Volume 2.29: August 3, 2020

Publications of the Week

Dissecting Cell Type-Specific Metabolism in Pancreatic Ductal Adenocarcinoma

First Author: Allison Lau *(pictured)* | Senior Author: Matthew Vander Heiden
eLife | MIT, Harvard Medical School, and the University of Massachusetts

Tumors are composed of many different cell types including cancer cells, fibroblasts, and immune cells. Dissecting functional metabolic differences between cell types within a mixed population can be challenging due to the rapid turnover of metabolites relative to the time needed to isolate cells. The authors assessed differences between cancer cell and fibroblast metabolism in murine pancreatic cancer organoid-fibroblast co-cultures and tumors. Profile | Abstract

CRISPR C-to-G Base Editors for Inducing Targeted DNA Transversions in Human Cells

First Author: Ibraham Kurt | Senior Author: Keith Joung *(pictured)*
Nature Biotechnology | Massachusetts General Hospital, Harvard T. H. Chan School of Public Health, and Harvard Medical School

CRISPR-guided DNA cytosine and adenine base editors are widely used for many applications but primarily create DNA base transitions (that is, pyrimidine-to-pyrimidine or purine-to-purine). The authors describe the engineering of two base editor architectures that can efficiently induce targeted C-to-G base transversions, with reduced levels of unwanted C-to-W (W = A or T) and indel mutations. Abstract

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Local News

Protecting Beta Cells against Stress May Guard against Type 1 Diabetes

Joslin Diabetes Center

Type 1 diabetes occurs when a person's own immune system destroys insulin-producing beta cells in the pancreas. In recent years, scientists have learned how to grow large volumes of replacement beta cells, but they're still trying out many options to protect these cells against immune attack. Researchers led by Dr. Peng Yi *(pictured)* have now found an unusual strategy that eventually may help to guard such transplanted beta cells or to slow the original onset of the disease.
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COVID-19 Vaccine Trial Launches

Harvard Medical School

A candidate vaccine for preventing COVID-19 is advancing to a 30,000-participant phase 3 trial, and Brigham and Women's Hospital will play two key roles in the trial. The phase 3 COVE study will evaluate mRNA-1273, a vaccine candidate against COVID-19 manufactured by Moderna. The study will enroll participants at locations throughout the United States, with Brigham and Women's serving as a clinical research site as part of the COVID-19 Prevention Network. Read More

Drug Delivery Nanoparticles Given Neurotransmitter "Passports" to Cross Blood-Brain Barrier

Genetic Engineering & Biotechnology News

Biomedical engineers at Tufts University have developed tiny lipid-based nanoparticles that incorporate neurotransmitters, which can help to carry drugs, large molecules, and even gene editing proteins across the blood-brain barrier and into the brain in mice. The researchers believe the new neurotransmitter-derived lipidoids could overcome many of the current limitations encountered in delivering intravenously administered therapeutics into the central nervous system.
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How COVID-19 Causes Loss of Smell

Harvard Medical School

Temporary loss of smell, or anosmia, is the main neurological symptom and one of the earliest and most commonly reported indicators of COVID-19. Now, an international team of researchers led by neuroscientists at Harvard Medical School has identified the olfactory cell types in the upper nasal cavity most vulnerable to infection by SARS-CoV-2, the virus that causes COVID-19. Surprisingly, sensory neurons that detect and transmit the sense of smell to the brain are not among the vulnerable cell types. Read More

DNA in (Even More) Detail

Wyss Institute

To better grasp how genome structure alters function, scientists have been developing imaging technologies that can take snapshots and video clips of large swaths of chromosomes in cells at ever-higher resolutions. Now, a team of researchers at Harvard have developed a way to quickly visualize more regions of the genome at once in human cells and create 3D maps of chromosome organization that are more complete and detailed than before. Read More

Proteins — and Labs — Coming Together to Prevent Rett Syndrome

Whitehead Institute

Dr. Richard Young has been exploring the previously unknown role that condensates play in gathering the molecules needed for gene transcription. In order to better understand when and how cells use phase separation, Charles Li, a graduate student in Young's lab, set out to identify more proteins that can form condensates. That search led him to MeCP2, a protein associated with the severe neurodevelopmental disorder Rett syndrome. Read More

Gene-Controlling Mechanisms Play Key Role in Cancer Progression

MIT News

MIT and Harvard University researchers have mapped out a new layer of control that guides the evolution of cancer — an array of structural changes to "chromatin," the mix of proteins, DNA, and RNA that makes up cells' chromosomes. In a study of mouse lung tumors, the researchers identified 11 chromatin states, also called epigenomic states, that cancer cells can pass through as they become more aggressive. Read More

It Takes Two: Immune Correlates of Protection in RTS,S/ASO1 Malaria Vaccine

Ragon Institute

Researchers at the Ragon Institute have discovered two markers of immunity in response to the RTS,S/ASO1 malaria vaccine that correlated strongly with protection from infection. The ability to identify a successful immune response to the RTS,S/ASO1 vaccine could greatly reduce the amount of time and funding needed to develop more effective malaria vaccines. Read More

Getting Under the Skin of Psoriasis

Wyss Institute

A team of researchers at Harvard's Wyss Institute for Biologically Inspired Engineering and John A. Paulson School of Engineering and Applied Sciences is using an ionic liquid combination to successfully deliver a small interfering RNA-based treatment directly to the skin in a mouse model of psoriasis, significantly reducing levels of inflammatory cytokines and symptoms of psoriasis without systemic side effects. Read More

Finch Therapeutics Unleashes the Power of the Gut

MIT News

The human gut microbiome contains trillions of bacteria that play important roles for the proper functioning of our bodies. But those bacterial colonies went relatively unexplored until recently, when new computational tools made it possible to understand their makeup in more detail. Finch Therapeutics is one of a number of companies trying to turn that new perspective into new treatments. Read More

Dana-Farber to Offer First Car T-Cell Therapy for Mantle Cell Lymphoma Following FDA Approval

Dana-Farber

The Food and Drug Administration (FDA) has approved the first CAR T-cell therapy for mantle cell lymphoma, representing a key advance for patients with relapsed or treatment-resistant forms of the disease. Dana-Farber/Brigham and Women's Cancer Center will be a certified treatment center for the therapy, known as Tecartus™. Read More

A Master Regulator of Kidney Health?

Boston Children's Hospital

End-stage kidney disease often begins with injury to podocytes. The lab of Jordan Kreidberg at Boston Children's Hospital has been trying to understand how kidneys and podocytes naturally maintain themselves. In a new study, the team describes a master genetic program that seems to orchestrate podocytes' innate injury-repair response. Read More

A Recipe for Cell Fitness

MIT Biology

What ratio of ingredients makes a healthy cell? Researchers know which components are required for proper function, but they're still working to understand what happens when there's too much of one protein or not enough of another. Darren Parker *(pictured)*, a graduate student in Gene-Wei Li's lab, spent years tweaking the recipe for a bacterial cell, adding more or less of one enzyme, aminoacyl-tRNA synthetase. Read More

New Study Demonstrates Early Detection of Lung Cancer Using Blood Plasma

MIT Sloan School of Management

A new study led by Omid Farokhzad *(pictured)*, the CEO of life sciences startup Seer and a Professor at Harvard Medical School, describes a new technique for interrogating the proteome. This technique is both relatively comprehensive and, at the same time, fast, taking a few hours. By combining proteomic data made available through this approach with machine learning methods, the lung cancer study shows the potential for fast diagnoses through a simple blood draw.
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Five Things to Know about the Ragon Institute

Massachusetts General Research Institute

The Ragon Institute is a leading institution in infectious disease and immunology research and has been a crucial partner of Massachusetts General Hospital since its inception. The Ragon has long been recognized as a leader in HIV/AIDS research, but since the COVID-19 pandemic began, Ragon researchers have pivoted to apply their expertise to SARS-CoV-2 and COVID-19. Read More

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Upcoming Events in Boston

August 3
3:00 PM
Rebooting Your Research Program
Online

August 5
12:00 PM
Webinar: Impact of SARS-CoV-2 Infection on the Central Nervous System
Online

August 6
3:00 PM
Boston College Science on Tap: Farm to Ferment, the Ecology of Lactic Acid Bacteria
Online

August 12
12:00 PM
COVID-19: BioMaking Solutions – Applying Ginkgo's Platform to the COVID-19 Response
Online

August 13
3:00 PM
Boston College Science on Tap: The Sex-Specific Impact of Anxiety on Alzheimer's Disease Progression
Online

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