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MAAFS ABSTRACTS

Comparison of PGM Subtyping Isoelectric Focusing and Conventional Electrophoresis on Agarose Gels – John Mertens†, MS, Research Unit, Forensic Science Research and Training Center, FBI Academy, Room 214A, Quantico, VA 22135; (703) 640-6131 ext 2825

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The analysis of PGM variants in the forensic laboratory is a well accepted technique in the individualization of blood and semen stains. By using an isoelectric focusing or subtyping procedure, the three common phenotypes may be further subdivided into ten phenotypes. Problems associated with the use of polyacrylamide gel as the support medium have led to the development of agarose methodologies which to date have given consistently good results coupled with ease of handling and preparation. Side by side studies were undertaken to compare subtyping by IEF and conventional electrophoresis. Aging studies of samples at 0°C, 4°C, 24°C, and 37°C were also completed. Data indicate that although upon aging, samples kept at 37°C lose activity fastest in both systems, with those aged under the other conditions, better results are obtained by isoelectric focusing. It should also be noted, however, that subtyping by conventional electrophoresis does provide an acceptable methodology for routine analysis, especially in laboratories that do not have or cannot afford to maintain IEF equipment and reagents.

A Micro Capillary Absorption-Inhibition Method for the Determination of Lewis Phenotypes from Semen and Saliva Stains – Betsy Baer†, BA, James Kearney, MS, Research Unit, Forensic Science Research and Training Center, FBI Academy, Quantico, VA 22135; (703) 640-6131

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A simple low-cost method for the detection of the Le^a and Le^b antigen to determine secretor status from body fluid stains other than blood is described. Combining a microcapillary hemagglutination method with absorption-inhibition, dried semen stains from 200 individual caucasians were screened for Lewis phenotypes. Among the samples tested, the frequency of Lewis (a–b–), (a+b–) and (a–b+) was 7%, 21% and 72%, respectively, thereby confirming the reliability of this method. Lewis a and b antigen titers were compared in samples from 30 individual secretors and 30 individual non-secretors. The titer of the Le^a antigen in non-secretors ranged from 1/32 to 1/512, and while in secretors the titer of the Le^b antigen ranged from 1/8 to 1/2024. In testing repeat samples from a single donor, varying levels of the Le^a and Le^b antigen were detected. Studies with saliva revealed increased titers for both the Le^a and Le^b antigens when compared to semen.

Sex Determination from Forcibly Removed Hairs – James Mudd†, MS, Research Unit, Forensic Science Research and Training Center, FBI Academy, Quantico, VA 22135; (703) 640-6131 ext 2825

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The determination of sex from forcibly removed hairs in forensic laboratories has in the past been based almost entirely on the presence or absence of the Y chromosome in the cells of the hair root sheath. Since the human male genotype is XY and female is XX, a technique was devised which permits root sheath cells to be stained successively for the Y and then the X chromosome using quinacrine mustard. Following staining, the Y and the X chromosome fluorescence is observed, at pH 5.5 and 3.0, respectively, by epi-fluorescence. Preliminary results indicate that hair root sheaths from known males (N=25) exhibit an average of 2% X and 35% Y chromosome fluorescence when counting a field of 100 cells. Conversely, hair root

sheaths from known females (N=25) exhibit an average of 20% X and 2.7% Y chromosome fluorescence. Additionally, sex typing from hair root sheaths up to 99 days old has been successfully accomplished. Work to date indicates that this technique will provide a reliable method for the determination of sex from forcibly removed hairs.

Detection of p30 in Semen by Thin-Layer Immunoassay – A. Masibay†, N. T. Lappas, PhD, Department of Forensic Sciences, The George Washington University, Washington, DC 20052; (202) 676-7319

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The protein p30 has been shown by others to be a semen specific antigen. TIA has been employed successfully for the detection of this antigen in semen. Using both a direct and an indirect method of TIA analysis, p30 may be detected in fluid semen as well as semen stains. The method is sufficiently sensitive and specific to be of value in forensic serology.

Forensic Bloodstain Identification – Presumptive Testing – Robert Spalding†, MS, FBI Laboratory, 9th & Pennsylvania Ave, NW, Washington, DC 20535; (202) 324-4362

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The literature reflects that efforts to identify blood for forensic purposes date back to the early 1800s. Then, as today, investigators would accept no presumptive test as absolutely conclusive nor universally applicable. Some of the approaches and reagents used in bloodstain identification will be reviewed.

An Improved Griess Test for Nitrites in Propellant Gunpowder Residue – James Molnar†, PhD, John Dillon Jr, Research Unit, Forensic Science Research and Training Center, FBI Academy, Quantico, VA 22135; (703) 640-6131

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When smokeless gunpowder burns or partially burns, as when a cartridge is fired, the residues will contain what is chemically referred to as "nitrites." The Griess test is used for detecting "nitrites" in burned gunpowder residue. The chemical reactions which take place in the test are based on the conversion of the nitrites to a colored dye. In the presence of nitrites and acetic acid, sulfanilic acid and Marshall's Reagent react to form an orange azo dye. By substituting 1-naphthol (used by the Royal Canadian Mounted Police) for the more toxic and expensive Marshall's Reagent, an improved Griess test for nitrites results. The sodium rhodizonate test for lead may also be conducted afterward.

Analysis of Explosives and Related Materials by HPLC – Ken Alden†, Waters Associates, Milford, MA

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A survey is presented on the use of HPLC on evidence from explosion sites.

Analysis of Exploding Dye Packets – Roger Martz†, BS, Dennis Reutter, PhD, Lynn Lasswell III, BS, FBI Laboratory, 9th & Pennsylvania Ave, NW, Washington, DC, 20535; (202) 324-3380

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Exploding money dye packets are an increasingly popular tool used to aid in the investigation of robberies. The Federal Bureau of Investigation Laboratory has found that dyes and lachrymators from these packets can often be identified on evidence by using GC/MS. Different ionization techniques may be employed to optimize sensitivity and specificity depending upon the formulations of the packets and the condition of the sample. In most cases electron impact ionization is sufficient for detection and identification; however, negative ion chemical ionization has been useful in identifying small quantities of the dyes and lachrymators when electron impact was unsuccessful.

Open Discussion on Explosive Residue Analysis – Rick Tontarski, BATF National Laboratory Center, 1401 Research Boulevard, Rockville, MD 20850; (301) 443-5335

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An open discussion covering the range of options in analytical techniques available today for the analysis of residues and debris found at sites of explosive activity. Analytical methods will be compared as to effectiveness, sensitivity, ease of use, cost (with special emphasis on inexpensive substitutes for fancy, commercial equipment), and the value of their data for

furthering the investigation of the crime and for testifying in court.

Alcohol and You – Who is in Control? – D. R. Wilkinson†, D. Sockrider, C. L. Wilkinson, Delaware State College, Department of Chemistry, Dover, DE 19901; (302) 736-4438, and Delaware State Police Crime Lab, Dover, DE

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"Alcohol and You – Who's In Control" is a film made jointly by the Delaware State Police and the Du Pont Company. The purpose of the film is to illustrate the effects of alcohol on a driver's judgement. This is accomplished by having volunteers (all scientists) consume sufficient alcohol to reach a 0.05% and a 0.10% blood alcohol levels, having them undergo routine physical tests and answer questions. The film is edited in such a manner that the changes become very apparent as the percent of alcohol increases. The answers to questions are especially interesting since the subjects are scientists and more analytical in their observations.

Illicit Substance Identification Using Fused Silica Capillary Gas Chromatography with Immobilized Stationary Phases – Paul Larson†, Linda Plotczyk, Hewlett-Packard Company, Avondale, PA 19311; (215) 268-2281

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Recent studies have shown that the incidence of drug related deaths may account for greater than 60% of the coroner's caseload [L. E. Norton, J. C. Garriott, and V. J. M. DiMaio, *Journal of Forensic Science*, 27:66 (1982)]. Sensitive, selective, and cost-effective methodologies are necessary which can rapidly identify a variety of illicit or therapeutic agents in serum, urine, tissue, and "street" powders.

In this study the chemical durability of a cross-linked siloxane deactivated phenyl methylsilicone stationary phase was investigated by measuring column performance with respect to reproducibility, extractability, capacity, and selectivity. Column effects on the reliability of the method were determined by monitoring the relative response factors and linear retention indices of selected underivatized alkaloids and barbiturates.

The simultaneous analysis of alkaloids, barbiturates, analgesics, and tricyclic antidepressants will be used to demonstrate the advantages of high resolution in drug screening techniques. Examples of a human serum and urine screen for drugs such as diazepam, morphine, amphetamines, meperidine, heroin, cocaine, amitriptyline, and PCP will be presented. In addition, the quantitative and qualitative analysis of street heroin, cocaine and drug profiling of unknown tablets by capillary techniques will be shown.

Simultaneous Qualitative and Quantitative Analysis of Mixtures of Cocaine Hydrochloride with Mannitol, Lactose, and Lidocaine – William Wolpe†, MSFS, Walter Rowe, PhD, Department of Forensic Sciences, The George Washington University, Washington, DC 20052; (202) 676-7319

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X-ray diffractometry is a technique widely used in forensic science for the examination of inorganic substances as soil minerals and plant pigments. Crystalline organic substances may also be examined by x-ray diffractometry. An x-ray diffraction method has been developed for the identification and quantitation of cocaine hydrochloride in mixtures containing diluents such as mannitol, lactose, and lidocaine. Advantages and disadvantages of the method compared to other methods of analysis will be discussed.

Liquid Chromatography of Opium Alkaloids, Heroin, and Cocaine using Electrochemical Detection – R. S. Schwartz†, PhD, and K. O. David, US Customs Service Laboratory, 1301 Constitution Avenue, NW, Washington, DC 20229;

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A new application of electrochemical detection is presented for the liquid chromatographic analysis of the opium alkaloids, heroin, and cocaine. This technique is based on the electrochemical oxidation of the aliphatic tertiary nitrogen common to almost all these compounds and is therefore, a general method having wide applicability in the area of narcotic analysis. Due to the high sensitivity inherent in electrochemical detection, this technique is well suited for forensic applications involving the analysis of these compounds at trace levels.

This study will demonstrate the most suitable conditions for the analysis of these com-

pounds including column, mobile phase, and pH. Performance will be evaluated from the standpoint of reproducibility, linearity, and sensitivity. Some practical applications will be demonstrated.

Fiber Evidence in the Wayne Williams Case – Harold Deadman†, PhD, FBI Laboratory, 9th & Pennsylvania Ave, NW, Washington, DC 20535; (202) 324-4918

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The Wayne Williams murder trial held in Atlanta, Georgia, in January and February of 1982, resulted in Williams' conviction on two counts of murder. During the trial, evidence linking Williams to 12 murder victims was introduced. An extremely important part of the case against Williams was the fiber evidence which associated Williams to these 12 victims. The objective of this paper is to present all aspects of the fiber evidence introduced at the trial. This discussion will be concerned primarily with 4 topics: (1) the recovery and handling of fibrous materials removed from the victims' bodies, (2) the methods and procedures used to characterize and compare the fibers, (3) the significance of many fiber "matches" reported at the trial and how this significance was determined, and (4) the actual presentation of the fiber evidence during the trial. Several of the items from Williams' home and automobile were composed of very uncommon fibers. A discussion of how information was developed about these uncommon fibers and presented at the trial will also be included in this paper.

Detection of Forgeries – Oil Paintings – Charles Olin†, Painting Conservation, 9447 Rabbit Hill Road, Great Falls, VA 22066; (703) 759-3581

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Examples of reasons why oil paintings need restoration treatment and types of treatment performed in the past are presented. Techniques of examination, documentation, and analysis of oil paintings and examples of current treatment are also presented. Dual color slides are presented to illustrate the above as well as several case studies of forgeries.

Identification of Wrapping Materials – Walter Rowe†, PhD, Victoria Mori, BA, Victoria Swift, BA, Department of Forensic Sciences, The George Washington University, Washington, DC 20052; (202) 676-7319

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Plastic film wrapping materials may occur as evidence in a variety of criminal cases. It may be necessary to compare samples of film wraps found at the scene of a crime or used to wrap contraband substances with samples of film found in the possession of a suspect. Comparison may be made on the basis of (1) infrared absorption spectra, (2) film thickness determined by the spacings of infrared diffraction fringes, and (3) extrusion (or calendaring) marks. While it will generally not be possible to show that two samples of film wrap came from the same roll, it may be possible to show that both are the same brand.

QD SESSION ABSTRACTS

Important Elements of Ancient Handwriting Comparison – Gideon Epstein†, Immigration and Naturalization Service Laboratory, Washington, DC

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The word "ancient" as used in this paper is taken from Rule 901(b)(8) of the Federal Rules of Evidence as writing "older than 20 years."

The examination and comparison of ancient handwriting presents many unique problems to the examiner. When this handwriting is made in a foreign handwriting system, the problems are multiplied many times and only through the applications of certain well established principles can the document examiner hope to reach correct conclusions.

Properties and Pitfalls of Language in Expressing Handwriting Opinions – Thomas McAlexander†, BS, US Secret Service Laboratory, 1800 G Street, NW, Suite 924, Washington, DC 20223; (202) 535-5830

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The limitations of language in expressing ideas and feelings can be severe for the forensic scientist, especially if he wishes to express his opinion to those with little or no knowledge of his field of expertise. Document examiners feel this limitation when expressing opinions that are less than conclusive, because often our knowledge is far greater than that of our audience. Sometimes the problem is compounded by faulty reasoning. It is critical that we are clear and precise when we express our opinions in reports and testimony and that we are not swayed by our prejudices; however, it is equally important that we admit our language limitations which are brought about because we have information which is only gained by years of experience and which cannot be communicated adequately to those who lack that experience.

The Current State of Questioned Document Examinations in the Arab Republic of Egypt – Riad Basalah, BSc, Ministry of Justice, Arab Republic of Egypt, and Peace Fellow, Department of Forensic Sciences, The George Washington University, Washington, DC 20052; (202) 676-7319

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The present state of the art in questioned document examinations in the Arab Republic of Egypt will be discussed, including the organization and staffing of forensic science laboratories and their current analytical capabilities. A number of current problems facing the questioned document examiner in the Arab Republic of Egypt will also be presented. These will include: (1) the incresed occurrence of forgery combined with alterations and obliterations, (2) inferences of pyschological states of signatories (especially for signatures allegedly obtained under duress), (3) incresed use of sophisticated counterfeiting techniques, (4) societal changes leading to increased use of typewriters, and (5) problems unique to the arabic alphabet.

How Long Will the Examination Take? – Philip White, BATF Laboratory, P. O. Box 2994, Atlanta, GA 30370; (404) 455-2660

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No abstract submitted in time for publication.

More on Inferences – Durley Davis, FBI Laboratory (retired) and Bureau of Forensic Sciences Northern Virginia Laboratory (retired), Falls Church, VA

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Further thoughts are developed on Jack McCarthy's presentation on Inferences given at the August American Society of Questioned Document Examiners meeting in Boston.

SOFT ABSTRACTS

Forensic Pharmacokinetics of Alcohol – Kurt Dubowski†, PhD, The University of Oklahoma HSC, Department of Medicine, Room 38-R, P. O. Box 26901, Oklahoma City, OK 73190; (405) 271-2270

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We have studied and report upon key biological factors in the uptake, distribution, and elimination of ethanol in human subjects. The findings document the fallacy of these long-standing postulates: (1) alcohol absorption is always complete in 60-90 minutes; (2) the classical Widmark BAC versus time curve applies universally; (3) the BAC declines in regular, zero order manner; (4) the β_{60} is a constant 15 mg/dl/hr for all subjects; and (5) retrograde extrapolation of the BAC is feasible and simple in routine medicolegal practice.

Among the phenomena to be illustrated and discussed are rectolinear versus exponential BAC decline as a function of time, variability of peak blood-alcohol time and concentration, the "steeple" effect and other short-term irregularities of BAC, and the broad range of human pharmacokinetic parameters. Results of two blood or breath-alcohol analyses do not per se suffice for meaningful and correct retrograde extrapolation.

These factors underlie the recommendation that *speculative retrograde extrapolation* of the BAC or BrAC, that is, conjectural estimates of the BAC or BrAC at a prior time, be abandoned in forensic science practice for traffic law enforcement or other purposes.

The Results of One Analytical Approach in a Hotel Fire with Four Fatalities – Michael Schaffer†, PhD, Reng-Lang Lin, PhD, Robert Stein, MD, Cook County Institute of Forensic Medicine, Office of the Medical Examiner, 1828 West Polk Street, Chicago, IL 60612; (312) 443-5010

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Four persons died as a result of an alleged "burning cigarette" mishap. Blood was received for toxicology containing sodium fluoride. Much speculation concerning the by-products of combustion and their "disorienting" effects on persons trapped in fires led this investigator to attempt to delineate if some chemicals were present in the conflagration in sufficent concentration to be measurable after inhalation by these persons. A systematic approach was initiated to analyze for the following categories of chemicals: natural gas, volatile halogenated hydrocarbons, volatile solvents, as well as carboxyhemoglobin, cyanide and thiocyanate. 2 ml of blood were placed in a 4 ml Pierce reactivial, heated for 10 minutes at 70°C and the headspace was injected into a GC equipped with FID for the analysis of natural gas. 1 ml of blood was extracted with CS_2 and 2 µl injected into a GC equipped with FID for the analysis of volatile solvents. 1 ml of blood was extracted with 1 ml of hexane and 2 µl injected into a GC equipped with ECD for the analysis of volatile halogenated hydrocarbons. A 1.2 m glass column packed with 0.2% carbowax on carbopack 1500 was used for all the GC analyses. Carboxyhemoglobin concentrations were 26, 67, 64, and 50% saturation, respectively. Cyanide concentrations were <0.25, 6.0, 2.7, and 1.4 mg/l, respectively. Thiocyanate concentrations were 100, 36, 55, and 43 mg/l, respectively. No chemicals were identifiable by the GC methodology. Other parameters are now being investigated to further elucidate the role of inhaled gases in these deaths. The role of the analytical forensic toxicologist must include the collection of this relevant data and its interpretation.

A Fatality Involving Propoxyphene and Chlordiazepoxide in a Ten Year Old Child: Suicide or Accident? – Michael Schaffer†, PhD, Reng-Lang Lin, PhD, Nancy Wu Chen, PhD, Yuksel

Konakci, MD, Mary Ann Suero, MS, Mary Lyn Kurland, BS, Robert Stein, MD, Cook County Institute of Forensic Medicine, Office of the Medical Examiner, 1828 West Polk Street, Chicago, IL 60612; (312) 443-5010

A 10 year old black male was found unresponsive. An autopsy was performed which demonstrated marked congestion and edema of the lungs with marked hyperemia of the mucosa of the trachea, larynx, and bronchi. Blood, bile, liver, and gastric contents were submitted for toxicology. Analysis of the blood revealed the presence of propoxyphene and chlordiazepoxide. A computerized Hewlett-Packard 5840A gas chromatograph equipped with either a flame ionization or nitrogen-phosphorus detector was used for the GC analyses. Quantitation was performed by internal standard methodlogy on a 3% OV-101 column. A Finnigan 3200 gas chromatograph/mass spectrometer with an Incos 2300 data system operating in the EI mode was used for the GC/MS analyses. Concentrations of propoxyphene in blood, bile, and liver were 16 mg/l, 24.6 mg/l, and 157 mg/kg, respectively. Concentrations of chlordiazepoxide in blood and liver were 3.0 mg/l and 8.6 mg/kg. The total amount of propoxyphene and chlordiazepoxide in the gastric contents was 124 and 7.8 mg, respectively. The initial history reported some breathing problems related to bronchitis and dizziness the night before his death. There were no visible signs of abuse or neglect. The follow-up investigations revealed a history of severe depression and psychiatric care since the age of 3 years. Because of the child's age and unusual history, the death certificate reported the manner of death as undetermined. Extraction techniques, GC conditions and follow-up investigations will be discussed.

Toxicological Findings in Digoxin Cases – Vina Spiehler†, PhD, R. H. Cravey, Office of the Sheriff-Corner, County of Orange, 550 North Flower Street, Room 201, Santa Ana, CA 92702; (714) 834-3073

Heart disease is the leading cause of death in the United States (38% of deaths) and a leading cause of sudden unexpected deaths. Digoxin is prescribed for many of these patients. The therapeutic dose of digoxin is fairly close to the toxic dose and in some patients digoxin causes nausea, vomiting, visual disturbances, and possibly life-threatening arrhythias. When digoxin has been prescribed for the deceased we analyze the heart blood taken at autopsy for digoxin. However, since post-mortem blood digoxin concentration has been reported to increase with time after death [Vorpahl and Coe, *Journal of Forensic Science*, 23:329 (1978)], the body distribution of digoxin is also determined. We have found that toxic symptoms and morbidity correlate best with the entry of digoxin into brain stem and optic pathways. Therefore, the concentration of digoxin in brain stem (area postrema, medulla, choroid plexus, cerebellar tonsil) and of the optic chiasm, optic tract and lateral geniculate nucleus of the thalamus are determined using 125 I-digoxin radioimmunoassay. In the case to be discussed the brain distribution predicted toxic blood concentrations which were subsequently confirmed by hospital digoxin assay of ante-mortem blood.

Toxicological Findings in a Homicide Due to Intravenous Injection of a Cleaning Solvent (Naptha) – Mary Mackell, BS, Alphonse Poklis†, PhD, Mary Case, BS, Department of Pathology, St. Louis University School of Medicine, 1402 South Grand Boulevard, St. Louis, MO 63104; (314) 664-9800

The toxicological findings in the murder of an 80 year old, white male forcibly restrained while being injected intravenously with 25-50 ml of a cleaning solvent (naptha) will be presented. Blood was analyzed by head-space gas chromatography under various conditions utilizing a series of stationary phases including 10% Carbowax 1500 on Chromosorb WHP 80/100 mesh, Porapak Q and 3% SE-30 on Chromosorb WHP 80/100 mesh. Resultant complex chromatograms of major hydrocarbon components of naptha were consistent with chromatograms obtained with the specific brand of cleaning solvent administered by the perpetrators of the crime. Mass spectrometric analysis demonstrated the presence of alkyl and aromatic hydrocarbon constituents of naptha. Additionally, aromatic hydrocarbons were determined in blood by colorimetry with formaldehyde-sulfuric acid reagent.

Cannabinoids in Plasma after Passive Inhalation of Marijuana Smoke – Andrew Mason†, BS,

Mario Perez-Reyes, MD, Arthur McBay, PhD, University of North Carolina, Room 903, Preclinical Education Building, Chapel Hill, NC 84112; (919) 966-2258 and Rodger Foltz, PhD, Center for Human Toxicology, Salt Lake City, UT

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Plasma samples were taken from a subject during a heavy passive exposure to marijuana smoke, and analyzed blind for THC by RIA and GC/MS, and for THC metabolites by GC/MS. RIA showed increasing concentrations of THC, which reached a plateau of 2.2 ng/ml after 20 minutes. RIA results were confirmed by GC/MS, although the values determined were higher. Sub-ng/ml concentrations of 9-Carboxy THC were found in the samples taken during the later part of the exposure. The shape of, the area under and the plateau concentration exhibited after passive smoking were reproduced in the same subject using a THC infusion. A potential method of distinguishing passive from active marijuana smokers, based on relative cannabinoid plasma concentrations will be proposed.

Analysis of LSD in Body Fluids – Judy Johnson†, Michael Peat, PhD, Center for Human Toxicology, University of Utah, 38 Skaggs Hall, Salt Lake City, UT 84112; (801) 581-5117

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Identification and quantitation of LSD in biological samples is difficult due to the small doses used and rapid metabolism. Using an HPLC system similar to that described by Twitchett, *et al* [*Journal of Chromatography*, 150:73-86 (1978)], nine urine samples were examined for the presence of LSD. Urine is extracted at alkaline pH using a heptane-isoamyl alcohol solvent. After back-extraction into hydrochloric acid, an aliquot of the aqueous layer is injected directly onto the HPLC column. A reverse-phase system with a phosphate buffer (pH 8):methanol eluent and a fluorescence detector were used. Each positive sample was irradiated with long-wave UV light for 30 minutes and rechromatographed. LSD is extremely susceptible to this treatment and no peak with the RV of LSD is observed following irradiation. The HPLC procedure has also been used to analyze tissue samples collected at various times after the injection of LSD (1.5 mcg/kg, i.p.) to rats. In an attempt to further differentiate LSD from other ergot alkaloids, the rate of disappearance of ergot alkaloids during irradiation was monitored.

In summary an HPLC-fluorescence technique has been evaluated for the detection of LSD in body fluids. The procedure has been successfully applied to case samples.

Detection of Opiates in Blood by means of Thin-Layer Immunoassay – L. C. Shughart†, N. T. Lappas, PhD, Department of Forensic Sciences, The George Washington University, Washington, DC 20052; (202) 676-7319

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The detection of opiates in urine by Thin-Layer Immunoassay (TIA) has been described previously. We now report on the use of TIA for the detection of opiates in post-mortem blood samples. Blood samples are prepared for analysis by the removal of proteins by one of several methods, for example, ultrafiltration. The procedure is capable of detecting picogram quantities of opiates in blood and has been evaluated in a study of over 50 post-mortem samples.

Detection of Opiate Drugs by Latex Agglutination-Inhibition Tube Test Method – Naresh Jain†, PhD, University of Southern California School of Medicine and Rancho Los Amigos Hospital, 7601 East Imperial Highway, Downey, CA 90242; (213) 922-7973

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A latex agglutination-inhibition tube test method for the detection of opiate drugs in urine is described. The test employs a derivatized drug covalently bound to latex and antiserum reagent predispensed in a reaction tube. Actually the test components consist of an antigen in the form of a suspension of latex polymer particles to which a morphine molecule has been covalently bounded and an antiserum containing antibodies to opiate drugs. One-half ml urine is added to a prefilled antiserum tube followed by 0.1 ml latex-antigen reagent. The tube is mixed, let stand at approximately 37°C for 2 hours and visually read. The antiserum is neutralized and NO FLOCCULATION occurs if the urine contains an opiate drug at greater than 300 ng/ml concentration. No flocculation is a positive test. Urine which contains no opiate drugs or contains below the test sentivity does not neutralize the antiserum, resulting in agglutination or

flocculation of the latex reagent. Thus flocculation indicates a negative test.

A series of several urine samples obtained from known heroin users gave excellent results. The test is simple and easy to perform. No equipment is required except a 37°C water or heating block. The test does not differentiate between morphine and opiate drugs similar in structure to morphine.

Identification of Basic Drugs in Urine by Dual Fused Silica Capillary Column Gas Chromatography – George Hime†, MS, Leonard Bednarczyk, PhD, Dade County Medical Examiner's Department, 1050 Northwest 19th Street, Miami, FL 33136; (305) 325-7347

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A method for analyzing urine for the presence of basic drugs and their metabolites using two fused silica capillary columns is described. Urine extracts are injected into a gas chromatograph equipped with nitrogen-phosphorous detectors and two capillary columns, housed in a single injection port. The injected material is simultaneously chromatographed in each column. Identification of unknowns is done using relative retention times. The operating conditions and column characteristics are presented and discussed.

The advantages derived from this method include: the resolution capabilities of the fused silica capillary columns, the specificity and sensitivity of the nitrogen-phosphorus detectors, and the simultaneous dual column configuration.

Quantitation of Cis Thiothixene in Human Blood by High Pressure Liquid Chromatography – Stuart Bogema†, Nedathur Narasimhachari, PhD, Departments of Pathology and Psychiatry, Medical College of Virginia, Richmond, VA 23298; (804) 786-5065

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Thiothixine (Navane; TTX), a low dose antipsychotic, occurs in cis and trans isomeric forms, the cis being the active drug. We have separated the isomers by HPLC using a Radial Compression Module (Waters Associates, Milford, MA) with a cyanopropyl reverse phase cartridge and methanol:acetonitrile:aqueous 0.03 M NaH_2PO_4:triethylamine (400:50:50:1) pH 7.45 mobile phase. Mesoridazine is used as an internal standard (K' values of 3.7, 4.4, 5.4, and 6.3 for cis TTX, trans TTX, N-desmethyl TTX and mesoridazine, respectfully.) A mixture of 2ml blood, 50 ng internal standard, and 0.5 ml 2N NaOH is passed through an activated C18 SEP–PAK cartridge (Waters Associates.) The drugs are eluted with 4 ml of ethyl acetate. Concentrated extract (20 µl of 40 µl) is injected into the HPLC. UV absorbance can be monitored at 254 or 229 nm. A standard curve is used to determine drug concentration in unknown samples to a sensitivity of 5 ng/ml.

Analysis of Disopyramide and Mono-N-Despropyl Disopyramide Using High Performance Liquid Chromatography – Roy Altman†, PhD, D. Greer Falls, MD, Medical College of Georgia, Augusta, GA, 30912; (404) 828-2179; and Bernard Thompson, PhD, Laboratory Procedures/Smith-Kline, King of Prussia, PA

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The antiarrhythmic drug Disopyramide has been assayed successfully using a variety of techniques including enzyme immunoassay (EMIT), GLC, and HPLC. For therapeutic drug monitoring the EMIT has gained the most popularity. However, when it is necessary to know the concentration of its metabolite, mono-N-despropyl disopyramide, some chromatographic technique is commonly employed. Numerous HPLC columns and mobile phases have been used and it is our purpose to select a method most suited to this laboratory and compare the results to the EMIT method.

The method chosen for patient samples involves an extraction of 0.5 ml serum and 0.2 ml 1N NaOH with 2 ml of chloroform. After solvent separation and evaporation the residue is redisolved in 0.05 ml of mobile phase. Then 0.02 ml of extract is chromatographed using C18 column heated to 45°C with methanol: triethylamine:water:acetic acid (40:4.5:54.5: 5.5) as the mobile phase.

Comparisons with EMIT for thirty patient samples gave a correlation coefficient (r) of 0.98.

Finally, a cyano column was utilized in a direct injection analysis of disopyramide and its metabolite. 0.1 ml of patient serum is vortexed with 0.1 ml of mobile phase, centrifuged and 0.02 ml injected. A Beckman Model 165 variable wavelength detector, which allows real time spectrophotometric scans, was also utilized to add specificity to this method.

Liquid Chromatographic Analysis of Thiopental in Blood and Tissues – Barry Levine†, BS, James Valentour, PhD, Robert Blanke, PhD, Department of Pathology and Legal Medicine, Medical College of Virginia, Richmond, VA 23298; (804) 786-0339

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Thiopental is an ultra-short acting barbiturate frequently administered as an anesthetic agent prior to surgery. Because of its potential role in anesthetic deaths, its quantitation can have significant forensic implications. Analysis of thiopental by gas chromatography is difficult because of its thermal instability. A liquid chromatographic procedure is presented here for the quantitation of thiopental. Specifically, 0.5 ml of blood is buffered to pH 5.5 and extracted with 5 ml dichloromethane after the addition of internal standard (200 mcg phenolphthalein.) After mechanical rotation and centrifugation, the organic layer is removed and evaporated to dryness at 40°C. The residue is reconstituted with methanol and 20 µl is injected into the liquid chromatograph. An Altex C18 Ultrasphere-ODS 10 micron column (4.6 mm ID x 25 cm) was used. The mobile phase was methanol:water (60:40) at a flow of 2 ml/min. The wavelength of detection was 290 nm. This procedure can be augmented to permit the quantitation of thiopental in tissues by back-extracting the methylene chloride into 0.1 M NaOH followed by reextraction with methylene chloride after acidification.

Amoxapine: Acute and Chronic Overdose as Determined by a Method Employing Gas Chromatography/Mass Spectrometry – Edward Briglia†, BS, Jesse Bidanset, PhD, Leo Dal Cortivo, PhD, Department of Pharmaceutical Sciences, St. John's University, Jamaica, NY, and Office of the Medical Examiner, Suffolk County Office Building, Hauppauge, NY 11788; (516) 360-5555

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Several cases of deaths due to chronic and/or acute administration of amoxapine have been investigated by gas chromatography/mass spectrometry. Ratios of parent drug to 8-hydroxyamoxapine, the major metabolite in man, have been determined for blood, brain, and liver. These findings are correlated with chronicity of use and survival interval. These observations are discussed as is the analytical process employed.

GC and GC/MS Analyses of Maprotiline (Ludiomil®) and its Tissue Distribution in Fatalities – Nancy Wu Chen†, PhD, Michael Schaffer, PhD, Reng-Lang Lin, PhD, C. Trojan, BS, S. Wang, MS, Robert Stein, MD, Cook County Institute of Forensic Medicine, Office of the Medical Examiner, 1828 West Polk Street, Chicago, IL 60612; (312) 443-5010

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A method for the analysis of maprotiline (Ludiomil®), a new tetracyclic antidepressant, is presented here. Biological specimens were extracted with hexane at pH 10, back-extracted with 1N sulfuric acid. The acidic layer was re-extracted with hexane at pH 10. The presence of maprotiline was detected by GC and confirmed by GC/MS. In the electron impact mass spectrum of maprotiline, the base peak and molecular ion were at m/z 44 and 277, respectively. Dexbrompheniramine was used as the internal standard for GC quantitation.

Maprotiline associated fatalities were rarely reported in the United States. Four such cases were reported in Cook County, Illinois. Maprotiline was the direct causative agent in two of these cases, while nortriptyline (5.7 mg/l in blood) and 2,2,2-trichloroethanol (9.4 mg/l in blood) were also contributory in the other two cases. Of the four cases, the mean concentration of maprotiline in blood was 10.3 mg/l (range 1.1–31.6). The mean concentration in liver was 143 mg/kg (range 16.5–288). The high liver:blood ratio is suggestive of acute intoxication. Tissue distribution of the four cases will also be discussed.

Toxicological Findings in a Darvon Overdose – Arvind Chaturvedi†, PhD, N. G. S. Rao, PhD, Michael Hurly, MD, Department of Toxicology, Box 5195, North Dakota State University College of Pharmacy, Fargo, ND 58105; (701) 237-8297

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Propoxyphene (Darvon), an analgesic, is often used in combination with aspirin and other related drugs. In the report, the findings of a fatal case involving propoxyphene are described. The deceased, a 35 year old caucasian male found dead on kitchen floor, was a known user of abused drugs and had been taking aspirin alone or in combination with phenacetin and caffeine for the relief of joint pains. The gross examination of the organs in autopsy revealed the slight grooving of the

uncus and various stages of necrosis in the renal papillae. Histological examination concluded the gross appearance of pulmonary congestion and edema, cerebral edema and interstitial nephritis. Toxicological evaluation of the blood and urine samples disclosed the presence of propoxyphene, salicylates, caffeine, phenacetin and acetaminophen. The analytical procedures used and the levels of these drugs in the samples will be presented. The drug levels and the pathological findings are consistent to report the death as drug related.

Analysis of Ethchlorvynol (Placidyl) in Driving-Under-the-Influence Cases – Larry Lewellen, H. Horton McCurdy†, PhD, Division of Forensic Sciences, P. O. Box 1456, Atlanta, GA 30371; (404) 656-6053

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A method is presented for a rapid screening and quantitation of ethchlorvynol from blood. An aliquot (approximately 1 ml) of methylene chloride from the JETUBE® extract is vortexed with 200 µl of diphenylamine reagent and allowed to stand for 1 hour. Positive cases are then extracted briefly with Hexanes (1 ml of blood with 10 ml Hexanes), centrifuged and 1 µl injected into a gas chromatograph equipped with an ECD detector. Trichloroethanol was used as the internal standard.

The results of the analysis of several DUI cases involving ethchlorvynol will be presented.

A Rapid Procedure for the Determination of Drugs of Abuse in Body Fluids – Mark Luckens, PhD, Emmet Technical Associates, 664 Sheridan Drive, Lexington, KY 40503;

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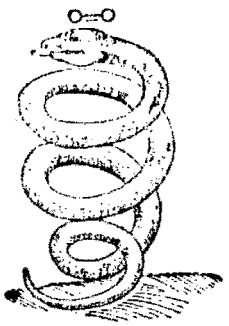
A method is presented for the preparation of thin layer chromatographic plates, of uniform thickness, utilizing lantern or microscope slides, mylar or fiberglass sheeting using materials readily available in the average laboratory. A simple extraction procedure and specified visualizing agents are described. The data generated by this procedure yields semi-quantitative data. The entire "set-up" may be made into a kit for use in the field or the emergency room for diagnosis or the determination of therapeutic levels. In the forensic laboratory it may serve as a rapid screening or confirmatory procedure. This procedure is particulary useful where modern laboratory equipment is not available.



Alchemy symbol for Arsenic.