Q&A column

Editor: Frederick L. Kiechle, MD, PhD

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Q. Can toxicology testing be performed on a person who has been deceased for two years?

A.Feburary 2021—The short answer is maybe. Modern instrumentation and analytical techniques can, theoretically, detect a wide range of drugs and poisons (toxicants) at very low concentrations. But several questions must be asked before testing the deceased. Among them, what is the condition of the remains after two years, and what organs or tissues are available for testing?

If bone or bone marrow is available, the laboratory can test for some drugs or other toxicants (for example, heavy metals), depending on the scope of its analytical methods. That said, few forensic laboratories perform toxicology testing on bone or bone marrow. Blood is the specimen that most forensic toxicology laboratories test, but it is not available in an embalmed body and likely will not be available in an unembalmed person after two years. Some testing may be possible on tissue, depending on the extent of decomposition. However, many drugs and poisons break down over time and may no longer be detectable after two years, even if they were present at the time of death.

Obtaining answers to the following questions can also help determine whether a drug or poison can be detected after two years. Was the body found in a remote location and most of the tissue eaten by predators? Was the body buried in a cemetery? If so, was the body embalmed prior to interment? Formaldehyde, the active ingredient used in embalming fluid, destroys many drugs and poisons. Groundwater that has entered the casket can also accelerate decomposition and leach drugs and poisons from the body.

The biggest problem with performing toxicology testing on human remains, especially after two years, is not analytical measurement but interpreting the results. Drug concentrations are usually measured in serum or plasma for clinical testing of living people. As stated, those specimens will not be available in a body two years after death. It may be impossible to determine whether a prescription drug that is detected was a factor in a person's death because the concentration in the blood or organs at the time of death would not be known. In rare cases in which a poison such as the potent and relatively stable strychnine is present, toxicology testing can be of value when coupled with a detailed forensic and police investigation. Analytical testing is relatively easy to perform on metals, such as arsenic, lead, and cadmium, though serious poisoning with these metals is rare. Again, the problem is interpretation. These metals occur naturally in organs, other tissue, and bone and can also be found in the soil and groundwater. Therefore, a body that has been buried in the ground could have higher concentrations of these metals. For example, some parts of the country have higher than normal concentrations of arsenic in the soil and groundwater.

In summary, toxicology testing of a body two years after death is possible theoretically, but meaningful interpretation of the findings is difficult or impossible in most cases.

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Graham R. Jones, PhD

Forensic Toxicologist
Office of the Chief Medical Examiner
Alberta, Canada
Member, CAP Toxicology Committee

Michael A. Graham, MD
Department of Pathology
St. Louis University School of Medicine
St. Louis, Mo.
Member, CAP Toxicology Committee

Q. Is there a standardized procedure for performing platelet estimates that incorporates the dilution effect for low hemoglobin in anemic patients? I am having a hard time proving what I see in practice. The formula I found for platelet estimation works well with low hemoglobin levels but not with levels greater than 13 g/dL.

A.A number of manual platelet count estimators have been proposed to account for variation in hemoglobin levels.[1,2] However, none of them appear to be as accurate as traditional estimation of the platelet count by magnification area, regardless of hemoglobin: Multiply the number of platelets in an average of 10 microscopy fields with non-overlapping red blood cells using a 100× (oil immersion) objective lens by 20,000 to get an estimate of the platelet count per microliter (µL).[3,4]

Malok and colleagues compared the aforementioned formula for the traditional manual method, in which the average platelet count per high-power field is multiplied by 20,000, to an alternative manual method in which the average platelet count per high-power field is multiplied by the hemoglobin in g/dL and 1,000.[5] Both manual methods were compared to an automated platelet count across 184 samples and two slides per sample. The study found strong concordance between the traditional manual method and the automated method. In contrast, platelet counts by the alternative manual method differed significantly from those generated by the automated method. With regard to this query, it is noteworthy that these findings held true across hemoglobin values, including normal hemoglobin, which was defined as ≥13 g/dL, as well as low hemoglobin.

In a separate study, Anchinmane and Sankhe used 100 blood samples randomly collected from inpatients at a tertiary care hospital in India with EDTA vacutainer tubes to compare the traditional manual platelet count estimate calculator by Brecher and Cronkite to an automated analyzer method.[6] Their study also demonstrated excellent concordance between the traditional manual and automated methods. While the authors do not mention other complete blood count parameters for these samples, including hemoglobin, it is likely that hospitalized patients in a random sampling demonstrated a wide range of hemoglobin values.

Based on these data, accounting for hemoglobin in manual platelet count estimation is not recommended, regardless of hemoglobin range. Malok and colleagues conclude their article with this encouraging statement: "Clinical laboratory professionals should feel confident in using the traditional multiplication factor of 20,000 for their platelet estimates for comparison to automated platelet counts as one measure of quality assurance."[5]

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Alexandra E. Kovach, MD
Associate Professor of Clinical Pathology
Keck School of Medicine, University of Southern California
Director of Hematology and Bone Marrow Laboratories
Staff Hematopathologist and Pediatric Pathologist
Children's Hospital of Los Angeles
Member, CAP Hematology/Clinical Microscopy Committee

Timothy Skelton, MD, PhD
Medical Director, Core Laboratory and Laboratory Informatics
Lahey Hospital and Medical Center
Burlington, Mass.
Member, CAP Hematology/Clinical Microscopy Committee