Internal Regulation of Triglyceride Levels in the Liver Through Autophagy-induced Protein Manipulation

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Abstract

Overnutrition in modern society has created many pathological conditions that have personal and social consequences. Fatty liver is one of such conditions that used to be considered transient and benign but is now known to be the beginning stage of more severe liver diseases. Excess lipids due to overnutrition are usually manifested in the liver by the appearance of subcellular structures known as lipid droplets (LD). LD are composed of a monolayer of phospholipids wrapping around a neutral lipid core mostly comprised of triglyceride (TG). TG is classically known to be catabolized by lipolytic-enzymes, such as Triglyceride lipase (ATGL), Hormone-sensitive lipase (HSL). This study describes a new mechanism of TG catabolism not by lipases but through cellular scavenger system – autophagy.

Through experimentation, data suggests LD is not only composed of lipids but also proteins that potentially regulate LD formation and catabolism. Plin2, one of the lipid droplet proteins, suggests a pivotal role in the regulation of lipid levels in the liver via autophagy. Previous studies showed that in the absence of Plin2 the hepatic TG level reduced to only 50% of the control. Results from western blotting and imaging analysis has identified Plin2-deficiency in correlation to increased autophagy activity. The absence of Plin2 on the LD concomitantly caused the elevation of other proteins such as ABHD5, and Plin5 on lipid droplets. By analyzing the TG levels and autophagy flux in different knockout combinations of these LD proteins there can be a more versed understanding of how autophagy regulates TG catabolism in the liver.

Keywords

Lipit droplets; autophagy regulation; hepatocytes; perilipin2 (Plin2); ABHD5

Cover Page Footnote

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ABSTRACT

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