Video Article

June 2015: This Month in JoVE - Celebrating JoVE's 100th Issue

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Abstract

Here's a look at what's coming up in the June 2015 issue of JoVE: The Journal of Visualized Experiments.

This month marks the release of JoVE's 100th issue, and we now have 10 scientific sections: Biology, Neuroscience, Immunology & Infection, Medicine, Bioengineering, Engineering, Chemistry, Behavior, Environment, and Developmental Biology.

In the field of Developmental Biology, sometimes you'll come across the term "buffy coat"-which might sound like a pet's coat color, or maybe a manicure, or maybe the leather under-armor worn by 17th Century cavalry. But a buffy coat is a product of centrifuging whole blood, and refers to the cloudy layer containing white blood cells, which forms between the red blood cells and the plasma.

Meraviglia *et al.* collect the buffy coats and turn peripheral blood mononuclear cells (PBMNCs) into induced pluripotent stem cells (iPSCs). Instead of inducing pluripotency as usual with viral vectors, our authors reprogram the cells using non-integrating plasmids. The resulting iPSC colonies show normal morphology, stable karyotypes, and significant expression of pluripotency markers. As far as we know, this is the first report of deriving virus-free iPSCs from frozen buffy coats, which are commonly stored in biobanks, and could become a valuable source of iPSCs for regenerative medicine.

In JoVE Bioengineering, we know that cells can behave differently depending on the stiffness of the extracellular matrix, which is measured in kiloPascals (kPA). Metastatic cancer cells, in particular, show higher traction stress than non-metastatic cells, so scientists examine tumor cell invasion and metastasis using traction force assays. However, traction data are lacking for primary tumor cells. Therefore, Yakut Ali *et al.* extract primary cells from human tumors and culture them on hydrogel substrates for traction cytometry. This technique may lead to the use of biophysical parameters, such as tumor cell stiffness and traction, in cancer prognostics.

In JoVE Behavior, we feature protocols that deal with cognition and learning in children. In the experimental paradigm by Sargent *et al.*, a mobile hangs above an infant, and a light-emitting diode (LED) is secured to the infant's leg. When it reaches a certain height, the LED activates the mobile. The infants discover that the mobile will spin and play music if they kick their legs up. A motion capture system records these movements so the learning process can be quantified.

Also in JoVE Behavior, children with speech impairments may benefit from a speech-generating device (SGD), which produces an electronic voice using a synthesizer. Some devices have dynamic interfaces, so users can access new words by changing levels. Cognitive factors can affect the ability to navigate through these levels, so Robillard *et al.* present a detailed protocol for assessing how cognitive factors contribute to navigational abilities. This could, in turn, guide clinicians to select the appropriate speech-generating device for a patient.

You've just had a sneak peek of the June 2015 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 http://www.jove.com/video/5730/

Protocol

Practical Methodology of Cognitive Tasks Within a Navigational Assessment

Manon Robillard[1], Chantal Mayer-Crittenden[1], Annie Roy-Charland[2], Michèle Minor-Corriveau[1], Roxanne Bélanger[1]

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Children who have complex communication needs can benefit from the use of a speech-generating device (SGD). Cognitive skills were identified as having an impact on the ability to navigate between levels of SGDs. This protocol describes the steps needed for Speech-language Pathologists to assess cognitive skills and navigational abilities.

Quantifying Learning in Young Infants: Tracking Leg Actions During a Discovery-learning Task

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A method is described in which 3-4 month old infants learn a task by discovery and their leg movements are captured to quantify the learning process.

Isolation of Primary Human Colon Tumor Cells from Surgical Tissues and Culturing Them Directly on Soft Elastic Substrates for Traction Cytometry

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A protocol is described to extract primary human cells from surgical colon tumor and normal tissues. The isolated cells are then cultured on soft elastic substrates (polyacrylamide hydrogels) functionalized by an extracellular matrix protein, and embedded with fluorescent microbeads. Traction cytometry is performed to assess cellular contractile stresses.

Generation of Induced Pluripotent Stem Cells from Frozen Buffy Coats using Non-integrating Episomal Plasmids

Viviana Meraviglia*[1], Alessandra Zanon*[1], Alexandros A. Lavdas[1], Christine Schwienbacher[1], Rosamaria Silipigni[2], Marina Di Segni[2], Huei-Sheng Vincent Chen[3], Peter P. Pramstaller[1], Andrew A. Hicks[1], Alessandra Rossini[1]

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Induced pluripotent stem cells (iPSCs) represent a source of patient-specific tissues for clinical applications and basic research. Here, we present a detailed protocol to reprogram human peripheral blood mononuclear cells (PBMNCs) obtained from frozen buffy coats into viral-free iPSCs using non-integrating episomal plasmids.

Disclosures

No conflicts of interest declared.