Chapter 12

Toxicology in the Crime Laboratory

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1. INTRODUCTION

Toxicology is the science of poisons and their effect on the human body. To paraphrase Paracelsus (1493–1541), all substances are poisons. The only difference between a remedy and a poison is the size of the dose. Toxicologists, therefore, deal with those substances that may cause bodily harm if taken in sufficient quantity. They deal with substances ranging from illicit street drugs to rat poison to prescription drugs, and everything in between.

Poisons rarely leave unique marks on the body. When searching for a cause of death, the medical examiner cannot determine from an autopsy whether or not drugs were involved. Samples of body fluids are collected and sent to the toxicology laboratory for study by the toxicology staff.

Similarly, erratic driving may be caused by any number of medical conditions, as well as drugs or alcohol. Although police officers are well trained in evaluating individuals in these situations, only the toxicology exam can tell for sure whether a drug is involved.

Most of the work of toxicologists involves the identification and quantitation of poisons in biological fluids and tissues, e.g., blood, urine, and liver. It is the toxicologist who measures the amount of drug or poison in the blood and determines if that amount was sufficient to cause death or impairment.

The scope of the toxicology aspect of a modern crime laboratory largely depends on the organization of the local criminal investigation apparatus. Traditionally, the crime laboratory has been a function of the police department.

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249
and the investigations undertaken by the crime laboratory have focused on crime scene investigation, firearms, tool marks, trace evidence, arson investigation, fingerprints, questioned documents, and similar fields. Most of these traditional crime laboratories also have a forensic chemistry section, the function of which is to identify unknown chemical substances in bulk form, e.g., powders, liquids, pills, and plant material. Toxicology in these laboratories is usually restricted to blood alcohol determinations and the investigation of “under the influence” situations.

In these traditional organizations, investigations involving death fall under the jurisdiction of the medical examiner’s office, and any toxicological investigation in these cases is performed by a toxicology laboratory selected by the coroner or medical examiner (ME). In most large cities, the toxicology laboratory is located in the ME’s facility and is a permanent fixture of that office. In smaller jurisdictions, there is little need for a full-time toxicology laboratory (or ME for that matter) so any toxicology work is sent to an off-site reference laboratory.

As a result, the toxicology laboratory in many crime laboratories is a rather small unit with limited capabilities. Because many deaths involve criminal activity or criminal investigations, the toxicology aspect requires close coordination between the crime scene investigators, the medical investigators from the ME’s office, the investigating police officers, and the ME. Because these entities are generally located at different sites, proper coordination can sometimes be difficult.

Several large jurisdictions in the United States (e.g., Bexar County [San Antonio] and Harris County [Houston] in Texas and Sedgwick County [Wichita] in Kansas) have addressed this problem by creating centralized forensic science centers. These centers contain most of the laboratories involved in criminal investigations thereby allowing consolidation of physical plant requirements, as well as the regular close interaction of the personnel investigating the crime. Thus, in a death case involving drugs or poisons, the autopsy, the firearms examination, the trace evidence from the body, and the toxicology can all be performed in a central location with minimization of chain of custody requirements and the chance for evidence to be lost or mishandled.

No matter which type of organizational structure is in place, the toxicological aspect of the crime laboratory involves two fundamental types of investigation: antemortem and postmortem. Depending on the organization, drug identification may also be performed in the toxicology laboratory, but this is generally not good practice because the possibility of contamination is always present.

In toxicology, as in every other aspect of forensics, a good rule that must always be remembered is that every time a forensic examination is performed, no matter how simple, someone’s life is at stake.