G141 Toxicology of the Exhumed Body: Challenges and Pitfalls

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After attending this presentation, attendees will improve their understanding about the "nightmare" of postmortem drug redistribution.

This presentation will impact the forensic science community by providing results from several studies in a topic which is often underestimated in the textbooks. This presentation is a proposal of guidelines for toxicology sampling in case of exhumation, including the most important sampling steps which have to be performed at the locus.

The word exhumation derives from the Latin words *ex* and *humus*, the former meaning "out of" and the latter meaning "ground." These words mean "out of ground" and describe the legal and authorized procedure to retrieve the coffin and the body from a grave for postmortem examination after legitimate burial in a cemetery. This event represents a real crime scene and has to be approached by pathologists and police officers as such.

Although autopsy procedures on corpses buried for a long time and in an advanced state of decomposition were regarded to be useless, without being accepted by the scientific community until the end of the nineteenth century, recent studies have proved that many useful histological and toxicological findings can be identified after months or years of interment. In several countries exhumations are extremely rare. Therefore, even for the most experienced forensic pathologist, it might be very difficult to develop the appropriate knowledge and skills to approach a forensic exhumation with the particular interpretative problems that might arise during the analysis of the findings.

The most famous exhumations performed in the United Kingdom (U.K.) were the victims of Dr. Harold Shipman, an English General Practitioner who shocked the population of his nation by killing up to an estimated 220 – 240 of his patients with lethal doses of diamorphine. Recent famous exhumations were performed in Italy in 2007, when the bodies of Poliziano (1454 – 1494), a Florentine classical scholar and poet, and Pico della Mirandola (1463 – 1494), a Renaissance philosopher from Modena, were exhumed from St. Mark's Basilica in Florence. Toxicological analyses established that both had died as a result of arsenic poisoning. Another extremely interesting item of research was recently performed on Napoleon's hair in France. The toxicology result undermined the theory that the British poisoned him with arsenic and disclosed that the pattern of arsenic consumption was spread over a long period of time, reflecting a chronic exposure rather than an acute poisoning; therefore, if the cause of death was due to arsenic poisoning, the theory of conspiracy which implicates one of Napoleon's companions poisoning him only while on St Helena's island would not be possible.

Although it is well known that arsenic and other heavy metals (such as antimony, zinc, copper, lead, mercury, cadmium, and thallium) may normally be present in the soil, a higher concentration within the human tissue clearly excludes the possibility of passive diffusion from the earth into the corpse. Mercury can persist in bones for thousands of years and it has been isolated from prehistoric human remains. High aluminium levels in bone, brain, and liver are regarded to be the most likely cause of death in exhumed bodies of dialyzed patients.

Postmortem toxicology in case of exhumation, especially after several years of burial, is indeed a very challenging matter and, as mentioned above, a failure during the sampling may result in a wrong interpretation of the data even for an experienced forensic pathologist.

Toxicology, Exhumation, Sampling

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