

Video Article

## February 2014: This Month in JoVE

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### Abstract

Here's a look at what's coming up in the [February 2014 issue](#) of JoVE: *The Journal of Visualized Experiments*.

This month, we have an improved method for studying the behavioral genetics of *Drosophila melanogaster*, or the common fruit fly. The classical test for *Drosophila* flight behavior was developed in the 1970s by famous fly geneticist Seymour Benzer. It involves dropping flies through a funnel into an oil-coated cylinder and seeing how far they fall before initiating flight and getting stuck in the oil. [Babcock and Ganetzky](#) added several features to Benzer's assay, including a drop tube to ensure consistent entry velocity; removable, adhesive-coated acrylic sheets for easy recovery of live flies; and digital imaging to automate data collection. With these improvements, scientists can assess flight behavior quickly and quantitatively, and accommodate large-scale datasets and genetic screens.

We also take look at calcium ions (Ca<sup>2+</sup>), which are important and versatile intracellular messengers that mediate many cellular functions, especially in excitable cells like neurons and muscle. [Park et al.](#) demonstrate a method for isolating skeletal muscle fibers and directly measuring distinct release events called "calcium sparks". This technique can be used to assess muscle function in normal, aged, and dystrophic muscle.

In *JoVE Neuroscience*, [Hao and Buttner](#) show how the nematode worm *C. elegans* can be a powerful tool in pharmacogenetic research. These tiny worms are sensitive to many bioactive compounds, so scientists can expose the worms to various compounds and observe the pharmacological effects. Because it's relatively easy to tinker with *C. elegans* genes, this technique is useful for large-scale chemical genetic screens and for validating targets identified in other screens.

In *JoVE Bioengineering*, we focus on vocal folds, which modulate the airflow from the lungs to produce voice and speech. Abnormal growths, like polyps, can disrupt vocal fold dynamics and a person's ability to communicate. To understand the fluid dynamic effects of these growths, [Stewart et al.](#) place a model vocal fold polyp in a wind tunnel and examine its effects using particle image velocimetry and other measurements. These techniques can improve the understanding vocal fold dynamics, which will in turn advance the treatment of voice and speech disorders.

In *JoVE Behavior*, we address the effects of aging on cognition. [Fuge et al.](#) use a tablet-based computer application to study age-related cognitive decline. Through a series of cognitive tasks, the application demonstrates great clinical and practical potential for detecting and monitoring cognitive dysfunction.

You've just had a sneak peek of the [February 2014 issue](#) of JoVE. Visit the website to see the full-length articles, plus many more, in *JoVE: The Journal of Visualized Experiments*.

### Video Link

The video component of this article can be found at <https://www.jove.com/video/5268/>

### Protocol

#### Methods for Studying the Mechanisms of Action of Antipsychotic Drugs in *Caenorhabditis elegans*

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Approaches for testing the effects of antipsychotic drugs (APDs) in *Caenorhabditis elegans* are demonstrated. Assays are described for testing drug effects on development and viability and on pharyngeal pumping rate. These methods are also applicable for pharmacogenetic experiments with drug classes other than APDs.

#### Assessment of Calcium Sparks in Intact Skeletal Muscle Fibers

Ki Ho Park<sup>1</sup>, Noah Weisleder<sup>2</sup>, Jingsong Zhou<sup>3</sup>, Kristyn Gumpfer<sup>1</sup>, Xinyu Zhou<sup>1</sup>, Pu Duann<sup>4</sup>, Jianjie Ma<sup>1</sup>, Pei-Hui Lin<sup>1</sup>

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Described here is a method to directly measure calcium sparks, the elementary units of  $\text{Ca}^{2+}$  release from sarcoplasmic reticulum, in intact skeletal muscle fibers. This method utilizes osmotic-stress-mediated triggering of  $\text{Ca}^{2+}$  release from ryanodine receptor in isolated muscle fibers. The dynamics and homeostatic capacity of intracellular  $\text{Ca}^{2+}$  signaling can be employed to assess muscle function in health and disease.

## Assessment of Age-related Changes in Cognitive Functions Using EmoCogMeter, a Novel Tablet-computer Based Approach

Philipp Fuge<sup>\*1,2</sup>, Simone Grimm<sup>\*1,2,3,4</sup>, Anne Weigand<sup>1,2,3</sup>, Yan Fan<sup>1,3</sup>, Matti Gärtner<sup>1,3</sup>, Melanie Feeser<sup>1,3</sup>, Malek Bajbouj<sup>1,2,3</sup>

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We tested the usability of a tablet-computer-based application (EmoCogMeter) in investigating the effects of age on cognition. Results show an age-related cognitive decline, thereby proving the usability of our application. Findings underline the great clinical and practical potential of a tablet-based application for detection and monitoring of cognitive dysfunction.

## Investigating the Three-dimensional Flow Separation Induced by a Model Vocal Fold Polyp

Kelley C. Stewart<sup>1</sup>, Byron D. Erath<sup>2</sup>, Michael W. Plesniak<sup>1</sup>

<sup>1</sup>Department of Mechanical and Aerospace Engineering, **The George Washington University**, <sup>2</sup>Department of Mechanical and Aeronautical Engineering, **Clarkson University**

Vocal fold polyps can disrupt vocal fold dynamics and thus can have devastating consequences on a patient's ability to communicate. Three-dimensional flow separation induced by a wall-mounted model polyp and its impact on the wall pressure loading are examined using particle image velocimetry, skin friction line visualization, and wall pressure measurements.

## An Improved Method for Accurate and Rapid Measurement of Flight Performance in *Drosophila*

Daniel T. Babcock, Barry Ganetzky

Department of Genetics, **University of Wisconsin-Madison**

Here we describe a method for rapid and accurate measurement of flight performance in *Drosophila*, enabling high-throughput screening.

## Disclosures

No conflicts of interest declared.