H122 Immune Responses in Opioid Use

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After attending this presentation, attendees will be able to: (1) identify situations in which opioid use is present but not definitely diagnostic of cause or manner of death; (2) collect and store specimens for opioid and immune analysis; (3) apply laboratory and anatomic findings to establish immune response in cases of opioid use; and, (4) apply immune responses in death certificates.

This presentation will impact the forensic science community by demonstrating how these findings can be used to perform forensic, toxicological, and immunological examinations of decedents and to certify the cause and manner of death.

Death from the abuse of prescription or illicit opioids is acutely on the rise in the United States.[1] Death from drug abuse is usually determined by toxicological examination of the blood or other body fluids in conjunction with an autopsy, scene investigation, and detailed decedent history; however, in some cases, the levels of opioids detected do not reach toxic levels, let alone fatal levels.[2,3] It was hypothesized that there is a subset of opioid users in whom immune activiation is a substrate of the mechanism of death, and they can be identified by demonstrating evidence of allergic or anaphylactic reactions.

In this experiment, cases from a ten-year period were reviewed. All cases with toxicological evidence of opioid use were recorded. The cases were further grouped by evidence of immune response in the presence of opioid use. Evidence of immune activation was based on external findings such as rash or scratches from recent pruritis; internal evidence such as overlapping lung apices from asthma; microscopic evidence such as lung changes of asthma; or elevated mast cell tryptase levels. Groups were compared with *t*-tests and chi-square 2x2 contingency tables.

In all, 49 cases of opioid use were identified. Of these, five had evidence of immune response in the presence of opioids: two with scratches, three with evidence of asthma, and one with elevated mast cell tryptase. There was no significant difference between the two groups based on age, race, or sex. There was no significant difference in the types of drugs or opioids identified in the two groups. There was no significant difference in the manner of death. Of a number of clinical histories and causes of death identified, asthma was the major condition that was significantly associated with immune response in the presence of opioid use.

In conclusion, men and women were equally likely to have used opioids in this study group, typically in their fourth and fifth decades. No specific type of opioid was favored. Other prescription drugs were frequently present. The most common cause of death was overdose or drug interaction. The manner of death was typically accident. Immune response was evident in 10% of the cases. A history and evidence of asthma was significantly associated with immune response and as a cause of death.

Reference(s):

1. Manchikanti L., Singh A. Therapeutic opioids: A ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical uses of opioids. *Pain Physician.* 2008;11(2 Suppl):S63-88.

2. Gruszecki A.C., Booth J., Davis G.G. The predictive value of history and scene investigation for toxicology results in a medical examiner population. *Am J Forensic Med Pathol.* 2007;28(2):103-6.

3. Mauer U., Kager C., Fellinger C., Loader D., Pollesböck A., Spitzer B., Jarisch R. Risk of anaphylaxis in opioid dependent persons: Effects of heroin versus substitution substance. *Substance Abuse Treatment, Prevention, and Policy.* 2014;9:12. https://www.substanceabusepolicy.com/content/9/1/12.

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