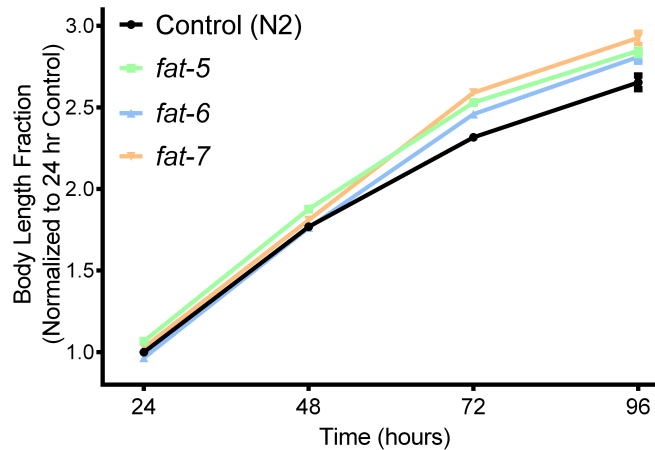


Delta-9 Fatty Acid Desaturase Mutants Display Increased Body Size

James F. Clark^{1,2} and Cathy Savage-Dunn^{1,2}

¹Department of Biology, Queens College, CUNY 65-30 Kissena Boulevard Flushing, NY 11367 ²Ph.D. Program in Biology, The Graduate Center, CUNY 365 5th Avenue New York, NY 10016



Significance from Control				
Hours				
Strain	24	48	72	96
fat-5	n.s.	**	***	***
fat-6	n.s.	n.s.	***	**
fat-7	n.s.	n.s.	***	***

Description

C. elegans contain three $\Delta 9$ fatty acid desaturases (FADs), *fat-5*, *fat-6*, and *fat-7*, responsible for the initial desaturation step in the synthesis of complex polyunsaturated fatty acids (PUFAs). Production of PUFAs is vital for survival, as simultaneous loss-of-function in all three genes results in synthetic lethality (Brock et al. 2006). Animals containing mutations in any one of the three $\Delta 9$ FADs, *fat-5*, *fat-6*, and *fat-7*, display an increase in body length. *fat-5* mutants display a significant increase from 48 hours onward, while *fat-6* and *fat-7* display a significant increase from 72 hours onward. Since *fat-6* and *fat-7* mutants have reduced lipid accumulation (Horikawa et al. 2008; Zhang et al. 2013; Clark et al. 2018), these findings on body size suggest that the two phenotypes are not correlated. Consistent with this conclusion, *dbl-1* mutants display both decreased body size and lipid accumulation while *lon-2* and *dbl-1(OE)* mutants display increased body size and decreased lipid accumulation at the L4 stage (Clark et al. 2018). Error bars denote SEM, Statistical significance determined via Student's T-test, n.s. not significant, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. $n > 25$ per strain, repeated in duplicate. Animals were synchronized via an egg lay followed by a timed hatch. Animals were collected and imaged at 25X using a QImaging Retiga EXi camera with QCapture software at each timepoint. Body length was measured by tracing the midline of the animals in ImageJ.

Reagents

Strains: N2. Alleles: *fat-5* (*tm420*), *fat-6* (*tm331*), *fat-7* (*wa36*).

References

Brock TJ, Browse J, Watts JL. 2006. Genetic regulation of unsaturated fatty acid composition in *C. elegans*. PLoS Genet 2(7): e108.

Clark JF, Meade M, Ranepura G, Hall DH, Savage-Dunn C. 2018. Caenorhabditis elegans DBL-1/BMP Regulates Lipid Accumulation via Interaction with Insulin Signaling. G3 (Bethesda) 8: 343-351.

09/18/2018 – Open Access

Horikawa M, Nomura T, Hashimoto T, Sakamoto K. 2008. Elongation and Desaturation of Fatty Acids are Critical in Growth, Lipid Metabolism and Ontogeny of *Caenorhabditis elegans*. *J. Biochem* 144: 149-158.

Zhang Y, Zou X, Ding Y, Wang H, Wu X, Liang B. 2013. Comparative genomics and functional study of lipid metabolic genes in *Caenorhabditis elegans*. *BMC Genomics* 14: 164.

Funding This work was supported in part by National Institutes of Health R15GM112147 and R15GM097692 to CSD. Some strains were provided by the CGC, which is funded by NIH Office of Research Infrastructure Programs (P40OD010440).

Reviewed by Jennifer Watts

Received 08/01/2018, **Accepted** 09/17/2018. **Available** starting WormBase release WS269, **Published Online** 09/18/2018.

Copyright © 2018 by the authors. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Citation: Clark, James F.; Savage-Dunn, Cathy. (2018). Delta-9 Fatty Acid Desaturase Mutants Display Increased Body Size. <https://doi.org/10.17912/SS8E-6587>