

Publications of the Week

Cross-Modal Autoencoder Framework Learns Holistic Representations of Cardiovascular State

First Authors: Adityanarayanan Radhakrishnan and Sam Friedman | Senior Author: Caroline Uhler *(pictured)*
Nature Communications | MIT, the Broad Institute, and Massachusetts General Hospital



A fundamental challenge in diagnostics is integrating multiple modalities to develop a joint characterization of physiological state. Using the heart as a model system, the authors develop a cross-modal autoencoder framework for integrating distinct data modalities and constructing a holistic representation of cardiovascular state. Their results systematically integrate distinct diagnostic modalities into a common representation that better characterizes physiologic state. [Abstract](#) | [Press Release](#)

Mini-PCDH15 Gene Therapy Rescues Hearing in a Mouse Model of Usher Syndrome Type 1F

First Author: Maryna Ivanchenko | Senior Author: David Corey *(pictured)*
Nature Communications | Harvard Medical School and Massachusetts Eye and Ear



Usher syndrome type 1F, caused by mutations in the protocadherin-15 gene (*PCDH15*), is characterized by congenital deafness, lack of balance, and progressive blindness. The authors use rational, structure-based design to engineer mini-PCDH15s in which 3–5 of the 11 extracellular cadherin repeats are deleted, but which still bind a partner protein. [Abstract](#) | [Press Release](#)

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Awards

Whitehead Institute Researcher Kathrin Kajderowicz Receives Paul & Daisy Soros Fellowship for New Americans

Whitehead Institute



Kathrin (Kat) Kajderowicz *(pictured)*, a research assistant in the lab of Dr. Siniša Hrvatin and graduate student at MIT, has been named a recipient of a Paul & Daisy Soros Fellowship for New Americans. The Paul & Daisy Soros Fellowship provides merit-based support for the graduate school programs of highly promising immigrants and children of immigrants. [Read More](#)

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Local News

Microneedle Patch Printer Enables On-Demand Vaccine Manufacturing

Genetic Engineering & Biotechnology News



Researchers from the lab of Dr. Robert Langer *(pictured)* at the Koch Institute say they have developed a printer for microneedle patches smaller than postage stamps that penetrate the skin to deliver vaccines, including the COVID-19 mRNA vaccine. The research article, "A microneedle vaccine printer for thermostable COVID-19 mRNA vaccines," was published in *Nature Biotechnology*. [Read More](#)

A Backpack Full of Multiple Sclerosis Therapy

Wyss Institute



A key driver of multiple sclerosis (MS) is the sudden inflammation of nerves caused by myeloid cells of the "innate" immune system in vulnerable regions of the brain and spinal cord. A team at the Wyss Institute has developed a cell therapy for MS that leverages myeloid cells. "Our biomaterial-based backpack approach is a highly effective way to keep [myeloid cells] locked into their anti-inflammatory state," said Dr. Samir Mitragotri *(pictured)*. [Read More](#)

Two-Component System Could Offer a New Way to Halt Internal Bleeding

MIT News



MIT engineers have designed a two-component system that can be injected into the body and help form blood clots at the sites of internal injury. These materials, which mimic the way that the body naturally forms clots, could offer a way to keep people with severe internal injuries alive until they can reach a hospital. "By introducing two complementary systems in sequence it is possible to get a much stronger clot," says Dr. Paula Hammond *(pictured)*. [Read More](#)

Biological Age Increases with Stress and Is Reversed with Recovery, Study Suggests

Technology Networks



A new study in both mice and humans has found that biological age is dynamic, and that some increases in biological age caused by stress can be reversed with recovery. "Despite the widespread acknowledgment that biological age is at least somewhat malleable, the extent to which biological age undergoes reversible changes throughout life and the events that trigger such changes remain unknown," said Dr. Vadim Gladyshev *(pictured)*. [Read More](#)

Nanoparticles Provoke Immune Response Against Tumors but Avoid Side Effects

MIT News



Cancer drugs that stimulate the body's immune system to attack tumors are a promising way to treat many types of cancer. However, some of these drugs produce too much systemic inflammation when delivered intravenously, making them harmful to use in patients. MIT researchers in Drs. Darrell Irvine's and Jeremiah Johnson's *(pictured)* labs have now come up with a possible way to get around that obstacle. [Read More](#)

Wearable Patch Can Painlessly Deliver Drugs Through the Skin

MIT News



In hopes of making it easier to deliver drugs through the skin, MIT researchers in Dr. Canan Dagdeviren's *(pictured)* lab have developed a wearable patch that applies painless ultrasonic waves to the skin, creating tiny channels that drugs can pass through. This approach could lend itself to delivery of treatments for a variety of skin conditions, and could also be adapted to deliver hormones, muscle relaxants, and other drugs, the researchers say. [Read More](#)

AI System Can Generate Novel Proteins That Meet Structural Design Targets

MIT News



MIT researchers are using artificial intelligence to design new proteins that go beyond those found in nature. In a paper published in *Chem*, the researchers demonstrate how these models can generate realistic, yet novel, proteins. The models, which learn biochemical relationships that control how proteins form, can produce new proteins that could enable unique applications, says Dr. Markus Buehler *(pictured)*. [Read More](#)

Neuroscientists Identify Cells Especially Vulnerable to Alzheimer's

MIT News



Neurodegeneration, or the gradual loss of neuron function, is one of the key features of Alzheimer's disease. However, it doesn't affect all parts of the brain equally. "It is fascinating that only the lateral mammillary body neurons, not those in the medial mammillary body, become hyperactive and undergo neurodegeneration in Alzheimer's disease," says Dr. Li-Huei Tsai *(pictured)*. [Read More](#)

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May 2-4 6:00 PM	MIT Biology Catalyst Symposium MIT
May 4 6:30 PM	Moving Science from .edu to .com: A Revisit Whitehead Institute & Online
May 11 1:00 PM	Career Paths in Finance/Industry Online
May 14 2:00 PM	Life After Incubator: Finding Your Own Place and Meeting Your Vendor Matches Boston Convention and Exhibition Center
June 6 6:30 PM	Community Concert at BIO Big Night Live

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