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**Standard for the Analytical Scope and Sensitivity of
Forensic Toxicological Testing of Blood in Medicolegal
Death Investigations**



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Standard for the Analytical Scope and Sensitivity of Forensic Toxicological Testing of Blood in Medicolegal Death Investigations

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Foreword

The medicolegal death investigation community relies upon quality toxicological testing to assist in determining the cause and manner of death. This document promotes standardization of the analytical scope and sensitivity of forensic toxicological testing of blood in medicolegal death investigations. These requirements were developed based on the current prevalence and availability of drugs in the United States.

This document was revised, prepared, and finalized as a standard by the Toxicology Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Toxicology Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

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All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

Keywords: *medicolegal death investigations; postmortem toxicology; scope of testing; analytical sensitivity; forensic toxicology*

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Standard for the Analytical Scope and Sensitivity of Forensic Toxicological Testing of Blood in Medicolegal Death Investigations

1 Scope

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

2 Normative References

There are no normative reference documents. Annex A, Bibliography, contains informative references.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1

analytical scope

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

3.2

analytical sensitivity

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

3.3

decision point

An administratively defined cutoff or concentration that is at or above the method's limit of detection or limit of quantitation and is used to discriminate between positive and negative results.

3.4

limit of detection

An estimate of the lowest concentration of an analyte in a sample that can be reliably differentiated from blank matrix and identified by the analytical method.

3.5

lower limit of quantitation

An estimate of the lowest concentration of an analyte in a sample that can be reliably measured with acceptable bias and precision.

4 Background

4.1 Postmortem forensic toxicology encompasses many different types of cases. However, the primary role of the postmortem forensic toxicology laboratory is to provide information for the determination of whether drugs or chemicals contributed to the cause and/or manner of death.

4.2 Postmortem toxicology can be divided into the following two general categories.

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

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

4.3 It may be necessary to modify the analytical scope and sensitivity of testing when unique circumstances (e.g., limited sample volume or mass casualties) affect a particular case.

5 Requirements for Forensic Toxicological Testing of Blood Specimens in Medicolegal Death Investigations

5.1 General Requirements

5.1.1 Laboratories shall meet the required scope and analytical sensitivity by testing internally, externally, or a combination of both.

5.1.2 Laboratories should consider including other potentially toxic substances based on regional drug trends and case histories.

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 the customer. If the testing is for analytes contained within Table 1, the designated analytical sensitivity shall be met.

Table 1—Required Minimum Analytical Scope and Sensitivity for Testing of Blood in Suspected Toxicological Cause of Death Determination¹

Compound	Blood Screen	Blood Confirm
Volatiles (g/dL)		
Acetone Isopropanol	0.01	0.01
Ethanol Methanol	0.02	0.02
Anticonvulsants (ng/mL)		
10-OH-carbamazepine Carbamazepine Gabapentin Lamotrigine Levetiracetam Pregabalin Phenytoin Primidone Topiramate	1000	1000
Antidepressants (ng/mL)		
Amitriptyline Bupropion Citalopram Clomipramine Desipramine Doxepin Duloxetine Fluoxetine Imipramine Mirtazapine Nortriptyline O-desmethylvenlafaxine Paroxetine Sertraline Trazodone Venlafaxine	200	200
Antihistamines/Antitussives (ng/mL)		
Chlorpheniramine Diphenhydramine Doxylamine Hydroxyzine Methorphan Promethazine	100	100
Antipsychotics (ng/mL)		
9-hydroxyrisperidone Risperidone	50	50
Chlorpromazine Clozapine Olanzapine Quetiapine	200	200
Barbiturates (ng/mL)		
Butalbital Pentobarbital Phenobarbital Secobarbital	1000	1000

Compound	Blood Screen	Blood Confirm
Benzodiazepines/Sedatives (ng/mL)		
7-aminoclonazepam Alprazolam Clonazepam Lorazepam Zolpidem	15	15
Diazepam Nordiazepam Oxazepam Temazepam	50	50
Cannabinoids (ng/mL)		
THC	N/A	2
THC-COOH	10	10
Carbon Monoxide²		
COHb	10%	10%
Dissociatives (ng/mL)		
Ketamine Phencyclidine	20	20
Cocaine (ng/mL)		
Cocaine Cocaethylene	N/A	20
Benzoylcegonine	50	50
Muscle Relaxants (ng/mL)		
Cyclobenzaprine	50	50
Carisoprodol Meprobamate	1000	1000
Opioids (ng/mL)		
Buprenorphine Fentanyl	1	1
6-acetylmorphine	N/A	5
Oxymorphone	5	5
Codeine Hydrocodone Hydromorphone Morphine Oxycodone	10	10
Methadone Tramadol	50	50
Over the Counter Pain Medications (µg/mL)³		
Acetaminophen	10	10
Salicylates	50	50
Sympathomimetic Amines (ng/mL)		
Amphetamine Methamphetamine Methylenedioxymphetamine (MDA) Methylenedioxymethamphetamine (MDMA)	25	25

¹ If a compound does not need to be accounted for in the screen, it is indicated by "N/A";

² Suspected carbon monoxide-related cases only;

³ Required if requested or necessary due to case circumstances.

Table 2—Required Minimum Analytical Scope and Sensitivity for Testing of Blood in Cases with a Known Anatomical Cause of Death

Compound	Blood Screen	Blood Confirmation
Volatiles (g/dL)		
Ethanol	0.02	0.02
Benzodiazepines/Sedatives (ng/mL)		
7-aminoclonazepam Alprazolam Clonazepam Lorazepam	15	15
Diazepam Nordiazepam Oxazepam Temazepam	50	50
Cannabinoids (ng/mL)		
THC-COOH	10	10
Cocaine (ng/mL)		
Benzoyllecgonine	50	50
Opioids (ng/mL)		
Fentanyl	1	1
Codeine Hydrocodone Morphine Oxycodone	10	10
Sympathomimetic Amines (ng/mL)		
Amphetamine Methamphetamine	25	25

Annex A **(informative)**

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or endorsement of literature on this topic. The goal of the bibliography is to provide examples of publications addressed in the standard.

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^a <https://www.nflis.deadiversion.usdoj.gov/DesktopModules/ReportDownloads/Reports/NFLIS-Drug-AR2018.pdf>



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