

## H133 The Sound of Violence: The Utility of Voice Recording in the Investigation of the Cause of a Sudden Death in Custody

Michael Freeman, MD, PhD, Forensic Research & Analysis, Lake Oswego, OR 97035; Ellen M.F. Strömmer, MPH\*, Salem, OR 97302

**Learning Overview:** The goal of this presentation is to present the results of the investigation of a sudden death in custody occurring in a forcefully restrained suspect, which was ruled as an accident due to methamphetamine toxicity and coronary artery disease after an autopsy. Audio evidence and body cam footage was used to establish a sudden change in breathing sounds and rate after the decedent's mouth and nose were obstructed by jail personnel who were attempting to remove jewelry from the decedent's ears.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community in two ways: (1) by demonstrating a counterfactual approach to assessing cause of death during forceful restraint by comparing the fatality risk of methamphetamine and asymptomatic coronary artery disease to the risk from three minutes of airway obstruction by a gloved hand, and (2) by illustrating the use of audio recording analysis to demonstrate airway obstruction that preceded cardiorespiratory arrest.

The case involves a 32-year-old male known methamphetamine user who was arrested for public intoxication and brought into custody. Several intake officers attempted to remove his earrings while he was restrained in a supine position. The man spat at the officers and one officer's gloved hand immediately covered his mouth. Body camera footage was then obstructed until three minutes later, when the man had stopped breathing and turned blue. After a few minutes, unsuccessful resuscitation efforts commenced.

The officers' reports all denied obstructing the man's airway, claiming that the man's shirt was held one inch away from his nose and mouth as a makeshift "spit-guard."

Autopsy revealed intramuscular hemorrhage secondary to Blunt Force Trauma (BFT) to the back, moderate to severe obstruction of the left anterior descending coronary artery, and a blood methamphetamine level of 1.85mg/L. Despite evidence of BFT and a history potentially consistent with asphyxia, the cause of death was concluded to be due to the toxic effects of methamphetamine combined with coronary artery disease.

Although body cam video was obstructed, the breathing sounds and moans the man was making were captured on audio recording. This allowed for quantification of the man's breathing rate, which paradoxically dropped from 55bpm prior to the spitting incident to 20bpm upon his last breath, a finding that is inconsistent with a methamphetamine-related death, characterized by hyperventilation until cardiac arrest.

To the naked ear, the moans became muffled immediately after the spitting incident, and thus a phonetic computer program was used to quantify the sound frequencies associated with the man's vocalizations before and after the spitting incident.<sup>1</sup> The post-spitting spectrogram was missing the higher frequencies that were present in the pre-spitting spectrogram. An ad hoc experiment was conducted of a 30-year-old man moaning with and without a hand over his mouth, and the spectrogram of the obstructed scenario was identical to the post-spitting spectrogram of the decedent.

A final step of the analysis was to estimate the competing risks of sudden death from the causes listed in the autopsy report: methamphetamine toxicity and coronary artery disease. The estimated risk of death due to methamphetamine toxicity at a recreational dose is less than 1 per 353,000 doses of methamphetamine.<sup>1</sup> The risk of sudden cardiac death in adult men aged 31–35 years like the decedent is 1 in 31,250 annually.<sup>2</sup> Assuming the decedent was in the least healthy 10% of the population for cardiac health, his annual risk of sudden cardiac death would be 1 in 3,125, and the risk during the three-minute interval preceding his death would be 1 in 548 million. While it is possible that the left anterior descending coronary artery obstruction and/or methamphetamine interacted with the asphyxia to result in a fatal tachyarrhythmia, the degree to which this occurred is unquantifiable.

The result of the analysis was used to conclude that the largest single factor contributing to the man's death was asphyxia by manual smothering, with coronary artery disease as a likely secondary cause, and methamphetamine presence only a possible contributing cause. The manner of death was a homicide.

### Reference(s):

1. Strömmer, E.M.F., Leith W., Zeegers M.P., Freeman M.D. The role of restraint in fatal excited delirium: A research synthesis and pooled analysis. *For Sci Med Path* 2020: doi.org/10.1007/s12024-020-00291-8.
2. Bagnall, et al. A prospective study of sudden cardiac death among children and young adults. *N Eng J Med*. 2016;374:2441-52.

---

### Death in Custody, Audio Recording Analysis, Counterfactual Causation