

**FORENSIC TOXICOLOGY LABORATORY  
OFFICE OF CHIEF MEDICAL EXAMINER  
CITY OF NEW YORK**

**ANALYTICAL TESTING GUIDELINES  
(POST MORTEM FORENSIC TOXICOLOGY)**

The medical examiners may request either of two types of toxicologic testing: basic screen or comprehensive screen.

**BASIC SCREEN**

Blood is the primary specimen used for basic screen. If two bloods are submitted the most peripheral with sufficient volume will be scheduled for testing.

Blood is tested for the presence of:

- a. Volatiles (ethanol, methanol, isopropanol, acetone) by head-space gas chromatography (HS/GC)
- b. Opiates, benzoylecgonine, barbiturates, benzodiazepines, amphetamines, oxycodone and methadone by enzyme immunoassay (ELISA). Positive results for a given test will initiate confirmation testing.
- c. Cannabinoids by ELISA as appropriate.

**COMPREHENSIVE TESTING**

The general approach to initial testing depends on the types and amount of submitted specimens.

1. If blood and urine are available blood is tested for the presence of:
  - a. Volatiles (ethanol, methanol, isopropanol, acetone) by head-space gas chromatography (HS/GC)
  - b. Opiates by enzyme immunoassay (ELISA) if case history indicates acute overdose.

Urine is tested for the presence of:

- c. Opiates benzoylecgonine, barbiturates, benzodiazepines, amphetamines and cannabinoids, by enzyme immunoassay (ELISA).
- d. Salicylates and acetaminophen by color test (CT).

- e. Basic drugs by gas chromatography using a nitrogen-phosphorus detector (GC) and a mass spectrometer (GC.MS).

Drugs included in this screening procedure are listed under "Agents included in routine screening".

- 2. If blood is available, but urine is not submitted, blood is tested for the presence of:
  - f. Volatiles (ethanol, methanol, isopropanol, acetone) by head-space gas chromatography (HS/GC).
  - g. Opiates, benzoylecgconine, barbiturates, benzodiazepines, amphetamines, oxycodone and methadone by enzyme immunoassay (ELISA).
  - h. Basic drugs by gas chromatography using a nitrogen-phosphorus detector (GC) and a mass spectrometer (GC.MS).

Drugs included in this screening procedure are listed under "Agents included in routine screening".

- 3. If only tissue specimens are available and neither blood nor urine are submitted, brain or liver are tested for the presence of:
  - i. Volatiles (ethanol, methanol, isopropanol, acetone) by head- space gas chromatography (HS/GC).
  - j. Benzoylecgconine, opiates, amphetamines and benzodiazepines by Single Ion Monitoring Gas Chromatography/Mass Spectrometry.
  - k. Barbiturates, acetaminophen and salicylates by high performance liquid chromatography (HPLC)
  - l. Basic drugs by gas chromatography using a nitrogen phosphorus detector (GC) and a mass spectrometer (GC.MS).

Drugs included in this screening procedure are listed under "Agents included in routine screening."

## **CONFIRMATORY AND QUANTITATIVE TESTING**

Results from the initial testing will determine the course and scope of confirmatory and quantitative testing. In approximately 30% of the submitted cases, no drugs are detected by the above screening tests. In those cases, the final toxicology report is issued upon completion of basic screen and data review.

All cases with positive findings are further tested to either confirm the initial findings or to perform quantitative analyses. Whenever possible, two tests (based on different chemical or physical principles) are performed for each analyte. Whenever possible and practical, at least two different specimens from the same case are analyzed to substantiate the toxicologic findings.

Examples:

- If blood is positive for ethanol, vitreous humor is analyzed; in the absence of vitreous humor, analysis is performed on urine, bile or brain.
- In homicide cases, if cocaine or benzoylecgonine are detected in the blood or urine, vitreous humour is analyzed as well.
- If morphine is detected in blood, vitreous humor is analyzed for opiates.

## **ADDITIONAL TESTING**

Certain tests are performed in addition to the above initial testing if they are indicated by the case history or they are specifically requested by the pathologists.

Acetaminophen	- Routinely done if codeine, oxycodone, hydrocodone, propoxyphene or tramadol are detected or if indicated by case history.
Carbon monoxide	- Routinely done in all fire death with no or minimal survival time, if history indicates driver with no significant survival time or if otherwise indicated by case history.
Cyanide	- By request or if indicated by case history.
Ibuprofen	- By request or if indicated by case history.
Theophylline	- Routinely done if history indicates asthma, otherwise by request.
Heavy metals	- By request or if indicated by case history.
Lithium	- By request or if indicated by case history.
Ethylene glycol Propylene glycoll	- Routinely done if history indicates ingestion of antifreeze, otherwise by request.
Ethchlorvynol	- By request or if indicated by case history.
Naproxene	- By request or if indicated by case history.
Vitreous chemistries	- By request. Glucose done routinely if history indicates diabetes.
Warfarin	- By request or if indicated by case history.

## **REFERRALS**

Forensic Toxicology Laboratory at the Office of Chief Medical Examiner, New York City, performs analyses of post mortem specimens for a wide variety of drugs and other toxic substances. Methodologies for certain substances are not currently available in the laboratory and each year approximately 150 tests are performed by an outside reference laboratory.

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