K70 Tapentadol in Postmortem Casework

Ruth E. Winecker, PhD, and Justin O. Brower, PhD, OCME, Box 7580, Chapel Hill, NC 27312; and Laura W. Friederich, BS, 613A Pleasant Dr, Durham, NC 27703*

After attending this presentation, attendees will be able to detail the types of postmortem casework associated with tapentadol at various concentrations.

This presentation will impact the forensic science community by providing information regarding tapentadol as it relates to cause and manner of death determinations.

Tapentadol (Nucynta®, Palexia®, Zyntap®) is a mu-opioid receptor agonist and norepinephrine reuptake inhibitor. Approved by the Food and Drug Administration in 2009, tapentadol is available as immediate-release tablets of 50, 75, and 100mg and is indicated for acute moderate to severe pain. Adverse reactions associated with tapentadol are generally related to CNS depression including drowsiness, dizziness, headaches, as well as nausea and vomiting. Limited information has been published on tapentadol toxicity. A literature review indicates there are presently only four reported deaths in which the causative agent(s) included tapentadol.

At the North Carolina Office of the Chief Medical Examiner, cases suspicious for toxicological cause or with essentially negative autopsy findings are routinely screened for common over-the-counter, prescription, and illegal drugs via various laboratory techniques. This presentation will detail a group of 12 cases were tapentadol was detected during routine postmortem drug screening in support of cause and manner of death determination. Tapentadol is easily detected by the laboratory's basic organics screen which utilizes both Gas Chromatography with Nitrogen Phosphorus Detection (GC/NPD) and Gas Chromatography Mass Spectrometry (GC/MS). The extraction procedure has been previously described.[1]

Quantification of tapentadol is accomplished using GC-NPD with a calibration curve (blood matrix) and matrix matched positive/negative controls using the extraction procedure referenced above. Linearity, LOD, and LOQ are 0.2-2, 0.025 and 0.2mg/L, respectively. Accuracy and precision in blood (liver) are 99.4 (106) and 4.5 (12)%, respectively. Decedents were divided into groups according to manner of death for the purposes of studying tapentadol concentrations in overdose and non-overdose situations. The accidental and suicidal overdoses were subsequently divided into subgroups for further study: those where tapentadol was determined to contribute to the cause of death (attributed) and those where it was not (unattributed). The deaths in which tapentadol was determined to contribute to the cause of death were further divided into those where tapentadol additively combined with other drugs to cause the death and those where the drug was present in sufficient amounts to have caused the death regardless of other drugs and their concentrations.

Discussion: In all, since December 2010, there have been 12 cases where tapentadol was detected during routine drug screening. Eight cases had paired central and peripheral blood specimens and central/peripheral ratios averaged 1.65 and ranged from 0.54 – 3.3. The mean (median) concentration of tapentadol in central blood was 3.8 (3.3) and concentrations ranged from to <0.2 – 10mg/L. Likewise, for peripheral blood the mean (median) are 2 (2.5) and range is <0.2 – 3.1. For liver, the mean (median) and range are 10 (7.1) and <1 – 25mg/Kg, respectively. Co-intoxicants included antidepressants, antipsychotics, antihistamines, ethanol, cocaine, and miscellaneous CNS depressants.

In conclusion, of the 12 cases studied: 2 (16%) tapentadol were ruled not contributory to death, 7 (58%) were ruled accidental multiple drug intoxication, and 3 (25%) were ruled suicidal multiple drug intoxication. Concentrations of tapentadol in these groups were <0.2, 0.58 – 3.1, and 2.5 – 5.2mg/L, respectively.

Reference:

1. Winecker RE: *Quantification of Antidepressants using Gas Chromatography Mass Spectrometry*; and, *Clinical Applications of Mass Spectrometry*, Hammet-Stabler CH and Garg U, eds. Humana Press, Clifton, NJ. 2010. (pp. 45-56).

Tapentadol, Death Investigation, Toxicology

 ** Presenting Author*