Supporting Information Legends

Figure S1: Average baseline GCaMP3 fluorescence intensity in the isthmus of adult animals of the indicated genotypes bearing the *myo-2^{Prom}::GCaMP3* reporter. Images were acquired from animals under identical conditions and exposure times. Asterisk (*) indicates a significant difference from wild type values ($p<0.05$).

Figure S2: Eight second traces of fluorescence intensity (F) in the center (blue) and posterior (red) isthmus of representative animals of the indicated genotypes bearing the *cuIs36 myo-2^{Prom}::GCaMP3* transgene. The data was extracted from (A) Table S14, (B) Table S29, (C) Table S36, and (D) Table S46 at the indicated time points.

Movie S1: DIC time-lapse movie of a wild-type L1 animal showing three pumps and one peristalsis after the second pump. Images were acquired at 25 frames/sec and are played back at 1/5 speed with the elapsed time shown in seconds.

Movie S2: DIC time-lapse movie of *cha-1(ok2253)* mutant lacking any pharyngeal muscle contractions. Images were acquired at 25 frames/sec and are played back at 1/5 speed with the elapsed time shown in seconds.

Movie S3: DIC time-lapse movie of *cha-1(ok2253)* mutant treated with 5mM nicotine showing two pumps, each followed by a peristalsis. Images were acquired at 25 frames/sec and are played back at 1/5 speed with the elapsed time shown in seconds.

Movie S4: DIC time-lapse movie of *cha-1(ok2253)* mutant treated with 5mM arecoline showing three pumps, each followed by a peristalsis. Images were acquired at 25 frames/sec and are played back at 1/5 speed with the elapsed time shown in seconds.

Movie S5: DIC time-lapse movie of *eat-2(ok3528)* L1 animal showing two pumps, each followed by a prolonged peristalsis. Images were acquired at 25 frames/sec and are played back at 1/5 speed with the elapsed time shown in seconds.

Movie S6: GCaMP3 time-lapse movie of a wild-type pharynx showing Ca^{2+} transients in the isthmus muscles during three pumps with first two followed by peristalsis. Images were acquired at 32 frames/sec and false colored (blue – low fluorescence, red – high fluorescence). Time-lapse is played back at 5 frames/sec.

Movie S7: Upper panel represents GCaMP3 time-lapse movie of a cropped isthmus from the same wild-type animal as shown in Sup. Movie 6. Bottom panel represents profile plot of GCaMP3 fluorescence intensity in the isthmus shown in the upper panel. GCaMP3 fluorescence is on the X-axis and distance in the isthmus is on Y-axis. Arrow shows wave like Ca^{2+} transients traveling through the posterior isthmus during peristalsis.

Movie S8: GCaMP3 time-lapse movie of *eat-2(ok3528)* pharynx showing Ca^{2+} transients in the isthmus muscles during one pump followed by a prolonged peristalsis. Images were acquired at 32 frames/sec and false colored (blue – low fluorescence, red – high fluorescence). Time-lapse is played back at 5 frames/sec.

Movie S9: Upper panel represents GCaMP3 time-lapse movie of a cropped isthmus from the same *eat-2(ok3528)* animal as shown in Sup. Movie 7. Bottom panel represents profile plot of GCaMP3 fluorescence intensity in the isthmus shown in the upper panel. GCaMP3 fluorescence is on the X-axis and distance in the isthmus is on Y-axis.

Table S1: Quantification of pharyngeal muscle contraction in *acr* mutants.

Tables S2-S13: Time-lapse of pharyngeal muscle contractions

Microsoft Excel files containing raw data extracted from time-lapse DIC images of pharyngeal muscle contractions quantified in Table 1. Each Excel file contains multiple tabs, which refer to individual animals, and each tab contains seven columns: frame (frame number), time (time in seconds), PC (procorpus), TB (terminal bulb), ant isth (anterior isthmus), mid isth (middle isthmus), post isth (posterior isthmus). Yellow shaded cells indicate times when the pharyngeal lumen was open (pharyngeal muscle contraction), while unshaded cells indicate frames when the pharyngeal lumen was closed (pharyngeal muscle relaxed). **Table S2** wild type, **Table S3** wild type + arecoline, **Table S4** *gar-3(gk305)*, **Table S5** *gar-3(gk305)* + arecoline, **Table S6** *eat-2(ad465)*, **Table S7** *eat-2(ad1116)*, **Table S8** *eat-2(ok3528)*, **Table S9** *eat-2(ok3528); gar-3(gk305)*, **Table S10** *eat-18(ad820)*, **Table S11** *ace-2(g72); ace-1(p1000)*, **Table S12** *ace-3(dc2)*, and **Table S13** *ace-3(dc2); gar-3(gk305)*.

Tables S14-S52: Time-lapse of GCaMP3 fluorescence

Microsoft Excel files containing GCaMP3 fluorescence measurements in the pharyngeal isthmus extracted from time-lapse fluorescence image quantified in Table 2. For each genotype there are multiple Excel files referring to individual animals, and each Excel file has two or more tabs referring to GCaMP3 fluorescence measurements in the central (Central) and posterior (Posterior) isthmus. Some Excel files have more than two tabs which reflect measurements for separate time periods of the same animal (frame number is indicated in parenthesis). Each tab has three columns: frame (frame number), time, sec (time in seconds) and F total (GCaMP3 total fluorescence). **Tables S14-S28** wild type, **Tables S29-S34** *eat-2(ok3528)*, **Tables S35-S40** *gar-3(gk305)*, and **Tables S41-S52** *eat-2(ok3528); gar-3(gk503)*.