



## Pathology/Biology Section - 2015

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### H140 Cardiovascular Pathology in Cases of Death Following Autonomic Failure

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After attending this presentation, attendees will be able to identify common, less common, and very rare histopathologic findings of the heart and its conduction system following a sudden death due to a derangement of the autonomic nervous system. Attendees will be taught the appropriate approach for the examination of the heart. Different dissection and sampling techniques, together with different histology, staining procedures, immunohistochemistry, and DNA analyses will also be presented.

This presentation will impact the forensic science community by approaching the concept of “neurocardiology” in a multidisciplinary way. The goal of this study is to provide new tools and guidelines for the medical examiners attending a case in which a failure of the autonomic nervous system is regarded to be the triggering factor in the chain of events leading to death.

Central autonomic failures may result in several cardiovascular complications ranging from reversible Electrocardiogram (EKG) changes to a well-established myocardial infarction. It is well recognized that physical and emotional stress (such as physical pain, anxiety, and anger) may result in sudden death following a major, apparently “inexplicable,” cardiac event. These mechanisms are known to be responsible for more than 300,000 sudden cardiac deaths every year in the United States.

During the presentation, the chain of cellular events resulting either in reversible cell injury or death of the myocytes will be explained briefly. After the explanation of the process involving cardiac physiology and physiopathology, attendees will be shown a series of cases in which the autonomic nervous system was found to be the only trigger factor for the development of a myocardial ischaemia or an infarction. At the time of the autopsy, all of the decedents were found to have patent coronary arteries, no abnormalities to the cardiac conduction system, and negative DNA analyses for the most common channelopathies. Both the macroscopic and the microscopic examination of the organs (with the exception of the heart) were unremarkable. The toxicological analyses were negative and there was no history of previous diseases or alcohol or drug abuse.

The goal of this study is to link the histopathological findings to the concept of neurocardiology. The most common EKG changes (when recorded shortly prior to death) will be shown and compared with the related “neurocardiac lesions” such as myofilament disintegration, coagulation necrosis, colliquative myocytolysis, coagulative myocytolysis (contraction band necrosis) and macroscopically, subendocardial hemorrhages, and/or a well defined myocardial infarction. The attendees will also be taught how to assess the different dating of the above-mentioned injuries using different tools such as the degree of inflammatory response, different histological stains, immunohistochemistry, and DNA analysis. Further “ancillary” analyses, techniques of fixation, and dissection will also be discussed.

After the presentation of several cases, a comprehensive explanation of the biochemical derangements and their underlying intracellular mechanisms, attendees will be able to recognize the different types of “neurogenic heart disease” such as those caused by increased plasma levels of catecholamines, increased or decreased plasma levels of steroids (e.g., fluorocortisol), or a sudden intracellular calcium influx.

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#### **Sudden Death, Autonomic Failure, Cardiovascular Pathology**