Video Article

November 2012: This Month in JoVE

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Abstract

In this issue, Oestreicher *et al.* show us how to isolate magnetotactic bacteria from freshwater samples, and concentrate the bacteria at one end of a glass capillary. The magnetotactic bacteria can then be visualized by light and transmission electron microscopy, and used for various other assays.

Also in the November 2012 issue, Boland *et al.* demonstrate how to reprogram fibroblasts into induced pluripotent stem cells (iPSCs), and how to isolate iPSC lines for injecting into tetraploid blastocysts, as demonstrated previously in JoVE. While mouth pipetting is generally not recommended because it can have adverse effects, this protocol requires the technique, executed carefully, to manipulate the embryos. This is one of the rare occasions when it's actually OK to mouth pipet in the lab. If the induced cells are fully pluripotent, they can result in full-term mice derived completely from iPSCs.

In JoVE Neuroscience, Heermann and Krieglstein demonstrate a method for visualizing Schwann cell development along growing axons. To do this, our authors culture cervical ganglia explants onto collagen matrices, and treat the explants with nerve growth factor or other substances. The collagen gels can then be visualized using time-lapse imaging with fluorescence or bright-field microscopy, migrating along axons towards the periphery.

Also in JoVE Neuroscience, Hoffmann *et al.* put tiny headphones on songbirds to study how they use auditory feedback to adjust their singing. The authors demonstrate how to construct the headphones and attach them to the bird's head; then, by adjusting the acoustic signal, they can study the computational and neurophysiological basis of vocal learning in birds.

In JoVE Clinical & Translational Medicine, Iyengar *et al.* use a zebrafish tumor model to study genes that can modify the pathogenesis of melanoma. This is done by first creating transgenic zebrafish that express a gene of interest. Various assays can then be performed to study how different genes affect melanoma, including onset, invasion, and transplantability.

In JoVE Bioengineering, Martin *et al.* demonstrate a gliding assay to measure the flexural rigidity of biopolymers (such as microtubules). By attaching motor proteins to a microscope slide, and adding fluorescently labeled microtubules, our authors can analyze the dynamics of cytoskeletal polymers.

This preview summarizes just a few notable video-articles in the November 2012 issue of JoVE. Stop by throughout the month of November to check out the full length versions of these articles and many more.

Video Link

The video component of this article can be found at http://www.jove.com/video/5044/

Protocol

Generation of Mice Derived from Induced Pluripotent Stem Cells

Michael J. Boland[1], Jennifer L. Hazen[1], Kristopher L. Nazor[1], Alberto R. Rodriguez[2], Greg Martin[2], Sergey Kupriyanov[2], Kristin K. Baldwin[1]

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Generating induced pluripotent stem cell (iPSC) lines produces lines of differing developmental potential even when they pass standard tests for pluripotency. Here we describe a protocol to produce mice derived entirely from iPSCs, which defines the iPSC lines as possessing full pluripotency[1].

Analyzing Murine Schwann Cell Development Along Growing Axons

Stephan Heermann[1, 2], Kerstin Krieglstein[1, 3]

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Here we describe a Schwann cell (SC) migration assay in which SCs are able to develop along extending axons.

A Lightweight, Headphones-based System for Manipulating Auditory Feedback in Songbirds

Lukas A. Hoffmann[1, 2], Conor W. Kelly[1, 3], David A. Nicholson[1, 2], Samuel J. Sober[1]

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We describe the design and assembly of miniaturized headphones suitable for replacing a songbird's natural auditory feedback with a manipulated acoustic signal. Online sound processing hardware is used to manipulate song output, introduce real-time errors in auditory feedback via the headphones, and drive vocal motor learning.

Screening for Melanoma Modifiers using a Zebrafish Autochthonous Tumor Model

Sharanya Iyengar[1], Yariv Houvras[2, 3], Craig J. Ceol[1]

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A rapid way to screen for melanoma modifiers using a zebrafish autochthonous tumor model is presented. It takes advantage of the miniCoopR vector which allows for expression of candidate melanoma genes in melanocytes. A method to obtain melanoma-free survival curves, an invasion assay, a protocol for antibody staining of scale melanocytes and a melanoma transplantation assay are described.

Flexural Rigidity Measurements of Biopolymers Using Gliding Assays

Douglas S. Martin, Lu Yu, Brian L. Van Hoozen

Department of Physics, Lawrence University

A method to measure the persistence length or flexural rigidity of biopolymers is described. The method uses a kinesin-driven microtubule gliding assay to experimentally determine the persistence length of individual microtubules and is adaptable to actin-based gliding assays.

Collection, Isolation and Enrichment of Naturally Occurring Magnetotactic Bacteria from the Environment

Zachery Oestreicher[1], Steven K. Lower[1, 2], Wei Lin[3], Brian H. Lower[2]

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We demonstrate a method to collect magnetotactic bacteria (MTB) that can be applied to natural waters. MTB can be isolated and enriched from sediment samples using a relatively simple setup that takes advantage of the bacteria's natural magnetism. Isolated MTB can then be examined in detail using both light and electron microscopy.

Transnuclear Mice with Pre-defined T Cell Receptor Specificities Against *Toxoplasma gondii* Obtained Via SCNT

Oktay Kirak[1], Eva-Maria Frickel[1], Gijsbert M. Grotenbreg[1, 2], Heikyung Suh[1], Rudolf Jaenisch[1, 3], Hidde L. Ploegh[1, 3]

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We demonstrate here that epigenetic reprogramming via Somatic Cell Nuclear Transfer (SCNT) can be used as a tool to generate mouse models with pre-defined T cell receptor (TCR) specificities. These transnuclear mice express the corresponding TCR from their endogenous locus under the control of the endogenous promoter.

Disclosures

No conflicts of interest declared.