TOOLBOX

New assay tracks active neurons in clews of worms

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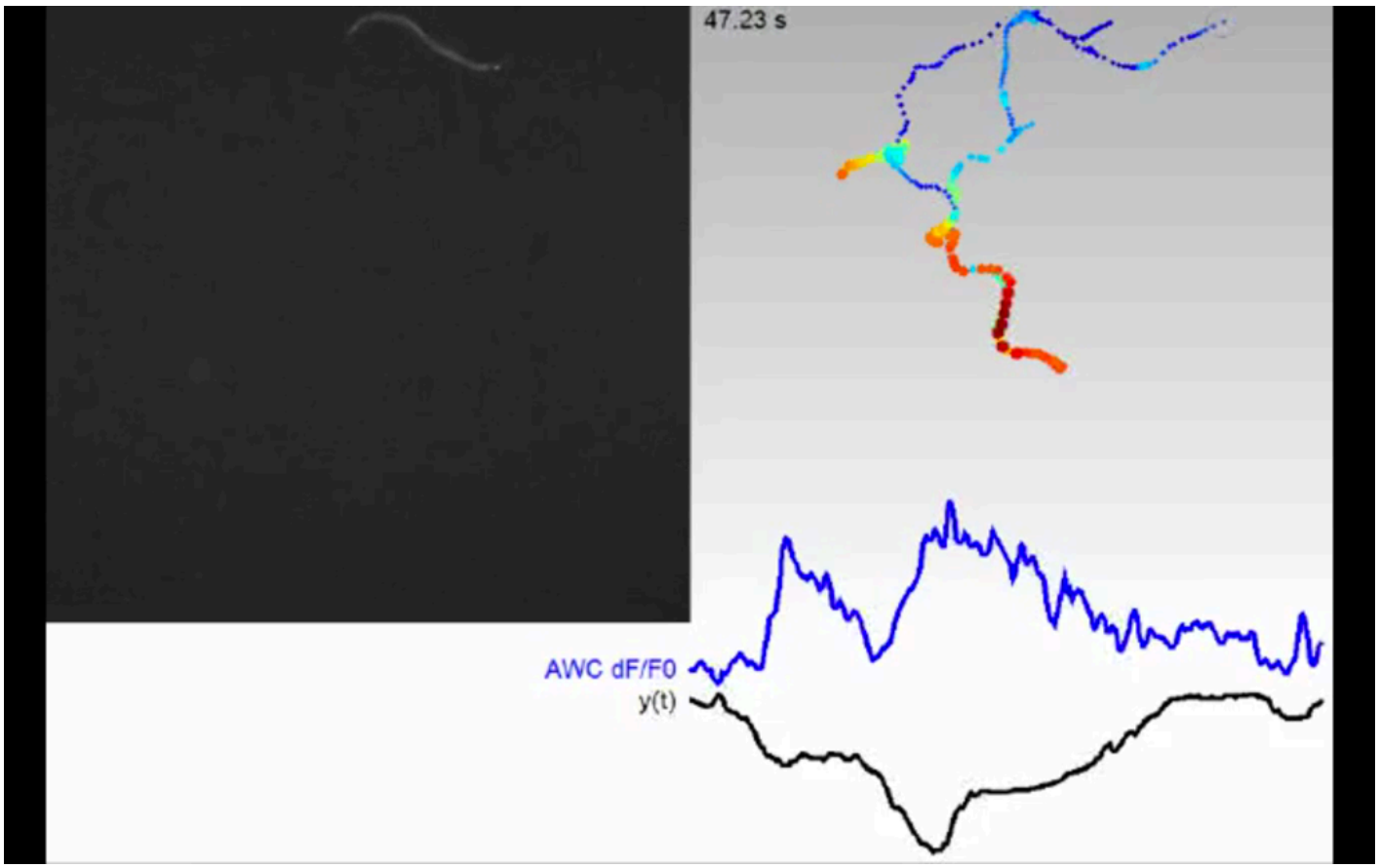

Researchers have developed a system that allows them to record the activity of neurons from as many as 20 worm embryos at once, they reported 5 November in the *Proceedings of the National Academy of Sciences*[1]. The method allows them to account for differences between individual animals, which might otherwise skew results.

Caenorhabditis elegans is a tiny nematode that has proven to be a useful **model for studying brain function**. Researchers have mapped the **connections between its 302 neurons**, which are easily visible within its transparent embryos.

To monitor brain function, researchers engineer the worms so that certain neurons fluoresce when they fire. Using this method, they can also monitor the activity of sensory neurons by adding certain smelly chemicals to a dish containing a swimming embryo. But because individual worms may respond differently, experiments must include hundreds or thousands of trials to account for a range of responses.

In the new study, researchers developed a method to track fluorescence in multiple nematodes simultaneously. A miniature chamber keeps the worms within the microscope's field of view and a software system called NeuroTracker tracks the fluorescence levels and relative locations of each one. To prevent bleaching of the fluorescent molecules, which can be toxic to the worms, the researchers activated fluorescence in short bursts instead of in a sustained way.

Using the method, the researchers monitored activity in neurons that detect chemical signals. They added 30 chemical odors, one at a time, to the worms' enclosure. The average magnitude of the neurons' responses varies for each chemical, the researchers found. They were also able to document the response to different concentrations of chemicals and how these reactions adapt to repeated exposure.

Because the method can automatically measure responses in multiple worms at the same time, it is ideal for high-throughput testing of pharmacological compounds or small molecules, the researchers say.

REFERENCES:

1. Larsch J. *et al. Proc. Natl. Acad. Sci. USA* **110**, e4266-4273 (2013) **PubMed**