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Lipid droplet structure-like proteins in *Caenorhabitis elegans*

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The current upswing in research interest in lipid droplets (LDs) has been fueled by the connection between LDs and human metabolic disorders, neutral lipid storage in food production and the development of biofuels. However, the mechanisms behind the formation, dynamics and functions of this organelle remain elusive. *C. elegans* is an excellent animal model for studying LDs, not only due to the ease of genetic manipulation and visualization but also because of the linkage between fat storage, metabolism, reproduction and the lifespan of the animal. However, a lack of knowledge of LD structure-like proteins in *C. elegans* has limited the utility of the model. Here we identify three LD structure-like proteins, DHS-3, MDT-28, and F22F7.1, which are analogous to mammalian perilipin and adipose differentiation-related protein. A series of comprehensive proteomic studies reveal that the localizations of these proteins are restricted to LDs and that they are among the most abundant on the organelle. We further determined LD targeting sequences and tissue distribution of DHS-3 and MDT-28. Most importantly, we demonstrate that depletion of these proteins alters LD size and affects the lifespan of the animal in a daf-16 independent manner, linking LD structure-like proteins to lifespan for the first time. These findings provide new knowledge and tools for the study of LD biology and will help to establish *C. elegans* as a powerful model of lipid storage-related disease states.

Biography

Pingsheng Liu obtained his Ph.D. from Clarkson University in 1994 and completed postdoc training in Dr. Richard Anderson's lab at UT Southwestern Medical Center. He is the Professor at the Institute of Biophysics, Chinese Academy of Sciences. His lab focuses on lipid droplet (LD) biology. His group established LD purification method and has identified many LD-associated proteins including Rabs, ATGL, CGI-58, Arf, MLDS, and DHS-3. He has published more 50 papers and is serving as an editorial board member of Journal of Lipid Research.

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