

Publications of the Week

**HLA Autoimmune Risk Alleles Restrict the Hypervariable Region of T Cell Receptors**

First Author: Kazuyoshi Ishigaki | Senior Author: Soumya Raychaudhuri (pictured)  
Nature Genetics | Brigham and Women's Hospital, Harvard Medical School, and Broad Institute

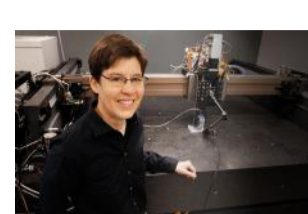


Polymorphisms in the human leukocyte antigen (*HLA*) genes strongly influence autoimmune disease risk. *HLA* risk alleles may influence thymic selection to increase the frequency of T cell receptors (TCRs) reactive to autoantigens. The authors investigated the influence of *HLA* alleles on TCR composition at the highly diverse complementarity determining region 3, which confers antigen recognition.

[Abstract](#)

**Orthogonally Induced Differentiation of Stem Cells for the Programmatic Patterning of Vascularized Organoids and Bioprinted Tissues**

First Authors: Mark Skylar-Scott, Jeremy Huang, and Aric Lu | Senior Author: Jennifer Lewis (pictured)  
Nature Biomedical Engineering | Wyss Institute, Harvard University, and Blavatnik Institute



The generation of organoids and tissues with programmable cellular complexity, architecture, and function would benefit from the simultaneous differentiation of human induced pluripotent stem cells (hiPSCs) into divergent cell types. The authors leveraged multimaterial bioprinting of hiPSC inks without extracellular matrix to generate patterned neural tissues with layered regions composed of neural stem cells, endothelium, and neurons.

[Abstract](#)

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Awards

**Emery Brown Earns AIMBE's Highest Honor**

The Picower Institute



The American Institute for Medical and Biological Engineering (AIMBE) has announced that it is awarding its highest honor this year to Dr. Emery Brown (pictured), Edward Hood Taplin Professor of Computational Neuroscience and Health Sciences & Technology in The Picower Institute for Learning and Memory and the Institute for Medical Engineering & Science at MIT. For decades, Dr. Brown's lab has uniquely unified three fields: neuroscience, statistics, and anesthesiology.

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Local News

**Developing Brain Needs Cannabinoid Receptors After Birth**

McGovern Institute



Doctors warn that marijuana use during pregnancy may have harmful effects on the development of a fetus, in part because the cannabinoid receptors activated by the drug are known to be critical for enabling a developing brain to wire up properly. Now, scientists at MIT's McGovern Institute for Brain Research have learned that cannabinoid receptors' critical role in brain development does not end at birth.

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**Atlas of Migraine Cell Types Sheds Light on New Therapeutic Targets**

Brigham and Women's Hospital



While scientists know that migraine and related headaches are caused by activity in a part of the nervous system known as the trigeminal ganglion (TG), it remains unclear which genes and cell types of the TG are involved. By analyzing both human and mouse TG, investigators from Brigham and Women's Hospital and Massachusetts General Hospital profiled, at single-cell resolution, the genes expressed in each TG cell type.

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**Ragon Institute Women Make a Difference: Alison Ringel**

Ragon Institute



Dr. Alison Ringel (pictured) didn't set out to exclusively choose female mentors when she started out in scientific research, but by following her research interests, that's what happened. Dr. Ringel joined the Ragon in January 2022 and currently studies how T cells — white blood cells that help protect against infection and can help fight cancer — survive in stressful environments.

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**Immune Cells Produce Chemical Messenger That Prevents Heart Disease-Related Inflammation**

Massachusetts General Hospital



The immune system's white blood cells, which are produced in the bone marrow, mostly help to defend against bacteria and injury, but sometimes they can turn against the body — for example, in cardiovascular disease, their inflammatory aggression can harm arteries and the heart. New research in *Nature Immunology*, supervised by Dr. Matthias Nahrendorf (pictured), provides insights into the pathways that increase or decrease the bone marrow's output of these cells.

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**Lipid, Glucose Levels at Age 35 Associated with Alzheimer's Disease**

BU School of Medicine



According to BU School of Medicine researchers, lower high-density cholesterol and high triglyceride levels measured in blood as early as age 35 are associated with a higher incidence of Alzheimer's disease (AD) several decades later in life. They also found that high blood glucose measured between ages 51–60 is associated with risk of AD in the future.

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**Heart-Saving AI**

Harvard Medical School



Heart transplantation can be lifesaving for patients with end-stage heart failure. However, many patients experience organ transplant rejection, in which the immune system attacks the transplanted organ. But detecting transplant rejection is challenging. In its early stages, patients may not experience symptoms, and experts do not always agree on the degree and severity of the rejection when they examine heart biopsies to diagnose the problem.

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**'The Infectious Disease That Nobody Ever Thinks About'**

Harvard T. H. Chan School of Public Health



Before COVID, tuberculosis (TB) was the leading infectious disease killer in the world. To mark World TB Day, March 24, Dr. Sarah Fortune (pictured), John LaPorte Given Professor of Immunology and Infectious Diseases and a TB expert, discusses the state of the disease worldwide, obstacles to fighting it, and the latest research.

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**Study Finds Neurons That Encode the Outcomes of Actions**

McGovern Institute



When we make complex decisions, we have to take many factors into account. Some choices have a high payoff but carry potential risks; others are lower risk but may have a lower reward associated with them. A new study from MIT sheds light on the part of the brain that helps us make these types of decisions. A team in Dr. Ann Graybiel's (pictured) lab found a group of neurons in the brain's striatum that encodes information about the potential outcomes of different decisions.

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**Targeting Treatments for Vascular Anomalies, Courtesy of Cancer Genetics**

Boston Children's Hospital



Vascular anomalies — overgrowths or malformations of the capillaries, veins, arteries, and/or lymphatic vessels — often confound physicians, especially in acute settings. They encompass a diverse group of conditions, all of them rare, and can affect multiple body systems. Many physicians have never encountered vascular anomalies and may be unaware of the risks they sometimes pose, such as constriction of the airway or spinal cord or excessive bleeding.

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**Navigating New Worlds in Biology and at MIT**

MIT Biology



MIT Professor Dr. Sallie "Penny" Chisholm (pictured) is best known for her role in discovering the tiny bacteria called *Prochlorococcus* — the world's most abundant photosynthetic organism. Together, Dr. Chisholm and her lab eventually learned that though each *Prochlorococcus* strain contains fewer than 2,000 genes, the collective as a whole contains more than 80,000 — four times the size of the human genome. She has also played a pivotal role in pioneering and advocating for women's rights at MIT and beyond.

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**How Molecular Biology Could Reduce Global Food Insecurity**

MIT News



Dr. Mary Gehring (pictured), Associate Professor of Biology and a member of the Whitehead Institute for Biomedical Research, is growing increasingly concerned about the potentially catastrophic impacts of climate change and resolved to do something about it. The Gehring lab's primary research focus is plant epigenetics, which refers to the heritable information that influences plant cellular function but is not encoded in the DNA sequence itself.

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**Upcoming Events in Boston**

April 5 3:30 PM	<b>Astellas Pharma Day</b> MassBioHub
April 8 12:00 PM	<b>2022 MIT Biotech Group Career Fair</b> Online
April 11 5:00 PM	<b>MIT Research Slam &amp; Three Minute Thesis</b> Online
April 27 8:00 AM	<b>Turning Great Ideas into Dollars: The Life-Cycle of a Start-Up – Part One</b> MassBioHub
April 27 4:30 PM	<b>Tufts@Kendall: Advances in Immunology and Inflammation</b> MassBio

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