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# Supplementary Materials for

## Octopamine connects nutrient cues to lipid metabolism upon nutrient deprivation

Jun Tao, Yi-Cheng Ma, Zhong-Shan Yang, Cheng-Gang Zou, Ke-Qin Zhang

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**The PDF file includes:**

## Supplementary Figures

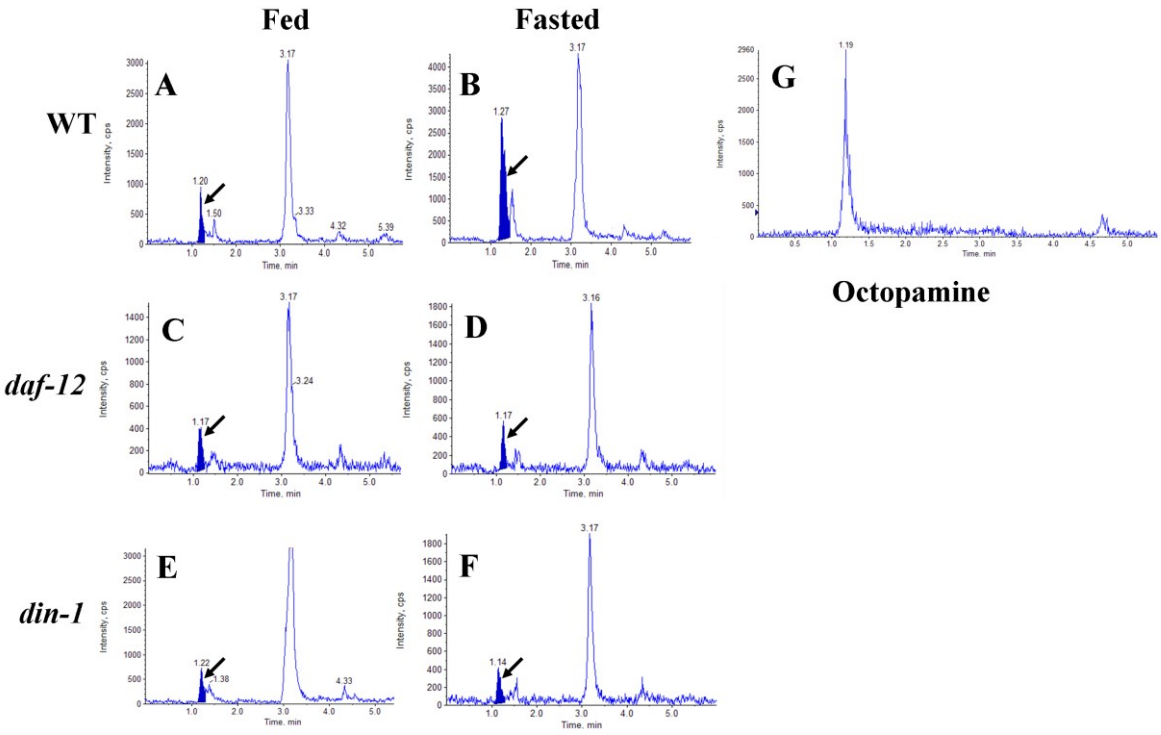


**fig. S1. LC-MS/MS detection of octopamine contents in worms.** Representative chromatograms of (A) well-fed wild-type (WT) worms, (B) starved WT worms, (C) well-fed *daf-12(rh61rh411)* mutants, (D) starved *daf-12(rh61rh411)* mutants, (E) well-fed *din-1(dh127)* worms, (F) starved *din-1(dh127)* worms, and (G) octopamine standard. cps, counts per second. Black arrows indicate the octopamine-specific peaks.

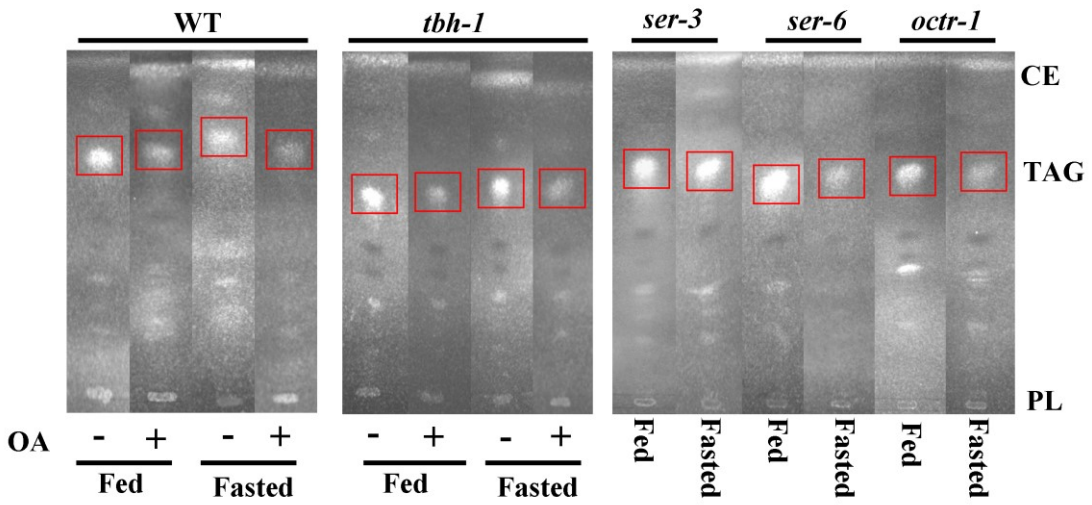


**fig. S2. TLC analysis of total lipids extracted from worms.** WT. wild-type worms; *tbh-1*, *tbh-1(n3247)*; *ser-3*, *ser-3(ad1774)*; *ser-6*, *ser-6(tm2146)*; *octr-1*, *octr-1(ok371)* mutants. CE, cholesterol ester; TAG, triacylglycerol; PL, phospholipids.

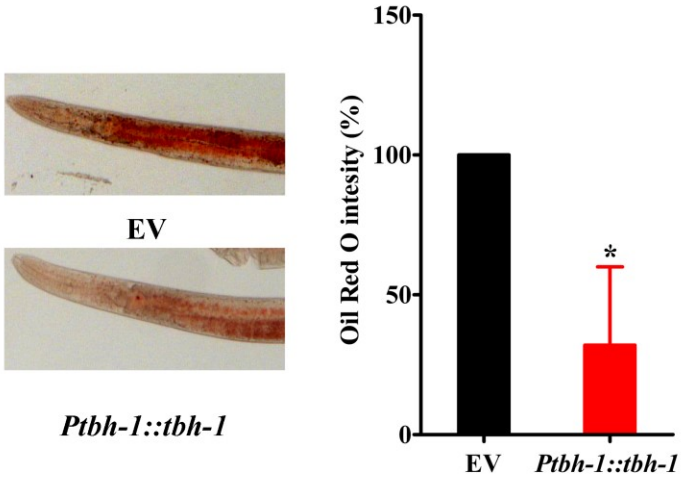


**fig. S3. Overexpression of *tbh-1* enhances lipid hydrolysis in well-fed wild-type worms.** The right panel represents relative Oil Red O intensity. EV, empty vector. **P*<0.05.

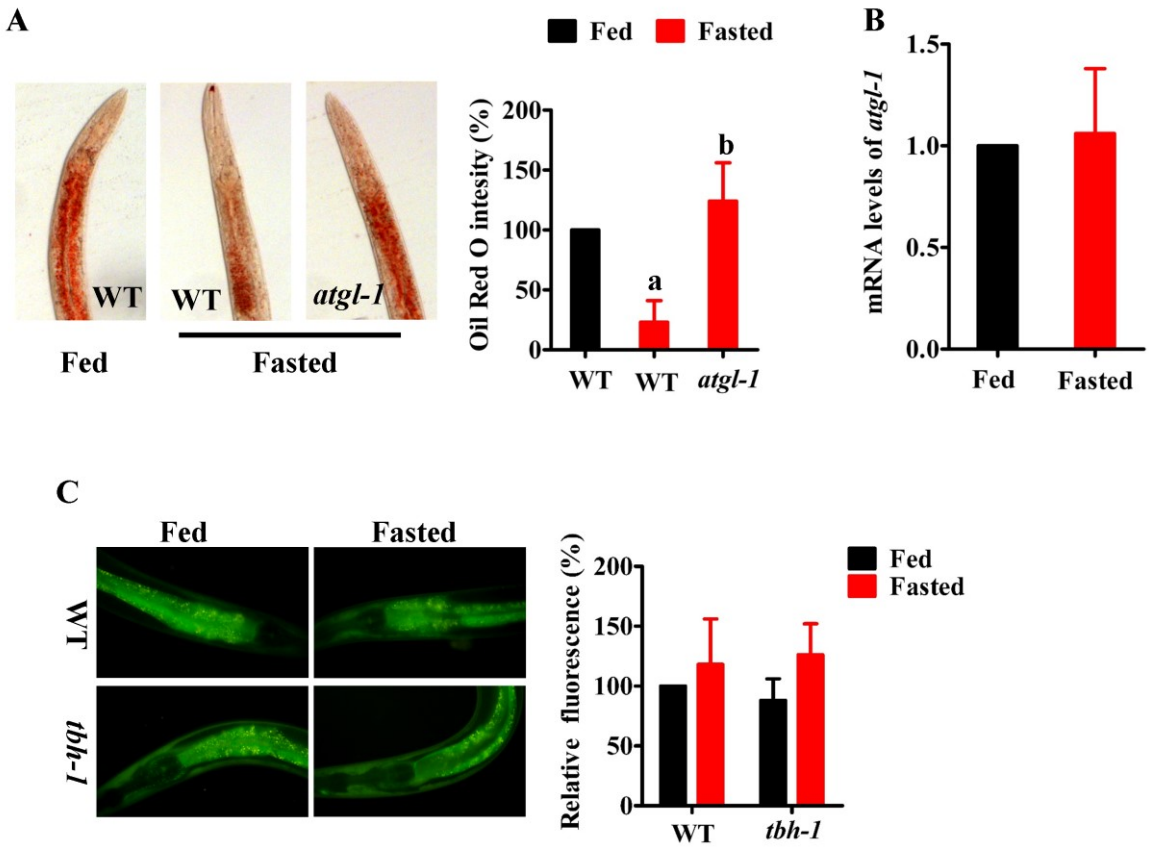


**fig. S4. Starvation does not alter the expression of *atgl-1*.** (A) The mutation in *atgl-1(tm3116)* led to lipid accumulation in starved worms. The right panel represents relative Oil Red O intensity. [a]$P < 0.05$ versus well-fed wild-type (WT) worms; [b]$P < 0.05$ versus starved WT worms. (B) mRNA levels of *atgl-1*. (C) Fluorescence microscopy of *Patgl-1::atgl-1::GFP*. The right panel shows quantification of GFP levels.

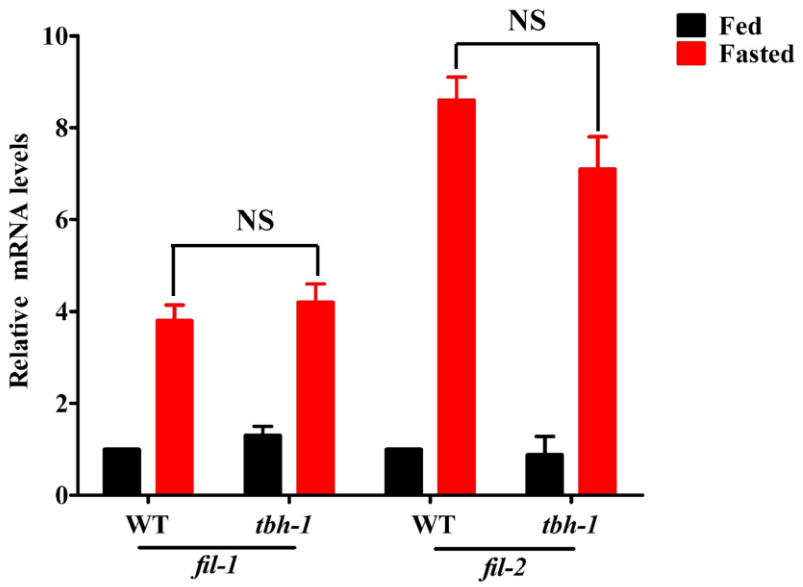


**fig. S5. A mutation in *tbh-1(n3247)* does not affect the expression of *fil-1* or *fil-2* in starved worms.** WT, wild-type worms; NS, not significant.

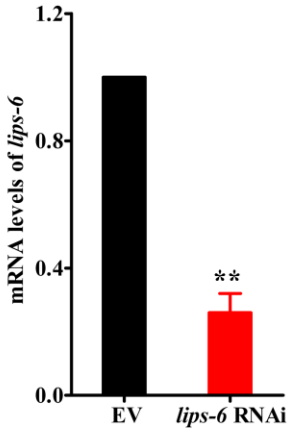


**fig. S6. Knockdown of *lips-6* by RNAi leads to reduced *lips-6* expression.** EV, empty vector. $^{**}P < 0.01$.

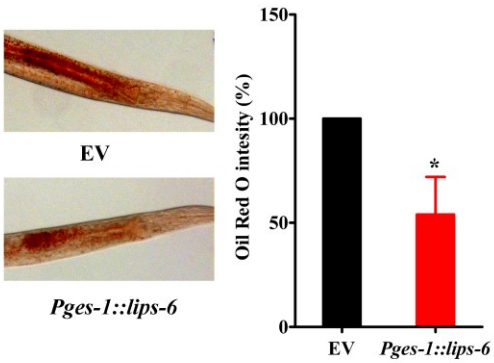


**fig. S7. Overexpression of *lips-6* in the intestine promotes lipid hydrolysis in well-fed WT worms.** The right panel represents relative Oil Red O intensity. EV, empty vector. $^{*}P<0.05$.

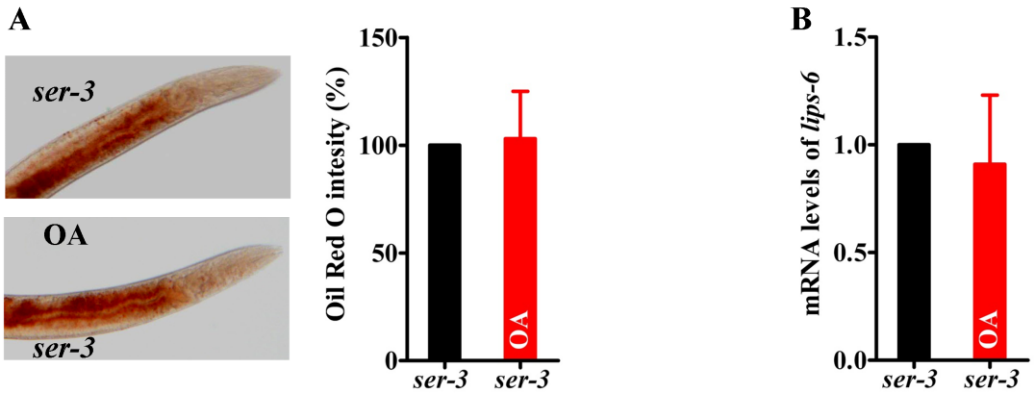


**fig. S8. Octopamine fails to restore lipid hydrolysis and expression of *lips-6* in *ser-3(ad1774)* mutants during starvation.** (A) Oil Red O staining. The right panel represents relative Oil Red O intensity. (B) mRNA levels of *lips-6*.

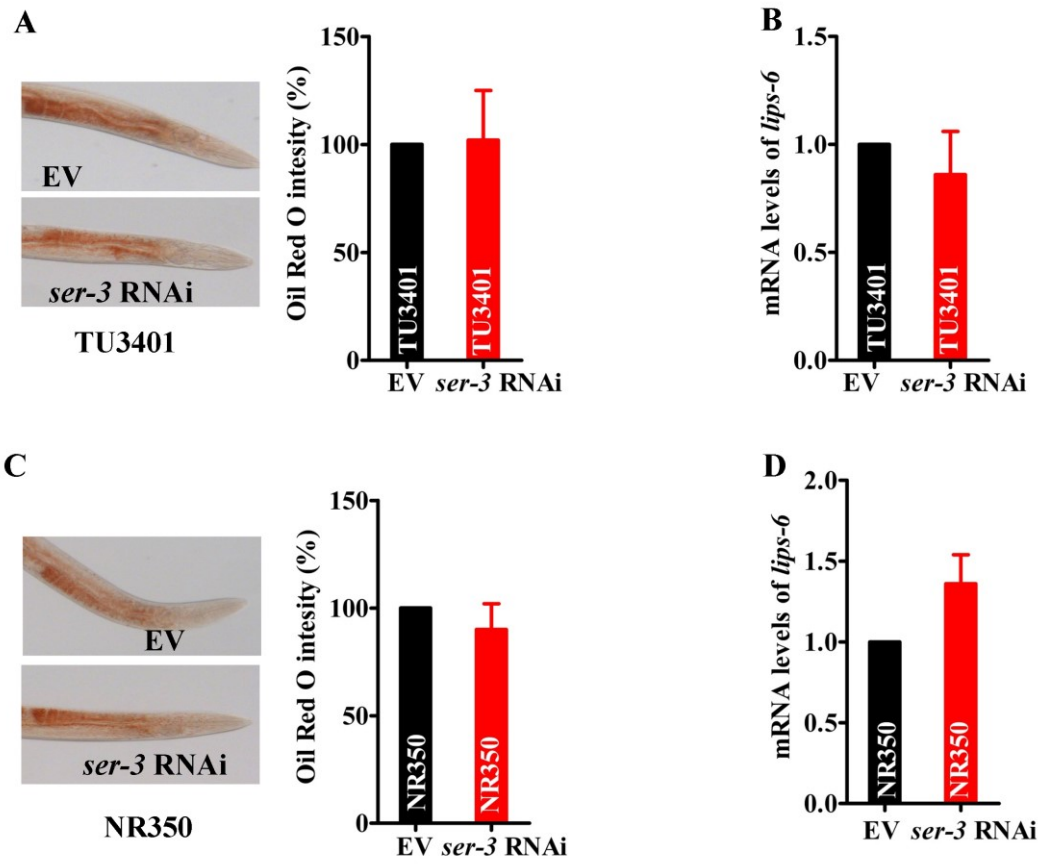


**fig. S9. SER-3 in the neurons and muscle is not involved in lipid hydrolysis during starvation.** (A and B) Neuronal-specific RNAi of *ser-3* (TU3401) did not alter lipid hydrolysis (A) and expression of *lips-6* (B). The right panel represents relative Oil Red O intensity. (C and D) Muscular-specific RNAi of *ser-3* (NR350) did not alter lipid hydrolysis (C) and expression of *lips-6* (D). The right panel represents relative Oil Red O intensity. EV, empty vector.

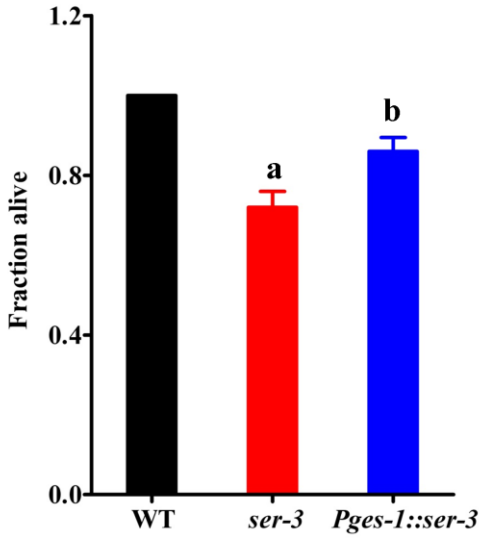


**fig. S10. SER-3 is involved in resistance to starvation.** A mutation in *ser-3(ad1774)* led to reduced rate of survival after three days of starvation. However, expression of s*er-3* in the intestine significantly suppressed the sensitivity of *ser-3(ad1774)* mutants to starvation. [a]$P < 0.05$ versus wild-type (WT) worms; [b]$P < 0.05$ versus *ser-3(ad1774)* worms.

**table S1. ChIP-qPCR analysis of the *tbh-1* promoter.**

| Distances to ATG | | Items | Mean ct | Δct | ΔΔct | $2^{-\Delta\Delta ct}$ |
|---|---|---|---|---|---|---|
| -4139 | 1 | Fed | 21.62 | 11.42 | 0 | 1 |
| | | Input | 10.2 | | | |
| | | Fasted | 21.24 | 9.54 | -1.88 | 3.68 |
| | | Input | 11.7 | | | |
| | 2 | Fed | 20.96 | 10.53 | 0 | 1 |
| | | Input | 10.43 | | | |
| | | Fasted | 21.75 | 8.98 | -1.55 | 2.93 |
| | | Input | 12.77 | | | |
| | 3 | Fed | 22.08 | 11.05 | 0 | 1 |
| | | Input | 11.03 | | | |
| | | Fasted | 21.21 | 9.23 | -1.82 | 3.53 |
| | | Input | 11.98 | | | |
| -3193 | 1 | Fed | 21.98 | 10.44 | 0 | 1 |
| | | Input | 11.54 | | | |
| | | Fasted | 20.51 | 9.18 | -1.26 | 2.39 |
| | | Input | 11.33 | | | |
| | 2 | Fed | 22.23 | 10.44 | 0 | 1 |
| | | Input | 11.79 | | | |
| | | Fasted | 21.29 | 9.44 | -1 | 2 |
| | | Input | 11.85 | | | |
| | 3 | Fed | 21.59 | 10.64 | 0 | 1 |
| | | Input | 10.95 | | | |
| | | Fasted | 20.95 | 9.34 | -1.3 | 2.46 |
| | | Input | 11.61 | | | |
| -2711 | 1 | Fed | 20.31 | 10.29 | 0 | 1 |
| | | Input | 10.02 | | | |
| | | Fasted | 18.84 | 8.45 | -1.84 | 3.58 |
| | | Input | 10.39 | | | |
| | 2 | Fed | 20.65 | 10.43 | 0 | 1 |
| | | Input | 10.22 | | | |
| | | Fasted | 19 | 8.71 | -1.72 | 3.29 |
| | | Input | 10.29 | | | |
| | 3 | Fed | 20.51 | 10.06 | 0 | 1 |
| | | Input | 10.45 | | | |
| | | Fasted | 17.89 | 7.9 | -2.16 | 4.47 |
| | | Input | 9.99 | | | |