Volume 5.35: September 13, 2021

Publications of the Week

A Unified Model of Human Hemoglobin Switching through Single-Cell Genome Editing

First Author: Yong Shen | Senior Author: Vijay Sankaran *(pictured)*
Nature Communications | Boston Children's Hospital, Harvard Medical School, Dana-Farber Cancer Institute, Broad Institute, and Harvard Stem Cell Institute

Key mechanisms of fetal hemoglobin (HbF) regulation and switching have been elucidated through studies of human genetic variation. The authors describe a single-cell genome editing functional assay that enables specific mutations to be recapitulated individually and in combination, providing insights into how multiple mutation-harboring functional elements collectively contribute to HbF expression.
Profile | Abstract

Topoisomerase I Inhibition and Peripheral Nerve Injury Induce DNA Breaks and ATF3-Associated Axon Regeneration in Sensory Neurons

First Author: Yung-Chih Cheng | Senior Author: Clifford Woolf *(pictured)*
Cell Reports | Boston Children's Hospital, Harvard Medical School, and Harvard Stem Cell Institute

Although axonal damage induces rapid changes in gene expression in primary sensory neurons, it remains unclear how this process is initiated. The transcription factor ATF3, one of the earliest genes responding to nerve injury, regulates expression of downstream genes that enable axon regeneration. By exploiting ATF3 reporter systems, the authors identify topoisomerase inhibitors as ATF3 inducers, including camptothecin. **Abstract**

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Awards

Recent Awards and Honors for the BIDMC Community

Beth Israel Deaconess Medical Center (BIDMC)

Dr. Stephanie Buss *(pictured)* has received a National Institutes of Health K23 Mentored Patient-Oriented Research Career Development Award to investigate the use of transcranial magnetic stimulation as a biomarker in Alzheimer's disease. See the full list of awards, honors and accomplishments the BIDMC community received in recent months. **Read More**

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Local News

Researchers Generate Protective Embryonic Heart Cells

Harvard Stem Cell Institute

Researchers at Massachusetts General Hospital led by Harvard Stem Cell Institute Principal Faculty Member Dr. Harald Ott *(pictured)* have generated the embryonic cells that support early heart development. In their study, these pre-epicardial cells were able to develop into the epicardial cells that form the epicardium, the protective membrane that covers the outer surface of the heart and plays a major role in protecting embryonic heart development. **Read More**

Meet a Whitehead Postdoc: Jason Matos

Whitehead Institute

Dr. Jason Matos *(pictured)* is a postdoc in Whitehead Institute member Dr. Jing-Ke Weng's lab studying how plants make medicinal molecules. He is specifically working on a molecule called resiniferatoxin, which comes from a resin spurge called *Euphorbia resinifera* and is involved in treatment of pain. Their team is trying to find how the plant makes the molecule so they can engineer the pathway elsewhere. **Read More**

Behind the Scenes, Brain Circuit Ensures Vision Remains Reliable

The Picower Institute

As mice watched movies, scientists watched their brains to see how vision could be represented reliably. The answer is that consistency in representation is governed by a circuit of inhibitory neurons. "The question of reliability is hugely important for information processing and particularly for representation — in making vision valid and reliable," said Dr. Mriganka Sur *(pictured)*. **Read More**

Two Feng Zhang Lab Alumni Find a New CRISPR Enzyme That Could Take a Big Gulp Out of RNA — and a Raft of Devastating Diseases

Endpoints News

Drs. Omar Abudayyeh *(pictured, left)* and Jon Gootenberg *(right)* have worked together since they were graduate students at CRISPR pioneer Dr. Feng Zhang's lab, where they discovered a new gene editing enzyme called Cas13. Two years later, they unveiled a new CRISPR protein: Cas7-11, so named because it combines the otherwise separate proteins Cas7 and Cas11. They showed the new enzyme could accurately edit RNA in mammalian cells without damaging the cell.
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Two Whitehead Fellows Named to MIT and Harvard Faculties

Whitehead Institute

The Whitehead Fellows program is renowned for preparing emerging leaders in biomedical research and education. Two recent Whitehead Fellows are continuing that track record. On July 1, Dr. Kristin Knouse *(pictured)* joined the MIT faculty as Assistant Professor of Biology and a member of MIT's Koch Institute for Integrative Cancer. This month, Dr. Silvi Rouskin joins Harvard Medical School as a member of the faculty in the Department of Microbiology. **Read More**

New Brain Model Sheds Patient-Specific Light on Alzheimer's Disease

Harvard Stem Cell Institute

A new brain model has been developed that will allow patient-specific insights in Alzheimer's disease. Researchers from Brigham and Women's Hospital, led by Harvard Stem Cell Institute Principal Faculty Dr. Tracy Young-Pearse, have developed a method to examine living brain cells and predict the rate of cognitive decline in humans. The team generated induced pluripotent stem cell lines from over 50 individual subjects. **Read More**

Researchers Discover the Mechanisms Behind Cold-Related Tooth Pain

Bench Press

Scientists have known the causes of cold-related tooth pain for a while — cavities, receding gums, and the side effects of chemotherapy are often the culprits. But until recently, the process by which teeth sense cold and transmit pain signals to the brain has been a mystery. A team of researchers from Massachusetts General Hospital and Friedrich-Alexander University in Germany have discovered a key player in the process — a type of cells called odontoblasts. **Read More**

Novel Approach Reverses Amblyopia in Animals

The Picower Institute

Amblyopia is the most common cause of vision loss in children, according to the US National Eye Institute. It arises when visual experience is disrupted during infancy, for example by a cataract in one eye. In a new study, MIT and Dalhousie University neuroscientists demonstrate that by temporarily anesthetizing the retina of the good eye, they could lastingly improve vision in the amblyopic one even after the critical period in two different mammal species. **Read More**

Statistical Model Defines Ketamine Anesthesia's Effects on the Brain

The Picower Institute

By developing the first statistical model to finely characterize how ketamine anesthesia affects the brain, a team of researchers at MIT's Picower Institute for Learning and Memory and Massachusetts General Hospital have laid new groundwork for three advances: understanding how ketamine induces anesthesia; monitoring the unconsciousness of patients in surgery; and applying a new method of analyzing brain activity. **Read More**

Patient-Derived Ovarian Cancer 'Organoids' Aid Precision Oncology Research

Dana-Farber Cancer Institute

The time may not be far off when the treatment for a person's ovarian cancer can be tailored to their malignancy using drugs selected by testing on "organoids" — miniature 3D clusters of cancer cells grown from a patient's own tumor cells. Because organoids mimic the patient's cancer and can be created in as little as seven to ten days, "we can do rapid, direct tests of drugs and combinations of drugs to predict a patient's response," says Dr. Alan D'Andrea *(pictured)*.
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LabCentral Launches Inaugural LabCentral Ignite

LabCentral via MassBio

LabCentral, with the support of AbbVie, recently announced the LabCentral Ignite Golden Ticket, an annual program designed to allow a more diverse range of biotech entrepreneurs to advance their research and bring their ideas to fruition. The program will award one year of advisory support and a seat at LabCentral's state-of-the-art shared lab space in Kendall Square for up to two innovative life sciences companies with founders from underrepresented groups in the industry.
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Upcoming Events in Boston

September 17 8:30 AM	**Engineering the Next Wave of Immunotherapy** Online	
September 17 12:30 PM	**Modifying Humans: Is Global Governance of Genome Editing Possible?** Online	
September 23 4:00 PM	**Colloquium on the Brain and Cognition with Dr. Michelle Monje, Stanford University** Online	
September 28 4:00 PM	**The Genetics of Opioid Addiction: What We Know, What We Are Learning** Online	
September 30 4:00 PM	**Industry Career Chat with Flare Therapeutics** Online	

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