Electronic Supplementary Material (ESI) for Environmental Science: Advances.

Supplementary Information

A comparison of carbon dot and CdTe quantum dot toxicity in *Drosophila melanogaster*

Shawninder Chahal[1], Jun-Ray Macairan[1],
Hoai-Nam N. Bui[2], Anthony Smith[2], Hans C. E. Larsson[2],
Rafik Naccache[3], Nathalie Tufenkji[1*]

[1] Department of Chemical Engineering, McGill University, Montreal, Quebec H3A 0C5, Canada

[2] Redpath Museum, McGill University, Montreal, Quebec H3A 0C4, Canada

[3] Department of Chemistry and Biochemistry and the Centre for NanoScience Research, Concordia University, Montreal, Quebec H4B 1R6, Canada

*Corresponding Author. Phone: (514) 398-2999; Fax: (514) 398-6678; E-mail: nathalie.tufenkji@mcgill.ca

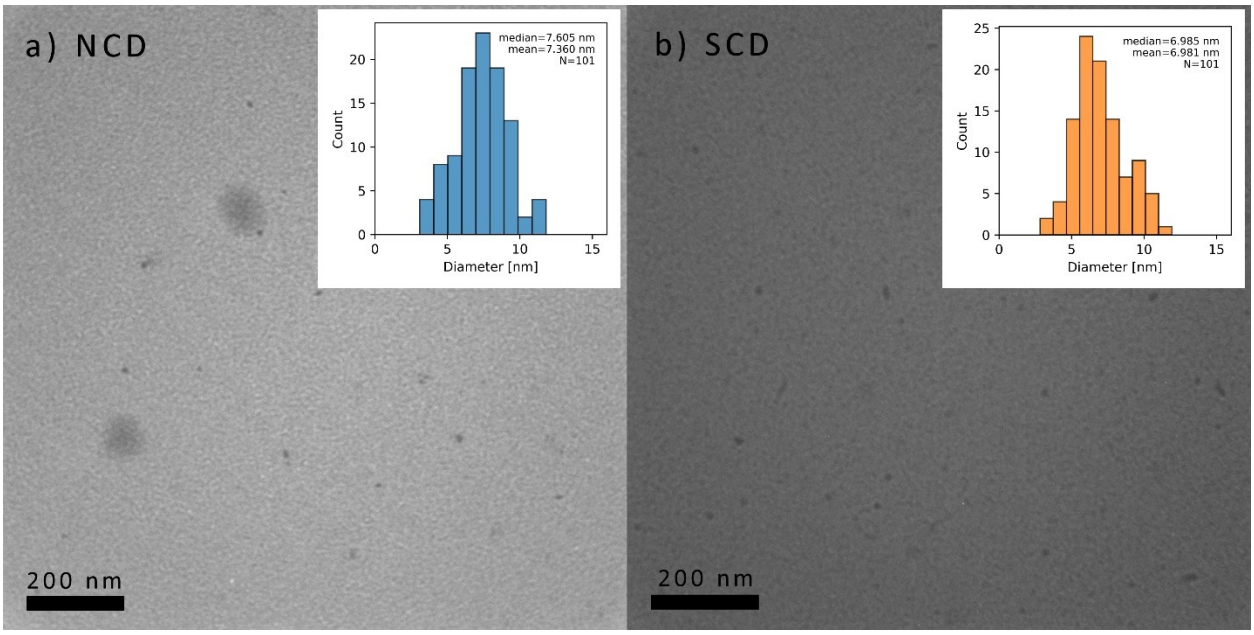

Figure S1. Representative TEM images of a) NCDs and b) SCDs. Insets show their respective size distributions (*i.e.*, Feret diameter) based on measurements across multiple images.

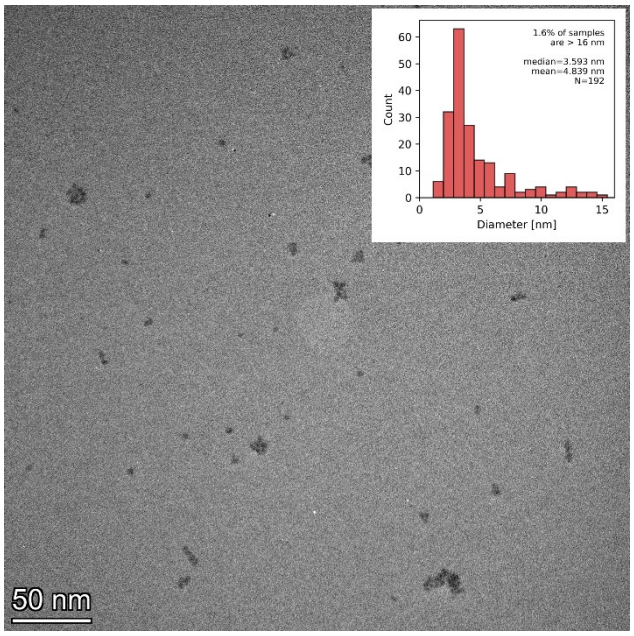

Figure S2. Representative TEM image of CdTeQDs. Inset shows the size distribution of the particles (*i.e.*, Feret diameter) based on measurements across multiple images.

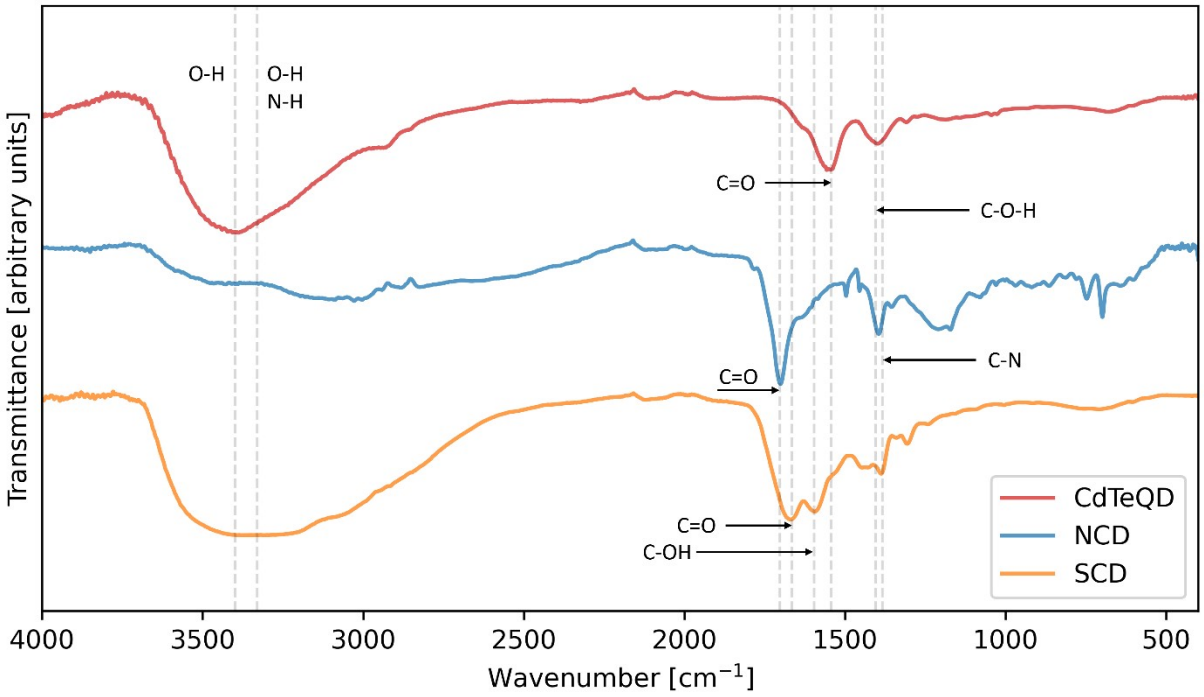

Figure S3. FTIR spectra of CdTeQDs, NCDs, and SCDs.

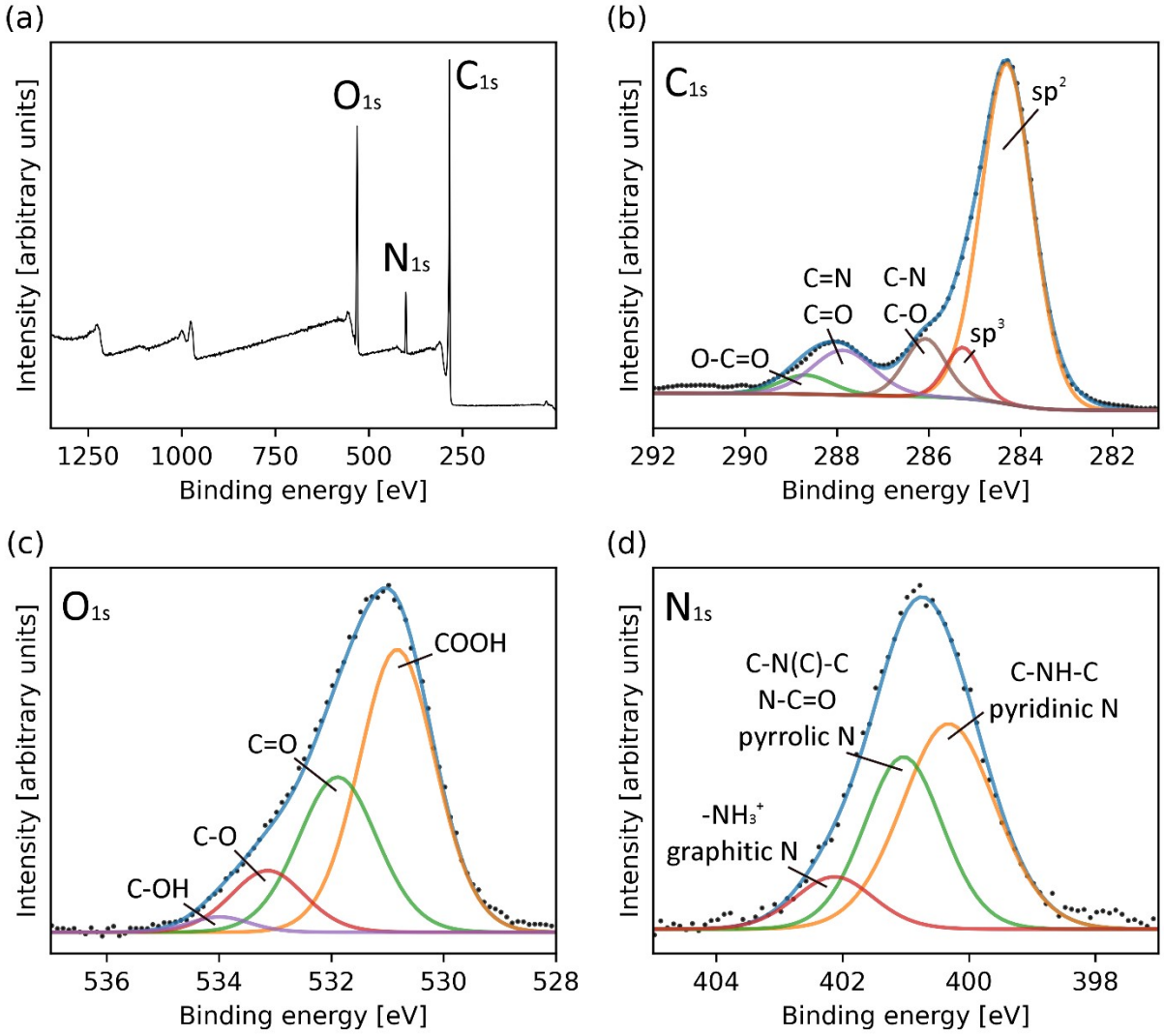

Figure S4. XPS spectra of NCDs showing a) survey scan, b) high resolution C_{1s} spectrum, c) high resolution O_{1s} spectrum, and d) high resolution N_{1s} spectrum.

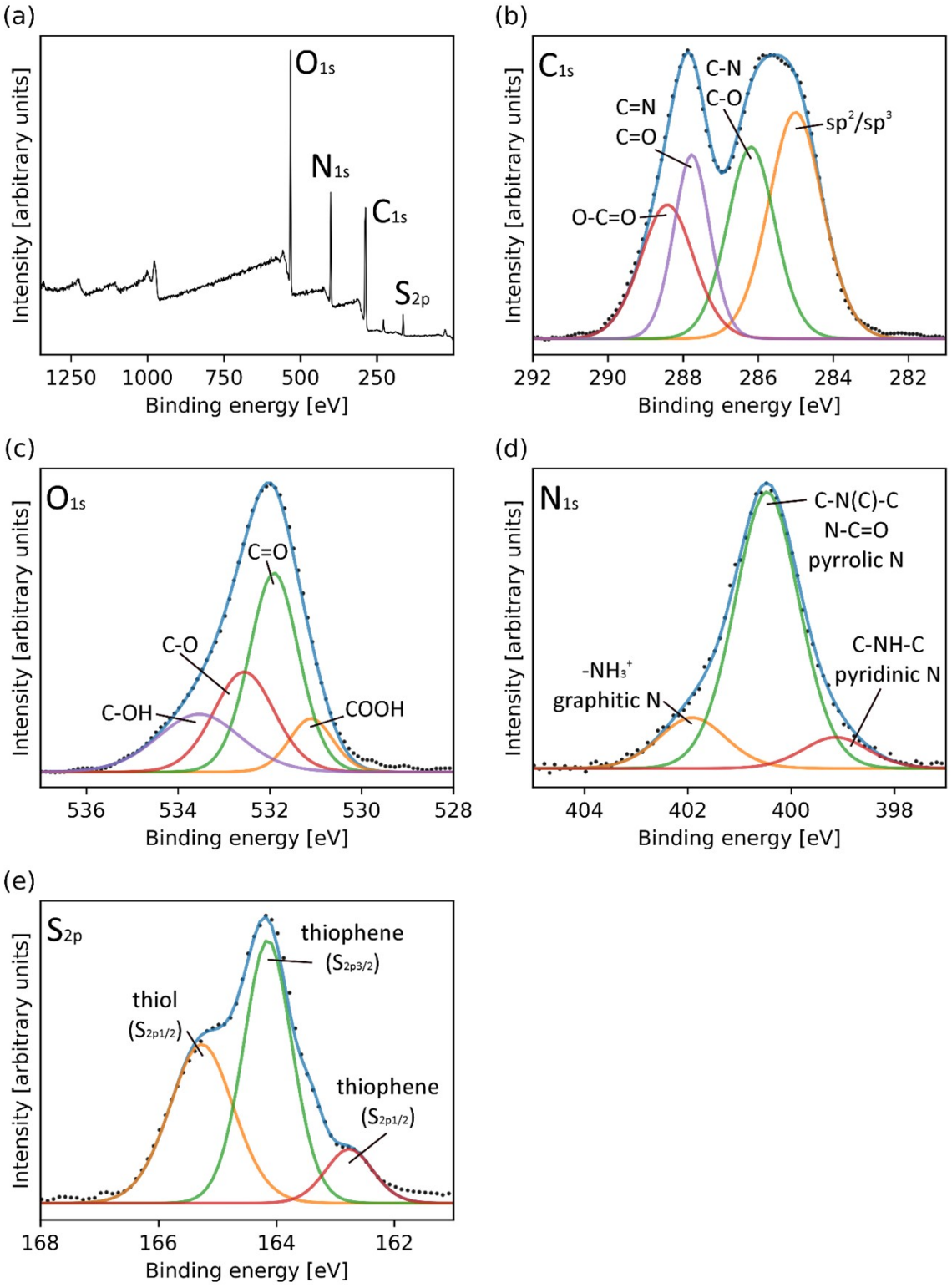

Figure S5. XPS spectra of SCDs showing a) survey scan, b) high resolution C_{1s} spectrum, c) high resolution O_{1s} spectrum, d) high resolution N_{1s} spectrum, and e) high resolution S_{2p} spectrum.

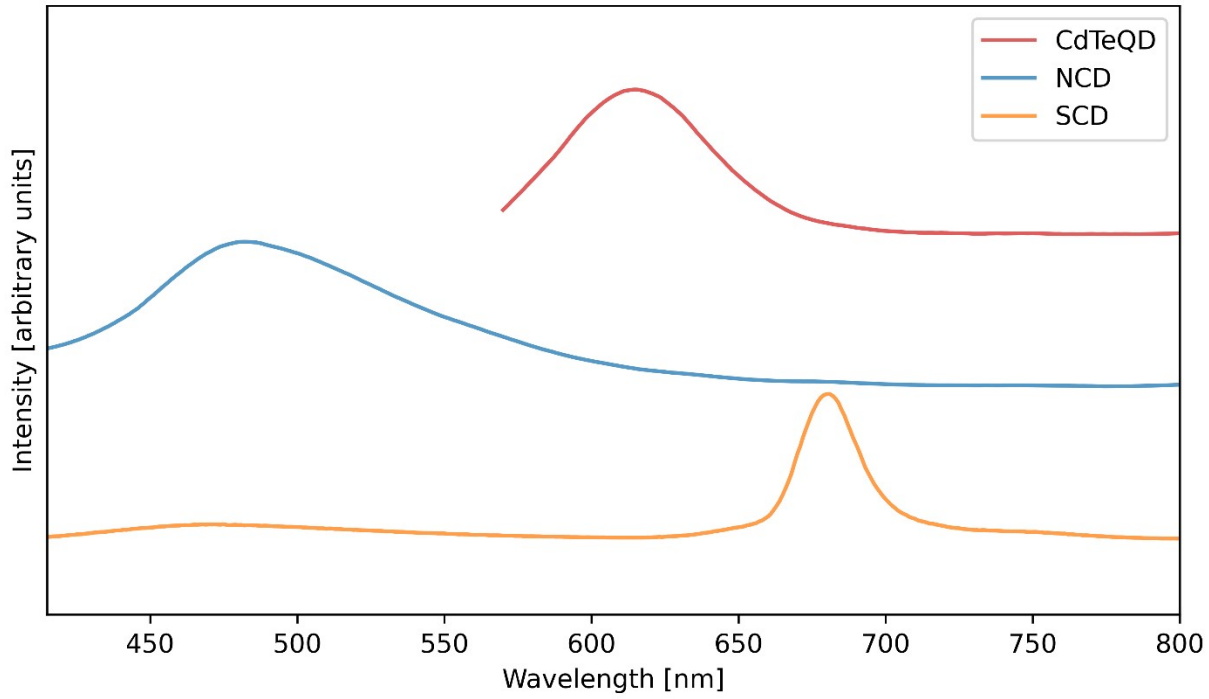

Figure S6. Fluorescence spectra of CdTeQDs, NCDs, and SCDs. The CdTeQDs were excited under 561 nm light, whereas the NCDs and SCDs were excited under 405 nm light. Only emission wavelengths above the excitation wavelength are shown.

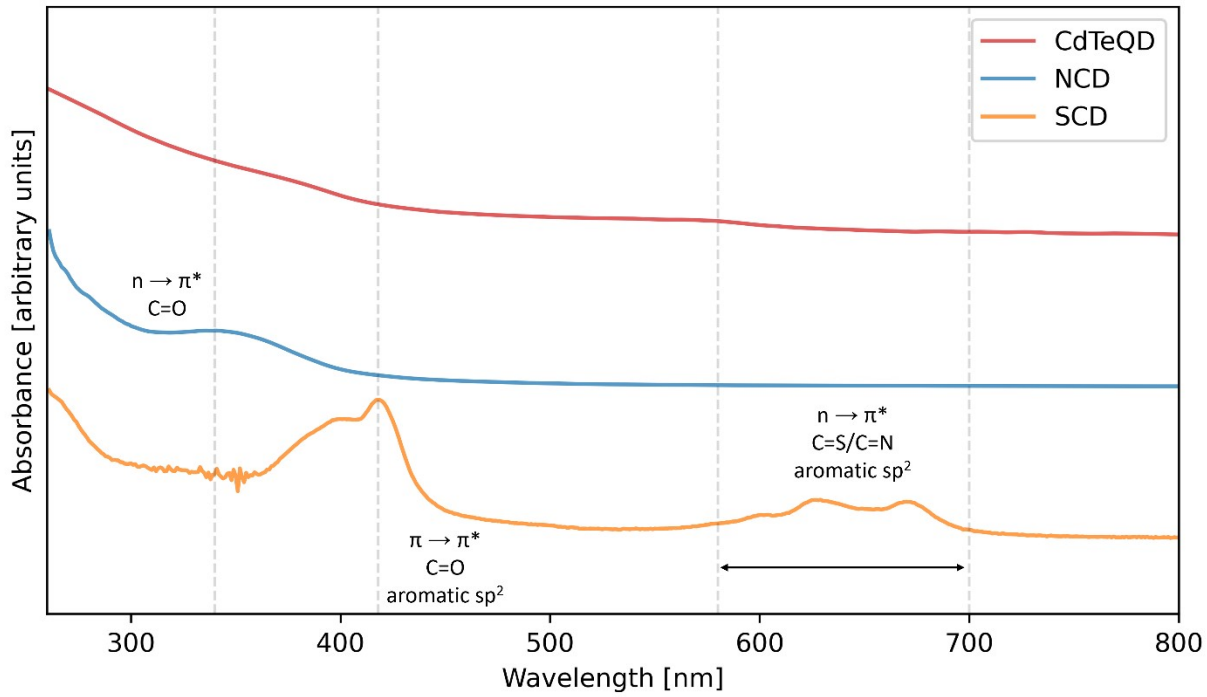

Figure S7. UV-vis spectra of CdTeQDs, NCDs, and SCDs.

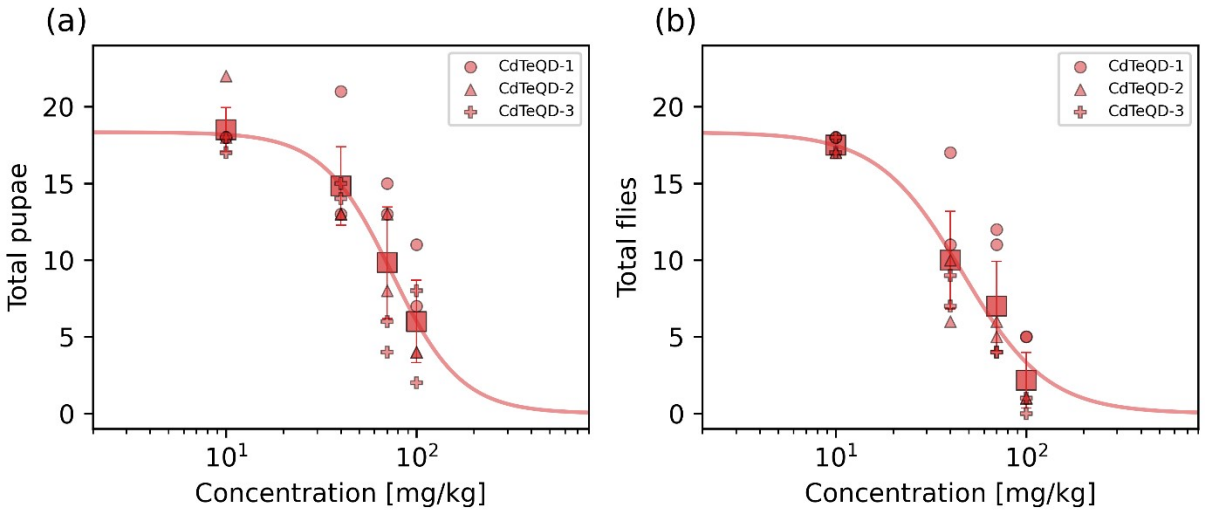

Figure S8. Number of (a) pupae and (b) flies that emerged from approximately twenty first instar larvae raised on 10, 40, 70, or 100 mg/kg CdTeQD treated food by day 14. Squares represent the mean of data points in that column and error bars represent 2 × the standard error of the mean. Legend labels have the format X-Y where X is the treatment and Y is the experimental block ID. The red curve represents the Hill equation that was fit to the corresponding data.

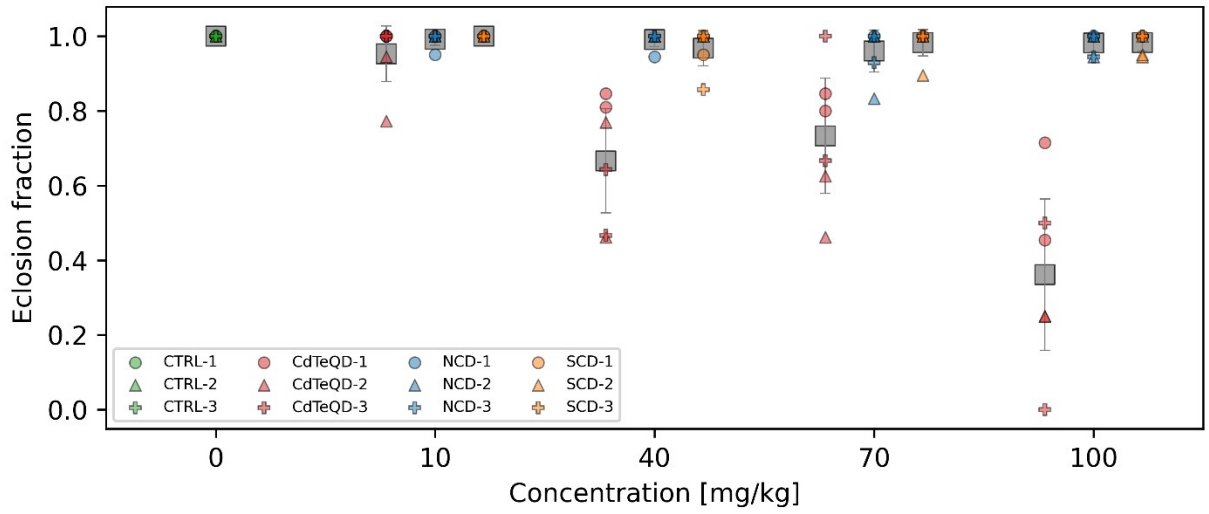

Figure S9. Eclosion fraction representing the fraction of pupae raised on 0, 10, 40, 70, or 100 mg/kg NCD, SCD, or CdTeQD treated food that successfully eclosed into flies by day 14. Grey squares represent the mean of data points in that column and error bars represent 2 × the standard error of the mean. Legend labels have the format X-Y where X is the treatment and Y is the experimental block ID.

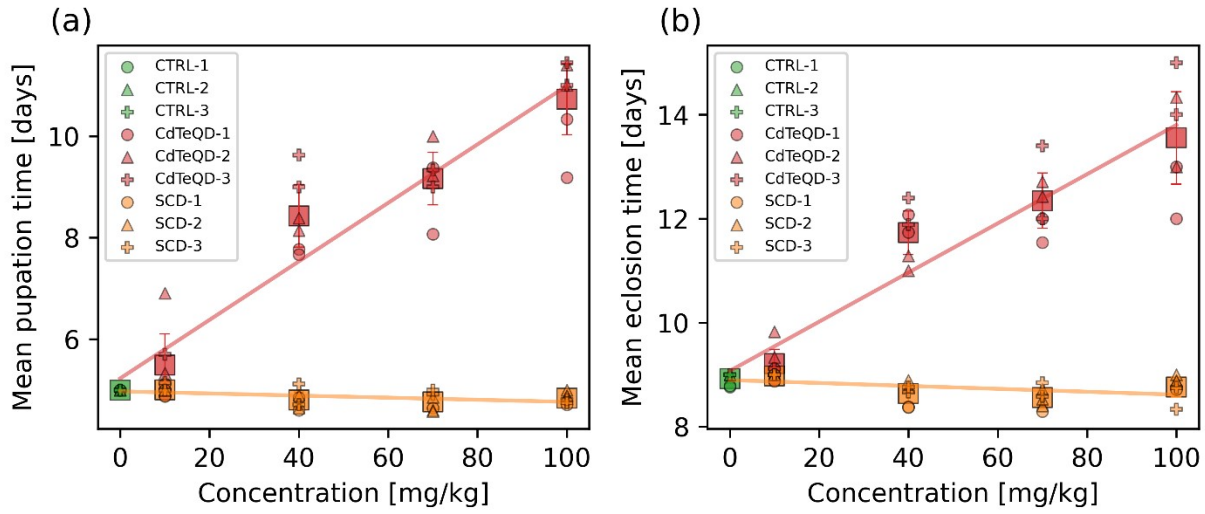

Figure S10. The mean (c) pupation and (d) eclosion time of the pupae and flies that emerged from approximately twenty first instar larvae raised on 0, 10, 40, 70, or 100 mg/kg SCD, or CdTeQD treated food by day 14. Squares represent the mean of data points in that column and error bars represent 2 × the standard error of the mean. Legend labels have the format X-Y where X is the treatment and Y is the experimental block ID. Lines represent a linear regression that was fit to the corresponding data.

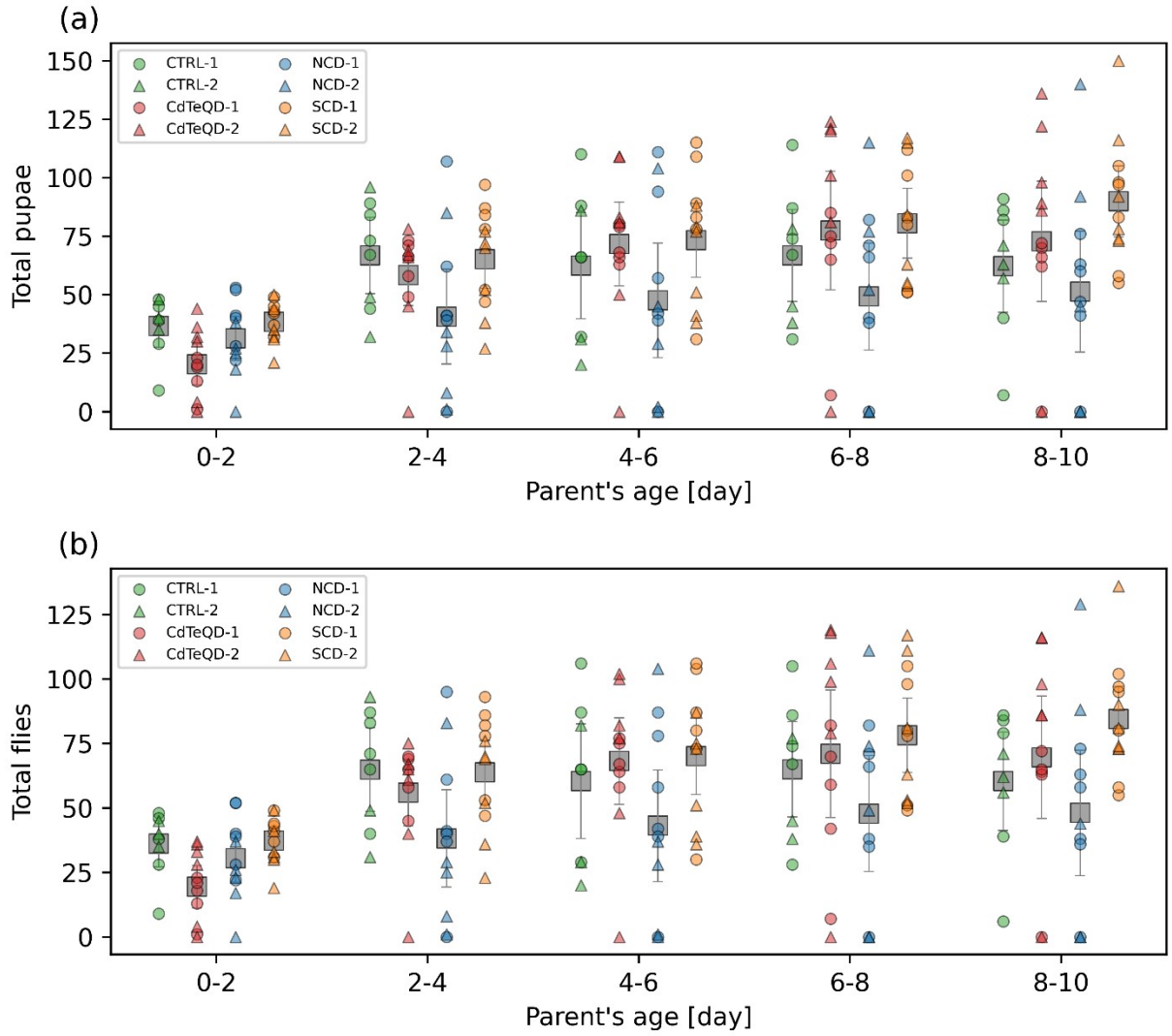

Figure S11. Number of (a) pupae and (b) flies that emerged after allowing one female and one male fly that were raised on CTRL (0 mg/kg), NCD (100 mg/kg), SCD (100 mg/kg), or CdTeQD (5 mg/kg) treated food to mate over 10 days. Grey squares represent the mean of data points in that column and error bars represent 2 × the standard error of the mean. Legend labels have the format X-Y where X is the treatment and Y is the experimental block ID.

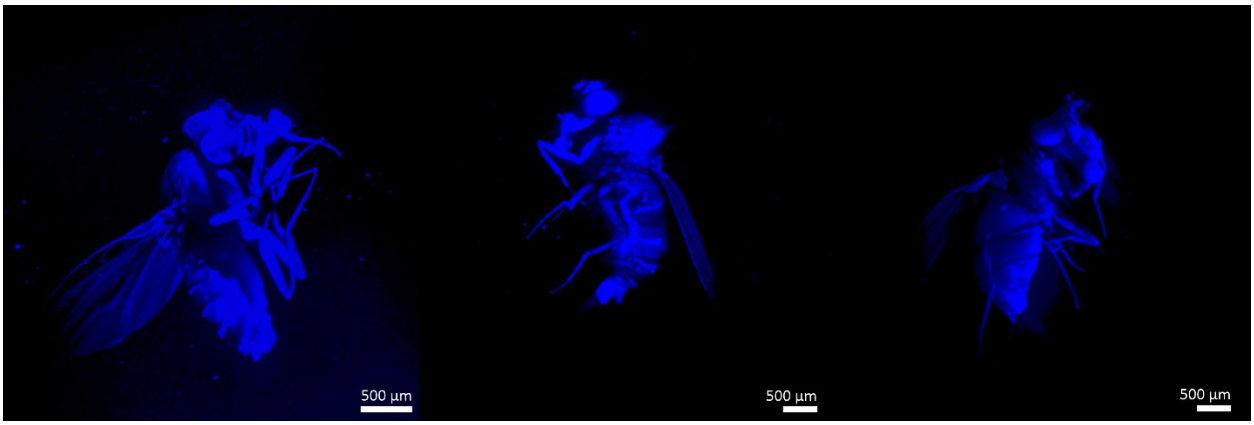

Figure S12. LSFM images of 3 different female flies from day 11 raised on CTRL (0 mg/kg) food. Blue fluorescence is from the fly's autofluorescence.

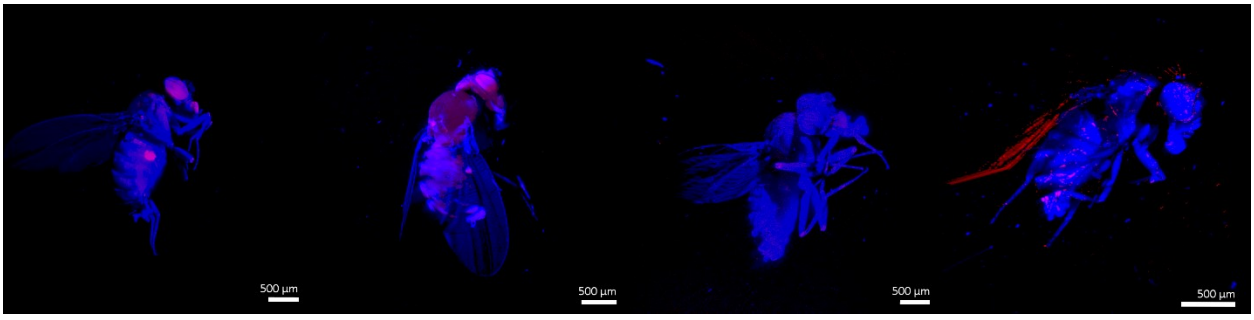

Figure S13. LSFM images of 4 different female flies from day 11 raised on CdTeQD (5 mg/kg) treated food. Red light shows fluorescence from CdTeQDs. Blue fluorescence is from the fly's autofluorescence.

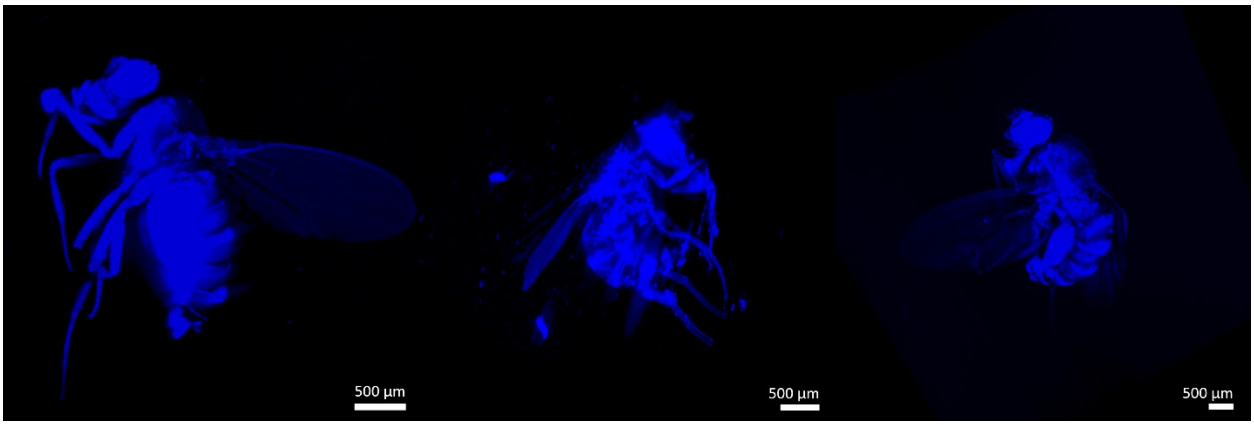

Figure S14. LSFM images of 3 different female flies from day 11 raised on NCD (100 mg/kg) treated food. Blue fluorescence is from the fly's autofluorescence. NCDs also emit blue light and are therefore not easily discernible.

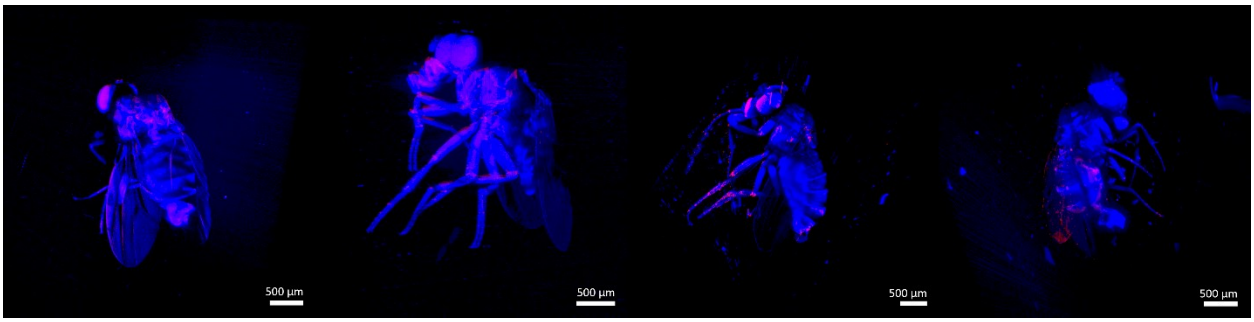

Figure S15. LSFM images of 4 different female flies from day 11 raised on SCD (100 mg/kg) treated food. Red light shows fluorescence from SCDs. Blue fluorescence is from the fly's autofluorescence.

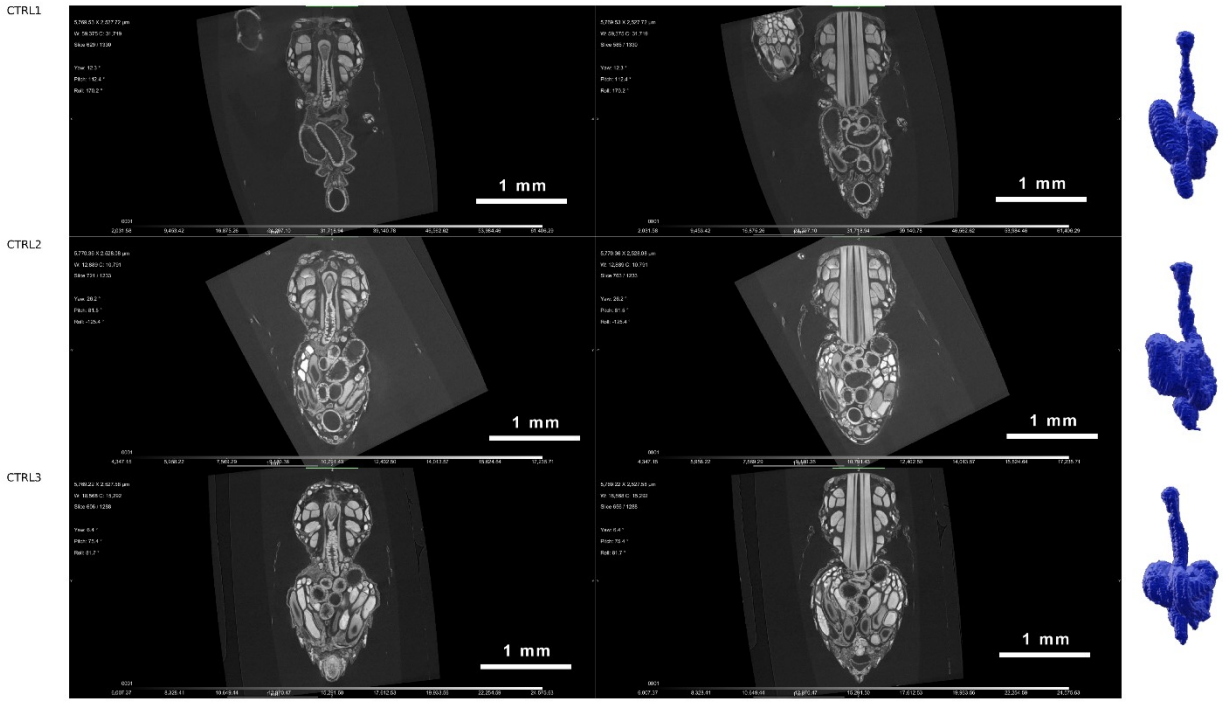

Figure S16. Nano-CT images of CTRL flies. Coronal sections are line with the long axis of the anterior midgut, passing through the thorax, and the salivary glands. The left column is a coronal section through the paired salivary glands. Middle column is a coronal section slightly more dorsal at the ventral-most coronal plane of the dorsal longitudinal muscles. Right column shows reconstructed gut tubes in dorsal view.

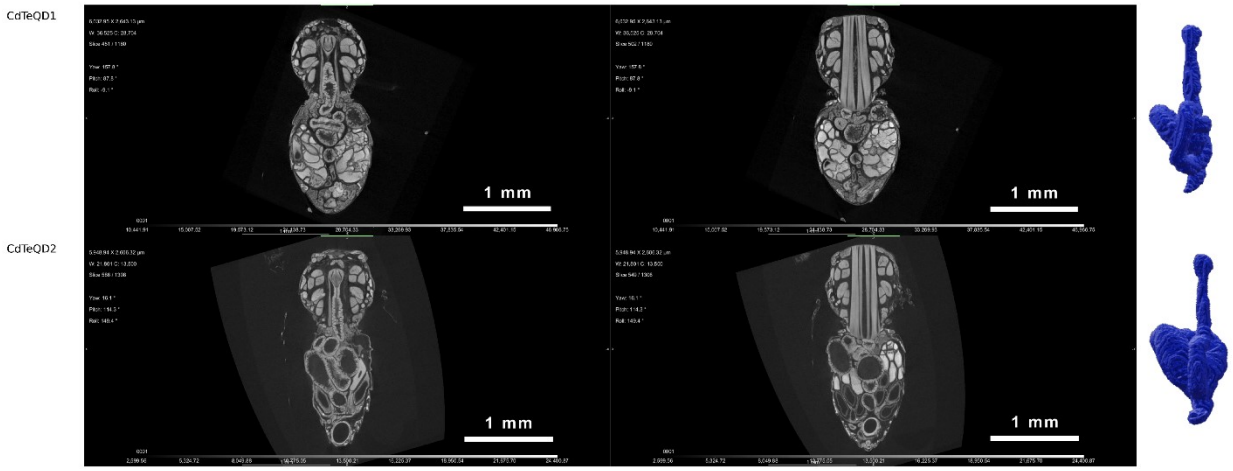

Figure S17. Nano-CT images of CdTeQD flies. Coronal sections are line with the long axis of the anterior midgut, passing through the thorax, and the salivary glands. The left column is a coronal section through the paired salivary glands. Middle column is a coronal section slightly more dorsal at the ventral-most coronal plane of the dorsal longitudinal muscles. Right column shows reconstructed gut tubes in dorsal view.

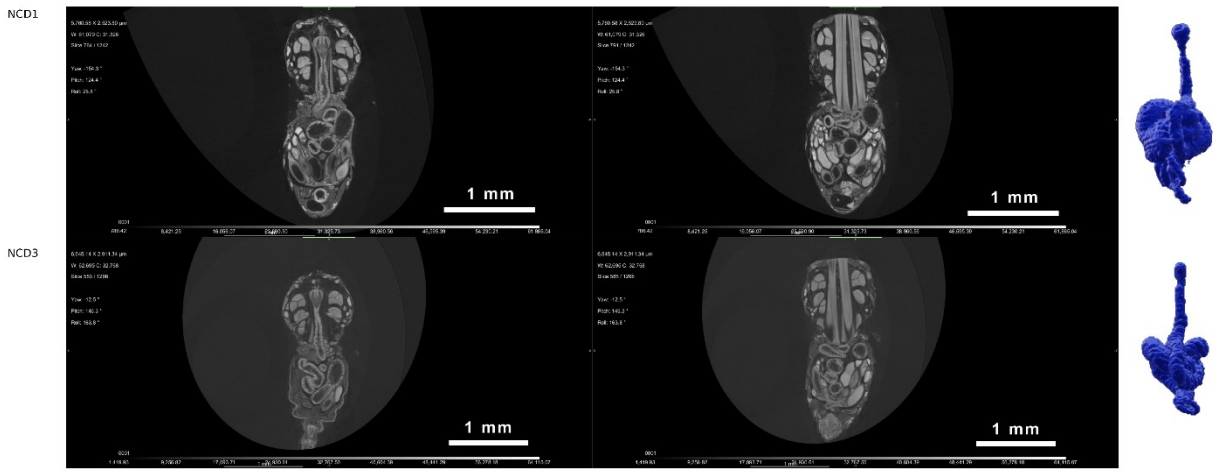

Figure S18. Nano-CT images of NCD flies. Coronal sections are line with the long axis of the anterior midgut, passing through the thorax, and the salivary glands. The left column is a coronal section through the paired salivary glands. Middle column is a coronal section slightly more dorsal at the ventral-most coronal plane of the dorsal longitudinal muscles. Right column shows reconstructed gut tubes in dorsal view.

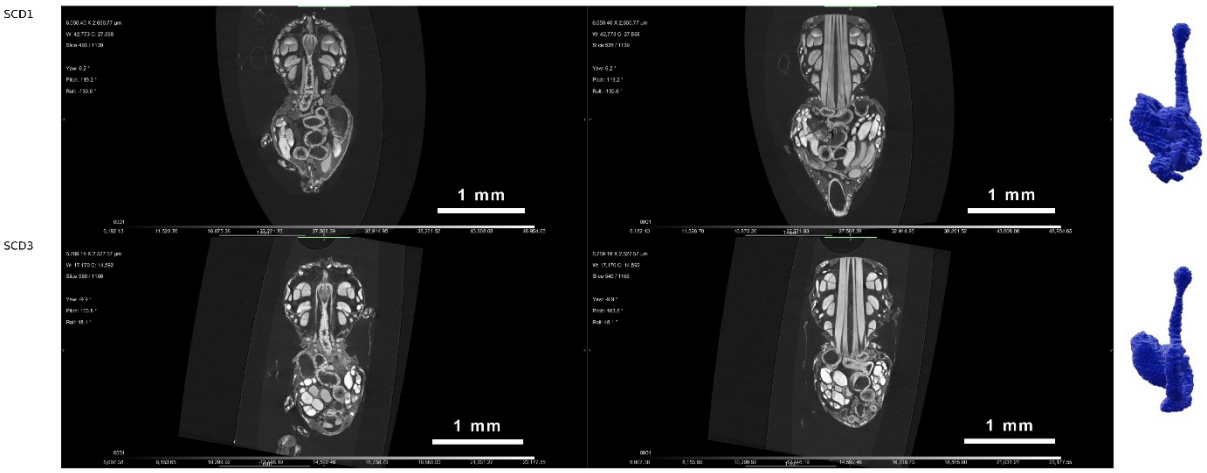

Figure S19. Nano-CT images of SCD flies. Coronal sections are line with the long axis of the anterior midgut, passing through the thorax, and the salivary glands. The left column is a coronal section through the paired salivary glands. Middle column is a coronal section slightly more dorsal at the ventral-most coronal plane of the dorsal longitudinal muscles. Right column shows reconstructed gut tubes in dorsal view.