SCIENCE IN BOSTON

STEMCELL TECHNOLOGIES

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Publications of the Week

A Luminal Unfolding Microneedle Injector for Oral Delivery of Macromolecules

First Author: Ester Caffaro-Salvador *(pictured)* | Senior Author: Robert Langer
Nature Medicine | Massachusetts Institute of Technology

Insulin and other injectable biologic drugs have transformed the treatment of patients suffering from diabetes. The authors developed an ingestible capsule, termed the luminal unfolding microneedle injector, which allows for the oral delivery of biologic drugs by rapidly propelling dissolvable drug-loaded microneedles into intestinal tissue using a set of unfolding arms. Abstract

Mouse Embryo Geometry Drives Formation of Robust Signaling Gradients through Receptor Localization

First Author: Zhechun Zhang | Senior Author: Sharad Ramanathan *(pictured)*
Nature Communications | Harvard University

Morphogen signals are essential for cell fate specification during embryogenesis. Some receptors that sense these morphogens are known to localize to only the apical or basolateral membrane of polarized cell lines *in vitro*. The authors showed that the formation of a robust BMP signaling gradient in the early mouse embryo depended on the restricted, basolateral localization of BMP receptors. Abstract

International Meta-Analysis of PTSD Genome-Wideassociation Studies Identifies Sex- and Ancestry-Specific Genetic Risk Loci

First Author: Caroline Nievergelt | Senior Author: Karestan Koenen *(pictured)*
Nature Communications | Harvard Medical School, Broad Institute, MGH, McLean Hospital, BWH and BCH

The risk of post-traumatic stress disorder (PTSD) following trauma is heritable, but robust common variants have yet to be identified. In a multi-ethnic cohort including over 30,000 PTSD cases and 170,000 controls, the authors conducted a genome-wide association study of PTSD. They demonstrated SNP-based heritability estimates of 5–20%, varying by sex. Abstract

3D Mapping Reveals Network-Specific Amyloid Progression and Subcortical Susceptibility in Mice

First Author: Rebecca Gail Canter | Senior Author: Li-Huei Tsai *(pictured)*
Communications Biology | Massachusetts Institute of Technology and Boston University School of Medicine

Alzheimer's disease (AD) is a progressive, neurodegenerative dementia with no cure. Prominent hypotheses suggest that accumulation of beta-amyloid (Aβ) contributes to neurodegeneration and memory loss, however identifying brain regions with early susceptibility to Aβ remains elusive. Using SWITCH to immunolabel intact brain, the authors created a spatiotemporal map of Aβ deposition in the 5XFAD mouse. Abstract

Phototherapy and Extracorporeal Membrane Oxygenation Facilitate Removal of Carbon Monoxide in Rats

First Author: Luca Zazzeron | Senior Author: Warren Zapol *(pictured)*
Science Translational Medicine | Massachusetts General Hospital and Harvard Medical School

Carbon monoxide (CO) is a colorless, odorless gas that can cause severe illness and death after inhalation. After entering the bloodstream, CO replaces oxygen on hemoglobin, reducing oxygenation to peripheral tissues. Leveraging previous studies showing that visible light was able to dissociate hemoglobin from CO, the authors have developed an extracorporeal membrane oxygenator for blood exposure to visible light. Abstract

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Awards

Dr. William G. Kaelin of Dana-Farber Cancer Institute wins 2019 Nobel Prize

Dana-Farber Cancer Institute

Dr. William G. Kaelin *Jr. (pictured)* of Dana-Farber Cancer Institute, Harvard Medical School, and Brigham and Women's Hospital has been named a winner of the 2019 Nobel Prize in Physiology or Medicine. The Nobel was awarded jointly to Kaelin, Sir Peter J. Ratcliffe and Gregg L. Semenza for their discoveries of how cells sense and adapt to oxygen availability. Read More

American Heart Association Funds Professor's Study of How Blood Vessels Respond to Exercise Training

UMass News

Assistant Professor of Exercise and Health Sciences at UMass, Dr. Huimin Yan *(pictured)* has received a two-year, $154,000 American Heart Association Institutional Research Enhancement Award for her research of vascular health, the health of the blood vessels that provide blood to your tissues. Yan says that if your blood vessels aren't healthy, you're more likely to develop cardiovascular diseases like heart disease, which remains the number one killer of both women and men in the United States. Read More

Deborah L. Levy, PhD, to Receive 2019 Valiant Researcher Award

McLean Hospital

The Schizophrenia and Related Disorders Alliance of America will present Dr. Deborah L. Levy *(pictured)*, Director of the Psychology Research Laboratory at McLean Hospital, with its 2019 Valiant Researcher Award. Established in 2018, the Valiant Researcher award recognizes an individual "who has designed and implemented studies to enhance the diagnoses and/or care of those affected with a neuropsychiatric illness." Read More

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Local News

Ra Pharma Acquired for $2.1B by Belgian Firm that Vows to Grow in Boston

Boston Business Journal

Ra Pharmaceuticals Inc., which is in late-stage trials of a drug to treat a rare muscle disease, has been acquired by Belgium-based UCB for $2.1 billion, immediately doubling the market value of the Cambridge biotech. Ra's lead drug candidate is called zilucoplan, intended to be a once-daily injected drug now in Phase III trials as a treatment for generalized myasthenia gravis, or gMG. Read More

New Method Visualizes Groups of Neurons As They Compute

MIT News

Using a fluorescent probe that lights up when brain cells are electrically active, MIT and Boston University researchers have shown that they can image the activity of many neurons at once, in the brains of mice. This technique, which can be performed using a simple light microscope, could allow neuroscientists to visualize the activity of circuits within the brain and link them to specific behaviors. Read More

Long Live the Worm

Northeastern University

Scientists have discovered how to make a certain kind of worm live ten times as long as it should. But staying young is actually pretty stressful. Northeastern researchers are trying to understand why things get old, if they have to at all. In this episode of Northeastern's Litmus podcast, the hosts talk to the Apfeld Lab at Northeastern about their research into how the brain regulates aging and resilience using a *C. elegans* model.. Read More

Flagship Pioneering Rolls Out Another Startup, Cygnal, with $65M in Backing

Boston Business Journal

Another company has rolled down Flagship Pioneering's conveyor belt: Cygnal Therapeutics, which hopes to stop the harmful communication between nerves and cancer or immune cells.Cygnal, which has around 40 employees working out of its Vassar Street office, and hoping to reach 58 employees within the next year, has raised $65 million to develop its two lead drug candidates. Read More

How to Improve Therapies for Inflammatory Bowel Disease

Broad Institute

About three million people in the United States suffer from inflammatory bowel disease (IBD), and while patients have more treatment options now than they did 10 years ago, IBD drugs don't work for more than half of them. Drs. Ramnik Xavier and Daniel Graham, field leaders and Broad Institute members, answered questions about how the IBD field should move forward and what the future of IBD treatment looks like. Read More

Platelet BioGenesis Receives Contract Worth Up to $56 Million from the Biomedical Advanced Research and Development Authority to Develop Human Stem Cell-Derived Platelets as a Medical Countermeasure to Radiological and Nuclear Exposure

BioSpace

Platelet Biogenesis, the leader in stem cell-derived, on-demand human platelets and genetically engineered platelet-based therapeutics, has been awarded a contract worth $5 million, with the potential to reach $56 million total with options, by the Biomedical Advanced Research and Development Authority, part of the US government's Department of Health and Human Services' Office of the Assistant Secretary for Preparedness and Response. Read More

Exploring Autism by Way of Three Rare Genetic Disorders

Boston Children's Hospital

Autism spectrum disorder (ASD) is now believed to affect 1 in 59 children in the U.S. Over the past five years, Boston Children's Hospital has led a quest by ten medical centers to explore the underlying causes of ASD and intellectual disability by focusing on three rare genetic disorders with features of both: tuberous sclerosis complex, Phelan-McDermid syndrome, and PTEN hamartoma tumor syndrome. Read More

Light Shed on Century-Old Riddle of Chromosome Pairing

Wyss Institute

How homologous chromosomes in the body's cells pair along their entire lengths is a century-old riddle. Now, two studies led by Wyss Institute and HMS Faculty member Dr. Ting Wu *(pictured)*, and her collaborators Dr. Leonid Mirny (MIT), Dr. Anton Goloborodko in the Mirny group, and Dr. Job Dekker (UMass, HHMI) have shed light on this question by studying cells and embryos of *Drosophila* fruit flies as a genetic model organism. Read More

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Upcoming Events in Boston

October 16 9:00 AM	**Neural Mechanisms of Memory and Cognition** The Picower Institute for Learning and Memory	
October 18 6:30 PM	**ETH Meets Boston 2019** District Hall Boston	
October 22 8:30 AM	**PerkinElmer Nexus East Coast User Meeting 2019** Merck Research Laboratories	
October 24 8:30 AM	**Advances in Preclinical & Translational CNS Research** Royal Sonesta Boston	
November 7 11:00 AM	**Discover Brigham** Brigham and Women's Hospital	

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