IASR

INTERNATIONAL ASSOCIATION OF SCIENTISTS & RESEARCHERS

eConference Proceedings

29th**-30**th
September
2021

9th INTERNATIONAL eCONFERENCE-2021

Forensic Chemistry & Toxicology

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GREETINGS FROM THE ORGANIZING DESK

The new era post the global pandemic has affected academics, establishments, and individuals' preparedness worldwide. Forensic Science has an interdisciplinary approach and its true essence can be proved meaningful with collaborative efforts of people present around the globe functioning together as a team. With a vision to bring all the academicians, students, and professionals and share their valuable contemplations, the International eConferences are structured to lead the way through endeavors focused to take Forensic to greater heights. We welcome every science enthusiast to become a part of this revolutionizing effort and explore the technological advancements, scientific researches, and opportunities for everyone to flourish.

Dr. Ranjeet Kr. Singh
President
International Association
Of Scientists and Researchers

Phaneendar B N
Forensic Expert, CEO
Clue4 Evidence Foundation

The Organizers

International Association of Scientists and Researchers (IASR)

IASR is a non-profit organization focused to deliver the updated literature and research work to the global scientific and research society, but everyone. Providing open access to critically reviewed high-quality research papers and literature, it works with a mission of providing a user-friendly global platform for researchers, scientists for sharing information, and dissemination of the recent groundbreaking researches and advancements in various fields working together for the better world to live in.

Sherlock Institute of Forensic Science (SIFS)

SIFS INDIA is registered with Govt. of India and ISO 9001:2015 Certified Educational Institute that has acquired a distinct place of honor globally. We provide a user-friendly platform in the field of education with an aim to impart high quality and easily accessible forensic education to meet the growing demand of Law enforcement and other government and private legal departments. SIFS INDIA offers numerous Forensic courses that give the knowledge of different possible modes of crime and methods to handle them to its students. Our main aim is to provide equal opportunities to those aspiring students who don't have access to traditional learning methods.

About the Conference

Forensic Science has proffered techniques that have leveled up the competence of humankind and are staying up with the trend. At the outset, the International Association of Scientists and Researchers (IASR) in association with Sherlock Institute of Forensic Science (SIFS) India organizing the eConferences in 2021. With utmost enthusiasm, the organizing committee invites the young minds and professionals of various disciplines of forensic science and become a part of the first-ever convention organized with the motto of bringing the unrecognized talents, present globally. The program would follow talks by eminent national and international experts accompanied by paper presentations, ePoster presentations, discussions, and scientific excellence awards.

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Mission Statement

"Committing towards the fact of being a lead-follower of technology with a bold spirit of risk-taking, helping us make our presence noticeable worldwide".

Highlights

▶ Advanced Scientific Research in Forensic and related fields

▶ Interaction with Eminent Experts over the Trends in Forensic

▶ Scientific Competitions: Paper/ePoster Presentation

▶ Prizes for the Best Scientific ePoster and Paper Appearances

▶ Panel Discussion on the Challenging Aspects of Forensic Science

▶ Global Views through the eyes of Internationally Renowned Experts

▶ eCertificates to Presenters and Delegates

▶ Publication perks to Best Papers

Areas Covered in the Conference

▶ Trace Evidence Analysis

▶ Advancement in Forensic Chemistry

▶ Instrumental Analysis

▶ Drug Analysis

▶ Analysis of Vegetable Oils

▶ Petroleum and its Derivatives

▶ Fire and Arson Cases

▶ Explosives Detection and Analysis

▶ Ignitable Liquid Residue Analysis

▶ Different Chromatographic Techniques

Who Can Attend?

▶ Undergraduate Students

▶ Postgraduate Students

▶ Research Scholars/Ph.D. Students

▶ Academicians

▶ FSLs & CFSLs Officers/Police Officials

▶ Law Professionals

▶ Professionals from Scientific Background

▶ Non-Governmental Organizations

▶ Government and Private Organizations

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SPEAKER'S PROFILE

Prof. RAJINDER SINGH CHANDEL

Punjabi University, Patiala, INDIA

Prof. Rajinder Singh Chandel is currently working as a Professor & Head of the Department of Forensic Science, Punjabi University, Patiala. He has also worked as an Assistant Professor in the same university from 2003 to 2016. He has total 17 years of teaching experience. He completed his Ph.D. in Forensic Science in the year 2008 and M.Sc. in Forensic Science in the year 2001 from Punjabi University, Patiala where he was the gold medallist. He is also a Visiting Professor at Xi'an Jiaotong University, Shaanxi, China since 2016. He was the Chair Professor at East China University of Political Science and Law in Shanghai, China from 2017 to 2020. He is a Visiting Faculty at LNJN-NICFS, MHA, New Delhi, Vice President at Indo-Pacific Academy of Forensic Odontology (INPAFO) as well as Resource Person in many conferences/symposia/workshops of national and international repute. He has taken membership of Advisory Board of "The Silk Road Forensic Consortium (SRFC), Xi'an, Shaanxi, China and was the member of International Scientific Program Committee of 23rd Annual Congress of the World Association for Medical Law, 50th Golden Anniversary Meeting, "Medical Law, Bioethics and Multiculturalism" at Baku, Azerbaijan in the year 2017. Moreover, he has published about 60 research papers, 02 book chapters and 01 book.

DR. RAJEEV JAIN

Central Forensic Science Laboratory Chandigarh, DFSS, MHA, Govt. of India, INDIA

Dr. Rajeev Jain is Senior Scientist of Forensic Toxicology at Central Forensic Science Laboratory, Ministry of Home Affairs, Govt. of India. He has more than 10 years of research experience in the field of analytical toxicology. During his tenure as Forensic Toxicologist, he has examined post-mortem samples of more than 300 medico-legal cases of drug overdose and poisoning. He has obtained his Ph.D. degree in Analytical Toxicology from CSIR-Indian Institute of Toxicology Research (India). His research work is focused on the Development of simple, rapid, eco-friendly, cost-effective, sensitive and selective analytical methods based on microextraction techniques (such as SPME and DLLME etc.) for the determination of chemical analytes for forensic toxicological, clinical and environmental importance in various complex samples such as blood, saliva, plasma, urine, tissue etc. using GC-MS, GC-FID, HPLC, GC-ECD, TLC-image processing and digital image colourimetry technique. He is the first scientist to explore the possibility of coupling liquid-liquid microextraction techniques with widely used TLC techniques for simple and quantitative analysis of drugs and poisons. He has published more than 30 research papers, review papers and book chapters in various referred journals on this subject. He was one of the first scientists to explore the possibility of coupling dispersive liquid-liquid microextraction with injector port silylation for rapid analysis of polar toxicants. He is also acting as an invited reviewer in various referred journals such as Journal of Chromatography A, Trends in Analytical Chemistry, Journal of Pharmaceutical and Biomedical Analysis, PLOS ONE etc. He is one on the editorial board member of various open access journals of Toxicology and Chromatography. He has received more than 550 citations on his research work. His h-index is 14.

SPEAKER'S PROFILE

DR. RAKHI KHANNA

State Forensic Science Laboratory, Jaipur, INDIA

Dr. Rakhi Khanna is presently working as Additional Director, Kota, Rajasthan and Deputy Director Training at State Forensic Science Laboratory, Jaipur, Rajasthan. She has working experience of 22 years as Forensic Scientist cum Toxicologist and is involved in analyses of a large number of cases with the help of numerous instrumentation methods. She is actively involved in organizing and managing training, conferences, workshops, courses on Forensic Sciences, Women and Child issues, DNA, Shooter identification, GSR Analysis, Photography and Videography, Crime scene management, SAECK KIT, Finance, Fire extinguisher, etc. She is president of the Internal Complaint Committee of Prevention, Prohibition and Redressal Act against Sexual Harassment of women at the workplace. She has been awarded with Best Speaker by Global Scientific Guild-2021, Best Woman Performer in Govt. Award, International Inspirational Woman Awards-2021, Wonder Women in Forensics by VGU-2021, Forensic Expert Award Toxicology by Legal Desire Magazine-Summit Awards 2021, and Best Oral Presenter Award at many Platforms, International Ambassador for TMU Journal of Indian Region in 2015 for her outstanding contribution to the journal. She is an Associate Member of the American Academy of Forensic Sciences (AAFS), Organizing Committee member of many National, International Conferences, and Editorial Board Member of Journals. She has many publications in AIFSC, journals of National and International Concern. She is invited Speaker and Scientific Committee Member of IASR, Mass Spectrometry, Analytica etc. Her interview was published in Legal Desire Magazine -June, Edition. She was appreciated by District Collector and District Magistrate for analysing 2001 cases. She has also provided lectures and training to Police personnel from Rajasthan Police Academy.
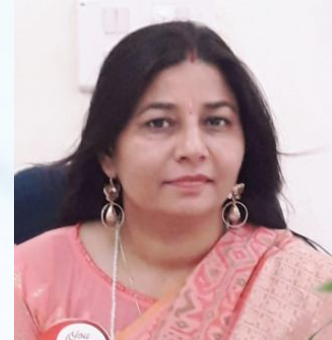
DR. JONATHON ANDREW BROOKS

King's College London, England, UK

Dr. Jonathon completed his Bachelor Honours in Forensic Science at Teesside University in 2015, collaborating his final year project with the Durham Police dog unit, investigating the volatile organic profile of blood. Later that year he became a PhD researcher in chemistry at the University of Leicester, focusing on the identification and application of volatile organic profiles released from mammalian decomposition. Integral to this research, he collaborated with UK national and international police forces providing advice on the search and analysis of human remains specifically around the effectiveness of cadaver dogs and the estimation of time since death. Alongside his academic commitments, he lectured at multiple institutions, delivering not only medico-legal forensic subject matter but also basic forensic crime scene skills. His academic sabbatical involved working and researching on the Australian Facility of Taphonomic Experimental Research (AFTER) site helping better understand the process of human decomposition. Consequently, he was recruited as a research fellow at the Saxion University based in the Netherlands which led to him becoming a forensic specialist for the National Dutch Police. From this, a collaborative organization was created between the United Kingdom and the Netherlands to help better understand human decomposition in different environments across different countries.

SPEAKER'S PROFILE

DR. RITESH SHUKLA

Ahmedabad University, Gujarat, INDIA

Dr. Ritesh Shukla is currently working as an Assistant Professor at School of Arts and Sciences of Ahmedabad University. He has received his doctorate in Toxicology from Jamia Hamdard, New Delhi. He received a Master's degree in Forensic Science from Dr. B R Ambedkar University, Agra. He has co-authored research articles in international peer-reviewed Journal. He has edited books on "Forensic Nanotechnology" and "Nanotoxicity". He received the Early Career Research Award from the Science and Engineering Research Board (SERB). He has research expertise in the diversified field of Toxicology and Forensic Science. He is a member of Silk Road Forensic Consortium, China (Founded by Professor Henry C. Lee) and the International Society for Forensic Genetics (ISFG). Currently, he has focused his research on the development of a 'Point of Detection device' for body fluid identification. In addition, his research interest also focused on various aspects of forensic nanotechnology, toxicology, and food forensics.

DR. CARLOS A. GUTIERREZ

True Forensic Science, Hawaii, US

Dr. Carlos A. Gutierrez, M.S.F.S., M.Ed. is a Ph.D. Candidate in the Institute of Legal Sciences of Nayarit State, Mexico. He got his Master of Science in Forensic Sciences, Chaminade University of Honolulu, USA and his Master in Educational Management, Universidad Andres Bello, Chile, he also holds a Bachelor's degree in Public Security Administration from the Escuela de Carabineros de Chile. Since 2016, he is the Science Director of True Forensic Science, and since 2017 he is a Faculty of Forensic Sciences at Chaminade University of Honolulu, USA. Previously he was a Teacher Assistant in the same program. He is a Mentor and Alumni in the Hogan Entrepreneurs Program. He is specialized in all subjects related to Crime Scene Investigation, Crime Scene Reconstruction, Bloodstain Pattern Analysis, Forensic Anthropology and Forensic Microanthropology, a new field in the Forensic Sciences he developed. His studies and experience as a retired Captain from the Chilean National Police Agency and former Forensic Laboratory Director make him ideally positioned to provide the student with the necessary theoretical and practical knowledge to be prepared to work in any forensic agency in the world. He is also a forensic consultant from different countries. He participates regularly in Forensic Conferences as a speaker not only in the U.S. but also in Latin America and Asia and has been interviewed as a guest in different TV, Radio shows and newspapers in different countries in the world such us, LA Times, Crime and Forensics, Just Science (USA), Hola Chile, Excelsior News (Mexico), Legal Desire (India), among others.

SPEAKER'S PROFILE

DR. RAJESH VERMA

Forensic Science Laboratory, Mandi, INDIA

Dr. Rajesh Verma has about 30 years of experience in research and analytical work, out of which more than 20 years in a Forensic Science Laboratory. He is currently working as the Deputy Director, Head of the Regional Forensic Science Laboratory, Central Range, Mandi, Himachal Pradesh supervising the work of different divisions in the laboratory. He has also served as the Assistant Director (2000-2011) in the State Forensic Science Laboratory, Head of the Physics and Ballistics Division. With this, he has also served as Project Associate in the State Council for Science, Technology, and Environment, Shimla, H.P. under the Solar House Action Plan for Himachal Pradesh. He has several publications in renowned journals in his name. He has also been awarded the best paper presentation in numerous conferences. He has also given training to various professionals and students related to the arenas of forensic science and has been continuously contributing and sharing his pool of knowledge with others.

DR. ALOK PANDYA

Institute of Advanced Research, Gandhinagar, INDIA

Dr. Alok Pandya is presently working as an Assistant Professor at the Department of Chemistry, Institute of Advanced Research, Gandhinagar. He is an interdisciplinary nano-interventions researcher, academician and administrator. As a researcher, his research work is broadly focused on nanobiotechnology, nanochemistry, and forensic nanotechnology. He has been the Research Associate (2013-2016) as well as Young Scientist (2016-2017) at the Institute of Life Sciences, Ahmedabad University for about 3 years. He completed his Ph.D. in Nanobiosensors, Nanocatalyst and Supramolecular Nanoassembly from Gujarat University in the year 2013 and Master's degree in Organic Chemistry from Sardar Patel University in the year 2008. He has received multiple projects with various funding agencies such as DST, SERB & GSBTM. Till date, he has published more than 50 research articles in high repute international Journals. He has published more than 7 book chapters in the international publishing agency and also a book on the "Introduction of Forensic Nanotechnology as Future Armour" with Nova Science Publisher, USA. In addition to this, he is an editor of two more books on Micro/nanofluidics and lab-on-chip based emerging technologies, Elsevier publisher and Self-Assembled nanomaterial, Elsevier Publications. Currently, his research focuses on the development of affordable nanodevice for disease monitoring, agricultural nano-products, and products for societal use. As an academician, he taught Organic and Analytical chemistry, Nano-Biotechnology, Biochemistry and Forensic nanotechnology. As an administrator, he is heading IAR placement cell and industrial relations, program coordinator (B.Sc), member secretary, SSIP and IAR startup and entrepreneurship cell. As an inventor, he has developed indigenous rapid flow through based point-of-care Immuno-Kit for the early detection of heart fatty acid-binding protein (h-FABP) on myocardial infarction.

SPEAKER'S PROFILE

DR. RICHA ROHATGI

Amity University, Gurugram, INDIA

Dr. Richa Rohatgi, Ph.D. in Forensic Science from the University of Delhi is currently working as Assistant Professor, Forensic Science at Amity University Haryana. She has more than 10 years of experience in the field of Forensics and has previously worked in the forensic lab as a scientific officer, worked as UGC-SRF at DU before she started teaching Forensic Science to UG/PG students of different colleges and universities across India. She has many publications in reputed journals and 3 book chapters in Forensic Science. She has also authored e-PG Pathshala modules under the UGC-MHRD scheme. She has been presented with the best paper award and best poster award in different International Conferences. She has presented and chaired sessions in national seminars on various occasions and has organized a five-day FDP on Forensic Science. She has been actively involved in various research activities in forensic science and has been invited as a Resource person for delivering lectures in forensic science. She has an article published in the leading newspaper on the scope of forensic science and has been invited to talk shows on the radio- AIR FM Radio. She was also part of a debate panellist as a forensic expert in the Aarushi Murder case telecasted on the NewsNation TV channel.

DR. SWATI SHRIVASTAVA

State Forensic Science Laboratory, Madhya Pradesh, INDIA

Dr. Swati Shrivastava is currently serving as Senior Scientist and Expert of Chemistry, narcotics and Explosives in State Forensic Science Laboratory, Madhya Pradesh, Police department, Home Ministry, Government of MP. She has always being a meritorious academic and was awarded gold medal in Graduation and Post-Graduation. She has completed her Ph.D. in Plant chemistry with a research fellowship. She has vast experience of 22 years and joined as Scientist in State FSL MP in 1998. She has published and presented more than 40 research papers & case studies in national and international journals, conferences and seminars under her name. She has been awarded numerous awards like the prestigious Union Minister's Award during the All India Forensic Conference, Ahmedabad in 2018. She is a regular faculty in many state and national level institutes including Judicial Academy, Police academies, CAPT, Universities. She has actively associated with and trained in UNO DC and Narcotics Bureau for New Psychotropic Substances.

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Keynote Speakers

Dr. Carlos A. Gutierrez

Forensic Investigation in Cases of Enforced Disappearances and Missing Person, Real Cases Study and Research Study Results

Dr. Rajinder Singh Chandel

Trends in the Forensic Analysis of Trace Cosmetic Evidence

Dr. Rajeev Jain

Microextraction Techniques in Analytical Toxicology

Dr. Rakhi Khanna

Digital Autopsy and Hyphenated Techniques Significance in Solving Various Crimes in Covid -19 Pandemic

Dr. Jonathon Andrew Brooks

Multi-Disciplinary Approaches – The Future of Forensic Taphonomy

Dr. Rajesh Verma

Chemometrics in Forensic Science

Dr. Alok Pandya

Solving Crime through Forensic Chemistry

Dr. Ritesh Shukla

Food Toxicovigilance: The Need of the Hour

Dr. Richa Rohatgi

Fluorescent Nanomaterials for Development of Latent Fingerprints

Dr. Swati Shrivastava

The Horrifying World of Narcotics and The New Age Drugs

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9th INTERNATIONAL eCONFERENCE-2021
Forensic Chemistry & Toxicology

Day 1: 29th September 2021

Time	Topic	Keynote Speaker
10:30 to 11:00 AM IST	Trends In The Forensic Analysis Of Trace Cosmetic Evidence	**Dr. Rajinder Singh Chandel**
11:00 to 11:30 AM IST	Microextraction Techniques In Analytical Toxicology	**Dr. Rajeev Jain**
11:30 to 12:00 PM IST	Digital Autopsy And Hyphenated Techniques Significance In Solving Various Crimes In COVID-19 Pandemic	**Dr. Rakhi Khanna**
12:00 to 12:30 PM IST	Multi-Disciplinary Approaches – The Future Of Forensic Taphonomy	**Dr. Jonathon Andrew Brooks**
12:30 to 01:00 PM IST	Food Toxicovigilance: The Need Of The Hour	**Dr. Ritesh Shukla**

Day 2: 30th September 2021

Time	Topic	Keynote Speaker
09:30 to 10:00 AM IST	Forensic Investigation In Cases Of Enforced Disappearances And Missing Person, Real Cases Study And Research Study Results	**Dr. Carlos A. Gutierrez**
10:00 to 10:30 AM IST	Chemometrics In Forensic Science	**Dr. Rajesh Verma**
10:30 to 11:00 AM IST	Solving Crime Through Forensic Chemistry	**Dr. Alok Pandya**
11:30 to 12:00 PM IST	Fluorescent Nanomaterials For Development Of Latent Fingerprints	**Dr. Richa Rohatgi**
12:00 to 12:30 PM IST	The Horrifying World Of Narcotics And The New Age Drugs	**Dr. Swati Shrivastava**

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Dr. Vindresh Mishra
Dept. of Toxicology, CFSL, Kolkata

Dr. Prateek Pandya
Amity Institute of Forensic Sciences, Amity University, Noida

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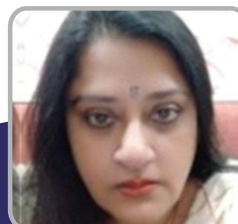
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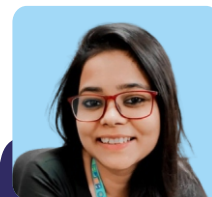
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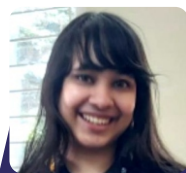Convenor
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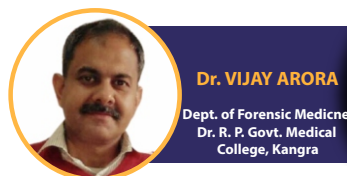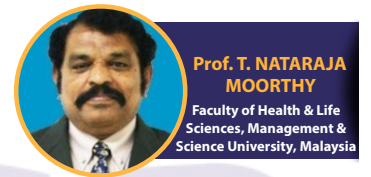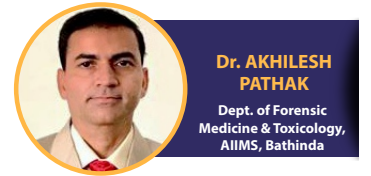**RAMANDEEP SINGH**
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PA 06	**Poonam Anil Moon** **Dr. C. Joseph Kennady** **Dr.Ashish Badiye**	*Detection Of Pesticides In Different Food Matrices And Their Impact On Human Health: A Review*
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ePoster Presentations

Eposter Code	Author and Co-author	Title
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Paper Presentations

GC/MS-MS ANALYSIS FOR THE DETECTION OF PREGABALIN DRUG IN BIOLOGICAL SPECIMEN OF SEXUALLY ASSAULTED VICTIM

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Abstract:

Modern society is witnessing a considerable ascend of sexual assault against women in India by using several illicitly abused drug predominantly psychoactive substances. This paper presents identified a prescription drug for the first time named as *Pregabalin* in the biological sample of rape victim. GC/MS-MS analysis was conducted on the extracts of biological specimen of the victim. These short scientific findings can be of immense significance for the forensic toxicologists to explore unregulated prescription drug that are illicitly procured to execute miscreant deeds. The scientific as well as public societies need to be attentive about such types of drugs and their misuses. Pregabalin is an anti-epileptic drug with sedative and analgesic property used for medical treatments. This article underlay the objective to generate public awareness peculiarly among females about substances with potency to facilitate sexual assaults as this is critically needed. Furthermore, scientific researchers can carry out research on this drug or identify other novel chemical substances or their derivatives circulated in commercial markets that are misused by the population for accomplishing vicious intentions.

Keywords: Forensic toxicology, Pregabalin, Drug facilitated sexual assault, Post-mortem specimen analysis.

POISON INFORMATION CENTRE: A PRIORITY NOT TO BE IGNORED ANYMORE

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Abstract:

Poisoning is a significant global public health problem with nearly a million deaths reported each year.   In India, also there are higher incidences of poisoning and is one of the major causes of death. According to the National Crime Records Bureau (NCRB) 2018, India reported 1, 34,516 suicides, showing an increase of 3.6% in comparison to 1, 29,887 reported cases the previous year. Among various methods of suicide; hanging (51.5%) remained the preferred mode followed by consumption of poison (26.7%). There were a total of 35,862 deaths in India due to poisoning; intake of pesticides either accidentally or intentionally is rising throughout India, where more people are involved in agricultural work or having access to these poisonous substances in day to day activities. Poisoning cases are treated at different levels of health care facilities including both government and private sectors. However, owing to lack of Poison Information Centre (PIC), management of acute poisoning cases is a difficult task for physicians working in emergency departments at various medical establishments. PICs can provide information which plays an essential part in a country's capacity for ensuring the safety of chemical substances. The primary aim of PIC is to reduce the morbidity and mortality due to poisoning and improve the patient's quality of life. A timely availability of appropriate information for the poison management is provided by PIC through a well-trained poison information specialist. The required information about poisoning will be provided to the general public and also to health care professionals throughout India.

Keywords: Poison Information Centre, PIC, Poison Control Centre, poisoning, pesticides.

DETERMINATION OF TOXIC HEAVY METALS IN ATMOSPHERIC OF KALAR, AS

SULAYMANIYAH, IRAQ

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Abstract:

Since 1991, in Iraq a lot of private electrical generator have been installed in every neighbourhoods of all Iraqi cities. Concurrently the industrial are are so near to the population cities. This is make an ancontrolled and fearul environmental. Thus the aim of this study to measuer the concentration of toxic heavy metals - lead (Pb), cadmium (Cd), mercury (Hg), Arsenic (As), chromium (Cr), and zinc (Zn) in atmosphere from different sites (population area that contain a lot of electrical generator, Industrial area, traffic lights and green land area)in the Kalar city. Using a homemade apparatus that has a capacity of flow rate was 0.05 m^3/sec. for one hour, the total volume of the each samples were 180 m^3/h collected. The inductive coupled plasma optical emission spectroscopy (ICP-OES) has been used for determination of heavy metals, the concentration ranged from 7 µgL^{-1} - 18.5 µgL^{-1} Pb, 47 µgL^{-1} - 245 µgL^{-1} Zn, 7 µgL^{-1} - 32 µgL^{-1} Hg, and 13 µgL^{-1} - 106 µgL^{-1} Cr. The main sources of these heavy metals in the sampled area could be attributed to car and electrical generation emission, and factory emission.

Keywords: Toxic metals, electrical generator, Environment, health and ICP-OES.

FORGED LATENT FINGERPRINTS IDENTIFICATION ON POROUS SURFACES

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Abstract:

The existence of little information about the characteristics that forged latent prints on paper may exhibit can lead to an erroneous estimate of the validity of a forged print. The study of fingerprints forged from the use of an ink jet printer, where cartridges have been filled with an amino acid solution, can generate a starting point for the analysis and establishment of the characteristics to be evaluated in a developed fingerprint. In order to establish the validity of latent prints developed with ninhydrin, the present study attempts to avoid estimation error by comparing features present in "natural" prints and "forged" prints. This supposes an adjustment regarding the way in which the impressions are analyzed by the fingerprint examiner, since the study of the characteristics of level 1 and 2 does not ensure that the impression has been deposited by the person's bearing that that fingerprint distinguishes. Thus, the microscopic analysis of each fingerprint will determine if this fingerprint is valid or not, so this type of deeper exploration should be considered essential when latent prints have been recovered on paper by applying the ninhydrin developer reagent, and can be extended to others amino acid developer reagents.

Keywords: Forensic Science, Forged Latent Fingerprints, Ninhydrin, DFO, Amino acid reagent, Porous surface.

A STUDY TO EVALUATE THE TOXICITY AND ECOLOGICAL IMPACTS OF DETERMINING METAL CONCENTRATIONS IN SURFACE WATERS AROUND THE SABARMATI RIVER IN GUJARAT: AN ICP-MS STUDY

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Abstract:

Pollution from municipal sources usually comes from untreated wastes from homes and businesses, whereas industrial pollution comes from the addition of heavy metals with the subsequent increase in metal loads in water bodies. A study was conducted to identify sources of potential pollutants and to subsequently characterize urban water quality along the Sabarmati River from its head to its mouth. Water samples were collected from seven different locations along the river's course in order to get a good idea of the extent of trace metal contamination. Samples were analysed for physiochemical parameters and 21 heavy metals (As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn) in two distinct seasons using inductively coupled plasma mass spectrometry (ICP-MS). Heavy metal pollution can be assessed in two ways: by calculating the potential ecological Risk Index (RI) and by examining the role of human activities. Considering the results, it seems that in the monsoon season, heavy metal concentrations in water samples were greater than in those of other seasons. Within water samples, heavy metals tended to be arranged in descending order Zn> Cd > Ca> Cr> Cu> Mg> Fe> Pb> Ni> Sb> As> Sr> Tl> Se> Li> Co> Be> V> Ti> Mn> Mo. various sources of metal distributions, their composition at different locations, and their health effects is presented in this research.

Keywords: Sabarmati River, Heavy Metal toxicity, Pollutant load, ICP-MS study, Risk assessment.

DETECTION OF PESTICIDES IN DIFFERENT FOOD MATRICES AND THEIR IMPACT ON HUMAN HEALTH: A REVIEW

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Abstract:

The toxic chemicals in pesticides are designed to be deliberately released into the environment. Though each pesticide is meant to kill a certain pest, a very large percentage of pesticides reach a destination other than their target. Instead, they enter the air, water, sediments, and even end up in our food. Detection of pesticides is usually carried out in acute poisoning cases but not routinely. Pesticides have been linked with human health hazards, from short-term impacts such as headaches and nausea to chronic impacts like cancer, reproductive harm. Detection of pesticides is generally carried out by using analytical techniques. This study reviews detection of pesticides from various matrices of food including poultry products, animal products, agricultural produce and aquatic produce using analytical techniques and their impact on human health. There is a need to practice monitoring techniques for the use of pesticides in agricultural and industrial processes to prevent the pesticides residues from exceeding the Maximum Residue Level (MRL) in food products.

Keywords: Pesticides residues, Screening, Detection, Human Health.

EFFECT OF HANDS SANITIZER ON THE VISIBILITY OF DEVELOPED FINGERPRINTS

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[2]Assistant professor, Amity Institute of Forensic Science, Amity University

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Abstract:

The general public's interest in hand sanitizers has soared after the covid-19 pandemic epidemic. This gave rise to the notion that the use of such hand sanitizers might impair the visibility of developed fingerprints. Based on this hypothesis, a hand sanitizer was tested to see how it affected the detection of fingerprints left behind after use. Fingerprint detection techniques used included: ninhydrin, silver nitrate, and iodine fuming and cyanoacrylate method. When hand sanitized fingerprints were compared to non-hand sanitized fingerprints, the alcohol-based hand sanitizers improved the visibility of fingerprints developed with ninhydrin and iodine fuming, and marginally improved those developed with silver nitrate and cyanoacrylate method. To determine the longevity of improved developed quality, various parameters such as time since hand sanitizer application prior to fingerprint deposition and age of deposited print were tested. It was hypothesized that the active ingredient in alcohol-based hand sanitizer, ethanol, and increased moisture content on the ridges, were responsible for the increased visibility of the fingerprints.

Keywords: Latent Fingerprints, Hand Sanitizers, Ninhydrin, Silver Nitrate, Iodine Fuming, Cyanoacrylate

STUDY OF SEXUAL OFFENCES, EXAMINED AT A TERTIARY CARE INSTITUTE

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Abstract:

Sexual assault is a crime of violence against a person's body and will. Sex offenders use physical and/or psychological aggression or coercion to victimize, in the process often threatening a victim's sense of privacy, safety, autonomy, and well-being. Doctors are legally bound to examine and provide treatment to survivors of sexual violence. Timely reporting, documentation and collection of forensic evidence are important toward investigation of the crime. The present retrospective study was conducted from case records of survivors (brought by police or the survivor presents herself directly) consenting for medicolegal examination & sample collection. In present study, 153 cases of alleged sexual assault underwent medicolegal examination at our hospital. All survivors were females. Majority of survivors were from 11-18 years age group (49.67 %) followed by 19-25 years (24.18 %). Most survivors were from urban area (64.71 %). Incident to reporting time was 3-7 days (35.29 %) in majority of cases followed by reporting within 72 hours (32.03 %) & alleged accused was boyfriend (66.01 %) in majority cases. Injuries noted on various body were thighs/buttock (4.58 %), Breast /chest/back (3.92 %), Perineal injuries (2.61 %), Grievious injuries (1.31 %), Vaginal injury (0.65 %) & Anal injury (0.65 %). Hymenal status was old tears (51.63 %), Carunculae formation (30.07 %), Intact (14.38 %), recent tear (2.61 %), incomplete tear (0.65 %) & Old tear with Tenderness (0.65 %). Sexual assault cases require a sensitive handling, prompt necessary treatment, proper evidence collection as well as if required psychiatric counselling. Involvement of registered medical practitioners from private clinics for judicial examination of survivor will help sexual assault survivors to get justice and proper medical treatment.

Keywords: Sexual Offence, Sexual Assault, Medico legal Examination, Survivor.

SODIUM THIOSULPHATE: A NOVEL SUBSTANCE MISUSED IN MONEY SCAMS

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Abstract:

With the thirst of money going through the roof, the number of cases involving money scams are also increasing. Black money scam, also known as wash-wash scam, is a scam where con artists convince the victim that piles of bank note-sized paper are real currency that has been stained in a heist. The victim is persuaded to pay fees and purchase chemicals to remove the dye with the promise of a share in the proceeds. Iodine solution is used to dye the piles of bank note-sized paper. The chemical used to remove this dye is called a magic cleaning solution which is generally crushed vitamin C tablets containing ascorbic acid. Solutions of calcium hydroxide and magnesium hydroxide are also used. In this study, two unknown samples were received from Baran district under sections 489D, 420, 120B IPC in State Forensic Science Laboratory, Jaipur, Rajasthan for chemical analysis. These samples were recovered from some con men who were trying to bluff people by convincing them that they can print currency with banknote-sized black papers by using a very special chemical, and were charging a large amount of money from the victim in return for the chemical. Laboratory examinations such as color tests, TLC and UV spectroscopy were carried out. Chemical and instrumental analysis revealed one of the samples as an Iodine solution that was used to dye the currency and banknote-sized papers. Presence of widely used chemical ascorbic acid i.e. vitamin C tablets is ruled out in another sample. This sample is found to be a novel substance Sodium thiosulphate. The latter was then successfully tested to remove the dye. The results show that Sodium thiosulphate is also being used by the con men as a magic cleaning solution in black money scams. Sodium thiosulphate is a widely available substance, used in gold mining, water treatment, the development of silver-based photographic film and prints, and medicine to treat cyanide poisoning and other ailments. This study establishes an evidence of the misuse of sodium thiosulphate in such frauds and brings new insight to forensic scientists.

Keywords: Sodium Thiosulphate, Black Money Scam, TLC, UV, Magic Cleaning Solution, ConMen

ON THE DISCRIMINATION OF SOIL SAMPLESBY DERIVATIVE DIFFUSE REFLECTANCE UV-VIS-NIR SPECTROSCOPY AND CHEMOMETRIC METHODS

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Abstract

The derivative diffuse reflectance UV-Vis-NIR spectroscopy combined with the multivariate methods are utilized for the discrimination and classification of the soil samples collected from thenorth-western part of India. The acquired spectra reveal the presence of different organic and inorganic minerals such as humic acid, fulvic acid, hematite, etc. in varying amounts. The differentiation/segregation among soil samples is achieved by peak comparison and chemometric methods like clustering algorithm and principal component analysis (PCA). Among these, the PCA method gives clear segregation of soil samples. The developed PCA model is further validated by analyzing unknown samples for the prediction to their respective clusters significantly. Principal component linear discriminant analysis (PC-LDA) based discriminant model is developed to classify the unknown soil samples to its respective groups. PC-LDA based model reveals 95% accurate clustering of the soil by the leave-one-out cross-validation approach.

Keywords: Derivative UV-Vis-NIR Spectroscopy, Soil, PCA, Chemometric, Forensic Chemistry.

STANDARD GUIDELINES FOR LABORATORY WASTE DISPOSAL OF BIOLOGICAL AND CHEMICAL EVIDENCES: A REVIEW

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Abstract:

The routine operations of most laboratories in our country, whether they are dealing with clinical, research or forensic science, generate some volume of waste materials. In forensic science laboratories, final evidence dispositions are made for closed cases in which evidences will either be disposed of, sold at auction, retained by the government or returned to their owners. It is of concern that many laboratories lack guidelines for the safe handling and disposal of these evidence materials. This review article highlights the importance of developing standard guidelines for disposing of laboratory wastes involving chemical and biological evidences. National Accreditation Board for Testing and Calibration Laboratories (NABL) is an authoritative body that confers formal recognition of competency for conducting sampling, specific tests or measurements, calibration methods and also assures that these laboratories are compliant with the internationally recognized standard ISO/IEC 17025:2005. It monitors laboratory accreditation processes as well as directs and develops criteria for forensic science laboratories accreditation in India. Through its guidelines, NABL specifically recommends that the forensic, chemical and biological testing laboratories establish proper procedures for disposing of exhibits and associated waste materials after the completion of their laboratory analyses and testing. Standard guidelines have also been established by international organizations such as American Society for Testing and Materials (ASTM), National Institute of Standards and Technology (NIST), American Chemical Society (ACS) to regulate laboratory waste management. The article further discusses the various aspects of laboratory waste disposal guidelines as proposed by these national and international organizations. This article also explores several strategies used by different laboratories in terms of waste disposal and seeks to draw a clear distinction between their processes and that of forensic science laboratories. Moreover, the study aims to provide a comprehensive overview of procedure and regulation that should be taken for working with a specific class of evidences which are potentially toxic or hazardous in nature and to ensure that these are handled in a way that is safer for the people and the environment.

Keywords: Waste, Laboratory, Evidence, Disposal, Standard Guidelines

PRESENT AND FUTURE ULTRAMODERN TRENDS FOR - CORRECTING SELENIUM TOXICANT IN ENVIRONMENT USING NATURAL BACTERIAL BIOFILMS AND NANOSTRUCTURES SYNTHESIZED BY GREEN TECHNOLOGY

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Abstract:

Selenium is a rare earth element, a metalloid and occur in four different valence states in the environment such as +VI, +IV, O and –II. The oxyanion selenate (SeO_4^{2-}), selenite (SeO_3^{2-}) are abundant in the strata of earth crusts and spread in soil and aquatic ecosystems because of anthropogenic activities. It is a micronutrient of cells but assume toxicity at higher concentrations by interaction with glutathione and related biomolecules, these may get reduced, as a result of this reactive oxygen species such as H_2O_2 or superoxide ions that are librated lead to death of cells. Naturally occurring microorganisms easily sequester, bioconvert or biomethylate toxic oxyanions of selenium. Aerobic and anaerobic microbes either alone or together of mono and multispecies as biofilms, bioflocs and engineered SeNPs employing biofilms/microconsortia, various bioreactors invented that used fabricated nanostructures from non-biological material and role in bioconversion of oxy-anions of Se to elemental selenium by bacteria has been discussed. Green technology incorporate bioremediation strategies to recover elemental Se(O) due to multitude advantages like simple, risk free, eco-friendly, low cost, easy to use, no skilled personal is required, it is a sustainable technique for all easy to manage and maintain, etc.

Keywords: Bacteria, Biogenic, SeNPs, Bioreactor, Toxicant, Biofilm

IDENTIFICATION OF DRUG ABUSE IN FORENSIC SCIENCES USING DENTAL HARD TISSUE

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Abstract:

Forensic odontology involves the handling, examination and evaluation of dental evidence in criminal justice cases. Forensic toxicology, which is dependent upon toxicology to aid in legal and medical investigation, relies on dental hard tissues in cases which may present with bodies that may have undergone pyrolysis, autolysis or decomposition and skeletonised bodies - making dental hard tissues or teeth a reliable and unique evidence for post mortem investigations in forensic odontology and toxicology. This study reviews the different studies undertaken to detect chemicals and licit and illicit drugs that can be identified in dental hard tissues and their uses in forensic toxicology and odontology. Thus making dental tissue or teeth important evidence in the identification of drug abuse in forensic toxicology. Making its application useful especially in post mortem cases with limited evidence.

Keywords: Forensic odontology, Toxicology, Dental hard tissue, Teeth, Drug abuse, Post mortem uses

A FOCUS ON SUDDEN DEATH CAUSED BY RHEUMATIC HEART DISEASE: A CASE REPORT

Dr Parmesh Singh[1]

[1]Junior Resident 2nd Year

Abstract:

The aim of this presentation is to share the uncommon form of sudden death suffered by 22 years female who died due to due to rheumatic heart disease. A forensic approach by means of history, autopsy, histo-pathological and toxicological investigations led to conclusion that the cause of death was rheumatic heart disease. The histological analysis showed the essential finding of Rheumatic Heart Disease. To reach a correct cause of death in absence of specific data, forensic approach is a must, to be viewed through the eyes of forensic medicine specialist.

Keywords: Rheumatic Heart Disease, Histo-Pathological Investigations, Toxicological Investigations, Forensic Medicine

ePoster Presentations

ON THE DISCRIMINATION BETWEEN LIPSTICK USING RAMAN SPECTROSCOPY AND LINEAR DISCRIMINANT ANALYSIS FOR FORENSIC INVESTIGATIONS

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Abstract:

Forensic science may be characterised as a discipline which, via various science principles, examines and authenticates the facts of interest in a judicial system. Lipstick, known as the easiest and most significant evidence evidence at crime scenes. This trace evidence may offer significant insights into the reconstruction on the discrimination between lipstick using Raman Spectroscopy (RS) and Linear Discriminant Analysis (LDA) for forensic investigations of crime, especially in the course of the occurrence when such cosmetic products transferred from the victim to the assailant. This study used for the first used on using Raman spectroscopy (RS) with exploratory principal component analysis (PCA) and supervised Linear Discriminant Analysis (LDA) for 45 lipstick samples from 8 different brands. Preliminary assessments through visual inspection of their Raman spectra revealed the presence of oxides, titanium dioxide and castor seed oil found in the composition of lipsticks. Unsupervised PCA was performed and the results shows that on chemometric the basis of PCA (PC1=38.1%, PC2= 38.7%) score plot, it was observed that all the samples were entirely segregated according to brand from rest of the samples using PCA technique. The exploratory PCA correctly segregated samples into 7 clusters and the supervised PCA-LDA model correctly classified (100%) them into 8 classes. This study also demonstrates a proof of concept on non-destructive and rapid classification of the lipstick to its lipstick source.

Keywords: Chemometrics, Forensic Science, Lipstick, Principal Component Analysis, Raman Spectroscopy, Linear Discriminant Analysis

ASSESSMENT OF POSTMORTEM CONCENTRATIONS OF OPIATES AND THEIR METABOLITES IN DIFFERENT TISSUES AND FLUIDS

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Abstract:

To assess and compare postmortem concentrations of opiates/opioids and their metabolites in different tissues and fluids. Methods: comparative analytical assay to quantitate postmortem opiates/opioids concentrations in fluid and tissues samples taken from 64 cadavers. Examined samples were stored in the "Poison Control and Forensic Chemistry Center", in Jeddah, Saudi Arabia. The analysis of opiates/opioids was performed using LC-MS/MS Results: The highest levels of morphine concentrations in body fluids were present in bile and urine. For codeine, the highest levels were present in urine and gastric contents. For 6-monoacetylmorphine (6-MAM), the highest levels are present in urine and nasal secretions. The median concentrations of morphine, codeine and 6-MAM in blood were relatively low (77 ng/mL, 16.8 ng/mL, and 11.0 ng/mL, respectively). Almost all obtained biological samples were positive for morphine (60, 93.8%), codeine (55, 85.9%) and 6-MAM (44, 68.8%). The highest levels of morphine concentrations in tissues were present in intestine and stomach. For codeine, the highest levels were present in the urinary bladder and stomach. For 6-MAM, the highest levels were present in intestine and stomach. Conclusions: The highest levels for postmortem morphine concentrations in body fluids are present in bile and urine. The most common substance identified at autopsy is morphine, followed by codeine and then 6-MAM. For codeine, the highest levels are in urine and gastric contents. For 6-MAM, the highest levels are present in urine and nasal secretions. Concentrations of morphine, codeine and 6-MAM in blood are relatively low. The highest levels for postmortem assessment of morphine and 6-MAM concentrations in tissues are present in intestine and stomach, while for codeine, the highest levels are present in the urinary bladder and stomach. Medicolegal examination, including assessment of information from the police and relatives as well as a comprehensive toxicological analysis must be performed to confirm opiate overdose as a cause of death.

Keywords: Forensic Toxicology, Opiates, Morphine, Codeine, Heroin.

ANALYSIS OF CAFFEINE IN URINE BY DISPERSIVE LIQUID-LIQUID MICROEXTRACTION (DLLME) FOLLOWED BY GAS CHROMATOGRAPHY-FLAME IONIZATION DETECTION (GC-FID) – A PRELIMINARY STUDY

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Abstract:

Caffeine is one of the most consumed substances worldwide. Because to its stimulating effects, caffeine can be used as a doping agent, particularly when consumed concomitantly with other substances. On the other hand, caffeine can also be used as a cutting agent for illicit drugs, such as cocaine and amphetamines. For this reason, there is a need for analytical methodologies that allows its monitoring in biological matrices, *e.g.*, urine. In this preliminary study we propose the development, optimization, and partial validating of a dispersive liquid-liquid micro extraction (DDLME) based application to enrich caffeine from urine samples followed by analysis using gas chromatography with flame ionization detection (GC-FID). To optimize the enrichment factors using DLLME, a univariate approach was employed to select the extraction (CH_2Cl_2 $CHCl_3$ or CCl_4) and disperser solvents (CH_3OH, CH_3CH_2OH, $CH_3CHOHCH_3$, $CH3(CO)CH3$ or CH_3CN), followed by a Box-Behnken response surface experimental design with 4 factors (extraction and disperser solvents volume, matrix pH and NaCl content) and 3 levels (-1, 0, +1). The data shows that the maximum enrichment factors are reached when $CHCl_3$ was the extracting solvent (100 μL), CH_3CH_2OH the dispersing solvent (700 μL), the matrix had a pH of 12.0 and a NaCl content of 20 % (m/v). The validation assays performed using only 1 mL of caffeine-free urine samples showed a homoscedastic linearity (R^2 = 0.9941) in the range of 0.05 and 2.5 mg/mL. Intraday precision and trueness assays using three spiking levels (0.05, 0.5 and 2.5 mg/mL) showed relative standard deviations (RSD) and bias (%) of 7.9-19.7 % and 12.6-104.1 %, respectively. The preliminary data indicates that the proposed analytical approach is easy to use, requires very few analytical steps and organic solvents, and presents potential for future applications regarding caffeine monitoring in real urine samples.

Keywords: Caffeine, DLLME, GC-FID, Urine, Micro extraction

DISCRIMINATION OF VERMILION BY ATR-FTIR CUM CHEMOMETRICS

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Abstract:

Vermilion (*sindoor*) is used in Hindu rituals and festivals. It is applied by married women along the line of hair parting as a sign of good omen. Due to its aesthetical appeal, it is used in the work of art, and at times, illegally used as food additive. Vermilion can be encountered at a crime scene, especially in sexual assault cases. Linking vermilion evidence to its source of origin is of utmost forensic interest as it can provide a link between the suspect and the questioned item and the exhibit be used as associated evidence in the court of law. In the current study, an investigation has been carried out to examine whether different manufacturers of vermilion can be discriminated using attenuated total reflectance- Fourier transform infrared spectroscopy (ATR-FTIR) technique supported by chemometric methods. Herein, 17 different brands of vermilion (maroon colour) have been analysed by the aforementioned technique and the pattern in the dataset have been visualized using principal component analysis (PCA). Classification has been carried out using PCA- LDA (linear discriminant analysis) on 6 manufacturers (each with triplicates). 100% classification accuracy was achieved and the model was validated using 6 samples (independently analysed) which resulted in 100% validation accuracy. The present research methodology was able to classify samples according to its manufacturer, and has the prospect to aid investigative agencies to perform quick assessment with regard to the source of origin of vermilion exhibit.

Keywords: Forensic sciences, Vermilion, Discrimination, ATR-FTIR spectroscopy, Principal component analysis, Linear discriminant analysis.

SYSTEMATIC REVIEW ON SCREENING METHODS AVAILABLE FOR NICOTINE AND THEIR METABOLITES IN FORENSIC TOXICOLOGY

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Abstract:

Nicotine is toxic alkaloids which is derived from Nicotiana tabaccum Linn plants. It works as a CNS stimulant in small amounts but high amounts can depress CNS and it is also used as pesticides. The determination and identification of nicotine and their metabolites has great importance in pharmacology, medical and forensic science. In this poster we reviewed screening methods available for nicotine and their metabolites in forensic science. Case studies which are published during the year 2000 to 2021 and indicate toxicological analysis procedures for nicotine are taken into consideration. Various techniques such as Immunoassay, LC-MS, HPLC, GC-MS and TLC were utilized by various authors. Cotinine and trans-3'-hydroxycotinine, these two metabolites are taken in study the most. Nicotine extraction done from the various biosamples (whole blood, urine, brain, kidney, lung and hair). Hair is a great source to extract nicotine from the human body.

Keywords: Nicotine, Screening methods, LC-MS-MS, Biosamples, Metabolites.

THE USE OF BREATH ANALYSER IN THE EXAMINATION OF DRUNKENNESS IN COVID PANDEMIC: HOW AND NEW PROCESS

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Abstract:

There is a risk that COVID-19 may be transmitted to the assessor and/or assessee either by traditional or with the modern method of use of breath analyser. In the traditional method, the assessor either used to smell the breath of the subject or passively used to smell the hand of the subject after he/she exhaled on theirs. Due to the use of N-95 smelling distantly is also not possible. The smell of alcohol in the breath is still a very important fact to mention while examination of drunkenness. To reduce the risk of transmission by correctly using the devices; that is, with single-use disposable mouthpieces; and disposed of hygienically; and disinfected appropriately using alcohol-free wipes. Any traces of rubbing alcohol on units may alter the readings. During the pandemic, it is recommended to minimize the use of a breath analyser. To introduce a new, two-stage process for taking a breath test reading from the subject. Existing devices can operate in two modes – passive, or active. Passive mode is when the subject speaks closely to the device but does not contact it directly. Passive mode detects the presence or absence of alcohol, but not alcohol concentration. Active mode requires the subject to blow into a disposable mouthpiece. Active mode indicates the presence of alcohol and its concentration. Following the use of the breathalyser, the device will be cleaned and disinfected using alcohol-free wipes and a standard infection control process.

Keywords: COVID-19, Breathanalyser, Drunkenness, Blood alcohol concentration, Infection control

A RARE AUTOPSY CASE OF ACUTE HEMORRHAGIC PANCREATITIS IN A CHRONIC ALCOHOLIC PATIENT

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Abstract:

Acute Hemorrhagic Pancreatitis an uncommon type of Chronic Pancreatitis. Most patients with Acute Hemorrhagic Pancreatitis are middle-aged men, smokers with excessive alcohol consumption. Most challenging situation of a forensic pathologist is opining the cause of death in sudden, unexpected, unwitnessed and medically unattended deaths. Although infrequent in the forensic setting, acute pancreatitis should be considered in sudden, unexpected deaths, particularly in those related to alcohol abuse. The gross findings of acute pancreatitis may overlap with those of postmortem autolysis, and therefore microscopic evidence of acute inflammation must be present to confirm the diagnosis. Thus, acute pancreatitis should be considered as a differential diagnosis for cases with signs and symptoms of digestive diseases.

Keywords: Acute Hemorrhagic Pancreatitisis, Alcohol abuse, Sudden death

ADVANCED TECHNOLOGY AS FUTURE OF FORENSIC

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Abstract:

Forensic dentistry has developed into an important component of forensic science and is concerned with the proper handling, examination, and evaluation of dental records, which are then given to the courts in the interest of justice. It plays a crucial role in identifying people who have died in mass disasters or crimes and those that can't be identified visually or by any other means. Digital forensics can be defined as "Application of computer science and investigative techniques for a legal purpose involving the analysis of digital evidence". In terms of data gathering and analysis, digital forensics with its recent technologies like, virtopsy that uses magnetic resonance spectroscopy for extraction of toxins, comparison microscopes, forensic biorobots, intraoral optical scanners, computerized facial reconstruction among others, has transformed traditional forensic investigations. Digitised images in additional to being more dependable, faster, more accurate and error free, it has an advantage of easy transfer of data and cannot be modified by third party. These technologies are particularly useful in disaster victim identification, where large number of bodies have been brutally mangled, as they allow for digital picture transfer without loss of information. With a little upgradation of the software and devices it is safe to say that advanced technology and digitization of data is the future of forensic.

Keywords: Forensic Dentistry, Digital, 3-D Analysis, Identification, Technology

MICROSCOPY AND FORENSICS

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Abstract:

One of the latest technologies of microscopy is the development of scanning electron microscope (SEM). It enables us to view any particle under three different modes - high vacuum mode, low vacuum mode, particular ESEM mode. This microscopes combines the functions of three microscopes under one instrument and thus allows widest range of samples to be investigated. It allows the Analysis and imaging of uncoated specimens which are also unstable in vacuum. The SEM has a great significance in forensic investigations as it is very suitable for the imaging of non-conducting materials at high kV. Material such as plastics, fibers, fingerprints, hair strands, Polymers, glass, wood, paint, fibers etc. can be imaged with the help of SEM under their uncoated natural state. The software of SEM automatically controls the transition of view mode from high vacuum to low vacuum. The third mode of operation plays a significant role in the analysis of delicate samples such as pollen and fungi, wet samples, dirty and oily samples such as shoes and shoe prints. The SEM has a wide variety of applications for various forensic investigations such as detecting forgeries, distinguishing the cause of textile fiber damage, investigating paint chips, bulb filaments and cartridge cases. It also finds its way in the investigations of Gunshot residues, fresh pollen on clothes and gym shoe debris.

Keywords: SEM, Forensic Application, Investigation, Microscopy