H2 Incidence and Distribution of Intracellular Fat in Cardiac Myocytes in Chronic Alcoholics

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The goal of this presentation is to show the results of research describing the incidence of a change that can be seen in the cardiac myocytes of chronic alcoholics: the accumulation of intracellular neutral lipids.

This presentation will impact the forensic science community by suggesting that the presence of intracellular lipids in cardiomyocytes could serve as histologic evidence for a cause of death in chronic alcoholics in the absence of other pathologic findings at autopsy.

Chronic alcohol intake in some patients produces a congestive type of cardiomyopathy. Pathologically, alcoholic cardiomyopathy is manifested as cardiomegaly and biventricular dilatation. Microscopic sections of severely affected hearts show fibrosis. This investigation describes the incidence of intracellular lipids, a change that can be seen even earlier in alcoholic heart disease.

The objective of this research was to determine whether there is a significant increase in lipid accumulation in postmortem samples of myocardium from chronic alcoholics. The case material used in this study was obtained from 26 hearts of patients who were known to have histories of chronic, excessive alcohol consumption. These patients were autopsied at the University of Maryland Medical Center, the Baltimore VA Medical Center, and the Office of the Chief Medical Examiner for the State of Maryland. Hearts obtained from 35 autopsy patients at the University of Maryland Medical Center with no history of alcohol abuse served as the random control population.

Samples were obtained from the myocardium at the time of autopsy from the posterior right ventricle, the left ventricle, and the intraventricular septum. A modified Oil-Red-O stain was used to determine intracellular lipid droplets. The subjective intensity of lipid deposition was graded in terms of an arbitrary scale 0 to 5+ (0=no lipid, 5+=total replacement of the myocyte by lipid). Electron microscopy was performed on selected cases to confirm the light microscopic observations.

Microscopic examination of Oil-Red-O-stained sections of heart muscle showed that 13 of the 26 alcoholic hearts chosen had increased amounts of lipid in the myocardium, predominantly in the right ventricle. In no case was alcoholic cardiomyopathy diagnosed on a clinical basis, although gross examination of the heart in a few cases indicated the possibility of the presence of this disease. In two alcoholic cases, lipid distribution was widespread. In both cases, the cause of death was not clear cut. In the non-alcoholic population, seven of the 35 hearts showed evidence of intracellular lipid deposition. Of these seven patients, six had documented histories of treatment with chemotherapeutic regimens, a known cause of intramyocardial fat. Statistical comparison between the two study populations was calculated by the Chi-square test and gave a significant value of p less than 0.05.

The findings in this study suggest that intracellular lipid deposition may reflect occult alcoholic cardiomyopathy of varying severity, especially in the absence of other known causes of intramyocardial fat, such as prolonged anemia and chemotherapy. The lipid deposition observed in this investigation appears to be a sub-lethal, covert insult to the myocardium which precedes or predisposes to the overt symptoms of alcoholic cardiomyopathy. The finding of lipid-laden cardiac myocytes may also suggest the possibility of sudden/toxic metabolic cardiac death in alcoholics where no other significant or lethal pathologic findings are documented at autopsy.

Cardiac Myocytes, Alcoholic Cardiomyopathy, Alcoholism