positive result of cyanide by prussian blue test. However, the cyanide that produced from cypermethrin was significantly different from the detected cyanide in gastric content due to its pH was 10 which is similarly to the pH of cyanide solution at 9.5 whereas pH of cyanide from cypermethrin was 1.

2. Title: ANALYSIS OF COMMERCIAL INSECTICIDES IN ABNORMAL NECROPHAGOUS INSECTS USING GASS CHROMATOGRAPHY-MASS SPECTROMETRY

Authors: Fazrul Muhammad Yasin and Fitri Rahmadani

Organization: Indonesian Forensic Science Association

Country: Indonesia

Abstract: Insecticides are a class of pesticides that are generally used in the household environment, to maintain health and avoid various types of diseases that originate from insects such as cockroaches, flies, and mosquitoes because this type of insecticide has a highly toxic effect on insects and can be deadly to humans. Scavenger insects (necrophages) are animals used in forensic entomology to determine the cause of death. Flies are insects present a few minutes after death, carrying out a life cycle in the decomposing body, starting from when the egg is laid until it becomes an adult fly. This research was conducted to observe the presence and impact of the life cycle of flies caused by commercial insecticide poison (Baygon). As a result of this research, 12 species of flies from 4 families were obtained, namely Chrysomya megacephala, Chrysomya buzzing, Chrysomya rufifacies, Lucillia sp., Calliphora sp., Hemipyrelia linguriens (Calliphoridae), Hydrotaea ignava, Antherigona orientalis (Muscidae), Protopiophia sp. (Piophilidae), Sarcophaga brevicornis; Sarcophaga cf australis; and Sarcophaga cf lincta (Sarcophagidae). The life cycle of flies on carcasses treated with commercial insecticides slows down and there are morphological abnormalities in the growth of pupae to adults. Abnormalities that occur in fly pupae are transparent, c-shaped, larva-form pupae, and pupae that fail to eclosion. Apart from that, abnormalities occur in adult flies, namely the legs change direction, and the wings and abdomen become wrinkled. Qualitative analysis using Gas Chromatography-Mass Spectroscopy (GC-MS) from Agilent, proved the presence of fly pyrethroid insecticides at the observation location.

3. Title: Detection of New Psychoactive Substances and their metabolites in Hair by Liquid Chromatography High-Resolution Mass Spectrometry

Authors: Xuan Wei TAN, Hian Twan CHANG, Hooi Yan MOY

Organization: Health Sciences Authority

Country: Singapore

Abstract: In Singapore, hair is used to monitor drug consumption as it offers longer drug detection windows and can provide drug use history through segmental hair analysis. In response to the increasing demand for testing new psychoactive substances (NPS) in hair, particularly synthetic cannabinoids (SC) and synthetic cathinones, due to the recent rise in NPS abuse, our laboratory has recently expanded its hair testing scope to encompass these emerging substances using high-resolution mass spectrometry.

To ensure the detection of NPS in hair, especially SC and their metabolites which are typically present at low pg/mg level, the laboratory has refined its current hair sample preparation method to improve recovery and clean up. The enhanced method involved pulverizing and extracting 20 mg of hair with pure methanol in a pulverizer for 15 min at room temperature, followed by reconstituting the dried extract using a solution of water:methanol:1M ammonia (25:50:25 v/v/v%) before proceeding with clean up using Supported Liquid Extraction (SLE). The addition of 1M ammonia solution improved the recovery of NPS from hair. Subsequently, instrumental analysis was performed on a Thermo Scientific Q-Exactive hybrid quadrupole-orbitrap mass spectrometer (Orbitrap MS) coupled with liquid chromatography, using data-dependent acquisition mode with an inclusion list covering prevailing NPS and their metabolites. The identification of substances was based on the precursor accurate mass, retention time, reverse spectral matching against the in-house library and fragments accurate masses to minimize false negatives, considering the low drug concentration and potential nominal mass interferences from hair matrices.

The method was evaluated using hair blank samples spiked with 60 substances, including SC, synthetic cathinones, phenethylamines, LSD, fentanyl, and other NPS. The evaluation involved assessing the substances' limits of detection (LOD), ionization suppression/enhancement effects (matrix effects), matrix interference, and sample carryover.

Most substances had detection limits between 1 and 10 pg/mg and matrix effects within an acceptable range of ±25% (n=10). However, a few substances, such as 4-Fluoro-MDMB-BUTICA, 4-Fluoro-MDMB-BINACA ester hydrolysis metabolite, MDMB-4en-PINACA butanoic acid metabolite, MDMB-FUBINACA, 4-Fluoro-MDMB-BUTICA ester hydrolysis metabolite, and BZP, showed higher matrix effects of -32.9% to 114.3% (n=10). No sample carryover was found up to a concentration of 1000 ng/mg for all substances. The laboratory aims to apply the validated method on the authentic hair samples obtained from drug abusers in the upcoming months to verify the method's applicability as a routine test for detecting prevalent NPS and their metabolites in hair. The results of this application will be shared during the meeting.

4. Title: Validation of LLLE-GC-MS method for determination of drugs in gastric content and urine samples

Authors: Jittiput Thitinilnithi, Tanasiri Yokchue

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: In this study, an analytical liquid-liquid-liquid extraction-gas chromatography-mass spectrometry (LLLE-GC-MS) method was fully validated for 17 drugs in gastric content and urine samples. An extraction method based on LLLE was performed to remove excess lipids from biological samples which can restrain the detection of target analytes. Several parameters relevant to qualitative method namely interferences, limit of detection (LOD), carryover, stability, and real samples were evaluated. The results showed no interferences observed in blank samples and 17 drugs were successfully detected. The limit of detection (LOD) ranged from 1-10 g/mL. Carry-over effects were noticeably observed at 100 g/mL in both samples. Stability of the samples in the GC autosampler was measured at low (10 μg/mL) and high (30 μg/mL) concentrations showing the relative response within 20% of the original measurement on the first day and after 24, 48, and 72 hours. Real gastric contents and urine samples were also applied to validate and verify the viability of the LLLE-GC-MS method. As a result, this LLLE extraction method is useful and suitable for routine detecting of drugs in gastric contents and

urines which can reduce the amount of specimen required, shorten the analysis time and demonstrate a decrease in background interference from lipids.

5. Title: High sensitivity detection of 30 volatile organic compounds (VOCs) in human blood samples by headspace gas chromatography-mass spectrometry

Authors: Zou Bo1, Song Ge1, Zhang Yunfeng1, Chang Jing1, Wei Chunming1, Fan Linyuan2, Zhu Xiaohan2

Organization: 1. Institute of Forensic Science of China

2. People's Public Security University of China

Country: China

Abstract: An automatic headspace gas chromatography-mass spectrometry (HS-GC-MS) method was developed to analysis 30 volatile organic compounds (VOCs) in blood with high sensitivity, including 13 halogenated hydrocarbons, 12 aromatic compounds, and 5 inhaled anesthetics. 0.5mL blood in a glass bottle was heated online at 60°C for 8 min, and the headspace vapour was injected into GC-MS for a 30 min gradient heating program on Gaspro® column. EI-MS detected the ions of m/z 20~300 in SCAN mode.

Spiked blood samples were batch analyzed and the limits of detection (LODs) of the 30 VOCs were 0.02~0.05 μg/mL, the limits of quantitation (LOQs) were 0.1~0.5 μg/mL. The precision of the method is fine with RSD<12%. Multiple isomers could be well separated and identified, such as ethylbenzene/o-xylene/p-xylene and 1,1-dichloroethane/1,2-dichloroethane.

This method is applicable for the toxic analysis of the deceased's blood in cases such as fire, refrigerant leakage, and fluoroalkane anesthesia poisoning.

6. **Title:** Hydroxyzine plus Cetirizine or Hydroxyzine and their active metabolites

Authors: Pranida Kigpituck, Tanasiri Yokchue

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: It is widely known that hydroxyzine and cetirizine are both antihistamine medications, with cetirizine being an active metabolite of hydroxyzine. Cetirizine is also a standalone medication. Hydroxyzine is a first-generation histamine H1-receptor antagonist, while cetirizine, also commonly known as Zyrtec, is an orally active second-generation histamine H1 antagonist. In instances of post-mortem clotting blood analysis, either hydroxyzine or cetirizine is sometimes detected alone, while in other cases, both hydroxyzine and cetirizine are found together. It remains unclear whether hydroxyzine was administered alone and metabolite to cetirizine or if both medications were used concurrently. Combining these two medications may lead to increased side effects such as dizziness, drowsiness, and difficulty concentrating, which is not beneficial for the patient. In forensic investigations, it is not customary to specifically quantify medications in the antihistamine class. Therefore, it is still uncertain when both hydroxyzine and cetirizine were deteced whether these two medications were used together or if the detection was a result of hydroxyzine metabolited.

7. Title: Is it methamphetamine or something else in his hair?

Authors: Kwok Yi Ling Miiko, Moy Hooi Yan, Peh Poh Choo

Organization: Health Sciences Authority

Country: Singapore

Abstract: In the laboratory, hair samples are subjected to initial screening for controlled drugs using a liquid chromatograph mass spectrometer (LC-MS/MS), followed by confirmatory testing on a gas chromatograph mass spectrometer (GC-MS/MS). Recently, during a method transfer from the existing GC-MS/MS (method A) to a new GC-MS/MS (method B), a parallel study involving fifty suspected drug users' hair samples revealed that the methamphetamine results obtained from methods A and B deviated by more than 20% from their mean. Notably, four out of the fifty hair samples displayed a deviation of 32.2% to 74.6% from their mean. Additionally, two samples that did not detect methamphetamine on method A showed methamphetamine levels above the LLOQ of 0.2 ng/mg (0.244 and 0.437 ng/mg) on method B. The analysis of these six affected hair samples yielded lower methamphetamine levels on method A compared to method B, prompting speculation of an additional contributing factor to the detection of methamphetamine using method B. Further investigations identified the presence of ephedrine in these six hair samples as the contributing factor to the observed discrepancy in methamphetamine results. The investigation work, scientific findings, as well as the implications of the presence of ephedrine in routine casework analysis will be discussed in this study.

2. Poster Presentation

1. **Title:** Pediatric Cannabis Edible Ingestion: A Case Report

Authors: Ka-wai KU, Yuk-ki CHENG

Organization: The Government Laboratory, HKSAR

Country: China

Abstract: Cannabis edibles are food and drink products infused with tetrahydrocannabinol (THC). Consumption of cannabis edibles can result in psychoactive effects similar to those experienced when ingesting cannabis in its traditional form. This case report focuses on the analytical toxicology findings of two children, aged 2 and 4, who accidentally consumed THC-infused candy, resulting in loss of consciousness. The determination of 11-nor-delta-9-tetrahydrocannabinol-9-carboxylic acid (THCA) content in urine specimens using an LC-MS/MS method is described. It also highlights the inherent risks associated with cannabis edibles, specifically those that closely resemble everyday snacks like candy or cookies. Unintentional consumption of these products can have potentially fatal consequences.

2. **Title:** Nicotine vs/or Caffeine Poisoning: a study of case reports

Authors: Yujin Park, Hyeon Jaegal, Sineun Kim, Jihyeon Kim, Yuran Park

Organization: National Forensic Service

Country: Republic of Korea

Abstract: Nicotine and caffeine are common substances and favorite foods that everyone knows about and can easily access. Both chemicals are stimulants that act on the central nervous system, and they have positive effects when taken in small amount. However, if consumed in high doses, these alkaloids are profoundly toxic and can result in death. Although nicotine or caffeine poisoning is relatively rare, fatal cases of poisoning continue to occur every year due to their easy availability of high-dose products.

We reviewed cases where the cause of death was nicotine or caffeine poisoning alone or in combination, investigated by the National Forensic Science in 2022 and 2023. There were a total of 14 cases of nicotine poisoning, and a total of 4 cases of caffeine intoxication.

Most cases of nicotine intoxication were caused by intentional consumption of nicotine products, such as e-cigarettes or pure liquid nicotine. A caffeine overdose was most likely to result from the consumption of nutritional supplements or caffeine pills. For nicotine poisoning, out of a total of 14 intoxication cases ranging from those in their 20s to 50s, those in their 30s accounted for the most with 8 cases, but for caffeine poisoning, 4 intoxication cases occurred in various age groups such as teenagers, 20s, 30s, and 60s.

The average postmortem nicotine concentration were 270.0 mg/L (1.25 ~ 1061.6 mg/L) in the cardiac blood and 63.5 mg/L (1.16 ~ 318.6 mg/L) in the femoral blood. The average ratio of the heart blood to the femoral blood was 17.5 times in 12 cases. The average postmortem caffeine concentration were 78.9 mg/L (18.9 ~ 186.7 mg/L) in the cardiac blood and 89.6 mg/L (35.0 ~ 193.5 mg/L) in the femoral blood.

3. Title: Method development and validation for a rapid analysis of 11 drugs in Hair by LC-MS/MS

Authors: Tanasiri Yokchue

Organization: Central Institute of Forensic Science

Country: Thailand

Abstract: Hair drug testing is one of the forensic services used to monitor the relapse of drug use among juvenile under the supervision of Department of Juvenile Observation and Protection who are under the rehabilitation process. The common technique used to quantitate drugs and its metabolites in hair is liquid chromatography/tandem-mass spectrometry (LC/MS/MS) due to the high selectivity and sensitivity. However, all method must be validated before applied as a routine method. These articles present the method development and method validation for a rapid analysis of 11 drugs in Hair by LC-MS/MS which can quantitate 11 drugs and it's metabolites in 5 minute.

The validation results shown that linear calibration curves for all drugs range from 0.05 to 2 ng/mg of hair with a correlation coefficient (r2) values >0.99. The limits of detection of method for all drugs are 0.01-0.02 ng/mg and the limits of quantification are 0.05 ng/mg with precision values were lower than 15%, and bias values within ± 15%. The accuracy and precision of the method are in acceptable range within ±20%. The results of matrix effect determination are in ± 25%, except diazepam for ion suppression and amphetamine and nordiazepam for ion enhancement. The carry-over was not found at the concentration of 2 ng/mg and the presence of interferences including other drugs and endogenous compounds also were not found too. Finally, the stability of drugs in extracted samples on tray is 24 hours.

4. Title: Development of a rapid screening method for identifying cyanide in blood samples.

Authors: Pichapar O-chongpian, Theerin Sinchai

Organization: Institute of Forensic Medicine, Police General Hospital, Bangkok, Thailand

Country: Thailand

Abstract: Cyanide, a harmful substance to both humans and animals, has a molecular arrangement of one carbon atom and one hydrogen atom (CN). It is present in various forms, including salts such as KCN and NaCN, and as hydrocyanic gas (HCN). Moreover, it occurs naturally in plants containing cyanogenic glycosides like cassava, sorghum, and bamboo shoots. Cyanide is widely utilized across different industries, including metal plating, mold making, plastics production, and artificial leather manufacturing. [Baker, A., 2018] Currently, cyanide is being abused due to its hazardous characteristics, serving purposes such as suicide, criminal activities, and animal poisoning. The mechanism of action of cyanide involves CN^- binding with positively charged iron molecules Fe^{2+} and Fe^{3+} found in hemoglobin and myoglobin, respectively, leading to the inhibition of the cellular respiration process. This binding disrupts the cellular respiration process, resulting in oxygen deficiency, which adversely affects the cardiovascular system. Consequences may include seizures, loss of consciousness, low blood pressure, cessation of breathing, and potential fatality [Bhattacharya, R., & Flora, S. J. S., 2009]. Assessing cyanide involves a screening using a color test and confirming the results using gas chromatography (GC) or liquid chromatography (LC). However, some laboratories in some areas may have restrictions on verification due to insufficient diagnostic resources and time constraints for analysis. Therefore, the expediency and reliability of screening cyanide analysis are crucial. The principles are as follows: Cyanide within the blood sample reacts with 1M sulfuric acid to generate hydrogen cyanide, capable of evaporation. The evaporated HCN subsequently interacts with p-nitro benzaldehyde and o-dinitrobenzene under sodium hydroxide conditions, leading to the formation of o-nitrophenyl hydroxylamine, exhibiting a purple coloration. The degree of color intensity is commensurate with the cyanide concentration within the sample. [Untang, M., 2010] The Toxicology division at the Institute of Forensic Medicine in the police hospital of the Royal Thai Police plays a vital role in criminal investigations, especially in cases involving deaths

that are unnatural or unidentified. The importance arises from the ability of toxicological analysis to identify the primary cause of death or factors that contribute to it. Therefore, it is essential to utilize established protocols and enhance analytical methods. This study aims to evaluate the usability of a method for screening cyanide analysis in blood samples using a field water cyanide test kit (MU test KIT), with the goal of reducing testing duration and providing a means to quantify cyanide levels through color stripe comparison. The data obtained from this study will serve as an important basis for future studies. This will lead to an increase in the potential for toxicological analysis.

5. **Title:** Fast and simple urine analysis of amphetamines using LC-MS/MS

Authors: Anongphan Junkuy, M.S., Tawachai Monum, M.D.

Organization: Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University.

Country: Thailand

Abstract: The study aimed to find a fast and simple one-point calibration method for the quantifying amphetamines using LC-MS/MS for daily use. After diluting and adding a deuterated internal standard, various amphetamines (amphetamine, methamphetamine, 3,4-methylenedioxyamphetamine, 3,4-methylenedioxymethamphetamine and 3,4-methylenedioxyethylamphetamine) were separated using a C18 column with gradient elution of 0.1% formic acid in 5 mM ammonium formate and 0.1% formic acid in acetonitrile. The analytes were measured using positive multiple reaction monitoring mode, and the method was fully validated according to international guidelines. Linearity was established for all analytes in the 50-5,000 ng/mL concentration range with a weighting factor of 1/X and correlation coefficients (r) > 0.99. All analytes showed acceptable selectivity, accuracy and precision, matrix effects, carryover, dilution integrity and processed sample stability. A comparison between bias and intermediate precision datasets of full multiple-point calibration and three one-point calibration datasets (500, 1000 and 2000 ng/mL) indicated that full calibration did not offer significant advantages over one-point calibration, as shown by the non-significant results ($p>0.05$) of the repeated measures ANOVA. This suggests that the method with utilizing one-point calibration is suitable for the daily routine urine analysis of amphetamines.

6. Title: Rapid determination of four common toxic metal elements in biological samples by monochromatic focused X-ray fluorescence spectrometry

Authors: Zhang Yunfeng1, Wu Shihao2, Song Ge1, Zhao Peng1, Zoubo1, Wang Aihua1, Chang Jing1

Organization: 1. Institute of Forensic Science of China 2. People's Public Security University of China

Country: China

Abstract: Monochromatic excitation X-ray fluorescence (ME-XRF) spectroscopy is an emerging technique for elemental analysis with many potential forensic applications. Compared with inductively coupled plasma mass spectrometry (ICP-MS), it has the advantages of simple operation, high speed and low cost. is study established a rapid analysis method based on ME-XRF for arsenic, mercury, thallium and lead in biological samples such as blood, urine and organ tissues. Basic parameter method was used to correct the biological matrix effects of blood, urine and organ tissues, and corresponding detection was established: After the blood and urine were evenly oscillated, 0.4 mL was taken, and 0.3 g was taken after the organ tissue was homogenized. The samples were put into a sample cup and covered with a 12μm polypropylene film. The measurements were carried out for 100 s using each corresponding mode. The limits of detection(LODs) for the four elements in samples were 0.03~0.05μg/mL （g） , the limits of quantification (LOQs) were 0.10~0.15 μg/mL （g） .This method was applied to the determination of 22 biological samples in actual cases, and the results were consistent with the ICP-MS. This method does not need to destroy used for rapid detection in the laboratory and at the scene of the cases. This study provided a technical support for the public security departments to quickly investigate relevant cases.

7. Title: Use of LC-QTOF/MS for Basic Drugs Analysis in Blood

Authors: Tan Chyh Yeng, Lee Chia Min, Tan Yi Qian, Gina Chew*, Yao Yi Ju

Organization: Health Sciences Authority

Country: Singapore

Abstract: Background/Introduction: Traditionally for screening and quantitation of basic drugs in blood samples, our laboratory had used liquid-liquid extraction with gas chromatography coupled to nitrogen phosphorus detector and mass spectrometer (GC/NPD/MS). The limitation of this workflow is that thermolabile drugs (e.g. risperidone, propranolol) or non-volatile drugs (e.g. amiodarone) are not amenable to GC analysis and require separate workflows using LC/MS or LC-MS/MS. Our approach to tackle this limitation was to switch to liquid chromatography with quadrupole time-of-flight mass spectrometer (LC-QTOF/MS) for more efficient and comprehensive analyses. The sample preparation was also changed to a column-based extraction that would allow for future automation.

Methods: Samples were extracted using supported liquid extraction (SLE) on Biotage ISOLUTE SLE+ cartridges. Aliquot of 0.2 ml of antemortem or postmortem blood was adjusted to alkaline pH with 0.5 ml of sodium hydrogen carbonate buffer after addition of 20 µl of internal standard solution containing 9 deuterated drugs. The sample mixture was then loaded onto the SLE cartridge, equilibrated for 5 min and eluted using ethyl acetate (2.5 ml x 2). LC separation was on a ExionLC (SCIEX) using Phenomenex Kinetex Biphenyl column (100 mm x 2.1 mm, 2.6 µm) with a guard column of similar packing (10 mm x 2.1 mm). Mobile phase A was 0.1% formic acid in purified water, and mobile phase B was 0.1% formic acid in LC/MS grade methanol.

Detection was using positive polarity electrospray ionization (ESI) with data acquisition in Information Dependent Acquisition (IDA) mode on a SCIEX X500R QTOF/MS. Using IDA, precursor ions with intensities >1000 cps were acquired and fragmented to give MS spectra that were matched against an in-house spectral library. Positive identification was based on precursor ion mass error (<5 ppm), delta retention time (<0.25 min), % isotope difference (<20) and MS2 spectral library match (>70%).

Results: The method was fully validated according to ASB 036 ‘Standard Practices for Method Validation in Forensic Toxicology’ for quantitative analysis in blood. Parameters validated include matrix effects, recovery, limit of detection, calibration range, precision, bias, dilution integrity and processed sample stability for 128 drugs. The results were compared with parallel study samples analysed using older laboratory methods on GC/NPD/MS, LC/MS or LC-MS/MS. A paired t-test was performed and showed that there was no significant difference between the quantitation results obtained from the LC-QTOF/MS method and the previous methods. Proficiency test samples were also analysed, and the obtained drug concentrations were all within 2SD of the assigned values.

Conclusion/Discussion: The use of SLE combined with LC-QTOF/MS simplified the screening, confirmation and quantitation of basic drugs into one single workflow. Besides simultaneous quantitation of 90+ drugs, there are 800+ toxicologically relevant drugs in the spectral library to allow simultaneous qualitative detection. The method's sensitivity, specificity, and high confirmative power enables a faster and more comprehensive toxicological service that covers a wider range of qualitative and quantitative drugs in blood.

- TXWG Meeting Summery–

Report on the Conference Outcomes

The 16th Asian Forensic Science Network Meeting and Symposium

Between 26th – 30th august 2024 at Royal Thai Navy Convention Hall, Bangkok

Toxicology Workgroup (TXWG)

The 16th Asian Forensic Sciences Network (AFSN) Annual Meeting will be held in Thailand from August 26–30, 2024. The participants will include experts and practitioners in various fields of forensic science from several ASEAN countries, including China, South Korea, the Philippines, Malaysia, Singapore, Indonesia, Vietnam, and Thailand, among others.

Participant Statistics

The participants in the Toxicology Workgroup will number around 60 people from 13 countries, including Brunei, China, India, Indonesia, Malaysia, Mongolia, the Philippines, South Korea, Singapore, Sri Lanka, Timor-Leste, Vietnam, and Thailand.

The Toxicology Workgroup meeting consists of two main activities:

1. Pre-conference on the 26th**:** A lecture by world-renowned experts from The International Association of Forensic Toxicologists (TIAFT), including: 1. Assoc. Prof. Dimitri Gerostamoulos from VIFM, Australia 2. Prof. Jean-Claude Alvarez from University Paris-Saclay, France and 3.Dr. Sarah Wille from the National Institute of Criminalistics and Criminology (NICC), Belgium

2. TXWG workgroup on the 27th-28th: Lectures by the pre-conference speakers and additional experts from TIAFT, including Dr. Simon Elliott from the United Kingdom and Dr. Justics Tettey from UNODC. There will also be knowledge exchange through oral presentations and members sharing case issues.

Monday, August 26, 2024

Summary of details:

August 26, 2024 (TXWG Pre-conference)

Drugs in hair (Dr.Sarah Wille, Prof.Jean Claude Alvarez & Assoc.Prof.Dimitri Gerostamoulos)

- The speakers provided insights into the analysis of drugs and substances in hair, including result reporting and interpretation. They also discussed the process of validating methods according to international standards like ISO 17025. Case studies were shared regarding the detection of drugs in hair, emphasizing the need for detailed interpretation. In some cases, multiple stages of analysis are required to identify the cause of drug accumulation in hair, including considering the source of the detected drugs.



Topic: Drugs in Hair – Analysis, Reporting & Interpretation

Dr. Sarah Wille presented on "Hair analysis methods validation and QA". The lecture focused on the methods used for detecting drugs and substances in hair, the validation of these methods according to international standards like ISO 17025, and the interpretation of hair analysis results. One key topic covered was contamination due to passive inhalation or exposure to drug smoke. She discussed the use of hair in various cases, such as proving the death of a child due to indirect drug exposure from family members through breast milk or inhalation of smoke. Additionally, the lecture touched upon the analysis of cannabis and synthetic cannabis.

Assoc. Prof. Dimitri Gerostamoulos presented on "Interpretation of HAIR drug results – it isn't straightforward". The lecture focused on interpreting drug analysis results from hair, emphasizing that, in some cases, laboratory results may not align with the circumstances of the case. It highlighted the importance of considering surrounding contextual information to properly interpret the results.

Example 1 A 6-year-old child died at home with no visible injuries or signs of disease upon autopsy. Methadone was found in the

blood, liver tissue, and hair. Initial case history and circumstances revealed multiple bottles of Methadone in the house, and the child's parents had a history of using Methadone. During the investigation, the mother claimed that she may have mistakenly given the child Methadone, thinking it was cough syrup, as it was stored in the refrigerator.

The hair drug test results showed that a 34 cm hair sample, divided into 2 cm segments, tested positive for Methadone in every segment. However, no EDDP (a metabolite of Methadone) was detected. The absence of EDDP in the hair does not allow for a conclusion that the child had never used the drug before.

In this case, the detection of Methadone in the deceased child's hair could not definitively indicate that the mother gave the child the drug, leading to death. During questioning, the mother revealed that the child usually slept with her and the father, and the parents' pillows were often wet with sweat. The child also liked to wear the mother's hat and used the same utensils as the mother during meals. It is possible that the child was exposed to Methadone through daily interactions with the parents, who had a history of drug use over the past three years. As a result, the mother was exonerated from the accusation of administering the drug to her child, leading to the child's death.

Example 2 A study on environmental contamination of Codeine through external exposure involved three individuals who had not used Codeine for several months before the experiment. Each person was exposed to Codeine from external sources while engaging in physical activity. Hair samples were collected before and after showering, and after completing the exercise.

Person 1: Wore a wool hat containing 10 mg of Codeine while doing gardening activities.

Person 2: Wore a bicycle helmet containing 10 mg of Codeine while cycling for 45 minutes twice a week and 2 hours once a week.

Person 3: Wore a bicycle helmet containing 10 mg of Codeine while cycling for 30 minutes five times a week and 2 hours twice a week.

The results of drug testing on the hair samples of the three individuals showed:

Person 1: No Codeine was detected in the hair.

Person 2: No Codeine was detected in the hair, but it was found in the first wash water.

Person 3: Codeine was detected in both the hair and the wash water.

From the results of the experiment, it was concluded that external exposure or environmental contamination from daily activities can cause substances to penetrate into the hair. Therefore, careful consideration is necessary before interpreting laboratory results.

Example 3 In the case of a 1-year-old girl who passed away at home, investigators interviewed the parents and discovered that the father had a history of using Oxycontin 80 mg and Piroxicam 20 mg. The father would remove the pills from the blister pack and store them in his shirt pocket. Later, a pill of Piroxicam fell on the floor, and the child picked it up and swallowed it. The cause of the child's death was determined to be poisoning from Oxycodone, which was found in both the blood and stomach contents.

The analysis of the deceased child's hair revealed the presence of Oxycodone, Morphine, Codeine, Δ9-THC, and Amphetamine, indicating the use of illicit substances in the home. As a result, authorities decided to remove the remaining two boys from the household to reduce the risk of exposure to drug use by the parents.

When testing for illicit substances in the hair of the remaining two boys, it was found that the 9-year-old boy's hair contained Oxycodone, Morphine, Codeine, Δ9-THC, and Amphetamine, similar to the substances detected in the deceased child. However, no drugs were found in the hair of the 3-year-old boy.

In this case, the results of the drug testing in hair were complex. The detection of illicit substances in the children could be due to direct ingestion or contamination from the environment. It is not possible to conclusively determine whether it was an accident or a case of

homicide. Therefore, the interpretation of drug detection in hair must be supported by additional contextual information to ensure accuracy and reliability.

Topic: Drugs & Driving – Procedures and Issues for Forensic Laboratories

Assoc. Prof. Dimitri Gerostamoulos delivered a lecture titled "The Impact of Drugs in Road Trauma – The Role of Forensic Toxicology," focusing on the effects of drugs on road traffic accidents and the role of forensic toxicology in these cases.

Factors contributing to road accidents include driving under the influence of alcohol, other psychoactive substances, or drugs. For example, using amphetamines increases the risk of accidents by 19 times compared to non-users, while cannabis use doubles the risk of accidents. In Australia, random drug testing is conducted on drivers at roadside checkpoints using SECURATEC DRUGWIPE. If a driver tests positive, a saliva sample is collected and sent to VIFM for confirmation of substances such as MA, MDMA, and THC.

SUMMARY OF VIFM TESTING:

• MA Found in 74.9% of cases, with 69% of users showing only MA.

• MDMA was confirmed in 5.2% of cases, often found in combination with other RSA drugs (75%).

• THC was confirmed in 34.6% of cases, with 50% of these cases also involving MA.

• Other illegal drugs, such as Cocaine and 6-MAM, were found in 2.5% and 3.1% of cases, respectively.

• Ketamine and Cocaine were often found in combination with MDMA.

Dr. Sarah Wille delivered a lecture on **“Driving under the Influence: Focus on On-Site Detection”**, discussing drug detection during vehicle operation. Currently, Belgium uses saliva drug testing at checkpoints for screening drivers under the influence. The initial test (strip test) covers four categories: Methamphetamine, Opioids and Heroin, Cannabis, Cocaine

Saliva testing is easier to collect than urine samples, and if the initial test result is positive, a portable saliva collection kit is used to gather a further sample for laboratory confirmation. Additionally, there is growing concern over New Psychoactive Substances (NPS), including drugs like Ketamine (often referred to as "K") that are becoming more widespread and problematic for both usage and detection**.**

Professor Jean-Claude Alvarez gave a lecture titled **"Interpretation of Hair Testing: Forensic and Doping Cases"**, discussing how hair analysis can detect drug use over extended periods, sometimes several months. It can identify substances even if they were used just once.

This method is particularly useful in identifying medications in elderly individuals, as it can detect both regular and one-time drug use. The case studies presented highlighted how hair analysis helps in monitoring drug use in older adults, enabling informed decisions for management and control of their medication use.

There were two elderly individuals who tested positive for banned substances in their hair, which were not prescribed by a doctor, and the unprescribed drugs could not be identified. In cases of inappropriate treatment, careful consideration should be given to the possibility of medication errors. A 31-year-old tennis player had an adverse result for ROXADUSTAT after 2 hours post-competition. A urine sample was negative, but a positive result was found in the urine approximately 9 days later. The player was temporarily suspended and requested a B sample analysis, which confirmed the AAF result. The suspension was for 4 years. Hair testing is considered reliable for detecting stimulants or contamination.

Wednesday, August 28, 2024

August 28, 2024 (TXWG workgroup)

Topic: Updates by UNODC

Dr. Justice Tettey, a speaker from UNODC, gave a lecture on the topic "International Scheduling Decisions Support for forensic laboratories (UNODC)" which focuses on the development and support for combating drug use and crime that UNODC provides, to ensure laboratories are prepared to handle new types of drugs. This includes support for standard substances and proficiency testing between agencies, as well as the dissemination of knowledge and testing technologies among laboratories.

Topic: NPS: Prodrugs and more unusual aspects

Dr. Simon Elliott gave a lecture on Prodrugs, which are compounds that are not drugs themselves but can be converted into addictive substances or psychoactive drugs through metabolism in the human body. Prodrugs convert into drugs and new psychoactive substances (NPS) such as Lisdexamfetamine, Fenethylline, and Clobenzorex converting to Amphetamine, Benzphetamine converting to Methamphetamine, α-Phthalimidopropiophenone converting to Cathinone, 1-Propionyl-LSD (1P-LSD) converting to LSD, and Rilmazafone converting to Rilmazolam, etc. Therefore, there should be control over the use of Prodrug substances.

Topic: Validation: Practical aspects experimental set-up and interpretation

Dr. Sarah Wille gave a lecture on good laboratories, which involve method development, method validation, quality assurance, and accreditation. The development of an analytical method requires defining objectives and creating a validation plan based on the stability of the

method. For example, in testing for drugs and substances in hair, factors such as the temperature during hair soaking to extract the drugs, the centrifuge speed, and the amount of hair used must be considered. The analysis range should be defined to ensure it does not affect the analysis.

Dr. Sarah Wille gave a lecture on method validation, divided into two topics: Qualitative method: The parameters are as follows: Selectivity, Matrix effect, Limit of detection, Process sample stability, Stability during storage, ISR, Carry over and Quantitative method: The parameters are as follows: Selectivity, Matrix effect, Limit of detection, Process sample stability, Stability during storage, ISR, Carry over, Accuracy, Limit of Detection, Limit of Quantification

Dr. Sarah Wille gave a lecture on quality assurance, which includes assessing the suitability of instruments before analysis, controlling quality during analysis, and conducting proficiency testing (PT test). Finally, quality certification is requested. The requirements for applying for certification are as follows: method development and validation, quality assurance, PT test, method stability, uncertainty evaluation, risk analysis, re-examination, training, and legal implications.

Topic: The forensic toxicology of Chemsex

Prof. Jean-Claude Alvarez gave a lecture on Chemsex, which refers to the use of psychoactive substances during sexual activity (including NPS substances in the cathinone, Cocaine, GHB/GBL, Amphetamines groups, etc.). This practice is widespread among men who have sex with men (MSM). It was found that this population has an increased use of NPS substances, especially cathinones (39%). These substances enhance sexual desire and arousal, encourage actions that may not have been done before, increase endurance, induce relaxation, and improve sexual relationship quality (focusing on feelings).

A study in France between 2018-2023 found 232 cases of chemsex use, with 96% being men and an average age of 35 years (range 14-66). Among these, 90 cases (39%) were poisoning cases. Symptoms included coma, unconsciousness, agitation, and arrhythmia. The study on

chemsex in France found that NPS substances were used in the majority of cases, with 214 out of 232 cases involving NPS. The most common substances used were Cathinones (3 or 4-MMC) in 190 cases (82%), Cocaine in 89 cases (38%), GHB/GBL in 87 cases (37.5%), Amphetamines in 81 cases (35%), and Ketamine in 42 cases (18%).

There is currently growing interest in using hair to study drug use in this group, leading to an increased detection of drug users compared to self-reported use. Screening tests from urine cannot detect Cathinones.

Topic: Ketoacidosis in Post-Mortem Toxicology

Dr. Simon Elliott discussed Beta-Hydroxybutyrate (BHB), a ketone produced during fat metabolism when the body is deprived of glucose, resulting in acidosis (pH less than 7.3). Alcoholics or chronic drinkers often consume little food, causing low blood sugar and glycogen depletion, which forces the body to use fat for energy, resembling a fasting state. This leads to symptoms such as vomiting and dehydration. The mechanism of BHB formation occurs when ethanol breaks down into large amounts of NADH and acetate, which can convert into Acetyl-CoA, the precursor of ketone bodies (BHB, Acetoacetate, Acetone) in the Beta-oxidation pathway of fat breakdown. In addition to Alcoholic Ketoacidosis (AKA), acidosis can also occur in diabetic patients (Diabetic Ketoacidosis: DKA) with high blood sugar due to insulin deficiency, causing the body to break down fat for energy instead, leading to ketone body production. Case studies show that when blood BHB levels exceed 250 mg/L, acetone is always detected. BHB can serve as an indicator of cause of death due to acidosis in individuals who have consumed alcohol.

August 29, 2024 (TXWG workgroup)

Topic: Science Meets Law: Enhancing Your Forensic Work Through Legal Collaboration

Mr. Yang Ziliang, Director of the Legal Department from the Health Sciences Authority of Singapore, conducted an activity on the topic of "Science Meets Law." This session involved the exchange of knowledge between legal professionals from different organizations and their support for forensic scientists in preparing to be court witnesses or providing assistance during testimony. Mr. Ziliang presented approaches for collaborating with legal officers, such as conducting mock court trials where forensic scientists practice testifying using their own cases before going to court, participating in observations of senior officers' testimonies, and having senior officers follow up on the testimony of subordinates to identify areas for improvement and self-development. Additionally, he proposed methods for answering questions in court and providing explanations to judges, prosecutors, and defense attorneys to help them understand the forensic examination process and laboratory reporting. Furthermore, Mr. Chotiphan Chulaphat, a Senior Investigator from the Office of the Narcotics Control Board (ONCB) of Thailand, gave a lecture on "Forensic Science and Drug Cases." He discussed the responsibilities of ONCB, the value of forensic science in drug seizures, the guidelines for testifying in court, and how to write reports that support court proceedings. He also presented case examples, starting from drug (methamphetamine) seizures, press conferences, and the transfer of evidence to the laboratory, and addressed questions from seminar participants.

Academic Presentation

On Wednesday, August 28, 2024, there were 6 oral presentations (3 from Thailand, 2 from Singapore, and 1 from China), 5 members sharing case issues (2 from Thailand, 2 from Singapore, and 1 from Malaysia), and 6 poster presentations (4 from Thailand, 1 from Singapore, and 1 from China). The topics presented were as follows:

Oral presentation

Oral 1: Cyanide vs Cypermethrin Who's a killer?

Mr. Sanit Chaiya from Central Institute of Forensic Science, Thailand presented on Cyanide, a chemical substance that acts quickly, is colorless, and can be lethal. It exists in various forms, and the routes of cyanide poisoning include inhalation, ingestion, skin absorption, terrorism, and intentional poisoning. Cypermethrin, a pyrethroid insecticide, contains a cyanide group in its structure, which can decompose at high temperatures, producing hydrogen cyanide (HCN) as a byproduct. Its rapid action affects the central nervous system, causing burning sensations, dizziness, and itching.

The speaker discussed a case study of a man with personal issues who died in a barber chair. Laboratory forensic toxicology tests revealed the presence of cyanide and cypermethrin from food in the stomach. The results of the Cyanide screening test showed that the cyanide produced from commercial cypermethrin differed significantly from the cyanide found in the gastric content using the Prussian blue test technique. Additionally, the pH measured in the sample was within the range of cyanide, leading to the conclusion that the cause of death in this case was likely cyanide poisoning.

Oral 2: Detection of New Psychoactive Substances and Their Metabolites in Hair by Liquid Chromatography High Resolution Mass Spectrometry

Xuan Wei TAN from the Health Sciences Authority (HSA), Singapore, presented about the toxicology laboratory of HSA, which has developed and validated the HR-MS (LC-Orbitrap-MS) method for detecting and identifying new psychoactive substances (NPS) and metabolites in hair. The LC-Orbitrap-MS technique, which offers high sensitivity, ensures the detection of NPS in hair, particularly synthetic cannabinoids (SC), synthetic cathinones, and metabolites, which are generally present at low concentrations in the picogram-per-milligram range. After successfully

validating the method across all parameters, HSA aims to apply this validated method to hair samples from drug users in the coming months to assess its effectiveness.

Oral 3: Validation of LLLE-GC-MS method for determination of drugs in gastric content and urine samples

Ms. Chittiphutthi Thitininlithi from Central Institute of Forensic Science, Thailand presented on the detection of drugs from stomach contents and urine, which often encounter interference from fats in the samples. To address this, a method for drug extraction using liquid-liquid-liquid extraction-gas chromatography-mass spectrometry (LLLE-GC-MS) was developed to reduce fat content and minimize interference from fat signals during GC/MS analysis. This method is a qualitative analysis consisting of four parameters for testing its validity. The method passed all validation parameters, and thus, the forensic chemistry laboratory of the Forensic Science Institute has adopted it for drug extraction from stomach contents and urine samples.

Oral 4: High sensitivity detection of 30 volatile organic compounds (VOCs) in human blood samples by headspace gas chromatography-mass spectrometry

Song Ge from the Institute of Forensic Science (IFS) of China presented on a method for detecting volatile organic compounds (VOCs), consisting of 30 substances, including 13 halogenated hydrocarbons, 12 aromatic compounds, and 5 inhaled drugs. This method uses a 0.5 mL blood sample, which is then analyzed using HS-GC-MS with a Gaspro® EI-MS column. The analysis showed that the LOD for the 30 VOCs ranged from 0.02 to 0.05 micrograms/mL, with an LOQ of 0.1 to 0.5 micrograms/mL and an RSD of less than 12%, indicating the method's good precision. This method is also capable of separating and identifying several isomers, such as

ethylbenzene/o-xylene/p-xylene and 1,1-dichloroethane/1,2-dichloroethane. It is suitable for analyzing blood toxicity in various cases, including fires, refrigerant leaks, and poisoning from fluoroalkane anesthesia.

Oral 5: Hydroxyzine plus Cetirizine or Hydroxyzine and their active metabolites

Ms. Pranida Kitpitak from Central Institute of Forensic Science, Thailand presented on the issue of testing for Hydroxyzine and Cetirizine, which are both antihistamines. When Hydroxyzine and Cetirizine are taken together, they can cause increased side effects. In forensic testing of blood samples, both Hydroxyzine and Cetirizine may be detected due to the deceased having taken both medications, or only Hydroxyzine may be detected with Cetirizine found as well, since Cetirizine can be a metabolite of Hydroxyzine.

Oral 6: Is it Methamphetamine in His Hair or Something Else?

Kwok Yi Ling Miiko from the Health Sciences Authority (HSA), Singapore, presented on the forensic toxicology laboratory procedures. When hair samples are received, they must undergo initial screening to detect controlled substances using LC-MS/MS, followed by confirmation testing with GC-MS/MS. This study compared the confirmation steps using GC-MS/MS, consisting of Method A (the existing method) and Method B (the new method). When conducting a parallel study with hair samples from 50 suspected drug users, the results for methamphetamine detected by Methods A and B deviated by more than 20% from the average, especially in 4 out of 50 samples showing deviations from 32.2% to 74.6%. Additionally, two samples detected methamphetamine above the LLOQ (0.2 ng/mg) in Method A (0.244 and 0.437 ng/mg), but no methamphetamine was detected in Method B. Analysis of 6 samples revealed that ephedrine, which was present in these samples, was the factor causing discrepancies in the analytical results.

Members sharing case issues

Case 1 : Glucuronides Acid Hydrolysis Efficiency Study?

By Dr. Nordiana Rosli, Drug & Toxicology Lab, Hospital Kuala Lumpur, Malaysia

The study evaluates the acid hydrolysis efficiency through morphine analysis in urine samples targeting three compounds: Morphine, Morphine-3-glucuronide (M3G), and Morphine-6-glucuronide (M6 G), using samples with known concentrations from the College of American Pathologists (CAP).

Case 2 : Will There Be A Day Where We Know the "Truth"??

By Chan Si Jia, Analytical Toxicology Laboratory, Drugs Abuse Testing Unit (ATL-DAT)
Health Sciences Authority, Singapore

The interpretation of forensic toxicology results from hair samples must consider several factors, including the guidelines for hair testing, standard operating procedures, as well as the determination of cut-off values for continuous drug and substance use and the detection of relevant metabolites. The analytical technique involves screening methods and confirmation tests, which must be validated and compared for effectiveness with other laboratories. Case information is essential for reviewing drug use history, which is often denied, and for considering possible external contamination.

Case 3 : Preliminary Study for Ketamine Contamination in Hair via Sweat

By Christy Yong, Analytical Toxicology Laboratory, Analytical Toxicology Division,
Health Sciences Authority, Singapore

A preliminary study on ketamine contamination in hair via sweat was conducted. Since Singapore has a hot and humid climate throughout the year, drug testing in hair may be affected by contamination from sweat. Ketamine is one of the commonly detected drugs; therefore, an analysis of ketamine and its metabolites (norketamine and dehydronorketamine) in hair was

performed by spiking the target substances and metabolites at equal concentrations to monitor changes in the compounds.

Case 4 : THE DETECTION OF MIDAZOLAM AND METABOLITE IN MUSCLE OF PUTREFIED BODY BY LC-MS/MS

By Police Captain Dr. Pichapar O-chongpian, Institute of Forensic Medicine, Police General Hospital, Bangkok, Thailand

Midazolam is a benzodiazepine that acts through gamma-aminobutyric acid (GABA). It is used as an anesthetic, sedative, treatment for insomnia, anticonvulsant, and to manage agitation. This drug is commonly used as a sleep aid and to reduce anxiety. Its use can impair memory function. Midazolam can be administered orally, intramuscularly, intravenously, via inhalation, or as a solution through an intravenous drip. When administered intravenously, it takes effect within five minutes, while intramuscular injection takes effect within fifteen minutes, with a duration of action between one to six hours. Long-term use may lead to tolerance and dependence.

The presenter cited a case of a deceased individual who had been missing from home for two weeks. Toxicological analysis was performed on a thigh muscle sample using LC-MS/MS (Orbitrap), which detected the presence of Midazolam, 1-OH-Midazolam, and Flunarizine.

Case 5 : Gold Potassium Cyanide ($KAu(CN)_2$)

By Witchuda Witchayanarupol, Central Institute of Forensic Science, Thailand

Gold potassium cyanide ($KAu(CN)_2$), or gold cyanide, is a chemical compound in which gold is absorbed in the form of cyanide. It has various applications across different industries. In medicine, it is used for treatment to reduce inflammation and slow the progression of rheumatoid arthritis. However, if ingested in large amounts, the cyanide

anion can block cells from receiving oxygen, leading to cell death and fatality.

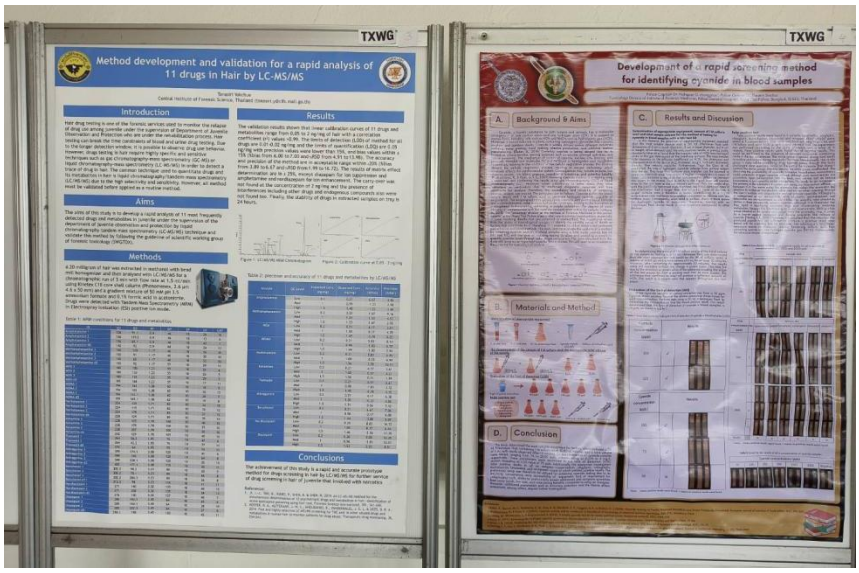
The presenter provided a case example of a 50-year-old deceased male whose boyfriend attempted to take him to the hospital after he experienced severe abdominal pain, diarrhea, and loss of consciousness. The hospital managed to revive him, and he was admitted to the ICU in critical condition. However, he later passed away. Before his death, his boyfriend became unreachable, and when authorities tracked him down, they discovered that he had traveled back to his hometown. He was subsequently invited for questioning to investigate the cause of death in detail, as the victim's relatives suspected foul play and did not believe that the death was solely due to food consumption.

Laboratory toxicology test results detected cyanide in the stomach contents using a preliminary technique. Therefore, further confirmation with a more advanced analytical technique is recommended.

Poster presentation

	Topic	Presenter	Organization
1	Pediatric Cannabis Edible Ingestion: A case report	Ka-wai Ku	HKSAR, China
2	Nicotin vs/or Caffeine Poisonong: a study of case reports	Yujin Park	National Forensic Service, Korea
3	Fingerprints detection techniques using powder of green bean seeds	Tanasiri Yokchue	Central Institute of Forensic Science, Thailand
4	Development of a rapid screening method for identifying cyanide in blood samples.	Pichapar O-chongpian	Institute of Forensic Medicine, Police General Hospital, Thailand
5	Fast and simple urine analysis of amphetamines using LC/MS/MS	Anongphan Junkuy	Department of Forensic Medicine,

	Topic	Presenter	Organization
			Chiang Mai university, Thailand
6	Use of LC-TOF/MS for basic drug analysis in blood.	Tan Chyh Yeng	Health Sciences Authority, Singapore



Business Meeting Summary

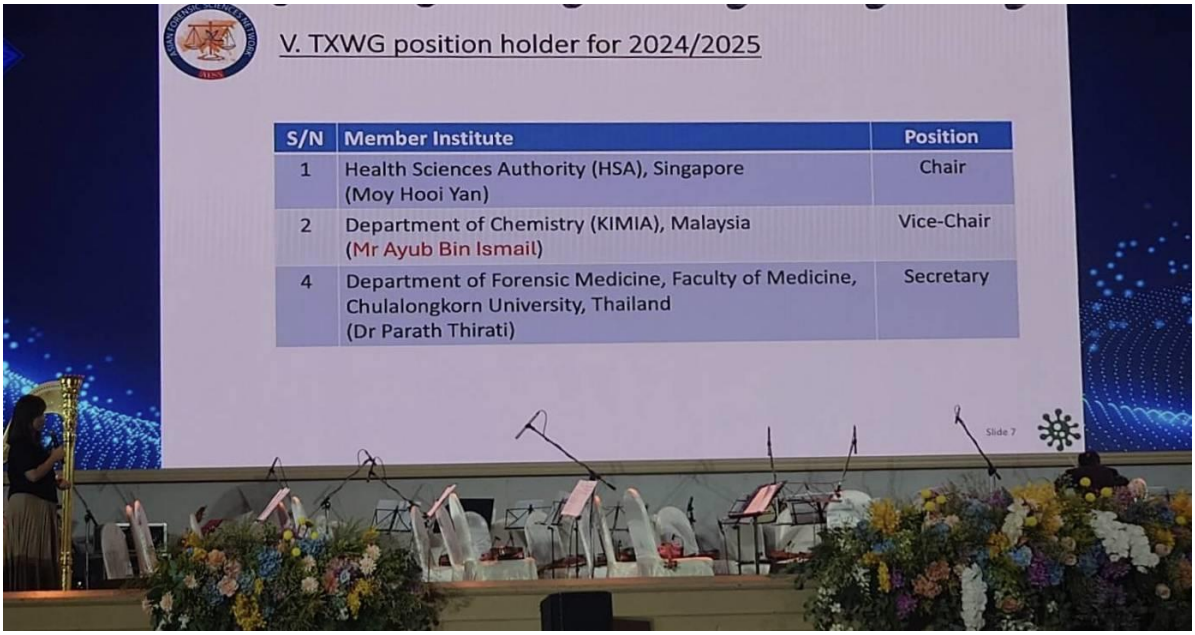
Update the Chair and Secretary of TXWG and elect the Vice Chair with the following results.

Name of the Workgroup Committee

Chairperson: Mrs. Moy Hooi Yan Health Sciences Authority, Singapore

Vice-chair: Mr. Ayub Bin Ismail Department of Chemistry (KIMIA), Malaysia

Secretary: Dr. Parath Thirati Department of Forensic Medicine, Chulalongkorn university, Thailand



Summary of Operations in 2024:

1. Webinar on LIMS for Forensic Investigation jointly organized by AFSN IDWG and TXWG (14 Mar 2024).

2. Attachment of Philippine National Police (PNP) officer to Health Sciences Authority, Singapore (22-26 April 2024)

3. Knowledge Sharing HSA Singapore sharing with Central Institute of Forensic Science (CIFS), Thailand on drug test in wastewater (1 July 2024)

4. Update of 2024 AFSN annaul meeting and Symposium 26-30 Aug 2024 in Thailand

- Speaker from TIAFT: 1) Assoc. Prof. Dimitri Gerostamoulos, VIFM, Australia. 2) Prof. Jean-Claude Alvarez, University Paris-Saclay, France. 3) Dr. Sarah Wille, National Institute of Criminalistics and Criminology (NICC), Belgium. and Dr. Simon Elliott, United Kingdom.

- TXWG Pre-conference Workshop on hair drug testing and drug & driving

I. Webinar on LIMS For Forensic Investigation

Jointly organized by AFSN IDWG and TXWG

Date: 14 Mar 2024

Presenters:

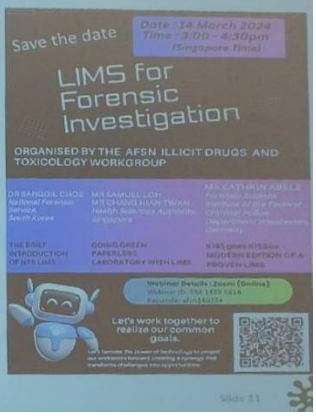
1. Dr Sanggil Choe, National Forensic Services, South Korea
2. Mr Samuel Loh (IDL) & Mr Chang Hian Twan (DAT), HSA
3. Ms Kathrin Abele, Forensic Science Institute of the Federal Criminal Police Department, Germany

Objective:

To showcase how technology could be leveraged to provide robust and reliable results as well as facilitate the seamless exchange of information.

Attendees:

More than 200 members from across Asia including Brunei, Germany, India, Indonesia, Malaysia, Mongolia, Philippines, Thailand, Vietnam, Singapore and Korea

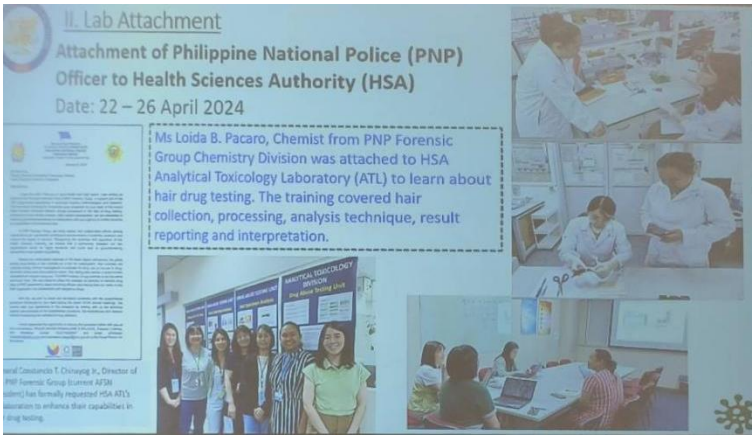


II. Lab Attachment

Attachment of Philippine National Police (PNP) Officer to Health Sciences Authority (HSA)

Date: 22 – 26 April 2024

Ms Loida B. Pacaro, Chemist from PNP Forensic Group Chemistry Division was attached to HSA Analytical Toxicology Laboratory (ATL) to learn about hair drug testing. The training covered hair collection, processing, analysis technique, result reporting and interpretation.



III. Knowledge Sharing

HSA Singapore sharing with the Central Institute of Forensic Science (CIFS), Thailand on drug test in wastewater

Date: 1 July 2024

- CIFS invited HSA to conduct an online session to share methodologies for drug testing in wastewater for capability building.
- About 40 scientists from CIFS and Thai Forensic Toxicology Network attended the session.

Plans for 2025:

1. Survey and Online Seminar on quality assurance in toxicological analysis.
2. Online Knowledge Exchange by organizing online member's knowledge sharing on drug testing in saliva and hair.
3. Online Knowledge Exchange for analyzing various cases by inviting experts for their opinions.
4. TXWG Activities at the 17th Asian Forensic Sciences Network (AFSN) Annual Meeting in South Korea in 2025, in collaboration with the TIAFT Board.

Suggestions:

A useful suggestion for the operation of TXWG is to invite and promote membership in TIAFT from various countries, as it offers a wealth of shared knowledge for members, including databases and educational lectures on the YouTube channel.

Quality Assurance and Standards Committee (QASC)

Abstract

1. Poster presentation

1. Title: A Cost-Effective and Secure Solution for Forensic Group Case Management: The Regional Forensic Unit 7 Database Management System Projectt

Authors: Jezrhell P. Cruda and April C. Madroño

Organization: Philippine National Police Forensic Group

Country: Philippines

Abstract: The surge of data in the digital age necessitates efficient Information Management Systems (IMS) for organizations. However, conventional systems can be expensive due to complex programming and user interface design. This is further compounded by the growing threat of cyberattacks on government platforms.

To address these challenges, the Regional Forensic Unit 7 – Database Management System Project (RFU7-DMSP) was developed. This innovative system leverages readily available Google applications to organize information received and analyzed by the RFU7. This cost-effective approach eliminates the need for expensive software development and minimizes the risk associated with custom-built systems.

The RFU7-DMSP has the potential to significantly impact the forensic community. Its affordability allows for wider adoption, particularly in resource-constrained regions. Additionally, the utilization of familiar Google applications simplifies user training and streamlines data management processes. This can lead to improved efficiency, accuracy, and collaboration within forensic units. Overall, the RFU7-DMSP presents a promising model for secure and cost-effective forensic case management.

2. Title: Critical Success Factors of ISO/IEC 17025: 2017 Implementation of the Central Institute of Forensic Science, Ministry of Justice, Thailand.

Authors: Mrs. Natthalak Pakdeenarong and MR. Thanphong Intarasorn

Organization: Central Institute of Forensic Science, Ministry of Justice.

Country: Thailand

Abstract: Forensic science investigations are of paramount importance in the judicial process. Therefore, forensic science agencies worldwide are continually seeking to develop reliable systems and methodologies by adopting international standards, such as ISO/IEC 17025: 2017. Medium and small-sized agencies often face challenges in obtaining ISO/IEC 17025: 2017 certification. Consequently, this research aims to study the success factors for obtaining ISO/IEC 17025: 2017 quality system certification within the Central Institute of Forensic Science, Ministry of Justice, Thailand. The objective is to enable forensic and medical institutions, as well as other agencies, to learn and adopt best practices in establishing and certifying quality systems.

The sample group for this research consists of 82 personnel working in laboratories within the Central Institute of Forensic Science, who have already received ISO/IEC 17025: 2017 quality system certification. The research instrument used is a 29-item questionnaire. The study's findings indicate that the commitment of senior management is the most critical success factor, followed by document and record control, as well as calibration and traceability to The International System of Units (SI unit), and finally, training and support. The success factors identified in this study can serve as a practical guide for medium and small-sized agencies in preparing for ISO/IEC 17025: 2017 certification. This includes prioritizing necessary actions to reduce costs and time associated with obtaining quality system certification and effectively applying these practices in their operations.

- QASC Meeting Summery –

The QASC has established the meeting topic: "Building a Quality Culture Across Forensic Science Networks in All Regions" to exchange information on the missions of forensic science agencies from different continents and discuss future collaboration strategies. The agencies presented as follows:

The International Forensic Strategic Alliance (IFSA) By Dr. Angeline Yap

IFSA is a cooperative organization of forensic science agencies from various regions worldwide, with a vision aimed at fostering collaboration in forensic science to create a safer society. Its objectives are:

1. To develop strategies and activities that support the improvement of forensic quality.
2. To exchange information and knowledge among the network.
3. To enhance the capacity and strength of the network.
4. 4. To collaborate with relevant international agencies or organizations.

American Society of Crime Laboratory Directors (ASCLD) by Mr. Scott Ford

The American Society of Crime Laboratory Directors (ASCLD) was founded in 1973 to promote excellence in forensic science by bringing together crime laboratory directors from across the United States to develop and share management principles and forensic science information. ASCLD plays a significant role in supporting forensic science standards globally. As a non-profit organization, ASCLD focuses on developing the highest standards in forensic science through management and innovation, sharing knowledge, and promoting the development of quality in forensic laboratories. Currently, ASCLD is not a quality accreditation body but has been involved in establishing standards since the 1980s, leading to the founding of ASCLD/LAB. Quality accreditation has since been integrated with ANAB since 2016.

Australia & New Zealand Policing Advisory Agency (ANZPAA) by Dr. Rebecca Kogios

The ANZPAA network is a collaborative agency for Australia and New Zealand with a mission to support the advancement of academic disciplines in forensic science, promoting cooperation and innovation in forensic practices. Additionally, it serves as a center for academic and specialized technical coordination in fields related to current issues that may impact service delivery in Australia and New Zealand. ANZPAA has affiliated organizations, including the Disaster Victim Identification Committee (ADVIC), which focuses on identifying individuals affected by disasters, and The Chemical Warfare Agent Laboratory Network (CWALN), which is concerned with the network of laboratories dealing with chemical warfare agents.

AICEF by Prof. Jose Lorente

The Ibero-American Academy of Criminology and Forensic Studies (AICEF) was established in 2004 and consists of 27 research institutions representing 18 countries in Latin America, Spain, and Portugal. Its objective is to foster cooperation among institutions and the involvement of experts in criminal investigations, all aimed at assisting agencies responsible for the justice process. The study of evidence, regardless of its significance, is considered a primary goal of criminology. AICEF serves as a scientific conference where issues related to the criminal justice process are discussed, enabling justice system administrators to access concrete evidence and effectively fulfill their roles within the justice process.

Southern Africa Regional Forensic Science (SARFS) By Dr. Helen Tumediso

The background of the Southern Africa forensic science network was established through a collaboration between the United Nations Office on Drugs and Crime (UNODC), the South African Police Service (SAPS), and the Southern African Regional Police Chiefs Cooperation Organization

(SARPCCO). They convened to lay the foundation for a forensic science network in Southern Africa to support regional efforts. The forensic agency network in Southern Africa comprises 12 countries and has drafted operational requirements and ethical guidelines for the Southern Africa Regional Forensic Science (SARFS). The executive committee of this network will consist of members from the SARPCCO FSWG. The SARFS network expands to cover other forensic work accredited by SARPCCO and facilitates information exchange within the criminal justice system, regardless of official affiliation or the provision of forensic services in various fields. Additionally, the SARFS network fosters cooperation with the international scientific community and directly coordinates with ASCLD, SMANZFL, ENFSI, AICEF, and AFSN.

AFSN Board Meeting

Meeting Date: Monday, August 26, 2024

Meeting Location: Wichai Prasit Meeting Room 1, Royal Thai Navy Convention Hall, Bangkok Thailand

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1. Confirmation of Minutes of the Previous AFSN Board Meeting

The meeting began with the confirmation of the minutes from the previous meeting held in September 2023, which had been distributed to all members for review in advance. There was a discussion regarding the process for confirming the minutes, and ultimately, the board approved the minutes without any objections or additional suggestions. This confirmation serves as the official approval and incorporates the minutes of the previous meeting into the organization's official records.

2. Consideration of New Membership Applications (Application for AFSN Membership)

The consideration of new membership applications was an important topic during this meeting, with the following details:

- **Central Police Forensic Science Division, Thailand:**

  The committee reviewed the application from the Central Police Forensic Science Division and found it necessary to amend the organization's name to clearly include "Royal Thai Police" for better clarity. There was a detailed discussion about accurately representing the connection to the main organization for transparency and clear understanding at the international level.

- **Pharmacy Enforcement Div. MOH, Malaysia:**

  The application from the Pharmacy Enforcement Division of Malaysia was temporarily suspended due to unclear information regarding the organization's main functions and operational structure. The committee requested additional information to clarify the details of their operations and involvement in forensic science, emphasizing the need to specify the main functions and clear operational structure.

- **Ministry of Defence, Singapore:**

  The application from the Ministry of Defence of Singapore was officially approved, as it met all qualifications and aligned with the criteria set by the network. The committee approved this application, reflecting a valuable acceptance and contribution to the forensic science network.

- **(Forensic Science Laboratory, Govt. of NCT of Delhi, India):**

  The committee approved the application from the Forensic Science Laboratory in Delhi, India, with the condition that some additional information regarding the organizational structure and operational role must be confirmed to comply with network requirements and ensure correct understanding among members.

- **Pakistan Anti-Nacrotics Force, Pakistan:**

  The membership application from the Pakistan Anti-Narcotics Force was suspended due to unclear information about the organization and insufficient operational details. The committee decided to request additional information for future reconsideration.

3. International Liaison Officer's Report

The report from the International Liaison Officer highlighted efforts to expand collaboration with international organizations to enhance knowledge and skills in forensic science. The report detailed significant activities and coordination efforts undertaken in the past year:

- **Collaboration with the Colombo Plan:**

  A partnership was established with the Colombo Plan to support the development of forensic capabilities, particularly in drug examination. This collaboration has opened up opportunities for accessing resources and training that can be utilized to enhance the capabilities of network members, including support for participation in meetings and presentations by members in the region

- **Support from the Australian Federal Police (AFP):**

  The Australian Federal Police expressed interest in collaborating with the Asian Forensic Science Network (AFSN) to improve the quality of forensic services in the region. Discussions took place regarding the possibility of joint projects, such as training and knowledge exchange initiatives to develop the skills and capabilities of members.

- **Presentation and Dissemination of Work at International Forums:**

  The network has presented its work at international conferences to foster understanding and recognition on a global scale. The report noted participation in various meetings, such as presentations at the International Association of Forensic Sciences (IAFS) and the preparation of publications to share experiences and lessons learned from the network's operations over the past 15 years.

4. Proposal for Co-Founding a New Association

The network received an invitation from the government of Kyrgyzstan to co-found a forensic science association covering both Europe and Asia. This proposal was carefully considered at the meeting, with discussions regarding the advantages and disadvantages of becoming a founding member of this new association:

- AFSN Concerns were raised about the potential obligations that might arise from joining as a founding member under the constitution of Kyrgyzstan, which could conflict with the current goals and mission of the AFSN.
- The board concluded that co-founding this new association may not align with the operational guidelines of the AFSN and could lead to future conflicts of interest. Therefore, a resolution was made to decline this proposal and choose to maintain the network's independence.

5. Amendments to the Constitution and Future Planning

During the meeting, a proposal was made to amend the AFSN Constitution to better accommodate the expansion of membership and improve the effectiveness of activities:

- **Increase in the Number of Board Members:**

  It was proposed to amend the constitution to increase the number of board members from "no fewer than 4 and no more than 7" to "no fewer than 7 and no more than 9." This change would allow for more new members to be included and align with the future growth of the network.

- **Appointment of Temporary Board Members:**

  A proposal was made to appoint temporary board members for a one-year term from the host country of the annual meeting. This appointment would enhance coordination

and management of activities, enabling faster and more effective communication and decision-making.

- **Enhanced Role of the Secretariat:**

  It was suggested to expand the role of the Secretariat and increase staff numbers to meet the growing administrative demands due to the network's expansion and the complexity of managing various activities. Increasing resources in the Secretariat would help ensure efficient operations that align with the growth of the network.

6. Future Cooperation and Participation

This meeting emphasized the importance of building collaborations with external organizations and experts in various fields to expand training opportunities and skill development:

- **Collaboration with the Australian Federal Police (AFP):**

  A proposal was made to explore further cooperation with the AFP to offer training and expertise in relevant areas, such as digital forensics, the use of Artificial Intelligence (AI) in forensic data analysis, and digital evidence analysis. Developing this type of collaboration would enable network members to access modern resources and knowledge.

- **Training in New Forensic Disciplines:**

  The meeting suggested considering training in new forensic disciplines that focus on the use of modern technology and contemporary methods. This includes training on the application of Artificial Intelligence (AI) and digital data analysis. Such training would enhance the members' capabilities to utilize new technologies to improve their work.

7. General Discussion and Additional Suggestions

The board engaged in a general discussion and made additional suggestions regarding the development of the network and enhancing operational efficiency:

- **Publicity and Announcement of Participation Opportunities:**

  It was suggested that ongoing publicity and announcements be made to inform members about opportunities for involvement in various network activities. This would help members understand how they can participate and support the network's operations.

- **Enhancing Coordination and Management Capabilities:**

  The board proposed increasing resources and personnel to meet the demands for coordinating and managing the network's activities. Enhancing resources in this area would allow the network to organize events and meetings more efficiently and respond quickly to members' needs.

8. Planning Future Activities

In the final segment of the meeting, the board discussed plans for future activities to ensure that the network continues to grow and remain relevant in the field of forensics:

- **Establishment of a Task Force:**

  It was proposed to establish a task force for planning and coordinating activities each year to ensure that meetings and events are managed smoothly and effectively. Having a dedicated team would enable systematic management of tasks and fully address the needs of the members**.**

- **Consideration of Future Meeting Locations:**

  The board discussed evaluating potential locations for future meetings to ensure that venues are suitable and can adequately accommodate the number of attendees. Additionally, it was suggested to survey members' preferences when selecting meeting locations to best meet their needs.

9. Expanding Member Participation and Strengthening the Network

To enhance the network and improve operational efficiency, the board considered ways to expand member participation and strengthen relationships with external organizations:

- **Increasing Member Participation:**

  The board proposed increasing member involvement in various activities and meetings by inviting members to participate in the planning and operations of the network in different areas. Enhancing member participation will enable the network to respond effectively to the needs and expectations of its members.

- **Strengthening Relationships with External Organizations:**

  To enrich knowledge and resources available for network development, the board suggested strengthening relationships with external organizations, such as government agencies, international organizations, and the private sector. Building connections with these entities will help the network access diverse resources and expertise.

10. Meeting Summary and Conclusions

The meeting concluded with a summary of the discussions and decisions made, including recommendations and plans for future operations. The board emphasized the importance of efficient operations and collaboration to strengthen and grow the network moving forward.

AFSN board retreat with Chair and Vice of Working group

Date: August 27, 2024

Time: 17.00-19.00

Location: Pho Sam Ton Auditorium, Chumpornkhet Udomsak Building, Royal Thai Navy Convention Hall, Bangkok

Attendees:

- **Chairman:** Pol. Brigadier General Constancio T Chinayog Jr.
- **Vice Chairman:** Mr. Mohd Izuan Othman
- **Secretary:** PLTCOL Meilany Joy Ordono

Member Country Representatives:	Position
Philippines	
1. Ms. Marietta Chinayog	Assistant
Malaysia	
2. Ms. Nor Aidora Saedon	The Next AFSN President
3. Mr. Farah Ad-Din Nordin	The Next AFSN Secretary
Indonesia	
4. Snr. Superintendent Dr. Lisda Cancer	Board member
People's Republic of China	
5. Mr. Chen Song	Participating on behalf of Mr. Zhao Qiming (Director-General)
6. Dr. Meng Qingzhen	Assistant
7. Ms Qiao Ting	Assistant

Member Country Representatives:	Position
Republic of Korea	
8. Dr. Bongwoo Lee	Board member
9. Dr. Kyung-moo Yang	Assistant
10. Dr. Dongkye Lee	Assistant
Singapore	
11. Dr. Angeline Yap,	Board member , keynote speaker
12. Ms Nellie Cheng	Assistant
13. Ms Wendy Lim	Assistant
Thailand	
14. Mr. Sarawut Sujarittham,	Director of Division of Forensic Science International Cooperation and Promotion, Participating on behalf of Director General of Central Institute of Forensic Science, Thailand
15. Ms. Pinpaka Sucotchadat	Head of Foreign Affairs Section

Agenda 1: Opening of the Meeting

The Chairman opened the meeting and summarized the key topics to be discussed. The Chairman emphasized the importance of expanding the membership and enhancing international cooperation in the future to support the growth of the organization.

Agenda 2: Amendments to the Network Constitution

The meeting discussed amendments to the network's constitution to align with growth and changes, focusing on the following key points:

1. **Increase in the Number of Board Members**

   The original bylaws stated that the board would consist of no more than 7 members. However, due to the expansion of membership

Resolution of the meeting: Agreed to amend the number to no more than 9 members and established that there must be at least 7 members to effectively manage the growth of work and future membership.

2. **Appointment of Special Members**

   The meeting considered the addition of a new provision in the bylaws to allow the appointment of special members from the host country of the event. This aims to have individuals with specific responsibilities for coordinating with various agencies and helping to resolve communication issues among member countries.

Resolution of the meeting: Agreed

3. **Coordination Among Working Groups**

   South Korea proposed the establishment of special working groups in each host country to facilitate effective coordination between the committee and the host country.

Resolution of the meeting: Agreed to the proposal, which will be added as a provision in the network's bylaws.

Agenda 3: Coordination for Future Events

The meeting discussed preparations for hosting events in the upcoming years, considering potential host countries for 2026, 2027, and 2028. As no country has yet taken on this role, member countries interested in hosting are encouraged to submit their proposals.

Agenda 4: Strengthening Cooperation Among Member Countries

The committee discussed strategies to enhance collaboration among member countries, particularly in organizing joint activities, training programs, and study visits to improve the skills and experience of officers and experts. Additionally, the discussion included seeking financial support from international organizations, such as securing funding from various institutions to support staff training.

Agenda 5: Management and Administration of Academic Working Groups

The academic working groups within the network reported on their progress and activities over the past year as follows:

1. DNA Work Group

The representative of the DNA Work Group reported on ongoing training activities and laboratory research. Key activities for the year included:

Past Activities

- Organized the ๙th Interlaboratory Exercise to enhance DNA sample analysis efficiency. This event saw participation from laboratories across ๑๑ countries, with a ๓๒% increase in participants compared to the previous year. The exercise focused on new DNA sampling and testing methods.
- Conducted a survey on laboratory frameworks to assess forensic DNA analysis capabilities and improve methodologies at an international level.

Future Plans

- **Training Programs in ๒๐๒๕**, including more complex interlaboratory testing from sample collection to final analysis.
- **Workshops and Seminars** on DNA analysis in criminal cases to improve investigative techniques and forensic capabilities.

2. Illicit Drugs Work Group

The representative of the Illicit Drugs Work Group reported on joint activities with the Toxicology Work Group and key laboratory training programs conducted over the past year.

Past Activities

- Collaborated with the Toxicology Work Group to conduct training on drug analysis and the detection of controlled substances. Experts from various countries shared their knowledge, and a partnership with UNODC was established to enhance drug analysis capabilities across the Asia region.
- Conducted Clan Lab Training, focusing on the inspection and management of illicit drug laboratories. This program saw participation from multiple countries.

Future Plans

- Expanding training programs on complex drug analysis and detection techniques and Developing new technologies for drug analysis to address drug-related issues in the region.

3. Toxicology Work Group

The representative of the Toxicology Work Group reported on various activities conducted in collaboration with international organizations and other forensic work groups.

Past Activities

- Collaborated with TIAFT (The International Association of Forensic Toxicologists) to organize workshops and knowledge exchange programs, featuring case studies on complex toxicological analyses, such as the detection of chemical substances in homicide cases and unexplained deaths.
- Conducted an online seminar on laboratory information management systems, with experts from multiple countries sharing their experiences and best practices.

Future Plans

- Expanding hands-on training programs on new topics, such as rare toxin detection.
- Exploring the integration of AI technology in toxicological analysis and forensic investigations.

4. Questioned Documents Work Group

The representative of the Questioned Documents Work Group reported on the implementation of document examination proficiency testing, conducted in collaboration with members from various countries.

Past Activities

- Laboratory testing on handwriting and signatures, with a particular focus on Chinese signature analysis. This initiative involved participants from multiple countries and simulated real-world scenarios to analyze signature characteristics in criminal cases.

Future Plans

- Planning to conduct more complex document examination tests.
- Initiating joint research projects with international agencies to advance knowledge in forgery detection and document verification techniques.

5. Crime Scene Investigation (CSI) Work Group

The representative of the CSI Work Group reported on the development and training programs related to evidence collection and crime scene analysis, as follows:

Past Activities

- Training on 3D laser scanning for crime scene analysis, enhancing accuracy in crime scene documentation. This training was conducted in collaboration with experts from Malaysia.

- Joint case study on Bloodstain Pattern Analysis (BPA), focusing on analyzing bloodstain patterns at crime scenes.

Future Plans

- Expanding joint testing and research on new technologies, such as Virtual Reality (VR) for crime scene reconstruction and simulation.

6. Trace Evidence Work Group

The representative of the Trace Evidence Work Group reported on key activities related to the examination of materials found at crime scenes, such as explosive residues.

Past Activities

- Conducted a Collaborative Exercise (CE) on Gunshot Residue (GSR) analysis and adhesive tape examination, with participation from forensic laboratories in multiple countries. The exercise also included explosive residue testing.
- Organized training on automated GSR analysis using SEM-EDS (Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy), improving the efficiency and accuracy of forensic evidence examination.

Future Plans

- Planning a conference on explosive evidence analysis in collaboration with Malaysia, which has previously hosted discussions on this topic. The next session is expected to take place next year.
- Preparing a joint testing program on various trace evidence analyses, including fire debris analysis, fractured materials examination, and other forensic evidence related to terrorism investigations.

7. Digital Forensics Work Group

The representative of the Digital Forensics Work Group reported on past activities and future plans related to digital evidence examination.

Past Activities

- Organized a seminar in Beijing, attended by experts from multiple countries, to exchange knowledge on digital forensics and cybercrime investigations. The discussions covered the analysis of mobile phones, computers, and internet networks as sources of digital evidence.
- Conducted training on digital data recovery from electronic devices, such as mobile phones, including techniques for retrieving deleted information for use as forensic evidence in criminal cases.

Future Plans

- Plan to organize additional training on AI and Machine Learning models for digital evidence analysis, enhancing investigative efficiency in handling complex digital forensic cases.
- Preparing for a scientific conference in another city in China next year, focusing on advanced digital crime analysis.

8. Fingerprint Work Group

The representative of the Fingerprint Work Group reported on training programs and knowledge-sharing initiatives related to fingerprint analysis.

Past Activities

- Conducted training on fingerprint analysis, focusing on challenging cases, such as unclear or damaged fingerprints, which are commonly found in violent crime investigations.

- Organized training sessions and joint meetings with experts from Hong Kong and South Korea, who specialize in fingerprint examination techniques.

Future Plans

- Plan to hold a scientific conference in China, inviting fingerprint experts from multiple countries to share knowledge and best practices in fingerprint analysis.
- Develop AI-powered fingerprint identification systems and machine learning applications to enhance the analysis of difficult-to-identify fingerprints.

9. Forensic Medicine Work Group

The representative of the Forensic Medicine Work Group reported on past activities as follows:

Past Activities

- Organized the Bring Your Own Case event, where real case studies from member countries were shared and discussed through an online meeting, with 96 participants attending. Countries sharing case studies included Thailand, Indonesia, and Malaysia.
- Participated in an international conference in China, focusing on the exchange of experiences related to forensic medicine cases.

Future Plans

- In 2025, plans to conduct additional training and academic activities, focusing on the study and analysis of more complex cases, including the election of a new committee for this work group.

10. Quality Assurance and Standards Committee

The representative of the Quality Assurance and Control Work Group reported on past activities as follows:

Past Activities

- Conducted a survey on the quality assurance capabilities of laboratories in member countries, covering work processes, equipment, and result analysis. Plans were made to organize training sessions and improve work processes to achieve higher standards.
- Collaborated with the DNA Work Group and the Toxicology Work Group to survey and assess analytical results to identify areas for improvement and development.

Future Plans

- Plans to expand workshop training on ISO 17025 and ISO 17020 to cover all member countries, ensuring that all laboratories can achieve appropriate accreditation standards.
- Additional surveys regarding laboratory quality control on other topics, such as chemical use control and real-world testing.

Agenda 6: Summary and Closing of the Meeting

The Chairperson summarized the outcomes of the meeting and discussed the various initiatives that need to be pursued in the future. Additionally, the Chairperson opened the floor for member countries to express their opinions or suggestions regarding the organization's future development.

Annual General Meeting 2024

The AFSN Annual General Meeting (AGM) is attended by participants from various countries, including Thailand, the Philippines, Malaysia, Indonesia, Singapore, China, South Korea, Mongolia, Uzbekistan, Brunei, Vietnam, India, and Sri Lanka, among others.

Dr. Panjai reported on the success of the 16th AFSN Annual Meeting and the 12th APMLA Meeting, including the number of participants. A total of 595 attendees from various countries joined the conference, with Thailand as the host country contributing 215 participants. Several countries sent a significant number of representatives, including the Philippines with 75 participants, Malaysia with 58, and Indonesia with 46. Other participating countries included Mongolia, Uzbekistan, Brunei, Vietnam, India, Sri Lanka, Australia, Austria, Cambodia, and more.

The conference featured 11 keynote speakers from around the world, including Dr. Simon Walsh from Australia and Dr. Angeline. These speakers shared valuable knowledge and experiences with the attendees. Various working groups also presented their research and developments. For instance, the DNA Working Group had 132 participants and presented a total of 34 oral and poster presentations. The Forensic Medicine Working Group had 76 participants.

This conference was a great success in strengthening collaboration within the forensic science community across the Asia region.

Table 1 Number of conference participants by countries

country	Number of Participants
Thailand	215
Philippines	75
Malaysia	58
Indonesia	46
Singapore	39
China	36
Korea	25
Mongolia, Uzbekistan, Brunei, Vietnam, India, Sri Lanka, Australia, Austria, Cambodia, Myanmar, Botswana, Japan, Timor-Leste, United Kingdom, United States	48
AFSN Board Members and Assistants	19
Keynote Speakers	9
APMLA Network Executives	8
IFSA Network	4
Workgroup Speakers	13

Table 2 Number of Participants by Workgroup

Workgroup	Number of Participants
DNAWG	132
APMLA/FMWG	76
TXWG	66
CSIWG	44
IDWG	46
QDWG	39
DFWG	33
TEWG	22
FPWG	16
QASC	4
No information	117

Table 3 Number of Presentations by Workgroup

Work Group	Poster Presentations	Oral Presentations
DNAWG	15	19
IDWG	4	8
TXWG	7	7
TEWG	3	10
CSIWG	7	10
DFWG	3	20
QDWG	2	11
FPWG	3	3
FMWG	11	10
QASC	2	-

The conference proposed amendments to the constitution to align with the increasing number of members and enhance operational flexibility. One key amendment involved increasing the number of committee members. Under the proposed changes, the committee will expand from a maximum of 7 members to a maximum of 9 members, ensuring broader representation from the growing number of member countries. This adjustment reflects the continuous expansion of the forensic science network across the Asia region.

Additionally, the role of the host country in organizing the annual meeting has been strengthened. According to the revised constitution, if the host country is not already a committee member, it will be appointed as a Vice Chair for that year's annual meeting. The Vice Chair will serve a one-year term but will not have voting rights. This amendment allows the host country to participate directly at the committee level, facilitating smoother coordination and recognizing its efforts in organizing the annual meeting.

The voting results showed that member countries unanimously approved all proposed constitutional amendments.

There were presentations from various working groups, such as the DNAWG, DFWG, CSIWG, and IDWG. These included training, research, and collaborative efforts in examining the results of joint experiments. The details of each group are as follows:

1. DNA Working Group (DNAWG):

The group organized the 9th laboratory training session focusing on DNA sample collection and evaluating the effectiveness of using swabs for collection. They conducted a survey on cooperation with QSC regarding quality assurance in biological laboratories. The annual meeting featured 21 oral presentations and 12 poster presentations from various countries. Plans for the upcoming year include discussions on laboratory quality and the publication of the training results.

2. Digital Forensics Working Group (DFWG):

The group discussed the seminar held in Beijing and the academic exchange on various topics in digital forensics. They conducted technical training on data recovery and the analysis of damaged digital devices. Plans for future activities include inter-laboratory proficiency testing and online training sessions.

3. Crime Scene Investigation Working Group (CSIWG):

The group organized mock crime scene investigations and training on blood spatter pattern analysis. They developed standard operating procedures for laboratory accreditation according to ISO 17020 standards. A new committee was elected, and plans for future site visits and additional training sessions were outlined for the following year.

4. Illicit Drugs Work Group (IDWG):

The group organized training and seminars on drug laboratory investigations and synthetic drug analysis. They collaborated with UNODC and the Colombo Plan to bring participants from various countries to the conference. They also conducted surveys and planned future training focused on drug analysis and big data management.

5. Forensic Medicine Work Group (FMWG):

The group organized meetings and seminars on case studies in forensic medicine, with speakers from Thailand, Indonesia, and Malaysia. They planned online seminars and exchanges of experiences in forensic pathology laboratories. The group also participated in planning for next year's annual meeting in South Korea.

6. Fingerprint Work Group (FPWG):

The group has 22 members from 10 countries and plans to organize an academic meeting in China next year. They have been working on developing new methods for detecting fingerprints at crime scenes and have plans for an online meeting to improve working methodologies. The group also updated its executive committee and invited renowned speakers to share their knowledge.

7. Question Document Work Group (QDWG):

The group consists of 20 institutions from 12 countries and has been involved in research projects related to handwriting analysis. They have organized joint practical sessions and academic meetings to share case studies and document analysis techniques. The group is planning further practical training sessions and exploring quality assurance standards.

8. Trace Evidence Work Group (TEWG):

The group has conducted joint practical sessions for gunshot residue and trace evidence analysis. They are planning an academic meeting on environmental forensic analysis and explosive databases. Additionally, they have organized workshops and knowledge-sharing sessions on various topics, including the application of AI in forensic science.

9. Toxicology Work Group (TXWG):

The group has organized workshops and joint training sessions with other workgroups, including testing drugs in waste and hair analysis. They have conducted practical sessions and academic meetings with international toxicology experts. They are planning to create surveys and online knowledge-sharing sessions for case studies and laboratory quality assurance.

10. Quality Assurance and Standards Committee (QASC):

The committee organized a quality workshop in collaboration with IFSA, with over 200 participants from various workgroups. They conducted surveys with different workgroups to improve quality assurance in laboratories. They plan to conduct additional workshops and collaborate with workgroups to enhance quality standards.

In the meeting, the visions of various board members were presented, including:

1. The vision of Police Brigadier General Constancio Anaya Junior from the Philippines emphasized that the success of the network depends on the cooperation of everyone. As members are spread across different countries in the region, managing a cross-border organization is challenging. He pointed out that leaders in this network do not need to be

experts in every field, but should be leaders who are open to input from all members. He stressed the importance of having no bias against experts in various fields, including forensic medicine and questioned document examination. He also acknowledged his own shortcomings in his role as president and is committed to supporting cooperation and full participation from all parties.

2. The vision of Dr. Bong Woo Lee from South Korea focuses on building a collaborative network among the member countries of the Asian Forensic Science Network, emphasizing effective connectivity and cooperation. His vision aims to promote the development of capabilities and the joint resolution of issues within the region. Dr. Lee emphasizes that every member country should participate actively, and the voices of all members are important in the network's development. This is to ensure that the network can consistently and effectively tackle evolving challenges. Additionally, he highlights strengthening relationships and exchanging beneficial experiences between member countries to elevate the standards and quality of forensic science practices at both regional and international levels.

3. The vision of Dr. Angeline Yap is built around three core principles: Collaboration, Commitment to Quality, and Change. She aims to foster collaboration among member countries to exchange knowledge and forensic science technologies, strengthen commitment to maintaining high-quality standards, and prepare the network to adapt to the changes of the modern era, particularly in advancing technologies and emerging challenges. Dr. Yap emphasizes the importance of working together among member countries to ensure the network upholds the highest standards of forensic science services across the Asian region.

4. Mr. Chao Chi Ming's vision, represented by Mr. Chen Song, focuses on strengthening and expanding cooperation within the Asian Forensic Science Network. China will support the sharing of knowledge and new technologies related to forensic science, as well as organize activities and conferences for exchanging experiences and best practices. Plans include hosting academic meetings in China to create opportunities for collaborative learning among member countries and improving forensic standards in the region. Additionally, Mr. Chao emphasizes the

importance of welcoming feedback from all member countries to further enhance and develop the network in the future.

5. Madam Nor Adora Sedon's vision, representing Malaysia, focuses on developing the AFSN network as a prominent center for innovation, collaboration, and excellence in forensic science at a time when the demand for justice and the pursuit of truth is increasingly important. She is committed to strengthening cooperation among member countries and promoting the exchange of knowledge and technologies across various fields to ensure the network can effectively respond to the complex challenges of today. Additionally, she emphasizes the importance of building international relationships and collaboration to elevate the standards and quality of forensic investigations throughout the region.

6. The vision of Brunei, as expressed by its representative, emphasizes a commitment to the development of forensic science alongside the values of humanity and technological innovation. Despite being a small country, Brunei is determined to focus on cooperation and the development of professional skills in forensic science through regional collaboration and the sharing of best practices. This approach aims to foster progress in forensic science operations and contribute to the advancement of the field.

7. The vision of Thailand, as expressed by the Director General of Central Institute of Forensic Science, Thailand aims to be a regional and global center for forensic science. This vision focuses on developing innovations and operating standards that meet international benchmarks, recognizing the crucial role of forensic science in supporting the justice process. Thailand is committed to fostering collaboration at both regional and international levels through knowledge exchange, training, academic conferences, and research. Furthermore, Thailand emphasizes the development of skilled personnel in forensic science to tackle the challenges arising from rapid technological advancements.

This year, Thailand is also hosting events and conferences related to forensic science, providing opportunities for countries in the Asia-Pacific region to share experiences, knowledge, and best practices. Thailand believes that strong cooperation will elevate regional standards,

promote justice, and create systems capable of effectively responding to societal needs. With this commitment, Thailand is ready to play a significant role in advancing forensic science on a global scale.

In the meeting, a secret ballot was conducted to elect the new Vice President and Board members, with the use of a QR code system ensuring secure and anonymous voting. In the election for the Vice Presidency, Dr. Weerakit Harnpariphan from Thailand won, with Dr. Bong Woo Lee from South Korea as the other candidate. Representatives from 10 countries participated in the vote, where Thailand secured 7 votes and Dr. Bong Woo Lee received 3 votes. This victory marked a significant achievement for Central Institute of Forensic Science, Thailand.

Thailand will hold the position of Vice President of the network during 2025-2026, and will transition to the President of the network during 2027-2028. Dr. Bong Woo Lee will assume the role of Vice President for the annual meeting as South Korea will host the next meeting.

In 2025, South Korea will host the 17th Asian Forensic Science Network (AFSN) Annual Meeting, scheduled for September 9-12. The conference will focus on the development of forensic science, international academic cooperation, knowledge exchange, and training aimed at enhancing forensic science capabilities globally. Additionally, there will be plans for supplementary activities such as training sessions and collaborative work across different groups during the conference. Topics will include cooperation in developing innovations and technologies in forensic science, such as digital evidence analysis, forensic investigations, and new technical training. This conference will provide a platform for sharing knowledge and improving international standards in forensic science.

Supplement

Meeting photo









VALIDATION OF STRMIX
Validation Findings

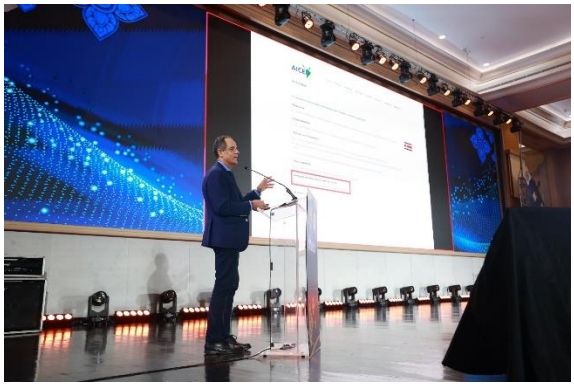

DNA & human rights:
facing the challenges
of the XXIst century
16TH AFSN & 12TH APMLA
26 - 30


AGENDA


Minimum Requirements Documents
• Establish a baseline or starting point that should be followed in order to achieve reliable results.
• Describes the minimum requirements.
• It addresses the following framework:
• Competence of Personnel.
• Equipment and Consumables.
• Collection, Analysis, Interpretation, Reporting.
• Procedures, Protocols, Validation.
• Quality Management.
Competence of Personnel
Equipment and Consumables
Collection, Analysis, Interpretation, Reporting
Procedures, Protocols, Validation
Quality Management
Quality Forensic Service


Overall bodies and foreigner(S) → autopsy
Others → external examination + emergent toxicology → death certificate report


Proficiency testing
$70k+
509




Ketoacidosis in casework - conclusions