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Publications of the Week

Spatial Maps of T Cell Receptors and Transcriptomes Reveal Distinct Immune Niches and Interactions in the Adaptive Immune Response

First Authors: Sophia Liu, J. Bryan Iorgulescu, and Shuqiang Li | Senior Authors: Catherine Wu and Fei Chen *(pictured)*
Immunity | Harvard University, MIT, Broad Institute, Dana-Farber Cancer Institute, and Brigham and Women's Hospital

T cells mediate antigen-specific immune responses to disease through the specificity and diversity of their clonotypic T cell receptors (TCRs). Determining the spatial distributions of T cell clonotypes in tissues is essential to understanding T cell behavior, but spatial sequencing methods remain unable to profile the TCR repertoire. The authors developed Slide-TCR-seq, a 10-µm-resolution method, to sequence whole transcriptomes and TCRs within intact tissues. **Abstract**

Differential ABC Transporter Expression during Hematopoiesis Contributes to Neutrophil-Biased Toxicity of Aurora Kinase Inhibitors

First Authors: David Chou, Brooke Furlong, and Ryan Posey | Senior Author: Donald Ingber *(pictured)*
Nature Communications | Wyss Institute, Massachusetts General Hospital, and Harvard University

Drug-induced cytopenias are a prevalent and significant issue that worsens clinical outcomes and hinders the effective treatment of cancer. While reductions in blood cell numbers are classically associated with traditional cytotoxic chemotherapies, they also occur with newer targeted small molecules and the factors that determine the hematotoxicity profiles of oncologic drugs are not fully understood. The authors explore why some Aurora kinase inhibitors cause preferential neutropenia.
Abstract

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Awards

Alzheimer's Drug Discovery Foundation Funds Research into Drugs Mimicking the Neuroprotective Effects of Exercise

Harvard Stem Cell Institute (HSCI)

Physical activity, especially endurance exercise, can improve cognitive function in part by reducing neuroinflammation. Research from HSCI affiliate member Dr. Christiane Wrann *(pictured)* has shown that the hormone irisin, which is secreted from muscles during exercise, may improve cognitive function in Alzheimer's disease. Her laboratory was awarded a grant from the Alzheimer's Drug Discovery Foundation to continue this work. **Read More**

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Local News

Humans of MGRI: Abigail Kane

Bench Press

Dr. Abigail Kane *(pictured)* is a postdoctoral research fellow in the Mucosal Immunology and Biology Research Center at the Massachusetts General Research Institute (MGRI). She works in Dr. Lael Yonker's lab studying immune responses to COVID-19 infection and vaccination in children. As a fellow, she oversees a double-blind, placebo-controlled clinical trial looking at the safety and efficacy of an investigational new drug for the treatment of multisystem inflammatory syndrome in children. **Read More**

Researchers Develop a Novel Antibiotic Cement to Treat Bone Infections

Brigham and Women's Hospital

Investigators from Brigham and Women's Hospital used a novel, interdisciplinary approach to construct a robust, computer program-generated library of antibiotics, and to identify an effective antibiotic for targeted use in a bone cement matrix. This approach could potentially be used to treat bone infections, a common complication after surgical orthopaedic procedures. "We must create a new generation of antibiotics that are optimized to meet this emerging need," says Dr. Hae Lin Jang *(pictured)*. **Read More**

Global Initiative Shows How Bringing Biobanks Together Can Yield New Genetic Insights

Broad Institute

In *Cell Genomics*, the Global Biobank Meta-analysis Initiative (GBMI) shared pilot analyses of summary statistics from multiple genome-wide association studies by member biobanks. "The construction of this GBMI resource represents a great starting point for how, as a worldwide community, we can together leverage genetic data to better understand disease," said Dr. Mark Daly *(pictured)*, co-corresponding author on the study and an institute member at the Broad. **Read More**

Radiotracer That Detects an Important Contributor to Neurological Diseases Tested for the First Time in Humans

Massachusetts General Hospital

Investigators at Massachusetts General Hospital have developed a radioactive demyelination tracer that can be detected by positron emission tomography scans. "Having an imaging tool that it is specific to demyelination can help to better understand the contribution of demyelination to different diseases and better monitor a disease or the response to therapy — for example, a remyelinating therapy," says Dr. Pedro Brugarolas *(pictured)*. **Read More**

New Insight into Dietary Approaches for Epilepsy

Boston Children's Hospital

Fasting has been believed since ancient times to curb seizures in epilepsy, and small patient studies in the early 1900s have revived the idea. But the reasons have remained mysterious. New research from Boston Children's helps explain how fasting affects the brain at the molecular level. The findings could lead the way to new approaches that would avoid the need for fasting or even the ketogenic diet, which mimics some of the effects of fasting and is now sometimes used to treat epilepsy. **Read More**

Building a Bridge between Neuroscience and Immunology

MIT News

When Dr. Gloria Choi *(pictured)* was making plans to launch her research lab at MIT, nearly ten years ago, she thought it would be nice to find a side project where she could collaborate with her husband, an immunologist at Harvard Medical School. The two scientists decided to look into a startling observation they had heard about as graduate students: A large study from Denmark showed that severe infections in pregnant women were correlated with a much higher risk of their children developing autism. **Read More**

Researchers Develop System for Generating Oxygen within Cells

Massachusetts General Hospital

Oxygen is vital for life, and clinicians can provide supplemental oxygen to patients through face masks and nasal tubes, but there are no methods available for delivering oxygen directly into cells. Investigators led by Dr. Vamsi Mootha *(pictured)* at Massachusetts General Hospital recently developed a technology that allows them to engineer cells to make oxygen on demand in response to an added chemical. **Read More**

Exercise and Obesity Have Opposite Impact on Muscle and Fat Tissues, Researchers Demonstrate

Joslin Diabetes

Exercise training is a well-known means of maintaining and restoring good health; however, the molecular mechanisms underlying the benefits of exercise are not yet completely understood. A team led by Dr. Laurie Goodyear, Senior Investigator of Integrative Physiology and Metabolism at Joslin Diabetes Center, launched a collaboration with a computational biology and artificial intelligence lab at MIT led by Dr. Manolis Kellis *(pictured)* to investigate how three metabolic tissues respond to exercise and to high-fat diet-induced obesity at single-cell resolution. **Read More**

Wyss Researchers Discover a New Type of RNA That Inhibits a Broad Range of Viral Infections

Wyss Institute

Researchers at the Wyss Institute have discovered a new class of immunostimulatory double-stranded (ds)RNAs that potently induces the production of two forms of interferon while limiting the inflammation commonly observed with previous types of RNA-based immunostimulants. "These new dsRNAs are an attractive treatment option for COVID-19," says Dr. Haiqing Bai *(pictured)*.
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Largest Genome-Wide Association Study Ever Uncovers Nearly All Genetic Variants Linked to Height

Broad Institute

In the largest study of its kind to date, researchers from the Broad Institute and the Genetic Investigation of Anthropometric Traits consortium have found more than 12,000 genetic variants that influence height. These variants explain 10 to 40 percent of all variation in height depending on a person's ancestry, and cluster around parts of the genome involved in skeletal growth. "We feel that this is really a milestone," said Dr. Joel Hirschhorn *(pictured)*, senior author on the study.
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Unlocking the Power of Our Emotional Memory

The Brink

What if it's possible to use the malleable nature of our memories as a way to cure mental health disorders like depression and post-traumatic stress disorder? That is exactly what Dr. Steve Ramirez *(pictured)* and his research team are working to do. And after years of studying memory in mice, they've found not only where the brain stores positive and negative memories, but also how to turn the volume down on negative memories by artificially stimulating other, happier ones. **Read More**

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Upcoming Events in Boston

October 21 11:00 AM	**Harvard Biotech Club Career Fair** Harvard Medical School
October 24–26 8:45 AM	**The MedTech Conference** Boston Convention and Exhibition Center
October 27 12:00 PM	**VendorFest Cambridge** Le Méridien Boston Cambridge
October 27 4:00 PM	**Third Annual Gilbert S. Omenn Lecture** Countway Library
November 3 8:00 AM	**The Forsyth Institute 5th Scientific Symposium: Craniofacial Biology, Disease, and Regeneration** Forsyth Institute and Online

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