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Identification of Lipid Droplet Structure-like Proteins and Their Function on Lifespan of Caenorhabitis elegans

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Storage of neutral lipids in lipid droplets (LDs) has been linked to many metabolic syndromes in humans, but formation, dynamics, as well as functions of the organelle remain elusive. C. elegans is a useful animal model to study lipid metabolism and storage, especially to conduct genome-wide screening. But lack of LD marker or/and structure-like proteins such as mammalian Perilipin family proteins (PLINs) in C. elegans have made the research very difficult. We recently isolated LDs from several strains of C. elegans, carried out comparative LD proteomic studies, and identified 154 LD-associated proteins including three LD structure-like proteins. We then determined tissue distributions of these three proteins and found that one was located in intestinal cells and another one was expressed almost all tissues. Interestingly, we identified their LD targeting domains and found that they could also target to LDs of mammalian cells. In addition, deletion or/and reduction of two of them significantly shortened lifespan of C. elegans and their effect on lifespan was not Daf-16 dependent.