Effect of Estrogen on the development of fatty liver in high fat fed SCID mice

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Introduction

Estrogen insufficiency combined with a high fat diet has been associated with insulin resistance and development of diabetes. Estrogen is essential for regulation of lipid metabolism in the liver by enhancing the expression of lipid receptors. Severe combined immunodeficient (SCID) mice were chosen for studying the role of 17β-estradiol in the development of fatty liver due to a previous experiment. In the previous experiment female SCID mice on a high fat diet did not gain weight compared to male SCID mice on a high fat diet. In the present study we aim to investigate the role of estrogen in this sexual dimorphism more closely.

Hypothesis

We expect 17β-estradiol to decrease lipid accumulation in SCID male mice on a high fat diet, due to an increase in lipid clearance in the liver.

Methods

SCID mice (n= 36) were fed a high fat diet (HFD) for 12 weeks. 17β-estradiol was administered every week to 12 male mice. Weight gain and glucose levels were assessed biweekly. Liver samples were processed and stained with Hematoxylin and Eosin (H&E) for analyzing.

Results

Male mice injected with estradiol weighed less than male mice w/o estrogen.

SCID, Male, High Fat, Control

Arrows show steatosis (fat accumulation)

SCID, Male, High Fat, w/ Estrogen

No steatosis around blood vessels in mice treated with estrogen

Conclusion and Discussion

• Male mice treated with estrogen weighed less than males not treated with estrogen.
• Male mice treated with estrogen did not develop fat around blood vessels in the liver.
• This study supports the hypothesis that an estrogen rich liver will decrease lipogenesis and increase fatty acid oxidation. This suggests that estrogen has the potential to decrease the production of bad cholesterol, LDL in the liver.
• This suggests that estrogen decreases lipid accumulation and also decreases the chances of male mice developing diabetes.

Future Direction

• Future research can explore the role that estrogen plays in males developing diabetes by examining how the concentration of estrogen influences insulin resistance in males.
• Further research could analyze the impact that age has on the development of diabetes in males treated with estrogen.
• Lastly, another study could analyze how the concentration of testosterone in human females may lead to diabetes.

References


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