



Study Guide for Examination Preparation

Examination Content

Sample Questions

and

References

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STUDY GUIDE FOR EXAMINATION PREPARATION

The ABFT examination deals with the fundamental information used in the practice of Forensic Toxicology. Examination questions generally cover the areas of postmortem toxicology, human performance toxicology, and workplace drug testing. Included in these areas of toxicology are topics such as driving under the influence of drugs and/or alcohol, drug overdose deaths, employee drug testing, athlete drug testing, urine and other matrices drug testing, interpretation, and expert opinion; and other related forensic toxicology issues. In addition, related analytical, physiological, pathological, pharmacological, and laboratory practice and management concepts are included.

The examination consists of 100 multiple choice questions relating to basic, general, and specific information, and has a time limit of 3 hours. Below is listed the five major areas covered by the examination and the percent contribution of questions in each area.

Laboratory Practice (10%)

Laboratory organization, policy and management; governmental and other regulations and guidelines; laboratory accreditation; and expert testimony, laboratory manipulations and calculations; statistics, quality control, and quality assurance.

- Management
 - Responsibilities
 - Legal Interactions
 - Daubert
 - DUID Laws
- Quality Assurance and Quality Control
 - Basic Concepts
 - Statistics
 - Calculations
 - Corrective Action
 - Documentation
- Regulatory Oversight
 - ABFT Accreditation Program
 - CLIA
 - HIPPA

Analytical Procedures (30%)

Basic principles and theory, separations, instrumentation, methodology, laboratory techniques, standardization, interferences, methods for specific analytes.

- Spectrophotometry
 - Color reactions
 - UV

- IR/FTIR
- Extraction
 - SPE
 - Liquid/liquid
 - pKa
 - Supercritical fluid
- Immunoassay
 - General
 - Cross-reactivity/specificity
 - Validation for non-approved applications
- Chromatography
 - TLC - theory and application
 - GC - theory and application
 - HPLC - theory and application
 - Method validation
- Mass Spectrometry
 - EIMS - theory and application
 - CIMS - theory and application
 - MSMS - theory and application
 - Electrospray - theory and application
 - Others – for example TOF, ICPMS
 - Method validation
- Other
 - Capillary electrophoresis
 - AA
 - Breath alcohol testing

Drugs and other xenobiotics – factual questions (20%)

Nomenclature, chemical structure, composition and classification of drugs and poisons, theory and practice of pharmacology, mechanism of drug action and disposition, absorption, distribution, metabolism, excretion, elementary pharmacokinetics and effects of physiological variables.

- Ethanol and other volatiles
 - Metabolism
 - Pharmacokinetics
- Carboxyhemoglobin
 - Methemoglobin etc
 - Fire deaths
- Cyanide
 - Fire deaths
- Commonly encountered drugs
 - Metabolism, pharmacology, toxicology and pharmacokinetic questions on
 - Drugs of abuse (heroin, other opiates, cocaine, amphetamines, cannabinoids, hallucinogens)

- Anti-depressants (include TCAs and newer ones)
 - Opiates
 - Methadone, buprenorphine
 - Benzodiazepines
 - Drugs of the moment (GHB, flunitrazepam) – pulse questions, do not include when out of news
- Metals
 - Pharmacology and toxicology
- Environmental chemicals (insecticides, organophosphates, dioxin)
 - Toxicology

Drugs and other xenobiotics – interpretative questions (20%)

Interpretation of toxic/lethal concentrations of substances in body tissues and fluids, postmortem changes; mechanisms of toxicity and antidote therapy, target organs, disposition of poisons, systemic effects, effects of underlying disease, drug interactions, interpretation of signs and symptoms associated with poisoning

- Ethanol and other volatiles
 - Pharmacological action and effects
- Commonly encountered drugs
 - Post-mortem redistribution
 - Therapeutic concentrations
 - Pharmacokinetic calculations on post-mortem blood
 - Body load
 - Drug interactions
- Metals
- Clinical toxicology
 - Treatment of common poisoning (acetaminophen, opiates, TCAs, organophosphates)
 - Therapeutic drug monitoring and toxicity (lithium, digoxin)

Pathology and Specimens (10%)

Pathological findings related to death in poisonings and drug overdose; appropriateness of specimens.

- Common autopsy findings
 - Pulmonary edema
 - Hepatic necrosis
 - Cardiac pathologies
- Specimens
 - Plasma vs blood – plasma protein binding
 - Post-mortem vs ante-mortem blood
 - Hair, finger nails, oral fluid

Urine Drug Testing (5%)

- HHS Regulations
 - Cut-Offs
 - Specimen Validity Testing
- Interpretation
- Alcohol testing

History (5%)

- History of Postmortem detection of poisons
- History of separation and detection methods

Preparation for the Examination in Forensic Toxicology should involve both review and updating of information in the areas cited above. Numerous books devoted to toxicology are now available. In addition to those that cover methodology and general laboratory practice, there are several that cover specialty areas. The most current information is found in appropriate journals and at meetings and workshops.

Sample Questions

Multiple Choice:

Concerning Morphine

- A. an inactive metabolite of codeine
- B. readily extracted from strong alkaline solution
- * C. urinary metabolites include morphine glucuronide
- D. biotransformed to monoacetylmorphine

Oxazepam is a metabolite of which of the following?

- * A. diazepam
- B. alprazolam
- C. clonazepam
- D. flurazepam

The screening cut-off values under HHS-SAMSHA mandatory guidelines for Federal workplace urine drug testing are;

- A. amphetamines; 2000 ng/ml
- B. cocaine; 100 ng/ml
- * C. phencyclidine; 25 ng/ml
- D. opiates; 1000 ng/ml

In gas chromatography which of the following has the longest retention time on a 50% phenylmethyl or HP 17 liquid phases?

- A. nicotine
- B. meperidine
- * C. strychnine
- D. diazepam

Study Guide References

These suggested references only represent a guide to information available to prepare for the examination. It is not intended to list the only references for study purposes. Some information is common to several sources. An individual's study should be conditioned by their own experience and knowledge. Some examination questions are based on practical laboratory experience rather than textbook information. The most recent edition of each reference listed is recommended which may be later than the edition listed.

Books (With an emphasis on those followed by an asterisk *)

Clarke's Analysis of Drugs and Poisons, 3rd edition. A.C. Moffat, Senior Ed., Pharmaceutical Press, London, England, 2004.

Casarett & Doull's Toxicology: The Basic Science of Poisons, 6th edition. Edited by Curtis D. Klaassen. McGraw-Hill, New York, 2001.

Clinical Chemistry Theory, Analysis and Correlation, 4th edition. Edited by L.A. Kaplan, A.J. Pesce, S. Kazmierczak. AACC Press, Washington, DC, 2003.

Clinical Management of Poisoning and Drug Overdose, 3rd edition. Edited by L.M. Haddad and J.F. Winchester. W.B. Saunders Co., 1998.

Disposition of Toxic Drugs and Chemicals in Man, 7th Edition. R. C. Baselt . Biomedical Publications, Foster City, CA 2004. *

Drug Abuse Handbook. Edited by Steven B. Karch, CRC Press, 1998.

Drug Effects on Psychomotor Performance. R.C. Baselt, Biomedical Publications, 2001.

Drug Facilitated Sexual Assault. Edited by M. LeBeau and A. Mozayani, Elsevier, 2001

Goodman and Gilman's the Pharmacological Basis of Therapeutics, 10th edition. Edited by L.S. Goodman (Editor), L. Limbird, J.G. Hardman. McGraw-Hill, 2001.

Handbook for Workplace Drug Testing. Edited by R.H. Liu and B.A. Goldberger. AACC Press, Washington, DC, 1995.

Handbook of Analytical Therapeutic Drug Monitoring and Toxicology. S.H.Y. Wong and I. Sunshine, CRC Press, 1996

Handbook of Forensic Drug Analysis. F. Smith and J. Siegel, Elsevier, 2005

Introduction to Forensic Toxicology. Edited by R.H. Cravey and R.C. Baselt. Biomedical Publications, 1981.

Medical Toxicology, 3rd edition. R.C. Dart, Lippincott, Williams & Wilkins, Philadelphia, PA, 2003.

Medico-Legal Aspects of Alcohol, 4th edition, J.C. Garriott, Lawyers & Judges Publishing, Tucson, AZ, 2003. *

On-Site Drug Testing. Edited by A.J. Jenkins and B.A. Goldberger, AACC Press, Washington, DC, 2002.

Poison Detection Human Organs, 4th Edition. A. S. Curry, Charles Thomas Publisher, Springfield, IL, 1988.

Principles of Clinical Toxicology, 3rd edition. Edited by T.A. Gossel and J.D. Bricker. Raven Press, 1994.

Principles of Forensic Toxicology. 2nd edition, B. Levine, AACC Press, Washington, DC, 2003. *

Self-Assessment in Clinical Laboratory Science, 3rd edition. A.H.B. Wu, R.E. Moore, G.J. Tsongalis, and R.W. Burnett. AACC Press, 2000.

The Clinical Toxicology Laboratory, Contemporary Practice of Poisoning Evaluation. Edited by L.M. Shaw, T.C. Kwong, T.G. Rosano, P.J. Orsulak, B.A. Wolf, and B. Magnani, AACC Press, Washington, DC, 2001 *

Tietz Textbook of Clinical Chemistry, 3rd edition. Edited by Carl A. Burtis and Edward R. Ashwood. W.B. Saunders Co., 1998.

JOURNALS:

Journal of Analytical Toxicology

Journal of Forensic Sciences

Forensic Science International