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"Sex Differences in Alcohol-Related Cardiomyopathy: Comparing Male and Female C57BL6J Mice on Lieber-DeCarli Chronic-Binge Alcohol Liquid Diet"

BACKGROUND: Alcohol-related cardiomyopathy (ACM) is a dilated cardiomyopathy characterized by left ventricle (LV) dilation and diminished contractile function. Up to 40% of all dilated cardiomyopathies in the United States can be associated with chronic excessive alcohol consumption, and ACM is typically irreversible at the time of diagnosis. The NIH reports that females constitute only 14% of all ACM cases, but they require lower levels of lifetime alcohol exposure to develop ACM compared to males. The National Center for Drug Abuse statistics also notes that about 35% of people 12 and over with an alcohol use disorder are women, and that proportion is growing. Still, studies investigating sex differences in ACM are limited.

OBJECTIVES: Determine if the Lieber-DeCarli chronic binge alcohol liquid diet affects female C57BL6J mice differently than male mice in terms of cardiac structure and function.

METHODS: A cohort of female C57BL6J mice (n=16) were acclimated to the Lieber-DeCarli control liquid diet for one week, and baseline echocardiographs and weights were recorded. The experimental group (n=10) was switched to the Lieber-DeCarli 5% ethanol liquid diet for 30 days. Oral gavage of a 5g/kg ethanol solution or maltose control was performed at days 10 and 30. Food intake and mice body weights were recorded throughout the cohort. Endpoint functional data was collected to be compared to a previous male cohort (n=16).

RESULTS: Comparing percent weight change, there was no significant difference between the male and female control groups. The ethanol groups in both cohorts had significantly less weight gain than their control comparisons. However, the female mice weights were significantly less impacted by the Lieber-DeCarli ethanol diet compared to the male ethanol group.

Stroke work in the male cohort measured 1622 mmHg*uL ± 129 in control mice and 1119 mmHg*uL ± 89 in ethanol mice at the 30-day mark. The dP/dt values for the male cohort at 30 days were 11188 mmHg/s ± 724 for control mice and 8054 mmHg/s ± 665 for ethanol-treated mice. Endpoint functional data from the female cohort will be compared to this male data.

FINDINGS: The Lieber-DeCarli liquid ethanol diet significantly hindered weight gain in both male and female C57BL6J mice, impacting the male cohort more significantly. LV catheterization data from the male cohort shows significant decline in stroke volume and dP/dt measures in the ethanol-treated group.

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