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Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Testing for Medicolegal Death Investigations



Draft Document

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Foreword

The medicolegal community relies upon quality toxicological testing to assist in determining the cause and manner of death. To promote standardization of testing scope and analytical sensitivity, the Toxicology Subcommittee of the Organization of Scientific Area Committees is submitting this standard to the ASB.

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Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Testing for Medicolegal Death Investigations

1 Scope

This document delineates the minimum requirements for target analytes and analytical sensitivity for the toxicological testing of blood specimens in medicolegal death investigations. This document does not include standards for the analysis of urine, tissues, or other specimens that are commonly analyzed in medicolegal death investigations.

2 Normative References

N/A

3 Terms and Definitions

For purposes of this document, the following definitions and acronyms apply.

3.1

analytical sensitivity

The lowest amount of an analyte that can be reliably measured in a specimen by a laboratory test. A laboratory may set this as the decision point, the limit of detection or the lower limit of quantitation.

3.2

analytical scope

A selection of drugs, drug metabolites and other chemicals covered in an analytical testing scheme.

4 Background

4.1 Postmortem forensic toxicology encompasses many different types of cases. However, the overarching role of the postmortem forensic toxicology laboratory is to provide information for the determination of whether a drug or chemical played a role in the cause of death.

4.2 Postmortem toxicology can be divided into two general categories:

4.2.1 Suspected Toxicological Cause of Death Determination. Inclusion or exclusion of drugs or chemicals in cause and manner of death certifications; and

4.2.2 Known Anatomical Cause of Death. To determine the role or impact of a drug or chemical for cases with a known anatomical cause of death.

4.3 Under unique circumstances (e.g., limited sample volume or direction by an outside authority), it may be necessary to modify the analytical scope and sensitivity of testing.

5 Requirements for Analytical Scope and Sensitivity for Forensic Toxicological Testing in Medicolegal Death Investigations

5.1 General Requirements

5.1.1 Laboratories shall accomplish the required analytical scope and sensitivity by testing internally or using a reference laboratory for analyses not performed.

5.1.2 Written laboratory procedure(s) shall specify:

- that confirmation testing is necessary for all potentially relevant findings.
- which alternate specimens will be analyzed in addition to or in the place of blood.
- when a reference laboratory will be utilized for the testing of analytes.

5.1.3 Laboratories should consider other potentially toxic substances based on factors such as regional drug trends and case histories, and if necessary, establish lower limits of analytical sensitivity, where required.

5.2 Suspected Toxicological Cause of Death Determination

Toxicological analyses in support of cause of death investigations shall include, at a minimum, the testing for analytes listed in Table 1 at or below the analytical sensitivity designated for each analyte.

5.3 Known Anatomical Cause of Death

Toxicological analyses in support of death investigations for cases with a known anatomical cause of death, shall include, at a minimum, the testing for analytes listed in Table 2 at or below the analytical sensitivity designated for each analyte.

5.4 Directed Analysis

Under unique circumstances, limited analyte-specific testing may be performed based on case circumstances or as directed by an outside authority. If the testing is for analytes contained within Table 1, the designated analytical sensitivity shall be met.

Table 1: Minimum Analytical Scope and Sensitivity for Cause of Death Determination

Volatiles			
Ethanol (0.02 g/dL)	Methanol (0.02 g/dL)	Acetone (0.01 g/dL)	Isopropanol (0.01 g/dL)
Anticonvulsants			
1000 ng/mL			
10-OH-carbazepine Carbamazepine Gabapentin	Lamotrigine Levetiracetam Pregabalin	Phenytoin Primidone Topiramate	
Antidepressants			
200 ng/mL			
Amitriptyline Bupropion Citalopram Clomipramine	Desipramine Doxepin Duloxetine Fluoxetine	Imipramine Mirtazapine Nortriptyline Norvenlafaxine	Paroxetine Sertraline Trazodone Venlafaxine
Antihistamines			
50 ng/mL			
Chlorpheniramine Dextromethorphan Diphenhydramine		Doxylamine Hydroxyzine Promethazine	
Antipsychotics			
50 ng/mL		200 ng/mL	
9-hydroxyrisperidone Risperidone		Chlorpromazine Clozapine	Olanzapine Quetiapine
Barbiturates			
1000 ng/mL			
Butalbital Pentobarbital		Phenobarbital Secobarbital	
Benzodiazepines/Sedatives			
10 ng/mL		50 ng/mL	
7-aminoclonazepam Alprazolam Clonazepam Lorazepam Zolpidem		Diazepam Nordiazepam Oxazepam Temazepam	
Cannabinoids	Carbon Monoxide*	Dissociatives	
THC 1 ng/mL 11-OH-THC 1 ng/mL THC-COOH 10 ng/mL	COHb 10%	Ketamine 20 ng/mL Phencyclidine 20 ng/mL	

Cocaine			
20 ng/mL		50 ng/mL	
Cocaine Cocaethylene		Benzoylecgonine	
Muscle Relaxants			
50 ng/mL		500 ng/mL	
Cyclobenzaprine		Carisoprodol Meprobamate	
Opioids			
1 ng/mL	5 ng/mL	10 ng/mL	50 ng/mL
Buprenorphine Fentanyl	6-acetylmorphine Oxymorphone	Codeine Hydrocodone Hydromorphone Morphine Oxycodone	Methadone Tramadol
Over the Counter Pain Medications**			
10 µg/mL		50 µg/mL	
Acetaminophen		Salicylates	
Sympathomimetic Amines			
50 ng/mL			
Amphetamine Methamphetamine		Methylenedioxyamphetamine (MDA) Methylenedioxymethamphetamine (MDMA)	

*Suspected carbon monoxide-related cases only

**Required if requested or necessary due to case circumstances

Table 2: Minimum Analytical Scope and Sensitivity for Cases with a Known Anatomical Cause of Death

Volatiles	
Ethanol (0.02 g/dL)	
Benzodiazepines	
10 ng/mL	50 ng/mL
7-aminoclonazepam Alprazolam Clonazepam Lorazepam	Diazepam Nordiazepam Oxazepam Temazepam
Cannabinoids	
10 ng/mL	
THC-COOH	
Cocaine	
50 ng/mL	
Benzoylecgonine	
Opioids	
10 ng/mL	
Codeine Hydrocodone Hydromorphone Morphine	
Sympathomimetic Amines	
50 ng/mL	
Amphetamine Methamphetamine	