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Supplemental Information

**Innate Immunity in the *C. elegans* Intestine
Is Programmed by a Neuronal Regulator
of AWC Olfactory Neuron Development**

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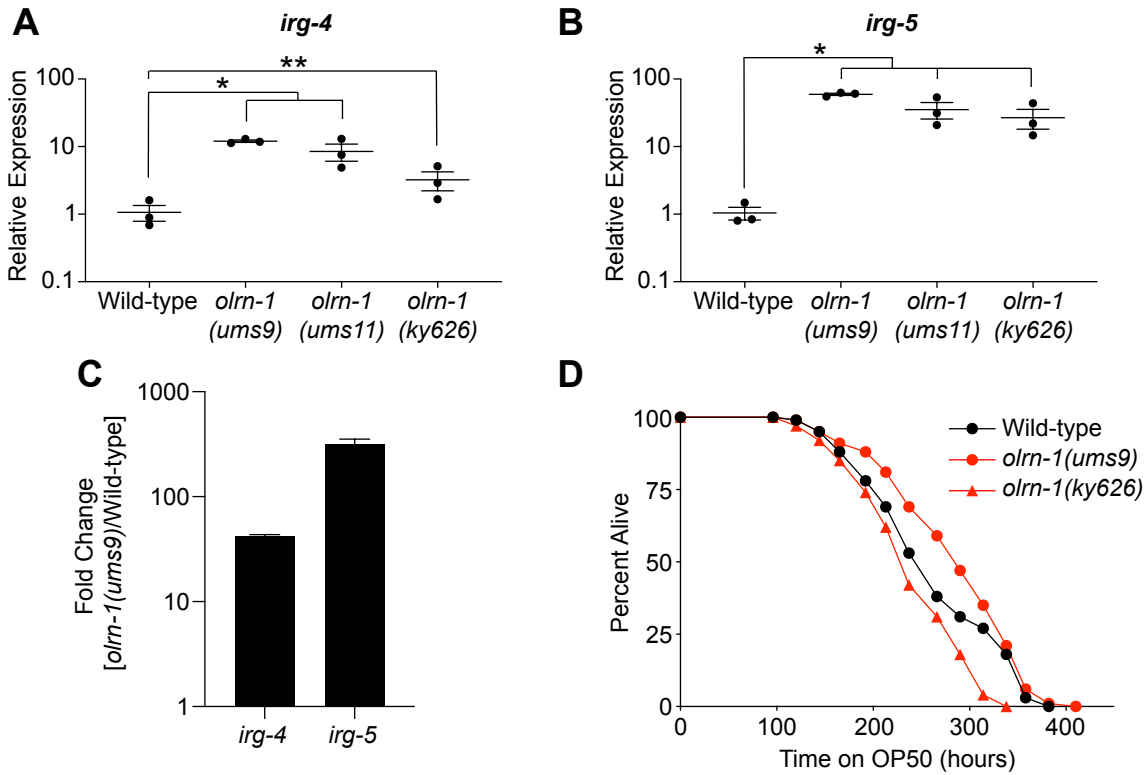


Figure S1. Loss-of-function mutations in *olnr-1* cause constitutive immune activation, Related to Figure 1. qRT-PCR data of *irg-4* (A) and *irg-5* (B) in wild-type, *olnr-1*(*ums9*), *olnr-1*(*ums11*) and *olnr-1*(*ky626*) is presented. Data are the average of three independent replicates, each normalized to the control gene *snb-1* with error bars representing SEM, and are presented as the value relative to the average expression from all replicates of the indicated gene in wild-type animals. * equals $p < 0.05$ by one-way ANOVA for the indicated comparison. ** $p = 0.10$ by one-way ANOVA and $p < 0.05$ by two-tailed *t*-test. C. Data from a nanoString analysis of *irg-4* and *irg-5* expression, presented as the fold change of gene expression in *olnr-1*(*ums9*) mutants versus wild-type animals. Data are the average of two independent replicates for *olnr-1*(*ums9*) and one sample for wild-type, each normalized to three control genes (*snb-1*, *ama-1* and *act-1*) with error bars representing SEM. D. The lifespan of *olnr-1*(*ums9*) and *olnr-1*(*ky626*) mutant animals is shown relative to wild-type animals. Sample sizes, mean lifespan and *p*-values for each of two trials is shown in Table S2.

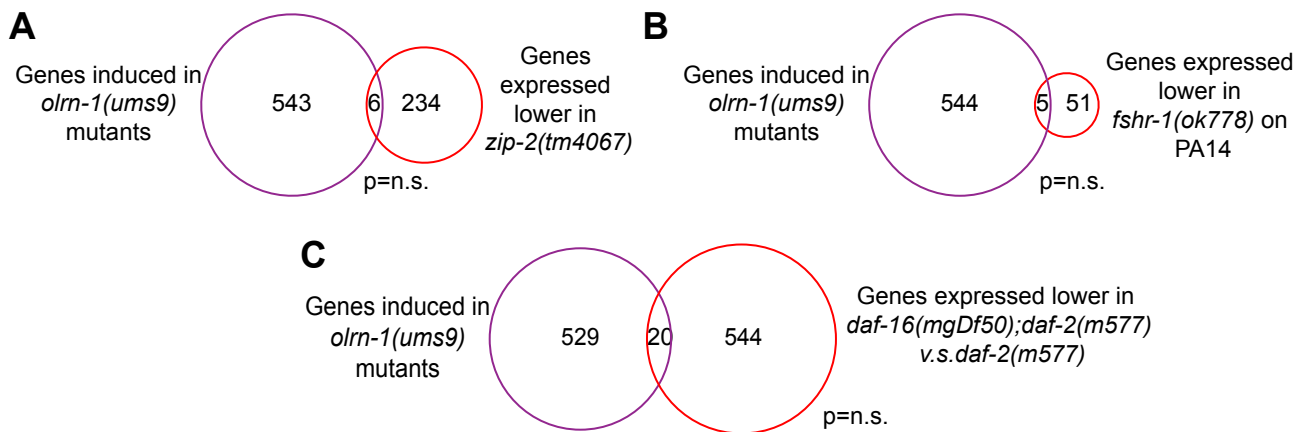


Figure S2. *oln-1* suppresses the p38 MAPK PMK-1 innate immune pathway, Related to Figure 2. Venn diagrams show the overlap of genes induced in *oln-1(ums9)* mutants with targets of (A) the bZIP transcription factor *zip-2*, (B) the G protein-coupled receptor *fshr-1*, and (C) the FOXO transcription factor *daf-16*. In A, B and C, the hypergeometric p value for the overlap between these datasets was not significant (n.s.).

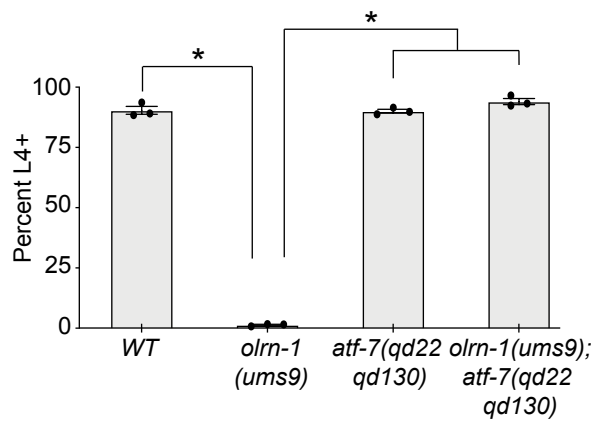


Figure S3. Promotion of intestinal immune homeostasis by *oln-1* is required to ensure reproduction and development, Related to Figure 4. Data for *atf-7(qd22 qd130)* and *oln-1(ums9); atf-7(qd22 qd130)* are shown, as explained in the Figure 4 legend. * equals $p < 0.05$ by one-way ANOVA.

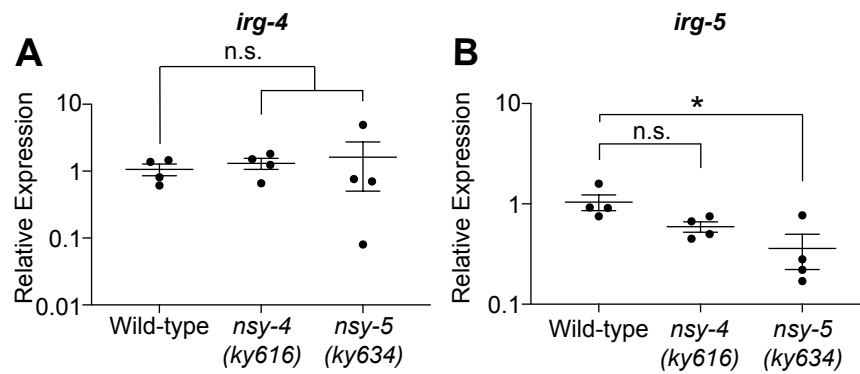


Figure S4. Expression of *olrn-1* in chemosensory neurons is sufficient to regulate innate immunity in the intestinal epithelium, Related to Figure 5. qRT-PCR data of *irg-4* (A) and *irg-5* (B) in wild-type, *nsy-4(ky616)* and *nsy-5(ky634)* animals is presented. Data are the average of three independent replicates, each normalized to a control gene with error bars representing SEM, and are presented as the value relative to the average expression from all replicates of the indicated gene in wild-type animals. “n.s.” equals not significant for the p value and * equals $p < 0.05$ by one-way ANOVA for the indicated comparison.

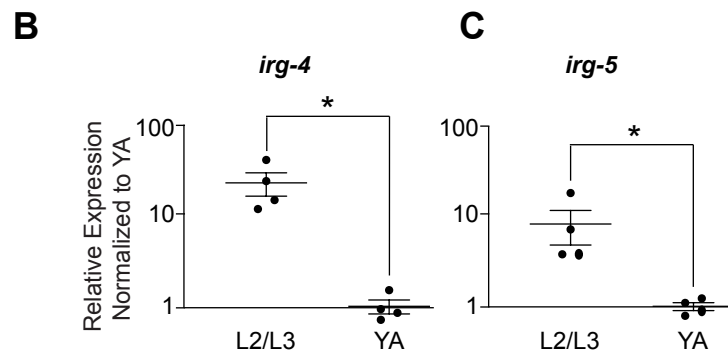
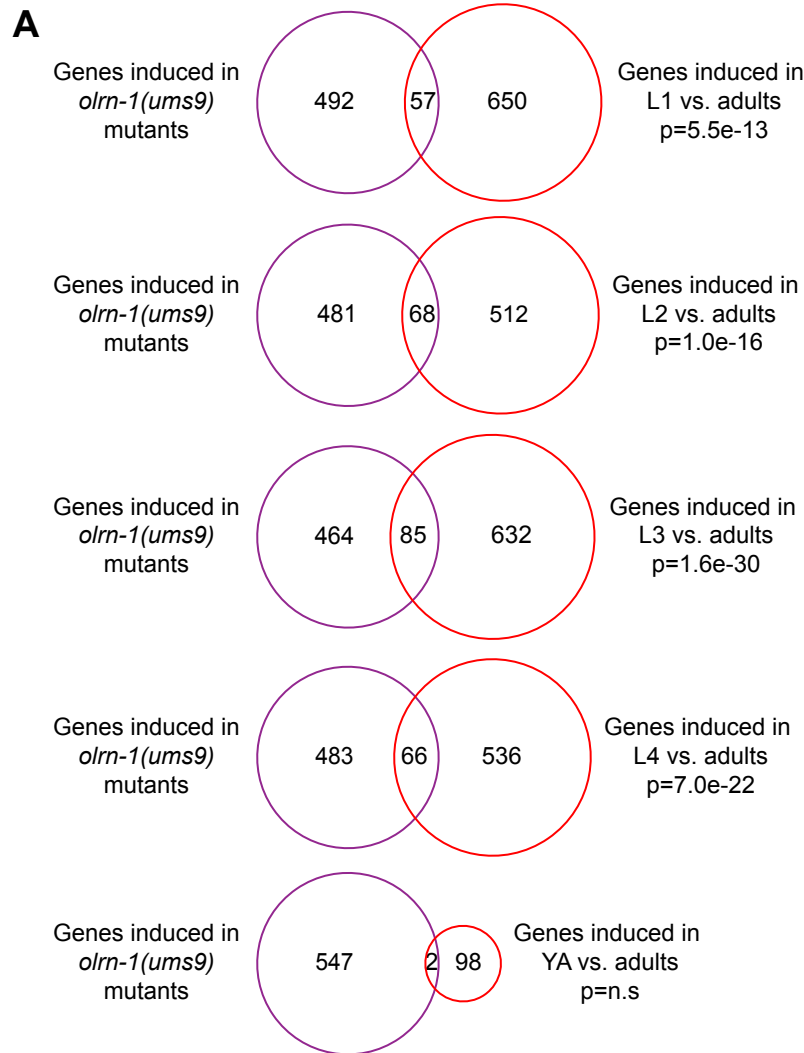


Figure S5. Neuronal *oln-1* regulates p38 MAPK PMK-1-dependent immune effector expression during nematode development, Related to Figure 6. **A.** Venn diagrams show the overlap of genes induced in *oln-1(ums9)* mutants with genes that are upregulated at each larval stage in wild-type animals compared to wild-type adult animals. The hypergeometric p value for the overlap of each dataset is given in the figure. “n.s.” equals not significant. qRT-PCR data of *irg-4* (**B**) and *irg-5* (**C**) in wild-type animals at the second or third larval stage (L2/L3), and the young adult (YA) stage are shown. Data are the average of four independent replicates, each normalized to a control gene with error bars representing SEM, and are presented relative to the average expression from all replicates of the indicated gene in animals at the young adult stage. * equals $p < 0.05$ by one-way ANOVA for the indicated comparison.