

Title: *C. elegans* basics.

*Caenorhabditis elegans*, abbreviated as *C. elegans*.

*C. elegans* immune system is made up of a basic innate system, with epithelial cells harboring MAPK, IGF-1, TGF- $\beta$ , and PCD. *C. elegans* immune system is not made up of an extensive innate system, so there are not TLRs, NF $\kappa$ B; there is also no adaptive immune system, so they have no B cells and no antibodies.

A larval stage 4 or L4 worm is less than 1 mm in length. A photo shows a cylindrical worm that has a light head with a dark body and a small white half-circle halfway down the body. This white half-circle has a black circle within it. This is the vulva.

There are 2 natural sexes in *C. elegans* – hermaphrodites and males. Hermaphrodites are XX, have oocytes and sperm, have a vulva, spermatheca, and uterus and contain 959 somatic cells and 302 neurons. Males are XO, contain sperm only, have spicules, and contain 1031 somatic cells and 383 neurons.

They can produce around 300 offspring by self-fertilization. Crosses between hermaphrodites and males can produce 1000+ offspring.

A variety of techniques are available to use with *C. elegans*. In vivo imaging, RNAi, multi-generational studies, genetic screens, CRISPR, FACS, single-worm studies including ddPCR and qPCR.

They have 6 chromosomes, 5 autosomes (I, II, III, IV, and V) and 1 sex chromosome (X).

They have  $\frac{1}{2}$  dosage compensation: both hermaphrodite X chromosomes are transcribed at  $\frac{1}{2}$  rate, while the single male X is transcribed at full rate.

They have a mouth, pharynx, rectum, nerve cord, nerve ring, gonad, and spermatheca. They do not have eyes, blood, heart, or nose.

They have 5 tissues: epidermis, muscles, digestive system, nervous system, and reproductive system.

They have 6 embryonic life stages: first cleavage, gastrula, comma, 1.5-fold, 2-fold, 3-fold.

They have 7 post-embryonic life stages: 4 larval stages L1, L2, L3, L4. 2 adult stages: young and gravid. 1 alternative stage: dauer.

They have a 3-day life cycle: hatching about 12 hours after fertilization, with each embryonic stage lasting around 2 hours. L1 lasts about 16 hours, L2, L3, and L4 last about 12 hours. Young adulthood is about 2 days until adults become gravid.