## H101 The Relationship of Chronic Psychostimulant Use and Cardiovascular Disease

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**Learning Overview:** The goal of this presentation is to assess the relationship between chronic psychostimulant abuse and the development of cardiovascular pathology.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by using a retrospective and prospective study to compare cardiovascular disease development in psychostimulant abusers. Cardiac parameters, histological changes, and user demographics are discussed.

There is considerable literature on the contribution of chronic stimulant abuse in causing or contributing to the development of cardiovascular disease. While it seems clear that cocaine and methamphetamine adversely affect the heart and blood vessels, the explanation of how chronic use contributes to cardiovascular disease remains elusive. The challenge in defining their role is because the same diseases are common natural diseases, and it is difficult to assess whether stimulants directly contribute to the development of cardiovascular disease, accelerate it, or are merely coincidental. The present study addresses these questions.

**Methods and Materials:** Using autopsy material from the King County Medical Examiner's Office (KCMEO) in Seattle, WA, this presentation uses two different approaches to assess the role of stimulant abuse in developing cardiovascular disease. The first is a retrospective review of specific cardiac parameters: heart weight and coronary atherosclerosis in decedents of drug overdose involving cocaine, methamphetamine, or heroin. These parameters were compared between two groups: those dying of overdoses including stimulants, with or without heroin, and those dying of overdoses including heroin, without stimulants.

The second approach is a prospective study examining additional cardiac parameters: heart weight, left ventricular wall thickness, coronary atherosclerosis, and cardiac fiber diameter measured histomorphometrically. These parameters were compared between two groups: decedents between the ages of 19 and 39 years dying of causes other than drug overdose who were positive for either cocaine or methamphetamine and decedents in the same age range dying of causes other than overdose who were negative for cocaine or methamphetamine.

**Results:** In the retrospective study, there were 249 decedents positive for methamphetamine or cocaine, with or without heroin. In the stimulant-negative comparison group, there were 193 decedents positive for heroin but negative for cocaine or methamphetamine. The average age was 44 years in the former group and 39 years in the latter group. In the stimulant-positive group, mean heart weight was 554 grams, compared with 425 grams in the stimulant-negative group. Coronary atherosclerosis was present in 37% of the stimulant positive group compared with 26% in the stimulant-negative group.

In the prospective study, there were 28 decedents positive for stimulants and 32 decedents negative for stimulants. The stimulant-positive group had no differences in heart weight and left ventricular thickness, compared to the stimulant-negative group. In the stimulant-positive group, cardiac fiber diameter was statistically greater than that of the stimulant-negative group. In the stimulant-positive group, 32% had coronary atherosclerosis, compared to 6% in the stimulant-negative group.

**Discussion:** The present study uses two novel approaches to further understand the contribution of stimulant abuse toward developing cardiovascular disease. One approach uses a comparison group of overdoses involving heroin, in which stimulants are absent, and the second uses histomorphometry to assess early or subtle changes in cardiac morphometry. Despite obvious limitations in using postmortem data to assess natural disease progression, the results of the two approaches, taken together, provide evidence that stimulant abuse may accelerate the progression of natural disease, starting in early adulthood, and may represent an independent risk factor acting additively or synergistically with other recognized risk factors in promoting the development of premature cardiovascular disease. Furthermore, cardiovascular disease likely represents an important condition predisposing to death due to acute intoxication involving stimulants.

**Psychostimulant, Cardiovascular, Cocaine**



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