

## **Role of perilipins in the development of fatty liver disease.**

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### **Background and Hypothesis:**

Lipid droplets (LDs) are fatty acid (FA) containing structures within cells. In obesity, hepatic LDs accumulate more FA which may cause steatosis and non-alcoholic fatty liver disease (NAFLD). Perilipins (PLINs) are a family of LD-associated proteins involved in intracellular trafficking and signaling. In hepatocytes, NAFLD alters expression of PLINs. Using metabolomics, Dr. Gupta's laboratory previously showed enlarged LDs and altered PLIN1, 3, and 4 content in NOD2<sup>-/-</sup> compared to wild type (WT) mice on high fat diet (HFD). Nucleotide-binding and oligomerization domain (NOD) is an intracellular receptor that regulates sensitivity to obesity.

To expand on Dr. Gupta's study, we quantified diet-induced alterations and visualized intracellular distribution of PLINs in mouse livers. We hypothesized that PLIN2, 3, and 4 concentrations would increase whereas PLIN1 would decrease in NOD2<sup>-/-</sup>HFD compared to WTHFD mice.

### **Methods:**

Immunostaining was used to visualize intracellular distribution of PLINs. Western blotting was used to quantify differences in PLINs protein expression.

### **Results:**

LD distribution showed WT regular chow (RC) = NOD2<sup>-/-</sup>RC < WTHFD << NOD2<sup>-/-</sup>HFD.

Bright LD-associated staining for PLIN2 was observed in both small and large LDs in all four groups. PLIN3 brightly stained the bile ducts, and it stained small LDs but not large LDs. PLIN4 stained small intracellular LDs in all four groups.

PLIN1 showed a trend for decrease in both NOD2<sup>-/-</sup>HFD and WTHFD compared with RC mice. PLIN2 appears to be decreased in WTHFD and both NOD2<sup>-/-</sup> groups compared to WTRC. PLIN3 seemed to show increased expression in WTHFD but not in NOD2<sup>-/-</sup>. PLIN4 showed a trend for decreased expression in both NOD2<sup>-/-</sup>RC and NOD2<sup>-/-</sup>HFD mice compared to WTRC.

### **Conclusion:**

Despite enlarged LD size, there was no detectable increase in PLINs expression in NOD2<sup>-/-</sup>HFD compared to WTHFD. This may be due to the impact of other LD-associated proteins in the livers of NOD2<sup>-/-</sup> mice.