

The measurement of food-intake and nutrient absorption in *C. elegans* by quantitative mass spectrometry

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Here we present a novel method to estimate nutrient absorption, upon eating, in the widely used genetic model system *C. elegans*. Our “Pulse-feeding” assay is a novel method to estimate the utilization of food in *C. elegans* using quantitative mass spectrometry and metabolic labeling with nitrogen. *C. elegans* is an attractive model system for studying food-related behaviors because of the ease of genetic manipulation and the presence of many human homologues involved in food-related behaviors.⁽¹⁾ *C. elegans* eat bacteria and metabolic labeling of bacteria is simple and inexpensive, which in turn makes metabolic labeling of *C. elegans* simple and inexpensive.⁽²⁻³⁾ Quantitative proteomics experiments that measure both levels of proteins in various mutant worms and even dynamic changes in protein levels over the course of larval development have been published and have changed our understanding of protein regulation and interactions in *C. elegans*.^(2,4) Here, we present a novel method for metabolic pulse labeling in *C. elegans* by changing the food source of the worms to ¹⁵N enriched *E. coli* mid-experiment. We show that by metabolic pulse labeling with stable-isotope enriched bacteria, we can observe the level of absorption of the “food” into worm proteins by mass spectrometry. This approach not only demonstrates whether or not food is incorporated into the worm, but also gives a picture of which proteins are synthesized when the worm is treated with a small molecule, such as serotonin, that makes them eat more. We propose this food uptake assay might serve as a starting point for future studies investigating chemical and genetic determinants of nutrient absorption.

References

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