Results and Discussion

Drugs and drugs of abuse found in body fluids, tissue samples, and hair could mostly be detected in dental tissues with the employed LC-QToF MS system. Selected analytes detected in post-mortem dental hard tissue screening that previously had not been detected during routine post-mortem analysis were labelled as "tentative" if the identification criteria (retention time, parent and qualifier ion present, isotopic ratio) were fulfilled.

In dental tissue samples, several opioids (6-acetylmorphine, buprenorphine, codeine, EDDP, fentanyl, methadone, morphine, and norfentanyl), cocaine, and its metabolite benzoylecgonine, numerous benzodiazepines (zolazepam, lorazepam, nordiazepam, oxazepam, temazepam, and tetrazepam), carbamazepine, chlorprothixene, clorazepate, dehydrocodeine, desmethyldesmethylmirtazapine, desmethyldoxepin, fentanyl, haloperidol, melatonin, metabolites of 4-AP (4-AP, 4-AAP, and 4-AFA), meprobamate, pregabalin, promethazine, quetiapine, ropinirole, tramadol, zolpidem, and - in one case - the synthetic cannabinoid NMDMB-CHMICA were detected.

In all cases included in this study, substances that supposedly contributed to death could be reliably identified with this approach. The screening’s overall sensitivity seems comparable to targeted MRMs after the assay was able to detect compounds at concentrations between LOD and LOQ determined for the LC-MS/MS method used[9] but in contrast, full scan MS and broad band CID model (bCID) of the QToF also allows for retrospective data analysis.

Conclusion

The preliminary results of this comparative study are promising so far. Analysis of dental hard tissue represents a useful alternative matrix for post-mortem toxicology, especially if there is no other material available. Based on a study conducted earlier, the incorporation of medical and illicit drugs into dental hard tissue depends on the compound’s physiochemical properties and seems to occur mainly via the blood stream.

However, further investigations, especially regarding the significance of quantitative data but also technical details like matrix effects, will be needed to completely implement the assay in routine post-mortem analysis.