CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

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Project Number

S1207

Project Title

The Role of Testosterone in Hepatocyte Apoptosis in High Fat Diet-Induced Non-Alcoholic Fatty Liver Disease

Abstract

Objectives/Goals

The objective of this study was to learn whether hepatocyte apoptosis exists in the rat high fat diet (HFD)-induced non-alcoholic fatty liver disease model, and if so, whether or not testosterone reverses these apoptotic effects.

Methods/Materials

Adult male rats were randomly placed into four groups: castrated rats on HFD, castrated rats with Testosterone replacement on HFD, intact rats on HFD, and intact rats on regular chow diet (RCD). The rats were fed ad libitum for 15 weeks, sacrificed, and liver tissue was collected for detection of apoptosis. Terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) assay was performed to directly stain apoptotic cells brown. Western blot was used to evaluate concentrations of cleaved PARP (89 kDa), a common marker for cell apoptosis.

Results

Both the TUNEL assay and the Western blot showed that HFD notably increased hepatocyte apoptosis compared with RCD in intact rats. Furthermore, they also showed that testosterone replacement significantly reduced HFD-induced hepatocyte apoptosis in castrated rats. This provided evidence that testosterone did in fact reverse the apoptotic effects of NAFLD.

Conclusions/Discussion

It was ultimately concluded that testosterone treatment significantly reduces HFD-induced hepatocyte apoptosis in the rat liver. This study confirms the beneficial effect of testosterone on cell apoptosis associated with NAFLD, and may forge a path toward developing methods to eventually attenuate NAFLD in the future.

Summary Statement

This study is about the role of testosterone in reversing the apoptotic effects associated with NAFLD.

Help Received

Used lab equipment at Los Angeles Biomedical Research Institute under the supervision of Dr. Yue Jia.