APPENDIX I

Glossary of Terms in Forensic Toxicology

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**Absolute Method** A method in which characterization is based on physically defined (absolute) standards.

**Accreditation** (1) A formal process by which a laboratory is evaluated, with respect to established criteria, for its competence to perform a specified kind(s) of measurement(s); (2) the decision based upon such a process; (3) formal recognition that a testing laboratory is competent to carry out specific tests or specific types of tests.

**Accuracy** Closeness of the agreement between the result of a measurement and a true value of the measured quantity.

**Acetaldehyde** The first product of ethanol metabolism.

**Acute** Severe, usually crucial, often dangerous in which relatively rapid changes are occurring. An acute exposure runs a comparatively short course.

**Acute tolerance** The development of tolerance within the course of a single exposure to a drug.

**Alcohol dehydrogenase (ADH)** The main enzyme that catalyzes the conversion of ethanol to acetaldehyde.

**Aldehyde dehydrogenase (ALDH)** The enzyme that converts acetaldehyde to acetate.

**Aliquot** (1) A divisor that does not divide a sample into a number of equal parts without leaving a remainder; (2) a sample resulting from such a divisor.

**Analyte** The specific component measured in a chemical analysis.

**Analytical run (series)** A set of measurements carried out successively by one analyst using the same measuring system, at the same location, under the same conditions, and during the same short period of time.

**Analytical sensitivity** The ability of a method or instrument to discriminate between samples having different concentrations or containing different amounts of the analyte. Slope of the analytical calibration function.

**Analytical specificity** Ability of a measurement procedure to determine solely the measurable quantity (desired substance) it purports to measure and not others.

**Analytical wavelength** Any wavelength at which an absorbance measurement is made for the purpose of the determination of a constituent of a sample.

**Antemortem** Before death, occurring before death.

**Ascites** An abnormal accumulation of fluid in the peritoneal cavity of the abdomen.

**Assignable cause** A cause believed to be responsible for an identifiable change in precision or accuracy of a measurement process.

**Beer’s law** The absorbance of a homogeneous sample containing an absorbing substance is directly proportional to the concentration of the absorbing substance.
Bias  A systematic error inherent in a method or caused by some artifact or idiosyncrasy of the measurement system. Temperature effects and extraction inefficiencies are examples of errors inherent in the method. Blanks, contamination, mechanical losses, and calibration errors are examples of artifact errors. Bias can be either positive or negative, and several kinds of error can exist concurrently. Therefore, net bias is all that can be evaluated.

Blank  (1) The measured value obtained when a specified component of a sample is not present during the measurement. In such a case, the measured value (or signal) for the component is believed to be due to artifacts and should be deducted from a measured value to give a net value due solely to the component contained in the sample. The blank measurement must be made so that the correction process is valid. (2) Biological specimen with no detectable drugs added, routinely analyzed to ensure that no false-positive results are obtained.

Blind sample  A control sample submitted for analysis as a routine specimen whose composition is known to the submitter but unknown to the analyst. A blind sample is one way to test the proficiency of a measurement process.

Calibrant  Substance used to calibrate, or to establish the analytical response of, a measurement system.

Calibration  Comparison of a measurement standard or instrument with another standard or instrument to report or eliminate, by adjustment, any variation or deviation in the accuracy of the item being compared.

Central line  The long-term expected value of a variable displayed on a control chart.

Certification  A written declaration that a particular product or service complies with stated criteria.

Certified reference material (CRM)  A reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation that is issued by a certifying body. [ISO Guide 30: 1981 (E)]

Certified value  The value that appears in a certificate as the best estimate of the value for a property of a certified reference material.

Chain of custody (COC)  Handling samples in a way that supports legal testimony to prove that the sample integrity and identification of the sample have not been violated as well as the documentation describing these procedures.

Chance cause  A cause for variability of a measurement process that occurs unpredictably, for unknown reasons, and is believed to happen by chance alone.

Check standard (in physical calibration)  An artifact measured periodically, the results of which typically are plotted on a control chart to evaluate the measurement process.

Chronic  Persistent, prolonged, repeated.

Chronic tolerance  The gradual decrease in degree of effect produced at the same blood concentration in the course of repeated exposures to that drug.

Coefficient of variation  The standard deviation divided by the value of the parameter measured.

Comparative method  A method that is based on the intercomparison of the sample with a chemical standard.

Composite sample  A sample composed of two or more components selected to represent a population of interest.

Concentration  Amount of a drug in a unit volume of biological fluid, expressed as weight/volume. Urine concentrations are usually expressed either as nanograms per milliliter (ng/ml), micrograms per milliliter (µg/ml), or milligrams per liter (mg/l). (There are 28,000,000 micrograms in an ounce, and 1,000 nanograms in a microgram.)

Confidence interval  That range of values, calculated from an estimate of the mean and the standard deviation, which is expected to include the population mean with a stated level of confidence. In the same manner, confidence intervals can also be calculated for standard deviations, lines, slopes, and points.

Confirmation  A second test by an alternate chemical method to positively identify a drug or metabolite. Confirmations are carried out on presumptive positives from initial screens.

Control chart  A graphical plot of test results with respect to time or sequence of measurement together with limits in which they are expected to lie when the system is in a state of statistical control.

Control limits  The limits shown on a control chart beyond which it is highly improbable that a point could lie while the system remains in a state of statistical control.
Control sample  A material of known composition that is analyzed concurrently with test samples to evaluate a measurement process. (See also Check standard.)

Correlation coefficient  Measures the strength of the relation between two sets of numbers, such as instrument response and standard concentration.

Cross-reacting substances  In immunoassays, refers to substances that react with antiserum produced specifically for other substances.

Cross-sensitivity  A quantitative measure of the response for an undesired constituent or interferent as compared to that for a constituent of interest.

Cutoff level (threshold)  Value serving as an administrative breakpoint (or cutoff point) for labeling a screening test result positive or negative.

Cytochrome P450  A detoxifying enzyme found in liver cells.

Detection limit or limit of detection (LOD)  The lowest concentration of a drug that can reliably be detected. Smallest result of a measurement by a given measurement procedure that can be accepted with a stated confidence level as being different from the value of the measurable quantity obtained on blank material.

Double blind  A sample, known by the submitter but supplied to an analyst in such a way that neither its composition nor its identification as a check sample or standard is known to the analyst.

Duplicate measurement  A second measurement made on the same or identical sample of material to assist in the evaluation of measurement variance.

Endogenous  Produced or originating within the body by natural processes such as intermediary metabolism.

Enzymes  Proteins whose function is to drive the chemical reactions of the body — a catalyst of biochemical reactions.

False negative  An erroneous result in an assay that indicates the absence of a drug that is actually present.

False-negative rate  The proportion of true positive samples that give a negative result.

False positive  An erroneous result in an assay that indicates the presence of a drug that is actually not present.

False-positive rate  The proportion of true negative samples that give a positive test result.

Fume  Gas-like emanation containing minute solid particles arising from the heating of a solid body such as lead, distinct from a gas or vapor. This physical change is often accompanied by a chemical reaction such as oxidation. Fumes flocculate and sometimes coalesce. Odorous gases and vapors are not fumes.

Hepatocyte  Name given to cells within the liver.

Hyperglycemia  An excessive amount of glucose in the blood.

Hypoglycemia  An abnormally low concentration of glucose in the circulating blood.

Impairment  Decreased ability to perform safely a given task.

Infrared  Pertaining to the region of the electromagnetic spectrum from approximately 0.78 to 300 microns (780 to 300,000 nanometers).

Insulin  A hormone produced in the islets of Langerhans in the pancreas as a response to elevated blood sugar levels. The hormone permits the metabolism and utilization of glucose.

Interferant  A chemical compound or substance other than the substance of interest (e.g., ethanol) to which the measuring instrument responds to give a falsely elevated result.

Interfering substances  Substances other than the analyte that give a similar analytical response or alter the analytical result.

Interindividual variation  Distribution of the values of a type of quantity in individuals of a given set.

Intraindividual variation  Distribution of the values of a type of quantity in a given individual.

Limit of quantification (LOQ)  The lower limit of concentration or amount of substance that must be present before a method is considered to provide quantitative results. By convention, \( \text{LOQ} = 10 \times \text{so} \), where \( \text{so} \) = the estimate of the standard deviation at the lowest level of measurement.

Matrix  The composition of the biological sample being analyzed, consisting of proteins, lipids, and other biomolecules that can affect analyte recovery.

Matrix effects  Influence of a component in the analytical sample other than the component being investigated on the measurement being made.
MEOS  The microsomal ethanol oxidizing system; an enzyme system in liver that converts ethanol to acetaldehyde.

Metabolite  A compound produced from chemical changes of a drug in the body.

Microsomal enzymes  Detoxifying enzymes associated with certain membranes (smooth endoplasmic reticulum) within cells.

Ordinal scale  Ordered set of measurements consisting of words and/or numbers indicating the magnitude of the possible values that a type of quantity can take.

Outlier  A value in a sample of values so far separated from the remainder as to suggest that it may be from a different population.

Perimortem  At or near the time of death.

Pharmacodynamics  The study of the relationship of drug concentration to drug effects.

Pharmacokinetics  The study of the time course of the processes (absorption, distribution, metabolism, and excretion) a drug undergoes in the body.

Physical dependence  A state that develops in parallel with chronic tolerance and is revealed by the occurrence of serious disturbances (abstinence syndrome) when drug intake is terminated.

Postmortem  After death, occurring after death, or of pertaining to a postmortem examination, an autopsy.

Precision  Closeness of agreement between independent results of measurements obtained by a measurement procedure under prescribed conditions (standard deviation).

Presumptive positive  Sample that has been flagged as positive by screening but that has not been confirmed by an equally sensitive alternative chemical method.

Proficiency-testing specimen  A specimen whose expected results are unknown to anyone in the laboratory, known only by an external agency, and later revealed to the laboratory as an aid to laboratory improvement and/or a condition of licensure.

Psycho  Pertaining to the mind and mental processes.

Psychoactive  Affecting the mind or mental processes.

Psychochemical  A substance affecting the mind or mental processes.

Psychology  The science of mental processes and behavior.

Psychomotor  Of or pertaining to muscular activity associated with the mental process.

Psychomotor functions  Matters of mental and motor function.

Psychosis  Severe mental disorder, with or without organic damage, characterized by deterioration of normal intellectual and social functioning and by partial or complete withdrawal from reality.

Psychotomimetic  Pertaining to or inducing symptoms of a psychotic state.

Psychotropic  Having a mind-altering effect.

Qualitative test  Chemical analysis to identify one or more components of a mixture.

Quality assurance (QA)  Practices that assure accurate laboratory results.

Quality control (QC)  Those techniques used to monitor errors that can cause a deterioration in the quality of laboratory results. Control material most often refers to a specimen, the expected results of which are known to the analyst, that is routinely analyzed to ensure that the expected results are obtained.

Quantitative test  Chemical analysis to determine the amounts or concentrations of one or more components of a mixture.

Repeatability  Closeness of agreement between the results of successive measurements during a short time (within run standard deviation).

Reproducibility  Closeness of agreement between the results of measurements of the same measurable quantity on different occasions, made by different observers, using different calibrations, at different times (between run standard deviation).

Screen  A series of initial tests designed to separate samples containing drugs at or above a particular minimum concentration from those below that minimum concentration (positive vs. negative).

Sensitivity  The detection limit, expressed as a concentration of the analyte in the specimen.

Specificity  Quality of an analytical technique that tends to exclude all substances but the analyte from affecting the result.
Split specimen  Laboratory specimen that is divided and submitted to the analyst, unknown to him or her, as two different specimens with different identifications.

Standard  Authentic sample of the analyte of known purity, or a solution of the analyte of a known concentration.

Substrate  The substance (molecule) acted upon by an enzyme; its conversion to a particular product is catalyzed by a specific enzyme.

Tolerance  A state that develops after long-term exposure to a drug. Metabolic tolerance infers a faster removal, oxidation by the liver. Functional tolerance infers a change in sensitivity of the organ to the effects of the drug.

Tolerance interval  That range of values within which a specified percentage of individual values of a population, measurements, or sample are expected to lie with a stated level of confidence.

Ultraviolet  Pertaining to the region of the electromagnetic spectrum from approximately 10 to 380 nm.

Visible  Pertaining to radiant energy in the electromagnetic spectral range visible to the human eye, approximately 380 to 780 nm.

Wavelength  A property of radiant energy, such as IR, visible, or UV. The distance measured along the line of propagation, between two points that are in phase on adjacent waves.