

### A163 Drugs From Dry Bone: How Toxicology Can Add to the Biological Profile

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**Learning Overview:** By attending this presentation, attendees can expect to discover that drugs may be extracted from dry bones even after a 15-year postmortem interval. A new method using accelerated solvent extraction was successfully applied to samples extracted from well-preserved cadavers during autopsies (serving as a control sample) and cemeterial skeletons buried for at least 15 years.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by demonstrating that drugs may be found in dry bones, including in skeletal remains after a long postmortem interval. In addition, a new effective and low-cost method will be presented to perform toxicological analysis on dry bone.

The anthropological practice is usually limited to macroscopic examination, microscopic observation, and DNA analysis. Indeed, very little literature has investigated the survival of toxicological substances in skeletal forensic material and none in dry bone with a postmortem interval of more than 15 years. The present research shows for the first time the detectability of toxicological substances in known bone material with a 15-year postmortem interval.

In this presentation, samples were extracted from the cranium (compact bone) and ribs (spongy bone) during ten autopsies to serve as a control sample. Samples were collected twice to be submitted to two protocols: the first was directly dried in the oven at 50°C for 24h after separation from soft tissues, thus preserving traces of blood; in the second protocol, samples were macerated until only the bones remained before being dried in the oven at 50°C for 24h, simulating a dry bone situation. All samples were then processed with Accelerated Solvent Extraction (ASE) and the eluates were analyzed using a Q Exactive™ Orbitrap™ mass spectrometer.

Additionally, bone samples were taken from cemeterial skeletons from the Collezione Antropologica LABANOF (CAL) Milano Cemetery Skeletal Collection for toxicological analysis. This collection is a modern and documented osteological collection consisting of unclaimed skeletal remains from the cemeteries of Milan, in agreement with Italian law. In total, 13 cemeterial skeletons with verified or suspected drug addictions, intoxication, or overdose in their associated documentation were selected for toxicological study. Fragments of approximately one gram of bone were extracted from the cranium and ribs and subjected to ASE. Similarly, eluates were analyzed using a Q Exactive™ Orbitrap™ mass spectrometer.

The substances tested included opiates, benzodiazepine, 3,4-Methylenedioxymethamphetamine (MDMA), cocaine, heroin, and antidepressants. The results obtained from the fresh and cemeterial samples show a positivity for chemical substances in the skeletal matrices, demonstrating the possibility of identifying toxicological substances in dry bone, after a postmortem interval of 15 years. In addition, results exhibit the efficiency of the ASE extraction for the purification of drugs and xenobiotic substances in dry bone with various postmortem intervals.

In conclusion, toxicological substances may be found in dry bone, even after a postmortem interval of 15 years. At the anthropological level, the toxicological analysis of chemical substances in bones will provide specific information for the construction of the biological profile for forensic and archeological cases.

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#### Forensic Anthropology, Forensic Toxicology, Dry Bone