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Publications of the Week

Structure–Function Analysis of the SHOC2–MRAS–PP1C Holophosphatase Complex

First Authors: Jason Kwon, Behnoush Hajian, Yuemin Bian, and Lucy Young | Senior Authors: Frank McCormick, Christopher Lemke, William Hahn, and Andrew Aguirre *(pictured)*
Nature | Broad Institute, Dana-Farber Cancer Institute, Brigham and Women's Hospital, and Harvard Medical School

The SHOC2–MRAS–PP1C holophosphatase complex functions as a key regulator of RTK–RAS signaling by removing an inhibitory phosphorylation event on the RAF family of proteins to potentiate MAPK signaling. SHOC2 forms a ternary complex with MRAS and PP1C, and human germline gain-of-function mutations in this complex result in congenital RASopathy syndromes. The authors use cryo-electron microscopy to resolve the structure of the SHOC2–MRAS–PP1C complex.
Abstract | Press Release

Monomeric Prefusion Structure of an Extremophile Gamete Fusogen and Stepwise Formation of the Postfusion Trimeric State

First Author: Juan Feng | Senior Author: Timothy Springer *(pictured)*
Nature Communications | Boston Children's Hospital and Harvard Medical School

The authors study the gamete fusogen HAP2 from *Cyanidioschyzon merolae* (Cyani), an extremophile red algae that grows at an acidic pH at 45 °C. HAP2 has a trimeric postfusion structure with similarity to viral class II fusion proteins, but its prefusion structure has been elusive. The crystal structure of a monomeric prefusion state of Cyani HAP2 shows it is highly extended with three domains in the order D2, D1, and D3. **Abstract**

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Awards

UMass Chan BRIDGE Fund Supports Seven Faculty Projects with Commercialization Potential

UMass Chan Medical School

BRIDGE Innovation and Business Development at UMass Chan Medical School has awarded $2.2 million to seven faculty-led biomedical research projects. The BRIDGE Fund supports critical research milestones that will expedite the advancement of discoveries and technological advances into viable commercial products for diagnosing and treating human diseases. Dr. Katherine Fitzgerald's *(pictured)* project involves the development of inhibitors of ASC-dependent inflammasomes for the treatment of inflammatory diseases. **Read More**

Four Researchers with MIT Ties Earn Schmidt Science Fellowships

MIT News

Four researchers with MIT ties — Juncal Arbelaiz, Xiangkun (Elvis) Cao, Sandya Subramanian *(pictured)*, and Hannah Zlotnick — have been honored with competitive Schmidt Science Fellowships. Created in 2017, the fellows program aims to bring together the world's brightest minds "to solve society's toughest challenges." **Read More**

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Local News

When Cells' Tiny Differences Have Far-Reaching Implications

MIT Chemistry

Within a given tissue or organ, cells may appear very similar or even identical. But at the molecular level, these cells can have small differences that lead to wide variations in their functions. In Dr. Alex Shalek's *(pictured)* lab, researchers develop and deploy technologies such as single-cell RNA-sequencing, which lets them analyze differences in gene expression patterns and allows them to figure out how each cell contributes to a tissue's function. **Read More**

New Findings Reveal How Neurons Build and Maintain Their Capacity to Communicate

The Picower Institute

Neurons "talk" when calcium ions flow through channels into "active zones" that are loaded with vesicles carrying molecular messages. The electrically charged calcium causes vesicles to "fuse" to the outer membrane of presynaptic neurons, releasing their communicative chemical cargo to the postsynaptic cell. In a new study, scientists in Dr. Troy Littleton's *(pictured)* lab at the Picower Institute provide several revelations about how neurons set up and sustain this vital infrastructure.
Read More

New Work Transforms Our Knowledge of How Blood Is Formed

Boston Children's Hospital

The origins of our blood may not be quite what we thought. In groundbreaking research, scientists in the Stem Cell Program at Boston Children's Hospital used cellular "barcoding" techniques in mice to track the development of blood in real time — and found that blood cells originate not from one type of mother cell, but two. **Read More**

Metabolic Protein Explains How Flies Choose 'Healthy' Food

Whitehead Institute

Many animals, including humans, have a preference for nutrient-balanced diets. A new paper, published July 20 in *Nature* and led by Drs. Xin Gu and Patrick Jouandin, shows that a family of proteins called Sestrins allows flies to sense the presence of the essential amino acid leucine — and choose foods with higher amounts of the nutrient. **Read More**

Scientists at Massachusetts General Hospital and Harvard Medical School Succeed in Freezing Rodent Livers and Preserving at Subzero Temperatures for Five Days

Massachusetts General Hospital

The clinical standard for organ preservation is hypothermic preservation at +4°C. However, this limits the time that vascular and metabolically active tissues such as the liver can be stored outside the body to hours. For the first time, Dr. Shannon Tessier *(pictured)* and a team of scientists from Massachusetts General Hospital and Harvard Medical School successfully froze rodent livers to extend preservation duration five-fold by adapting strategies used by animals to endure freezing temperatures in winter. **Read More**

A Potential Danger of CRISPR Gene Editing — and Why Base Editing May Be Safer

Boston Children's Hospital

Gene therapy using CRISPR/Cas9 gene editing is currently in clinical trials around the world for a variety of diseases, including various cancers, blood disorders, and metabolic disorders. It works by making cuts in DNA — both strands of the double helix — to insert or remove genes. But CRISPR carries a potential, previously undiscovered danger, finds a new Boston Children's–led study. **Read More**

Artificial Intelligence Model Finds Potential Drug Molecules a Thousand Times Faster

MIT News

In a paper that will be presented at the International Conference on Machine Learning, MIT researchers developed a geometric deep-learning model called EquiBind that is 1,200 times faster than one of the fastest existing computational molecular docking models, QuickVina2-W, in successfully binding drug-like molecules to proteins. EquiBind is based on its predecessor, EquiDock, which specializes in binding two proteins using a technique developed by the late Dr. Octavian-Eugen Ganea *(pictured)*. **Read More**

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Upcoming Events in Boston

July 26-28 8:00 AM	**iPSC Manufacturing Summit** The Bostonian
August 2 11:00 AM	**American Heart Association Funding Webinar** Online
August 11 5:00 PM	**STAT Locals** Cambridge Brewing Co., Kendall Square
September 14-16 8:00 AM	**Forsyth Dentech 2022** Forsyth Institute & Online
September 20 10:00 AM	**Precision Medicine 2022: The New "Normal"?** Joseph B. Martin Conference Center & Online

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Science Jobs in Boston

Principal Associate Scientist / Scientist I, Molecular Biology
Dragonfly Therapeutics

Scientist I/II, Protein Engineering
Editas Medicine

Diagnostics Scientist, Sentinel Program
Broad Institute

Associate Scientist/Scientist, Translational Pharmacology
Korro Bio

Scientist/Senior Scientist, Cell Biology, Assay Development and Screening
Foghorn Therapeutics

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