CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

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Project Number

S0513

Project Title

The Role of Testosterone in Hepatocyte Apoptosis in High Fat Diet-Induced Non-alcoholic Fatty Liver Disease: Year 2

Abstract

Objectives/Goals

The objective of this study was to discover whether or not hepatocyte apoptosis due to non-alcoholic fatty liver disease (NAFLD) is mitochondria-dependent, and thus follows the intrinsic apoptotic pathway. Furthermore, this study was intended to explore testosterone's potential ability to prevent apoptosis by inhibiting mitochondrial release of DIABLO in the intrinsic apoptotic pathway.

Methods/Materials

From a previous separate study, male rats were randomly placed into four groups: intact rats on regular chow diet (RCD), intact rats on HFD, castrated rats on HFD, and castrated rats on HFD with testosterone replacement. The rats were fed ad libitum for 15 weeks, sacrificed, and liver tissue was collected and fixed with formalin. These samples were used for the apoptosis detection in this study. Western blot was used to evaluate levels of Smac/DIABLO (23 kDa) in hepatocyte cytosol.

Results

Western blot results between the intact groups showed that HFD-induced NAFLD resulted in significantly greater mitochondrial release of DIABLO into hepatocyte cytosol. The comparison between castrated groups showed a significantly reduced concentration of DIABLO in hepatocyte cytosol after treatment with testosterone.

Conclusions/Discussion

It was concluded that one main mechanism behind testosterone#s protective effect in the liver is inhibiting release of DIABLO into hepatocyte cytosol. This study thus further develops the HFD-induced NAFLD model, and may forge a path toward eventually attenuating NAFLD.

Summary Statement

My study identified one main way that testosterone prevents hepatocyte apoptosis in the liver due to non-alcoholic fatty liver disease.

Help Received

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