Mass General Brigham

World Medical Innovation Forum

In partnership with
BANK OF AMERICA

September 15–17, 2025 | Boston

2025.worldmedicalinnovation.org

Discover your next connection here.

Download the app for full access to Forum content and interactivity

- Agenda – daily timing and locations
- Attendee Networking
- Panel Q&As
- Speaker Bios
- Program Content

Search for 'World Medical Innovation Forum' in your respective software app store.

To gain full access to the app, you will need to login using the same email address you used to register for the event. If you need help, please visit the Registration desk in the Rotunda.

Table of contents.

Welcome to the World Medical Innovation Forum. Our speakers and attendees look forward to sharing their views on the future of healthcare innovation and investment. Please be aware, that by attending this Forum, you are agreeing to abide at all times by the Forum's respectful and collaborative environment.

Anne Klibanski, MD
President and CEO, Mass General Brigham
Laurie Carrol Guthart Professor of Medicine,
Harvard Medical School

A heartfelt welcome!

For more than two centuries, Mass General Brigham has been at the forefront of medical advancement – pioneering discoveries, shaping clinical practice, and improving patient care. Today, as the nation's largest hospital-based research enterprise, we continue to drive progress through a deep commitment to innovation, collaboration, and scientific excellence.

In partnership with Bank of America, we are proud to welcome you to the 2025 World Medical Innovation Forum. This annual gathering convenes leaders from across healthcare – CEOs, investors, scientists, clinicians, and policymakers – to explore the breakthroughs transforming medicine and to accelerate the translation of innovation into real-world impact.

Under the theme "Innovation at Scale," this year's Forum explores how the most promising technologies – spanning digital health, therapeutics, and AI – can be advanced collaboratively to reach patients around the globe. Attendees will hear from dozens of prominent voices in healthcare and innovation, including industry leaders, entrepreneurs, government officials, and Harvard faculty clinicians and scientists, each offering insight into the forces shaping the future of medicine.

Mass General Brigham's longstanding commitment to research-infused, patient-centered care serves as the foundation for our research and innovation ecosystem. We are proud to share our approach and hope your experience in the coming days inspires meaningful dialogue, new connections, and bold ideas.

Brian Moynihan
Chair and CEO, Bank of America

Thanks for joining.

Welcome to the 2025 World Medical Innovation Forum. On behalf of more than 9,500 Bank of America teammates in the New England region, we're proud to again partner with Mass General Brigham to present this important opportunity for collaboration on medical innovations and breakthroughs that will change the world – today and into the future.

As we enter the second decade of the WMIF, we're building on the momentum that has happened since 2014. This year's conference will do that by:

- Convening dozens of thought leaders to share the latest insights into current and emerging therapies.
- Highlighting emerging trends in patient care.
- Sharing the latest advances in using AI to address the needs of the healthcare industry.
- Providing expert advice on accessing venture capital and other financing to help bring the next generation of healthcare innovation to life.
- Finding ways to use these advances to help strengthen our communities.

At Bank of America, we work with Life Sciences clients from start-ups with a dream to the largest and most advanced global businesses and research institutions. Whether those businesses are in New England, elsewhere in the United States, or on the other side of the world, we deliver leading corporate and investment banking solutions to help drive our clients' innovation, including M&A advice and a full range of treasury, lending and leasing services.

At the same time, our Global Research team provides timely, accurate, and relevant insights and analysis to help businesses grow – which our clients rely on to help them identify global investment opportunities. We have more than 60 healthcare analysts tracking nearly 500 Global Health Care equities and credits. Our understanding of the marketplace is unparalleled, with BofA Global Research earning a top 2 ranking in Extel's 2024 Top Global Research Firms.

Thank you for joining us at the WMIF. Our team here looks forward to talking with you about how we can be of assistance to you and your business.

2025 PLANNING COMMITTEE CO-CHAIRS

Miceal Chamberlain
President of Massachusetts, Bank of America

Christopher Coburn
Chief Innovation Officer, Mass General Brigham

Our thanks to all.

Welcome to the 11th annual World Medical Innovation Forum, where collaborative innovation takes center stage as industry, investment and medical experts explore the challenges and opportunities of an ever-evolving landscape. We're glad you're here to help shape the future of healthcare innovation and investment to deliver more breakthroughs to patients worldwide.

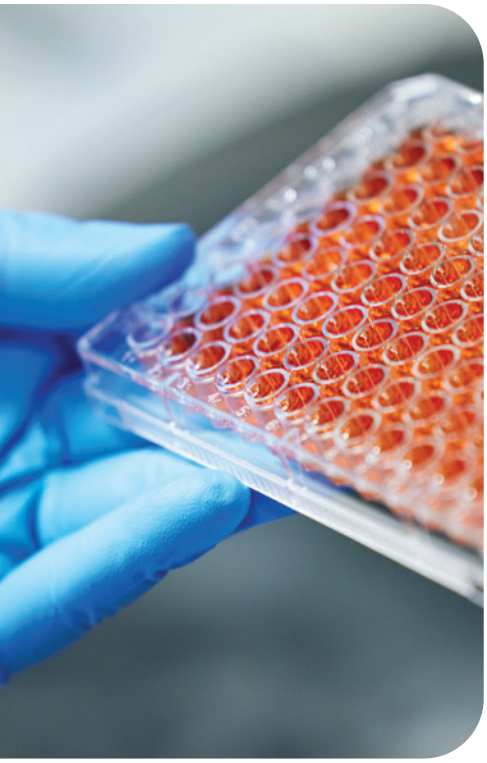
Jointly presented by Mass General Brigham and Bank of America, the Forum's goal is to identify new collaborative opportunities that will enable therapeutics, devices, and diagnostics to address unmet patient needs and enhance the strength of our communities. From the big ideas that will change the future of healthcare, to the ongoing research fueling near- and long-term breakthroughs, the Forum uniquely unites clinical experts, companies and investors to chart a path to progress.

This year, panels will cover a range of pressing disease, technology and therapies. They will be complemented by c-suite fireside chats and market-focused exchanges on disease breakthroughs, funding and more. Community health is a 2025 highlight. The Forum's digital health expo features hands-on demos that reflect compelling sessions on AI at the bedside, diagnostics and generative learning models.

Emerging breakthroughs can be found in the First Look presentations on commercialization-ready innovations from Mass General Brigham clinician-researchers. And we are honored to host leading government and regulatory officials who will share insights on the latest healthcare developments at the local, national and global levels.

Our thanks to all who have made this conference possible, including the Forum Planning Team and the generous support of our sponsors: Abridge, Amgen, Astellas, Cisco, Philips, and Siemens Healthineers.

Thank you for joining us in Boston, the center of biotech advancement. We wish you an engaging and productive Forum!



Research and innovation bring hope to patients everywhere.

We are dedicated to improving the lives of patients. With more than $2 billion invested annually in research, we are committed to innovation and advancement in care—not just in our communities, but for patients around the world.

Learn more

Mass General Brigham

Connecting innovators to the capital they need

Bank of America thanks the World Medical Innovation Forum for bringing together partners from private industry and academia to improve patients' lives. Working with Mass General Brigham, we're connecting medical innovators to the capital they need to advance medical breakthroughs and helping to continue Boston's growth as a biotech and investment hub.

What would you like the power to do?®

BANK OF AMERICA

AD-04-22-0043

2024 World Medical Innovation Forum

Fireside Chat (L-R)

Moderator: **Caroline Sokol, MD, PhD**, Assistant Physician, Massachusetts General Hospital; Assistant Professor, Harvard Medical School

Mark McKenna, Chairman & CEO, Mirador Therapeutics

Moderator: **Charlie Yang, PhD**, Large/SMid-Cap Biotech and Major Pharma Analyst, BofA Global Research

Event guide.

Monday, September 15

Continental Breakfast
Picasso Foyer & Promenade

Public Policy Sessions
Hear from current and former government leaders addressing national health policy and its challenges.

Focused Sessions
Blocks I and II
Concurrent sessions featuring some of the hottest topics in medicine, including emerging treatments, digital innovation and AI, advances in clinical care, evolving care delivery and provider strategies, and key investment insights. Full details and room locations are available in the mobile app and on pages 15–20 of this guide.

Lunch
Boxed lunches and beverages are available beginning at 11:00AM. Selections are available on a first come first served basis. Please enjoy your lunch in The Commons (South Lawn Tent).

Kraft Prize for Community Health
Presented by Robert Kraft, CEO, The Kraft Group, the inaugural Kraft Prize for Excellence and Innovation in Community Health recognizes a program that is making a measurable impact on health outcomes and has the potential to become a scalable model for addressing community health.

Fireside Chats
Don't miss these one-on-one discussions with leading minds. Refer to the app for up-to-date times.

Susan Collins | Senator (R-ME); Head of Senate Appropriations Committee
Eliav Barr, MD | CMO, Merck
John Reed, MD, PhD | EVP, Innovative Medicine, R&D, Johnson & Johnson
Chris Viehbacher | CEO, Biogen

Grab and Go Breaks: Sponsored by Abridge
Picasso Foyer

Cisco Emerging Technology Zone
Monet
9:00AM – 5:00PM
Attendees can explore the future of healthcare at Mass General Brigham—where cutting-edge technologies such as virtual and augmented reality, robotics, and AI-driven learning and diagnostic solutions come to life—advancing our mission as an integrated academic health system.

Opening Reception: Sponsored by Astellas
Picasso Terrace and Harborside Lawn 1 – All Forum Attendees Welcome
5:15 – 6:30PM

The Commons (South Lawn Tent)

A place to network with fellow Forum attendees in both structured and unstructured formats. Schedule meetings for up to four participants directly with attendees via the World Medical Innovation Forum mobile app or make new friends in the Lounge area while tuning into Main Stage sessions via a live stream. Snacks and beverages will be available.

Monday: 9:00AM – 6:00PM
Tuesday: 8:00AM – 3:00PM

Find more information in the World Medical Innovation app.

Tuesday, September 16

Continental Breakfast: Sponsored by United Imaging

Picasso Foyer & Promenade

Cisco Emerging Technology Zone

Monet

9:00AM – 5:00PM

Attendees can explore the future of healthcare at Mass General Brigham—where cutting-edge technologies such as virtual and augmented reality, robotics, and AI-driven learning and diagnostic solutions come to life—advancing our mission as an integrated academic health system.

Focused Sessions

Blocks III, IV and V

Concurrent sessions featuring some of the hottest topics in medicine, including emerging treatments, digital innovation and AI, advances in clinical care, evolving care delivery and provider strategies, community health and key investment insights. Full details and room locations are available in the mobile app and on pages 15–20 of this guide.

Lunch: Sponsored by Philips

Boxed Lunches and Beverages are available for pick up beginning at 12:45PM on the Picasso Terrace. Selections are available on a first come, first served basis. Please enjoy your lunch during Block V of the Focused Sessions.

Fireside Chats

Don't miss these one-on-one discussions with leading minds. Refer to the app for up-to-date times.

David Hyman, MD | CMO, Lilly
Jeffrey Balser, MD, PhD | CEO, Vanderbilt University Medical Center
David Reese, MD | EVP & CTO, Amgen

Grab and Go Breaks: Sponsored by Thermo Fisher

Picasso Foyer

Attendee Reception: Sponsored by Amgen

Mystic Lawn – All Forum Attendees Welcome

5:45 – 6:45PM

Attendee Dinner: Sponsored by Amgen

Featuring **Robert Langer, ScD | MIT**

The Commons (South Lawn Tent)

6:45 – 8:30PM

Pre-registration is required for dinner. Check with the Registration desk for availability.

Wednesday, September 17

Continental Breakfast

Picasso Foyer & Promenade

First Look

Join us for 19 rapid fire presentations from Mass General Brigham researchers on the commercial opportunities for new technologies across clinical areas. Abstracts for these technologies are located on page 36 of this event guide. Speakers will be available to meet with attendees after their presentations. Posters of their research will also be on display throughout the Forum on screens in Promenade 1 across from Picasso 3.

100 Harvard KOLs Weigh In – Big Ideas

Hear the results of 100 + interviews conducted with Harvard Medical School faculty on unmet clinical needs. A panel of clinical and industry experts will share their perspectives on the top findings.

Times, content, location, and speakers are subject to change.
Head to the World Medical Innovation Forum app for up to date information.

Emerging Technology Zone

Innovative Healthcare Technology Showcase Highlights AI, VR, and Advanced Medical Training Tools

This event features demonstrations of cutting-edge healthcare solutions from Mass General Brigham innovators and researchers, as well as industry-leading vendors. Solutions will include AI documentation and data abstraction solutions, smart diagnostic platforms, digital imaging products, and clinical training modules using immersive technologies. Experience in-person healthcare technologies that will impact care delivery today.

ABRIDGE

amplifire

CARTA HEALTHCARE

CISCO

CodaMetrix

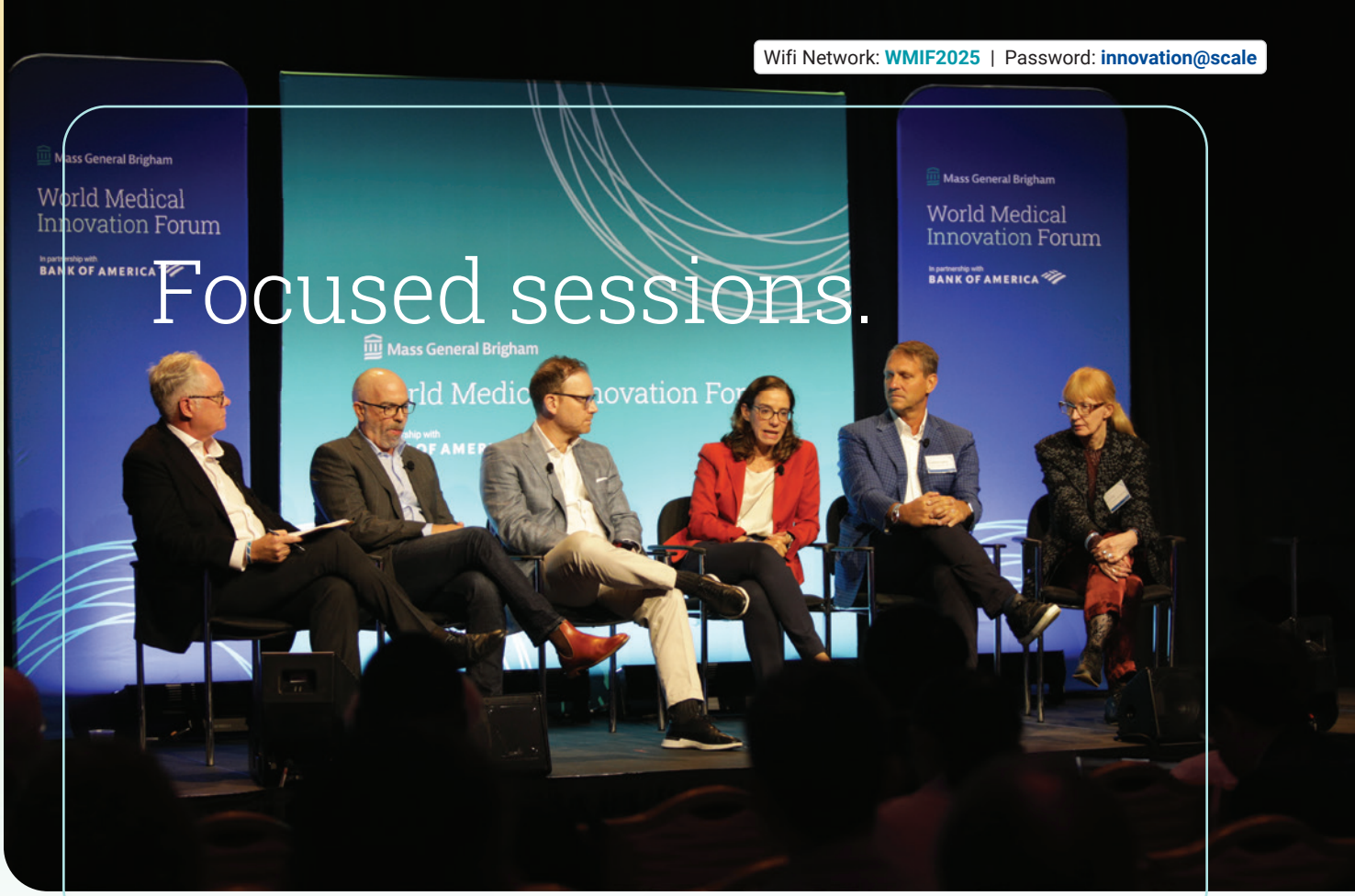
harrison.ai

PHILIPS

ThermoFisher SCIENTIFIC

Viz.ai

Wifi Network: **WMIF2025** | Password: **innovation@scale**



Focused sessions.

Join us for an immersive experience as experts from Mass General Brigham and other leading organizations take the stage to explore the forefront of medical innovation and markets. Get ready to be enlightened by interactive conversations that delve into the most cutting-edge trends and shed light on the future of healthcare.

Experts will lead focused discussions on emerging treatments—from Alzheimer's, cardiovascular disease, and hematologic cancers to lung and pulmonary disorders, neurodegeneration, and obesity/metabolic health. Sessions on AI in healthcare will examine clinical co-pilot roles, in-silico diagnostics, imaging advances, learning health systems, and cybersecurity and privacy challenges.

The program also explores business and care delivery innovation, including consumer-driven healthcare, hospital venture investing, LP perspectives, underserved community strategies, and AMC economics. Clinical spotlights will cover antimicrobial resistance, next-gen pain management, early cancer detection, gene editing, disability technology, ocular disease, regenerative and robotic surgery, sleep science, and xenotransplantation.

Times, content, location, and speakers are subject to change.
Head to the World Medical Innovation Forum app for up to date information.

Focused Sessions

EMERGING TREATMENTS

Emerging Treatments | Alzheimer's Disease

Alzheimer's Disease is the most common cause of dementia that is primarily a disease of the elderly with accelerating prevalence after the age of 65. With aging of the global population, estimates are that the number of people with AD will exceed 150 million by 2050. The economic and emotional burdens of this disease for both patients and care givers are difficult to overstate. This panel will discuss the current state of diagnosis, monitoring and treatment of the disease, pharmacological approaches to treat the disease itself and approaches to slow symptom progression. This will include updates on what has been seen thus far from the recent approval of monoclonal antibodies that target amyloid, lecanemab/Leqembi and donanemab/Kisunla, and prospects for disease diagnosis using blood-based biomarkers with the ultimate goal of replacing PET scans and lumbar punctures to confirm amyloid positivity. In addition, the panel will discuss pipeline opportunities including next-generation anti-amyloid antibodies like Roche's trontinemab, Lilly's remternetug, and anti-tau agents like Biogen's BIIB080.

Emerging Treatments | Cardiovascular Disease

Ischemic heart disease remains the leading cause of death globally and attracts significant investment by pharma and biotech. This panel will explore the evolving pharmaceutical pipeline for cardiovascular disease, focusing on promising advances such as Lipoprotein(a) reduction, oral PCS-K9s, Factor XI inhibitors, the role of GLP-1s in cardiovascular health, CETP inhibitors, and aldosterone synthase inhibitors (ASIs). The session will examine how these breakthroughs may shift clinical practice and improve long-term outcomes for patients living with CVD.

Emerging Treatments | Hematological Cancers

Over the past few decades, application of immunotherapy in cancer has gone from concept to successful therapy. In particular, manipulation and modification of T-cells has led to exciting results in treating heme malignancies such as acute and chronic leukemia, lymphomas, and multiple myeloma. In particular, CAR-T therapies and bispecific antibodies have shown success in treating several such cancers and have moved from drugs of last resort to earlier lines of therapy. This panel will discuss the progress that has resulted from introduction of highly targeted bispecific antibodies, as well as cell and gene hybrid therapies such as CAR-T, and will address challenges for future developments.

Emerging Treatments | Lung Cancer

Lung cancer is the third most common cancer in the U.S. and the leading cause of cancer death. While much therapeutic development is underway, insights from lung cancer research may also benefit other solid tumors. This session will explore the evolving treatment landscape: including bispecific antibodies (e.g., PD-1 x VEGF, EGFR x MET, PD-1 x TIGIT); novel ADCs (e.g. TROP-2 class of agents), checkpoint inhibitors beyond PD-1/-L1 and CTLA-4, such as TIGIT, LAG-3, and TIM-3; and late-stage cancer vaccines.

Emerging Treatments | Major Lung Disorders

Disorders of the pulmonary system such as idiopathic pulmonary fibrosis (IPF), pulmonary artery hypertension (PAH), interstitial lung disease (ILD), COPD, and bronchiectasis exhibit high morbidity and mortality for which global incidence is increasing. This panel will discuss the current approaches to treating these diseases and will discuss prospects for therapeutics that are currently in the pipelines of pharma companies especially those currently in clinical trials. Drug classes to be discussed will include activin signaling inhibitors (e.g. Merck's Winrevair), phosphodiesterase (PDE) inhibitors, prostacyclins, and more.

Focused Sessions

DIGITAL/AI

Emerging Treatments | Neurodegenerative Diseases

Neurodegenerative diseases are a group of conditions that gradually destroy parts of the human nervous system with diverse and highly debilitating impacts. In addition to Alzheimer's Disease, neurodegenerative diseases include amyotrophic lateral sclerosis (ALS), Parkinson's Disease (PD) and multiple sclerosis (MS), among others. In the aggregate neurodegenerative diseases affect some 50 million people globally. This panel will discuss the current slate of therapeutics in the market for treating these diseases, agents that are currently undergoing clinical trials, efficient and effective platform approaches to clinical studies in this space and prospects such as Calico/Abbvie's ALS agent fosigotifator, Sanofi's tolebrutinib for MS, and AbbVie's tavapadon, among others.

Emerging Treatments | Obesity and Metabolic Disorders

Obesity and related metabolic disorders are at the forefront of a medical transformation—fueled by advances in therapeutic agents, novel targets, and evolving care strategies. This panel builds on prior discussions to examine the next wave of breakthroughs shaping the field that extend beyond the current GLP-1's, such as amylin agonists, and other orthogonal mechanisms in development. Experts will explore progress in single-agent and multi-target therapies, structure-function insights, the latest clinical data, and challenges in side effect management and reimbursement. This session will map the future of care—where science, policy, and patient experience converge.

AI at the Bedside | Is A Physician Co-Pilot Imminent?

As AI advances at a breakneck pace, new capabilities are emerging that show greater and greater ability for AI to perform key clinical functions, including diagnostic decision making. Many have claimed that AI won't replace physicians, but will almost certainly augment them. This panel will explore the transformative role of AI in clinical care, focusing on its potential as a "co-pilot" to support physicians in decision-making and patient management, and how close – or far – we are from that vision. Experts will discuss real-world applications of AI technologies, including their impact on bedside care and diagnostic efficiency. The session will also examine the ethical considerations and barriers to implementation as AI becomes increasingly integrated into healthcare delivery.

AI Diagnostics | Is the Future of Diagnostics Moving "In Silico"?

For decades, diagnostics have required data generation and then interpretation. Computational approaches, however, could generate new diagnostics from *existing* data - images, radiology, EEGs, and genomics. This panel will delve into advancements in AI-driven diagnostic tools, emphasizing their ability to analyze complex data sets and predict clinical outcomes with unprecedented accuracy. Panelists will discuss how "in silico" diagnostics are transforming traditional workflows, improving early detection, and enabling more personalized approaches to patient care. The conversation will also address the challenges of scaling these technologies, including regulatory hurdles, integration into existing healthcare systems, and reimbursement.

AI Enabled Learning Health System | Can AI Finally Enable Us to Learn from Every Patient?

A learning health system, in which medicine as a field learns from the care of every patient, has been a longstanding goal of both academia and industry. The emergence of AI (and technology more broadly) has the potential to solve critical challenges in this arena, including to medical data across systems, curation and harmonization of disparate and unstructured datasets, and even biobanks and formal registries. This panel will explore how the idea of a learning health system may benefit from these technological advances and the impact they could have on patient care, biomedical research, and drug development. The session will also explore the obstacles to creating a truly adaptive learning framework, including data interoperability and ethical considerations for patient privacy.

AI and Imaging | Radiology Led Much of the AI Revolution, How is it Being Transformed?

Radiology has led much of the frontier of technological development, including in AI. This session will analyze the role of AI in radiology and imaging, emphasizing its ability to enhance diagnostic accuracy, automate workflows, and drive innovation. Panelists will explore how radiology remains at the forefront of the AI revolution, enabling faster and more precise evaluations while reshaping traditional imaging practices. Discussions will also cover emerging trends and the long-term implications of AI for radiologists and healthcare systems.

Cybersecurity, Privacy and Resilience in AI Age | Pitfalls to Avoid and Opportunities Ahead

As AI becomes more embedded in healthcare, this panel will address the critical issues of cybersecurity, privacy, and data resilience in protecting patient information. Experts will share insights on the vulnerabilities posed by AI systems and strategies for mitigating risks while maintaining operational efficiency. Attendees will gain a deeper understanding of how to balance innovation with security to build trust in AI-driven healthcare technologies.

CARE DELIVERY | PROVIDER STRATEGIES | INVESTING

Consumerism 2.0: Can Healthcare Meet Patients' Needs?

Over the last decade or more, health systems, pharmaceutical companies, health plans, and other health related organizations have all placed more emphasis on the patient / member / consumer. Health systems and pharmaceutical companies acknowledge consumers' desire to be more in control of their decisions and need for more information and education. Health plans, historically focused on brokers, want to engage directly with their members. This panel will discuss the multiple factors driving this shift in focus, the tradeoffs, implications and areas of controversy.

Enabling Communication in Patients with Severe Nervous System Dysfunction

The ability to communicate with other people is fundamental to healthy human existence. This ability is taken for granted by most humans but it is by no means guaranteed. Patients with illnesses such as ALS may lose the ability to communicate with caregivers or family as the disease progresses. In other cases, patients with severe brain injury may experience a condition known as Cognitive Motor Dissociation in which they appear unresponsive to commands or other inputs while they in fact maintain awareness. This panel will discuss such disorders and emerging technology development that hold promise for mitigating the lost ability to communicate by such patients.

First In Class Hospital Venture Investing | Lessons Learned

Hospitals and health systems have evolved into strategic investors, aligning early-stage innovation with clinical priorities and institutional missions. By building internal venture arms and co-investing in external opportunities, these organizations are reshaping how new technologies are identified, evaluated, and scaled.

Institutional Investor LP Perspective | Opportunities & Challenges in Today's Healthcare Investment Landscape

Endowments, pensions, and foundations are significant capital providers for public and private equity firms, including venture capital and hedge funds. These institutional LPs are evaluating investment opportunities, emergent risks, and timeline alignment for healthcare-focused funds in the wake of a market reset. The capital they deploy has wide-reaching implications for innovation and long-term value creation in healthcare investing.

Silver Tsunami | Unprecedented, Unaffordable, Unceasing

With aging populations accelerating and birth rates declining, societies face a demographic shift with wide-ranging implications. This panel will explore how health systems, economies, and care models must evolve to address an older population's growing demands—demands already testing affordability, infrastructure, and long-term sustainability.

Tackling High Priority Health Challenges in Underserved Communities

The need to develop creative solutions to priority health challenges affecting underserved communities is more important than ever, particularly when it comes to areas such as cancer, cardiometabolic disease, maternal health and substance use disorder. The panelists will offer a unique "community health" entrepreneur perspective, speaking to the driving forces behind their innovative organizations, how they prioritize a community-centered design approach in their work and what the journey has been in getting the financial resources needed to carry out their mission.

Upending the US Care Delivery and Medical Research Model | Planning for Excellence After the Cuts

Shifts in Medicare, Medicaid, drug pricing, and federal research funding are fundamentally altering the financial and operational environment for healthcare delivery organizations of all types – Academic Medical Centers, safety net hospitals, community hospitals, and others. As traditional revenue streams come under pressure and innovation incentives diminish, health systems must plan for new models of care delivery, investment, and institutional sustainability.

CLINICAL | TECHNOLOGY REACHING PATIENTS

Antimicrobial Resistance | The Urgent Global Response

Discovery of effective antibiotics has been one of the hallmark achievements of modern medicine. Maladies that historically decimated populations have been mitigated if not eliminated through developments in diagnosing and treating infectious diseases. Partly due to the overuse of one of the mainstays of medical treatment, antibiotics, resistance to treatment is emerging and no immediate replacement appears to be available. This session will discuss the growing threat of antibiotic resistance and what scientific, clinical and policy approaches may help mitigate that threat.

Beyond Opioids: Existing Therapies and Innovations in Pain Management

There is a critical need for safe and effective solutions to acute and chronic pain management in both the in-patient and outpatient settings. This panel will explore the evolving landscape of non-opioid/opioid sparing pain management, including recently approved therapies and emerging device innovations poised to transform the market and alter treatment paradigms for both neuropathic and nociceptive pain. Attendees will gain insight into the clinical need, the biologic pathways and the market potential driving the future of pain management beyond opioids.

Cancer's Newest Treatments | Early Detection, Early Treatment, Rapid Therapeutic Development

The idea that diseases are more readily treated when diagnosed at an early stage and when highly disease-specific treatments are deployed is not new. However, it is only in the past few years that the technologies that enable the clinical adoption of this paradigm have emerged as a potential reality. This panel will describe how this can be approached today in diseases as serious as cancer using a cross-discipline model that leverages technologies and care paths that have only recently transitioned from visionary to reality.

Gene Editing: Precision Medicine in Practice

Gene therapy and gene editing are transforming how rare and widespread diseases are diagnosed, treated, and prevented. Advances in molecular precision enable tailored interventions at the individual level while supporting scalable solutions for larger populations. This panel will explore how novel gene therapy and editing tools are revolutionizing the diagnosis, treatment and prevention of diseases at an individual and population-based level. Experts will discuss the latest breakthroughs in gene editing and the challenges that come with translating these innovations into widespread and effective clinical care.

Innovations in Disability Technology: Shaping a More Accessible Future

From adaptive devices to AI driven solutions, groundbreaking mobility technologies are transforming what's possible for people with disabilities, but the path from innovation to impact isn't always clear. This panel will bring together experts in mobility technology, healthcare, and lived experience – including physician scientist and gold medal-winning Paralympian Cheri Blauwet, MD – to discuss the current landscape of disability innovation. The panel will explore the impact of emerging tools on expanding access, improving function and quality of life, and building a more inclusive future.

Patient Centered Oncology: The New World of Cancer Care

The war on cancer was announced more than 50 years ago with a hope that cancer would be readily cured. Today, the clinical approach to cancer treatment is drastically different from what it was half a century ago due to better and deeper understanding of the disease. Rapid scientific advancement necessitates continued change of care delivery for cancer. This includes adapting the care delivery paradigm as new and more complex treatments are developed and approved. From the patient's perspective, the steps of diagnosis, staging, treatment planning, treatment delivery and follow up/ monitoring remain; however, the details underlying these steps have changed significantly, especially over the past decade. Early detection enables treatment at an earlier stage of disease. Unanticipated consequences may need to be addressed and ways must be found to enable treatment not just at large academic centers but also in the community setting. Modern cancer care requires us to adapt not only to new multimodal technology but also requires evolving institutional management processes for these complex diseases.

Saving Vision and Treating Ocular Disease

The WHO estimates that over 2.2 billion people worldwide have some form of vision impairment. A large fraction of this space is comprised of refractive disorders which are often self diagnosed and readily treatable. Another fraction however are genetic or arise as a result of other disorders such as diabetes or as a result of aging. Treatments for these latter cases in many instances are only now emerging. Advances in imaging, device development, genetics, cell therapies, surgical methods, pharmacological agents and most recently AI have enabled delivery of new treatments and created the promise for many more. This panel will discuss where the field currently stands, its present challenges and prospects for better therapies over the next decade.

Sleep: Why We Can't Get Enough | Understanding the Future of a Busy Market

This session will focus on a critical biological process that is easy to overlook and which explicitly affects each of the above topics and more -- that process is sleep, the quality and quantity of which plays an overriding role in human health and well-being. The panel will unwrap parts of this very complex process and highlight the key features that add to or detract from our ability to work, think, and generally how we feel. It will also describe the direction of innovation in sleep maintenance and improvement by software, devices or therapeutics and promising domains where advances are expected.

Surgery | Regenerative and Robotic

Surgery is evolving into a more precise, technology-driven discipline—where robotics, advanced imaging, and intelligent energy systems are expanding what's possible and even becoming routine in the OR. Surgery is becoming less invasive, surgical volumes are rising, and surgery's strategic importance in hospital systems is growing. From organ preservation breakthroughs that broaden access to transplants to digital tools that support better outcomes across specialties, the field is redefining its role in modern medicine. This panel will explore how innovation is changing surgical practice and reshaping the care pathways surrounding it.

Xenotransplant | The Clinical Reality Emerges

Over the past several decades transplantation has been established as a viable, last resort for instances of organ failure. However, the remarkable success rate of these procedures has become limited by the availability of healthy source organs. Taking advantage of the surgical knowledge gained over performance of thousands of transplants combined with greater understanding of immunology and novel post procedure treatment protocols, we are on the verge of solving the basic limitation of transplantable organ availability. This session will describe both the history and the near-term future of how this feat is expected to be accomplished.

Mass General Brigham
Ventures

Investing in Bold Transformative Ideas

$450M
Capital Under Management

62 Portfolio Companies

21 Exits

$18B Enterprise Value

Mass General Brigham Ventures is an early-stage venture capital firm founded in 2008 to advance new life science technologies emerging from Mass General Brigham, one of the United States' most renowned health systems for medical research. Our mission is to bring more bench-to-bedside innovations to market to dramatically expand our positive impact on the quality of healthcare worldwide.

www.massgeneralbrigham.org/ventures

From Boston to the World

Mass General Brigham Innovation

Mass General Brigham Innovation is dedicated to improving patient care worldwide by supporting the commercial application of the latest medical breakthroughs. Working directly with the largest academic medical center-based research program in the country, our expertise in business development, licensing, industry alliances, venture, and company creation is propelling innovation forward to improve patients' lives.

- At the center of world's #1 bioregion
- Powered by 7000 Harvard faculty
- $2.4 billion in annual research funding

Visit us at **massgeneralbrigham.org/innovation**

Mass General Brigham Innovation | 399 Revolution Drive | 9th Floor | Boston, MA 02145

Mass General Brigham

BWH and MGH ranked #1 and #2 in health-sciences output

Nature Index Health Sciences Supplement, March 2024

Make an impact

We connect with innovators who share

our commitment to moving communities forward.

What would you like the power to do?®

BANK OF AMERICA

Fighting the World's Toughest Diseases

LEARN MORE AT AMGEN.COM

Amgen harnesses the best of biology and technology to make people's lives easier, fuller, and longer. We draw upon our deep knowledge of science to push beyond what's known today. With roots in the biotech revolution, we are one of the world's leading independent biotech companies – fighting the toughest diseases and helping millions of people globally.

Our Mission :
To Serve Patients

LEARN MORE AT AMGEN.COM

We are looking ahead to harness the best of biology and technology to detect and treat illness earlier and better to make people's lives easier, fuller and longer.

AMGEN

Partner with us to transform the lives of patients

Together, we can turn the most innovative science into value for the patients we serve

Astellas.com/en/partnering

astellas

Connecting and Protecting the World's Leading Healthcare Organizations

In today's rapidly evolving healthcare landscape, Cisco stands as the trusted partner for healthcare providers worldwide, empowering them to connect, protect, and transform care delivery. With over 21,700 healthcare organizations relying on Cisco in 124 countries, we bring unmatched expertise and innovation to the forefront of healthcare technology.

If it's connected, it's protected.

cisco

PHILIPS

Better care for more people

We care about care. It's been at the heart of our innovations from the beginning. Today, as a health technology company, we're fully focused on delivering better care for more people.

Discover more

We pioneer breakthroughs in healthcare.

For everyone. Everywhere. Sustainably.

When our health is at risk, we rely on physicians to make the best possible decisions—from quick, early diagnoses to the most effective treatments and follow-ups. By constantly bringing breakthrough innovations to market, we help healthcare professionals to deliver high-quality care, leading to the best possible outcome for patients.

Our portfolio of products, services and solutions is at the center of clinical decision-making and treatment pathways. Patient-centered innovation has been and always will be at the core of our company. We aspire to create better outcomes and experiences for patients no matter where they live or what they are facing.

This is why we give our best every day, to improve the lives of patients and their families.

siemens-healthineers.us

SIEMENS Healthineers

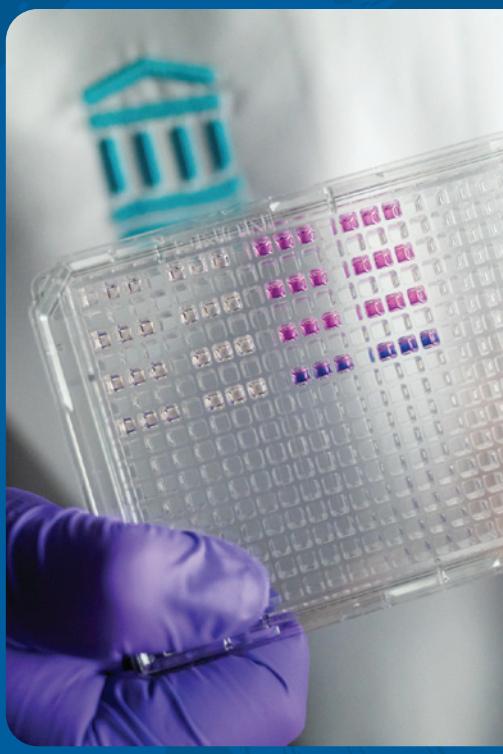
Mass General Brigham

Join us for the

Gene and Cell Therapy Research Symposium

December 11-12 | 399 Revolution Drive, Somerville, MA

Immerse yourself in a two-day event with engaging discussions from leaders in gene and cell therapy research presented by the Gene and Cell Therapy Institute.



Scan here
to learn more

Mass General Brigham

World-class care. Everywhere.

Mass General Brigham healthcare professionals drive innovation, push the boundaries of modern medicine, and care for thousands of patients every day in Boston, USA.

We envision a future where patients around the world receive advanced treatment, quality care and the latest research-driven healthcare solutions within their own communities.

Building on over 25 years of experience in more than 40 countries, Mass General Brigham welcomes collaboration with global organizations to create the innovative, patient-centered healthcare systems of the future.

Begin exploring collaboration with Mass General Brigham today.

Scan here or visit www.MassGeneralBrigham.org/GlobalAdvisory

Join our official healthcare innovation curriculum and learn from world-renowned innovators.

2-Day Healthcare Innovation Certificate Bootcamp in May 2026

Mass General Brigham

MESH Core 2026

May 4-5, 2026 | Boston

mesh2026.meshincubator.org

MESH INCUBATOR

Scan here or visit
mesh2026.meshincubator.org

Planning committee.

A special thanks to Planning Committee and Event Team for their unwavering commitment over the last 18 months to produce the 2025 World Medical Innovation Forum.

CHAIRS

Christopher Coburn
Chief Innovation Officer,
Mass General Brigham

Lawrence Di Rita
Head of Global Public Policy &
President of Greater Washington
DC, Bank of America

MASS GENERAL BRIGHAM

Tracy Doyle
Marketing Advisor

Pat Fortune, PhD
VP, Strategic Innovation Leader

Casey Frazier
Engagement Lead,
Innovator Growth Division

Chantal Ferguson, MD, PhD
Resident

Michelle Grdina
Senior Project Manager,
World Medical Innovation Forum

Kaitlyn Khoury
Program Coordinator,
Innovator Growth Division

Maggie Hastings
Program Coordinator,
Innovator Growth Division

BANK OF AMERICA

Tim Anderson
Pharmaceutical Analyst, BofA Securities

Miceal Chamberlain
President of Massachusetts,
Bank of America

Liz Everett Krisberg
Head of Bank of America Institute and
Deputy Director of BofA Global Research

Aamir Mecklai
Global Healthcare Investment Banking,
BofA Securities

Adrian Mee
Head of Global Healthcare Investment
Banking, BofA Securities

Erin Sutherland
Market Executive – Greater Boston,
Bank of America

Nathan Zibilich
Chair of the Americas Research
Recommendation Committee,
BofA Securities

EVENT TEAM

Adviciti
Susan Bernat

Biomedical Communications
Nicole Davis, PhD

Prose & Persuasion
Michael Freeman

Fletcher Spaght
Betsy Adams
Sophie Szymkowiak

Jamie Belkin Events
Jamie Belkin
Jerry Mizer
Amy Pappas
Lisa Savin

Mueller Design
Eric Castle
Hayes Chambers
Greg Mueller

NPi Audio Visual Solutions

First Look

The Next Wave of Breakthroughs in Health Care

Top Mass General Brigham Harvard faculty will present 8-minute "First Look" pitches on their market ready, breakthrough technologies.

With cash prizes for the best market-focused presentations, this Forum element showcases the high impact commercial potential of the cutting edge work of some of Harvard's most successful innovators.

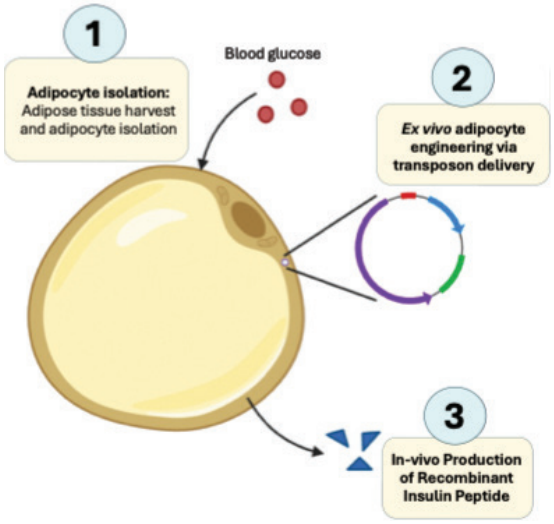


Figure 1.

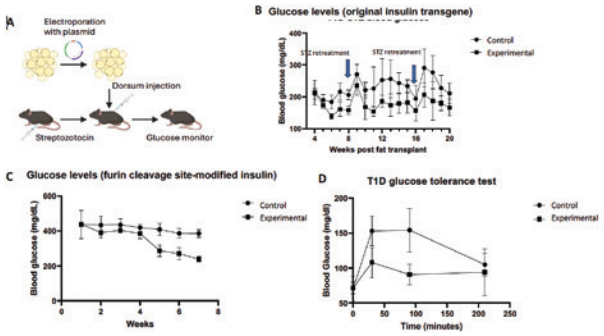


Figure 2.

Closed-loop Cell Therapy to Restore Normoglycemia in Types 1 Diabetes

Shailesh Agarwal, MD
Associate Surgeon, Division of Plastic Surgery, Brigham and Women's Hospital;
Assistant Professor of Surgery, Harvard Medical School
sagarwal15@bwh.harvard.edu

Type 1 diabetes (T1D) affects over 2 million individuals in the US and is caused by autoimmune destruction of pancreatic islet cells. This leads to chronic cardiovascular, cerebrovascular, ophthalmologic, and renal complications that severely limit quality of life and reduce life expectancy. Current treatments rely on exogenous insulin delivery using subcutaneous injections or infusion pumps; however, these strategies are marred by missed doses, pump malfunction, and loss of access to insulin. Strategies to enable long-term endogenous insulin production have focused on restoring pancreatic cells; however, this approach is complicated by recurrent autoimmune destruction of the reconstituted cells. A cell therapy that restores closed-loop insulin production while evading autoimmune destruction would be transformative to T1D, and potentially myriad other medical conditions.

Our team at the BWH has developed a point-of-care cell therapy using a patient's own fat cells (adipocytes) modified to enable glucose-responsive insulin production. Fat cells are removed and modified with a transcriptional circuit which includes a glucose-responsive promoter element and a modified insulin transgene. The modified fat cells are then directly re-implanted into the subcutaneous tissues. The procedure is designed for the clinic setting under local anesthesia or moderate sedation and takes approximately 90 minutes.

We engineered and validated a transcriptional circuit enabling glucose-responsive insulin production in a T1D mouse model. All mice received subcutaneous injections of adipocytes; treated mice received modified fat cells from same-strain mice. These mice exhibited improved glucose control, with levels dropping to ~200 mg/dL compared to ~400 mg/dL in mice receiving unmodified fat cells. Glucose tolerance testing confirmed better glycemic response within 60 minutes after glucose load. In addition, no episodes of hypoglycemia were observed, and treated mice exhibited improved weight gain, as expected with repletion of insulin therapy.

Our approach combines two innovative strategies: 1) permanent modification of adipocytes using point-of-care ex vivo genetic techniques for safe, durable gene delivery and 2) transcriptional circuits that leverage the cell's own environmental sensing to drive expression and secretion of the desired payload. Our strategy is applicable beyond T1D providing an attractive platform technology with a tangible first-use case. We are seeking strategic partners for continued T1D development in T1D and for expansion to additional indications.

Accelerating Clinical Trials with Large Language Models and Agentic AI

Danielle Bitterman, MD
Radiation Oncologist, Brigham and Women's Hospital; Assistant Professor of Radiation Oncology, Harvard Medical School
dbitterman@bwh.harvard.edu

Curating clinical trial outcomes is costly, inefficient, and error-prone. These challenges inflate clinical trial expenses, delay important trial-related decisions, compromise study validity, undermine trust in clinical outcomes, and represent a large proportion of a trial's costs. Improving outcome reporting efficiency in real-time could multiply the number of trials run across healthcare sites and speed the delivery of high-quality data, bringing better treatments to our patients, faster.

Generative artificial intelligence (AI), including large language models (LLMs), provides a new approach to address the challenge of clinical trial adverse event abstraction and reporting. However, LLMs in isolation cannot do this with the performance and reliability required by clinical trials.

To address this, we have developed an agentic AI system, where multiple LLMs collaboratively conduct clinical reasoning over patients' clinical notes to automate adverse event detection, severity grading, and attribution. Our system uses guidelines and study protocols to output standardized outcomes that adhere to regulatory and compliance standards.

Compared to expert oncologist determination, our agentic AI system detects adverse events with an accuracy of 98%. Our system is more accurate than clinical research coordinators (66% vs. 98% accuracy, respectively). Our system can process a note in approximately 10 seconds, compared to 10 minutes required for fully manual abstraction. When used to assist clinical research coordinators, they require >40% less time to collect trial data. In qualitative interviews, clinical research coordinators report that using the AI agentic system is acceptable, usable, and improves their experience abstracting adverse events. A real-time pilot of our system is underway at Mass General Brigham. To our knowledge, this is the first agentic AI system fully implemented in a healthcare system for real-time trial reporting.

Our promising results and demonstrated success implementing our agentic AI system for real-time clinical trial reporting shows the significant potential of our system to accelerate clinical trials. In next steps, we will expand our system to other clinical trial outcomes to improve the cost, efficiency, and quality of clinical trials.

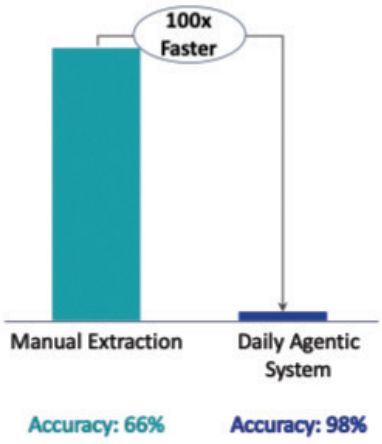


Figure 1: Our agentic AI system for clinical trial adverse event reporting is 100x faster than manual reporting, with improved accuracy.

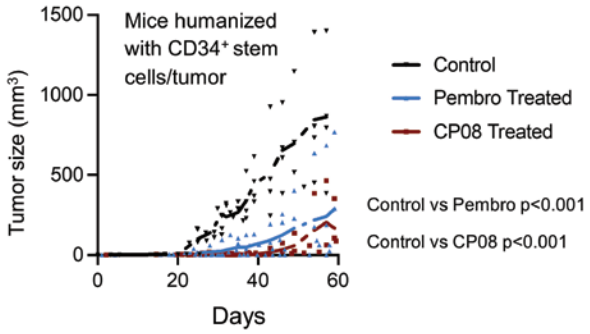


Figure 1.

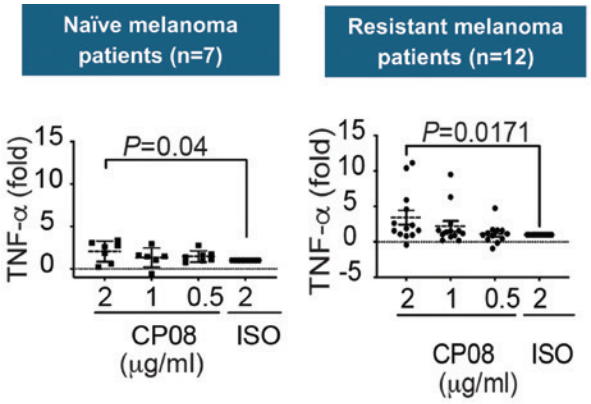


Figure 2.

Targeting Resistance: A Novel CEACAM1 Antibody to Address Immunotherapy Resistance Upstream of PD-1/PD-L1

Richard Blumberg, MD
Vice-Chair for Research, Department of Medicine;
Jerry S. Trier, MD, Endowed Chair in Gastroenterology, Brigham and Women's Hospital;
Professor of Medicine, Harvard Medical School
rblumberg@bwh.harvard.edu

While checkpoint inhibitors have transformed cancer treatment, resistance to PD-1/PD-L1 blockade remains a critical unmet need; up to 60% of patients either fail to respond or relapse after initial benefit. These treatment-resistant cancers often exploit alternative immunosuppressive pathways to evade immune detection and sustain tumor progression.

To address this challenge, we developed CP08, a high-affinity, humanized monoclonal antibody engineered to selectively bind the GFCC' interface of CEACAM1. This structural domain is essential for both homophilic (CEACAM1–CEACAM1) and heterophilic (CEACAM1–TIM-3) interactions, which are implicated in immune dysfunction and tumor invasion. By targeting this interface, CP08 blocks a previously untargeted axis of immunosuppression within the tumor microenvironment.

Preclinical studies show that CP08 restores immune surveillance and reactivates innate and adaptive immune responses in models of treatment resistance. It enhances cytokine production in patient-derived immune cells, promotes the activity of key immune cell populations such as memory-progenitor and progenitors of exhausted CD8 T cells critical to immunotherapy responses, and inhibits tumor aggressiveness. Notably, CP08 demonstrates potent monotherapy activity across several solid tumor models. Furthermore, it shows a favorable safety profile: no toxicity has been observed at clinically relevant doses in humanized mouse models.

CP08 is ready for IND-enabling toxicology studies for the treatment of melanoma, pancreatic ductal adenocarcinoma, colorectal and other solid tumors. Given the pre-clinical data package assembled, within a year, CP08 will be ready for first-in-human studies in solid tumors.

CP08 offers the potential to extend the reach of immunotherapy to patients who currently lack effective options, positioning it as a differentiated therapeutic in a high-value segment of the oncology market. This platform offers the potential to transform treatment of cancers resistant to checkpoint inhibitors. We are seeking partners to help bring this technology to the clinic.

Targeting Granzyme K: New Therapeutic Approach Blocks Chronic Inflammation Across Diseases

Michael Brenner, MD
Director, Human Immunology Center, Brigham and Women's Hospital; Elizabeth Fay Brigham Professor of Medicine, Harvard Medical School
mbrenner@bwh.harvard.edu

The complement system - a powerful component of our immune systems – is a network of proteins that work together to help the body fight infection, heal injury, and clear microbes. Our laboratory has made a paradigm-shifting discovery that fundamentally changes how we understand the complement system and its activation.

We discovered that granzyme K (GZMK) – produced by CD8 T cells that infiltrate diseased tissues – directly activates the entire complement cascade. It directly cleaves C4 and C2 proteins generating a classical C3 convertase which cleaves C3 and triggers a chain reaction that leads to formation of the C5 convertase and all the major inflammatory products of the complement cascade: signaling and chemotactic anaphylatoxin molecules (C3a and C5a), tagging proteins by opsonization with C3b that mark antigens for phagocytosis and cells for attack, and the membrane attack complex, which can activate or lyse cells.

In rheumatoid arthritis (RA) synovium, GZMK is most abundant in regions where complement activation is strongest. In fact, GZMK CD8 T cells dominate in the inflamed tissues not only in RA, but also in Crohn's Disease and ulcerative colitis gut, lupus nephritis kidney and other autoimmune diseases. In inflamed tissues, stromal fibroblasts produce large amounts of complement proteins (C2, C3 and C4) which are the major source of complement produced locally in inflamed tissues and acted on by GZMK. This represents a tissue focused process that differs from the previously known classical, alternative or lectin pathways of complement activation.

GZMK represents a novel and promising therapeutic target to inhibit complement activation across autoimmune and chronic inflammatory diseases. Unlike existing complement inhibitors that broadly suppress the entire system and compromise infection defense, GZMK inhibition offers precision targeting. This approach preserves essential anti-microbial complement functions while specifically blocking the harmful pathway driving chronic tissue inflammation such as in autoimmune diseases—addressing the key therapeutic limitation of current complement drugs.

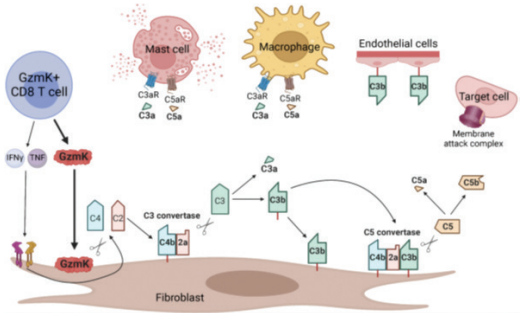
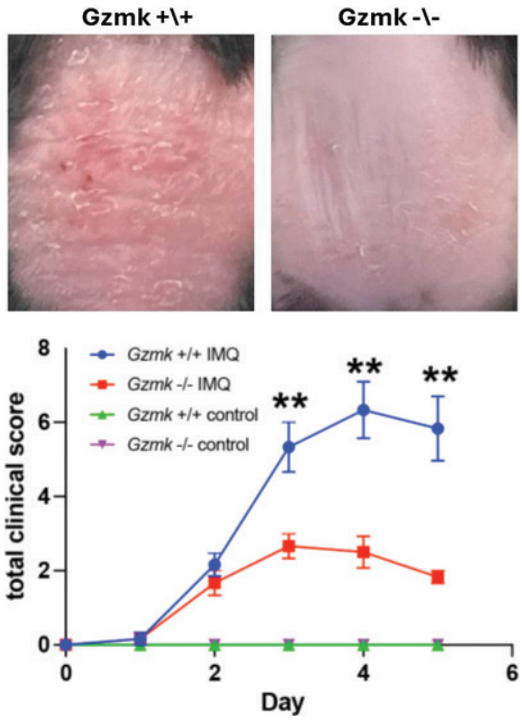


Figure 1: GZMK produced by CD8 T cells in inflamed tissues drives activation of the entire complement cascade with release of anaphylatoxins, opsonization and the full range of complement-mediated inflammation.



Figures 2-3: GZMK −/− mice have less severe psoriasiform dermatitis, and are protected from IMQ-induced dermatitis and complement activation.

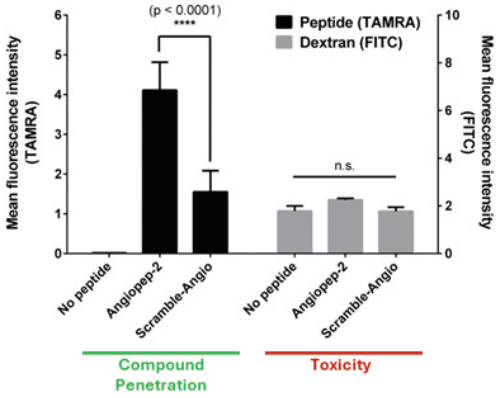


Figure 1: Angiopep-2 traverses BBB spheroids without compromising barrier integrity.

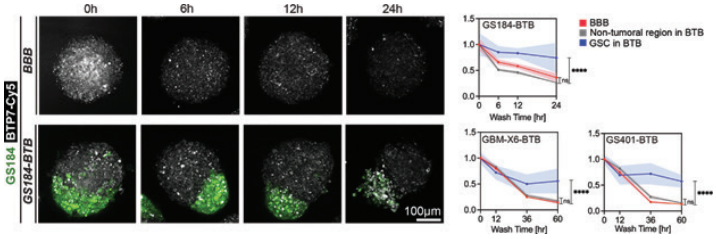


Figure 2: Brain-tumor targeting peptide BTP-7 permeates BTB assembloids and is selectively retained in tumor niches.

Breaking Barriers: Human Blood-Brain Barrier and Blood-Tumor Barrier Models De-risk CNS Drug Discovery

Choi-Fong Cho, PhD
Assistant Professor of Neurosurgery, Brigham and Women's Hospital & Harvard Medical School
ccho@bwh.harvard.edu

The impermeability of the blood–brain barrier (BBB) and the heterogeneity of the blood–tumor barrier (BTB) remain major bottlenecks in translating promising therapeutics into effective treatments for central nervous system (CNS) diseases and brain malignancies. To overcome the longstanding challenge of poor translational predictability in preclinical studies, we have engineered a next-generation suite of self-assembling human 3D assembloids that accurately model both the physiological BBB and malignant BTB. These models are designed for high-throughput, high-fidelity screening, enabling rapid, mechanism-informed de-risking of CNS therapeutics.

The BBB assembloids self-organize within just 2-3 days from primary human brain endothelial cells, vascular pericytes, and astrocytes. The resulting structures feature an astrocytic core enveloped by a continuous endothelial–pericyte surface that consistently exhibits high expression of tight-junction proteins and robust transporter activity. This model has been rigorously validated to rapidly identify compounds with true BBB penetrance and discriminate them from non-penetrant compounds.

Complementing this platform, our BTB assembloids integrate patient-derived glioblastoma (GBM) stem cells (GSCs) with the same vascular constituents to recreate the compromised tumor vasculature often observed in vivo and in clinical GBM specimens. Thousands of BTB organoids can be formed in parallel, while preserving the genetic landscape of the originating tumors. Transcriptomic and functional profiling of these models reveals enhanced stemness, mesenchymal transition, invasiveness, angiogenesis, which are phenotypes that have been confirmed in orthotopic models and clinical GBM samples. The assembloids enable simultaneous evaluation of drug delivery and therapeutic response.

Together, these modular platforms provide a unified, scalable toolkit for 1) unbiased discovery of brain-penetrant modalities, 2) mechanistic insights into BBB and BTB biology, and 3) accelerated, risk-mitigated development of neuro-oncology therapeutics. Our approach bridges the preclinical-to-clinical divide and opens a fast lane for translational success in CNS drug development.

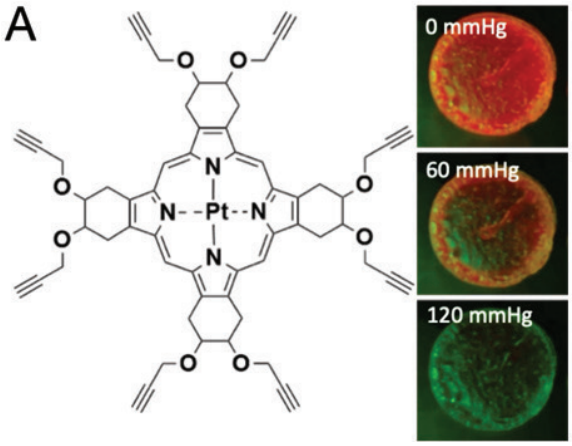


Figure A: The core technology is based on a highly sensitive, brightly-emitted porphyrin molecule that can be enmeshed or conjugated into a host of materials. When paired with a green emitter like fluorescein, this allows for simple "traffic light" oxygen-sensitive, color-changing materials that can be read out by-eye or by a simple camera.

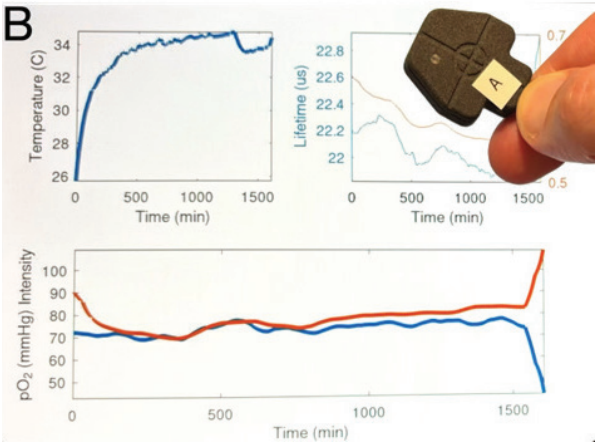


Figure B: The extreme brightness of the porphyrin allows it to be excited by LEDs and read out by photodiodes to build small quarter- and dime-sized sensors based on inexpensive, commodity electronics, such as the one shown here that has been validated in human studies.

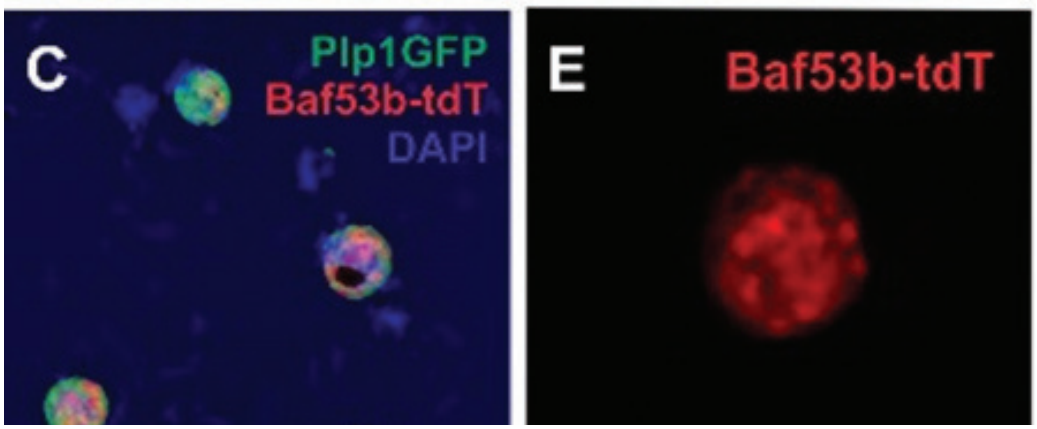
Simple, Lightweight, and Accurate Oxygen Concentration Sensing Platform Technology

Conor Evans, PhD
Principal Investigator, Wellman Center for Photomedicine, Mass General Brigham;
Associate Professor, Harvard Medical School
evans.conor@mgh.harvard.edu

A central challenge in the clinical care of patients is the measurement of tissue oxygen. The majority of devices currently in use for tissue oxygen monitoring measure SpO2 or StO2, the oxygen saturation of hemoglobin. While adequate for measuring systemic oxygenation, these metrics rely on normal oxygen delivery to tissues and provide only indirect information regarding local tissue oxygen concentration. These tools importantly can fail to report meaningful information when blood flow is compromised, such as in injured, ischemic tissues. Transcutaneous oxygen measurement (TCOM, or TcpO2), on the other hand, is a noninvasive technique used in wound care and surgical settings to record the oxygen concentration, or partial pressure of oxygen (pO2), at the skin surface. Standard-of-care TCOM devices, however, require precise placement in controlled environments, as much as 20 minutes of bedside calibration, heating of tissue to 45°C, and a well-trained operator. Despite the need for the information they provide, current TCOM devices have significant limitations that prevent their use in crucial applications including post-surgical monitoring, ICU, and NICU settings.

To address this important gap in patient care, we have developed a platform technology that rapidly, accurately, and directly reports tissue oxygen concentration. The core technology employs phosphores that emit red light in response to oxygen levels; this highly sensitive chemistry is based on ultrabright oxygen-sensitive phosphores known as Clickaphores. Their glow is so bright it can be seen by eye even in sunlight, enabling oxygen sensing films, bandages, dressings, wearable sensors, needles, and catheters. Films, bandages, and dressings allow by-eye or simple camera-based imaging of oxygen across tissue for simple, red-light/green-light mapping of pO2. We have miniaturized the sensors, developing low-cost, self-contained, and quarter-sized devices weighing a few grams. These wearable sensors enable continuous, unobtrusive measurement of tissue oxygen without the need for heating or wires. We have validated these materials and devices across numerous animal and human studies, including first-in-human clinical testing in patients undergoing breast reconstruction surgery.

We are seeking partners or financing to further advance this technology. Plastic surgery is the planned beachhead market as there are predicate devices for a 510k pathway and existing CPT codes.



NousNav: Democratizing Image-Guided Neurosurgery with a Low-Cost, Portable, Open-Source Neuronavigation System

Alexandra Golby, MD
Director of Image-guided Neurosurgery, Brigham and Women's Hospital;
Professor of Neurosurgery and Radiology, Harvard Medical School
agolby@bwh.harvard.edu

In lower-resource settings, access to advanced medical care is often limited by infrastructure, cost, and availability of trained personnel. To address these challenges, innovative medical technologies are being developed with a focus on affordability, portability, ease of use, and durability. These technologies are not stripped-down versions of devices used in high-income countries but are often entirely reimagined to meet local needs and constraints.

NousNav is a complete low-cost neuronavigation system that aims to democratize access to high quality Neurosurgical care in lower resource settings. NousNav's goal is to provide a model for local actors to be able to reproduce, build and operate a fully functional neuronavigation system at an affordable cost. NousNav is entirely open source and relies on low-cost off-the-shelf components, which makes it easy to reproduce and deploy in any region. NousNav has been engineered to not require consumables which add to expense and are not viable in countries with limited transport. NousNav's software is also specifically devised for the low-resource setting in mind. The designed interface is clean and simple to allow for easy intraoperative use by the practicing clinician and offers means for intraoperative control to alleviate need for a technician.

We have built a prototype implementation of the design, with hardware and algorithms designed for robustness, ruggedness, modularity, to be standalone and data-agnostic. Early clinical use of NousNav has demonstrated promising results, including increased surgical confidence, improved targeting accuracy, and the potential for better outcomes for patients with brain tumors and other neurological conditions. As the system continues to evolve, ongoing research is focused on integrating additional data types, such as real-time imaging with ultrasound, to further personalize and refine surgical guidance. By providing neurosurgeons in resource-limited settings tools to perform better surgeries and deal with more difficult cases, the platform will help address the growing surgical burden of potentially treatable brain illness.

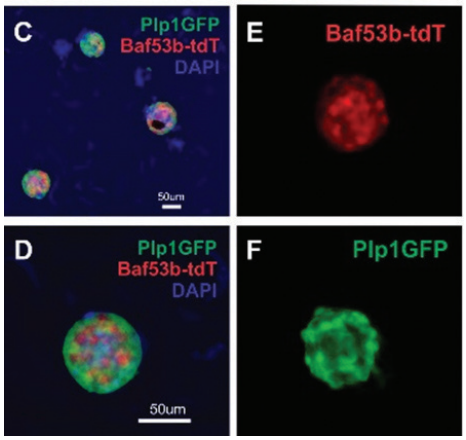


Figure 1: Mouse-derived enteric neurospheres contain neural progenitors, glia cells (PLP1-GFP), and mature neurons (Baf53b-tdT).

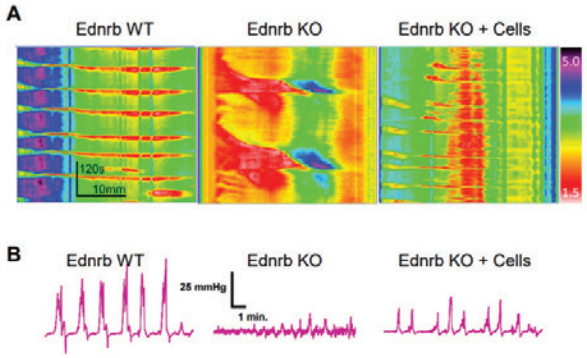


Figure 2: (A) Spatiotemporal mapping of gut contractility shows normal contractions in wild-type mice (left), absent contractions in Ednrb-deficient mice (middle), and improved contractility following cell therapy (right). (B) Luminal pressure recordings show similar findings.

Novel Neural Cell Therapy for Hirschsprung Disease and Related Enteric Nervous System Disorders

Allan Goldstein, MD
Chief, Pediatric Surgery, Massachusetts General Hospital; Surgeon-in-Chief, Mass General for Children; Marshall K. Bartlett Professor of Surgery, Harvard Medical School
amgoldstein@mgb.org

The enteric nervous system (ENS) is the network of neurons and glia throughout the gastrointestinal tract that controls all major functions of the gut, including its motility. As a result, abnormalities of the ENS lead to serious neurointestinal disorders, including esophageal achalasia, gastroparesis, and Hirschsprung disease (HSCR) to name a few. Despite the morbidity associated with these conditions, current treatments target symptom control and are not curative. Our laboratory is developing an autologous neural cell-based therapy as a novel treatment for these disorders.

HSCR is a congenital disorder in which the enteric nervous system fails to develop in the distal end of the gastrointestinal tract, leaving it aganglionic and therefore functionally obstructed. The disease affects 1 in 5,000 newborns and causes severe obstruction in the neonatal period. Current treatment involves major abdominal surgery during infancy to remove the aganglionic segment. While surgery is life-saving, at least 50% of patients experience life-long complications, including fecal incontinence and obstructive symptoms. Regenerative neural cell therapy offers an alternative approach that would restore innervation to the gut and avoid major surgery and its complications.

Our laboratory has developed methods for isolating neural stem cells from the intestinal tract and the subcutaneous adipose tissue of rodents and humans. These cells are expanded as free-floating neurospheres in cultures supplemented with growth factors (Fig. 1). When these neurospheres are transplanted into the aganglionic colon of mice with HSCR, they engraft, migrate, differentiate, and establish neuromuscular connections. Using optogenetics, electrical field stimulation, spatiotemporal mapping, and luminal pressure recordings, we have shown that the transplanted cells restore colonic motor function (Fig. 2).

The preclinical studies are largely completed, and manufacturing work is underway. IND filing is anticipated in the near future, followed soon after by a first-in-human trial. Neural stem cell therapy represents a transformative approach to treating HSCR, and one that can be expanded into other indications, including enteric neuropathies more broadly and traumatic injuries of the peripheral nervous system, increasing the market opportunity and the number of patients that can benefit.

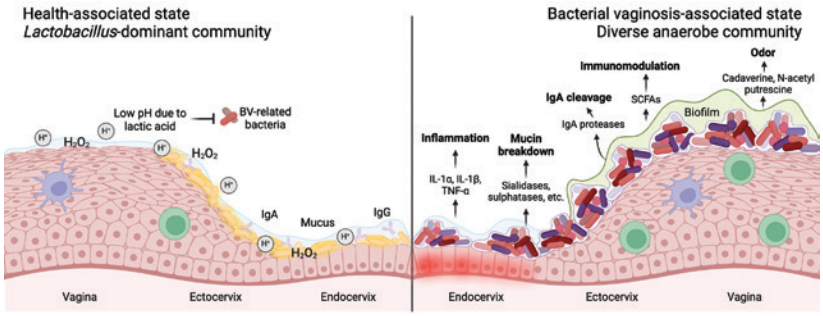


Figure 1.

Figure 2: LC-106 Vaginal LBP Tablet

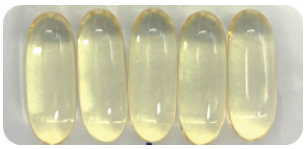


Figure 3: LCFA-01 Vaginal Capsule

Restoring Vaginal Health: Next-Generation Live Biotherapeutics and Microbial-Modulating Metabolites for Bacterial Vaginosis and Reproductive Health

Douglas Kwon, MD, PhD
Director of Clinical Operations, Ragon Institute of MGH, MIT and Harvard;
Associate Professor of Medicine, Harvard Medical School
dkwon@mgh.harvard.edu

Bacterial vaginosis (BV), a common disruption of the vaginal microbiome, affects 20–30% of women worldwide and is associated with a range of adverse health outcomes—including spontaneous preterm birth, infertility, increased risk of sexually transmitted infections (including HIV), and cervical dysplasia. Despite billions of dollars in annual healthcare costs, the standard-of-care antibiotic, metronidazole, fails to deliver durable responses in over 50% of cases. It has been almost 40 years since a new class of intervention for BV has been developed, resulting in a significant unmet need that impacts the health of women globally.

Our approach directly addresses this gap by developing precision microbial and small-molecule therapies that work together to re-establish a healthy Lactobacillus crispatus-dominant microbiome. Unlike standard antibiotics, which indiscriminately disrupt microbial communities, our strategy seeds beneficial, protective bacteria and supports their robust colonization across diverse patient populations. Our lead program, LC-106, is a live biotherapeutic product comprising a genomically selected geo-diverse consortium of L. crispatus strains, formulated for vaginal administration. In parallel, we are advancing LCFA-01 and LCFA-02, two novel microbiota-modulating metabolites designed to selectively promote the colonization of the health-associated bacteria found in LC-106.

In a Phase 1 clinical study in women with Nugent-score-defined BV, LC-106 reduced BV recurrence to 24% (95% CI: 10%–48%) compared to 66% with placebo (95% CI: 36%–88%) at five weeks post-treatment. Preclinical development of LCFA-01 and LCFA-02 has demonstrated favorable safety and selectivity profiles, with a first-in-human study expected to launch in Q1 of next year.

Together, these complementary programs represent new classes of interventions designed to restore microbial balance, reduce recurrence, and address the downstream reproductive health risks associated with BV. By shifting from symptom control to targeted and durable microbiome restoration, this approach has the potential to transform women's health outcomes on a global scale.

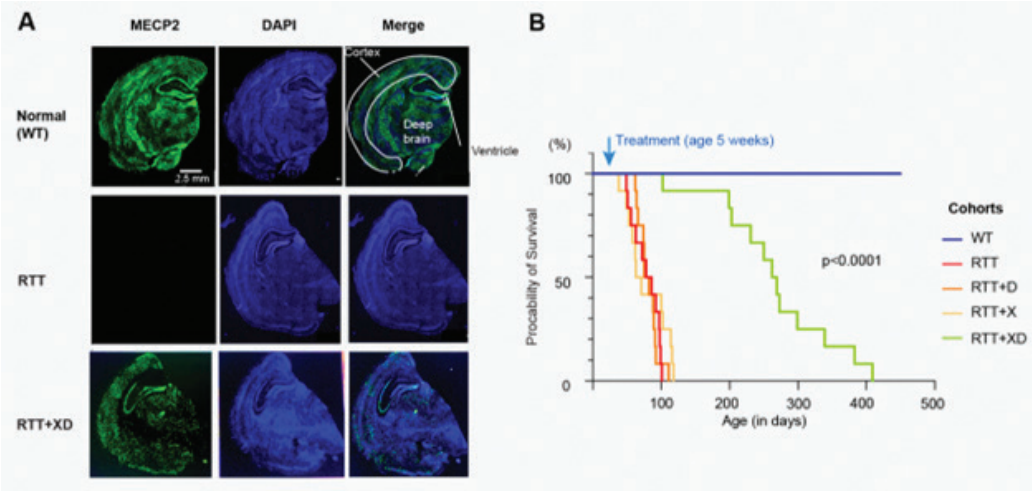


Figure A: MECP2 immunostaining (green) of coronal sections of hemi-brains from normal (wildtype, WT), untreated RTT, and RTT treated with the Xist ASO (X) and decitabine (D) at 5 weeks of age and tested at 10 weeks of age. DAPI counterstain (blue). Scale bars: 2.5 mm. N=5 animals for each cohort, with similar results within each cohort.

Figure B: Kaplan-Meier survival curves for each cohort (n=12/cohort). Single treatment was initiated at 5 weeks of age. P< 0.0001 (Mantel-Cox test) when comparing RTT+XD versus untreated RTT, RTT+D, and RTT+X. The differences between untreated RTT, RTT+D, and RTT+X are not significant.

Selective Reactivation of the Dormant MECP2 Gene: A Disease-Modifying Therapy for Rett Syndrome

Jeannie Lee, MD, PhD
Phillip A. Sharp Chair, Department of Molecular Biology, Mass General Brigham;
Professor of Genetics, Harvard Medical School
jlee32@mgh.harvard.edu

Rett syndrome (RTT) is a severe neurodevelopmental disorder that affects ~1:10,000 girls throughout the world. Affected girls inherit one defective copy of the X-linked MECP2 gene. Affected girls develop normally until about ages 1-3, at which point RTT leads to severe cognitive and motor impairments, seizures, and shortened lifespan.

The current standard of care involves treating symptoms rather than targeting the root cause of RTT. However, mouse models have shown that genetically restoring MECP2 expression reverses the neurological disease, raising hopes of a pharmacological treatment. While gene therapy to do this is under investigation, challenges with delivery and risks of MECP2 overexpression remain major limitations. We have developed a complementary epigenetic approach that selectively reactivates the normal MECP2 gene on the inactive X chromosome (Xi). Because affected girls retain one functional MECP2 allele lying dormant on the Xi chromosome in roughly half of their cells, our approach unlocks a genetic cure from within.

We demonstrated proof-of-concept for this approach in a female mouse model of RTT. We found that targeting XIST RNA — the master regulator of the Xi — with an antisense oligonucleotide (ASO) will selectively reactivate MECP2 from the Xi. Treatment is administered via direct CNS delivery at 5 weeks when animals begin to manifest symptoms. The restorative effects are most robust when animals are primed with a DNA methylation inhibitor, decitabine, at the start of treatment. Treated animals exhibit phenotypic reversal, transcriptomic restoration, and a nearly 4-fold extension of lifespan. Furthermore, we achieved a high level MECP2 expression in neurons with minimal off-target effects on other X-linked genes. Thus, we established that RTT can be pharmacologically reversed through selective Xi-reactivation using an epigenetic approach. This novel approach opens a new therapeutic modality for RTT and other X-linked disorders.

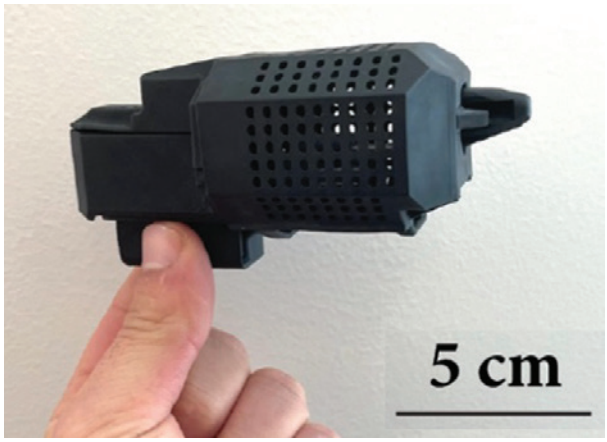


Figure 1: The microscope in a compact 3D printed housing.

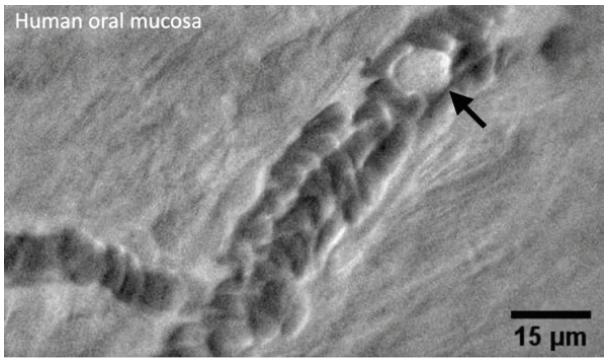


Figure 2: A still frame from a video of the microcirculation in the human oral mucosa. Arrow points to a white blood cell.

Counting White Blood Cells Without Drawing Blood

Charles Lin, PhD
Principal Investigator, Wellman Center for Photomedicine, Mass General Brigham;
Professor of Dermatology, Harvard Medical School
charles_lin@hms.harvard.edu

Despite tremendous advances in imaging technologies such as MR, CT and PET, a method for noninvasive monitoring of the immune system does not exist. White blood cell (WBC) count, a key metric for assessing a patient's immune status, requires drawing blood for laboratory analysis. Drawing blood poses inherent risks for secondary infection and anemia in vulnerable patient populations, such as infants, critically ill patients, and oncology patients. Additionally, laboratory analysis can be slow and requires specialized equipment, expertise, and infrastructure that are not always available in resource-poor settings. To address these limitations, we have developed a compact microscope that enables real-time imaging of circulating blood cells in the microvasculature of the human oral mucosa, capturing videos of fast flowing cells in the blood stream. In addition, we have developed an analytic pipeline to detect and enumerate WBCs from the videos. We tested our device on a cohort of healthy volunteers and validated our image-based WBC count with the clinical standard from blood draw. We benchmarked the time it took to obtain a stable WBC count from a single microvessel (about 3 minutes). We found that the WBCs are not uniformly distributed among individual microvessels, and it is necessary to image multiple microvessels in order to obtain a reliable WBC count. Our next generation device will capture videos of multiple vessels simultaneously to improve measurement accuracy.

Beyond cell counting, our imaging technology enables direct visualization of WBC motion along the vascular wall. Immune cell migration is essential for immune function. Recruitment of WBCs into tissue starts with their tethering, rolling, and adhesion on the endothelium lining the blood vessel walls. Known as leukocyte-endothelial interaction (LEI), it is a hallmark of inflammation. Our instrument provides high-resolution videos of LEI in real time, and we are developing machine learning tools for diagnosing systemic inflammation such as sepsis by automatic detection and tracking of leukocyte motion on the endothelial surfaces.

We are launching a startup to produce a clinically viable product for noninvasive blood cell analysis and welcome discussions with interested parties.

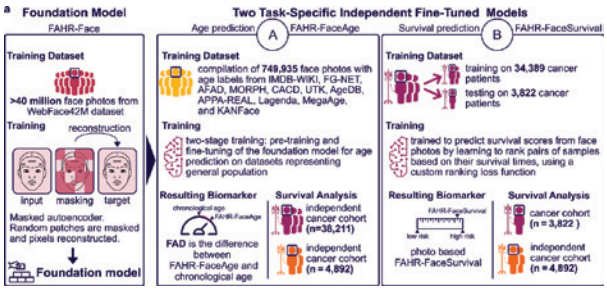


Figure 1: Development and validation of the FAHR-Face foundation AI model, which was then used to train two independent facial health algorithms: FaceAge and FaceSurvival.

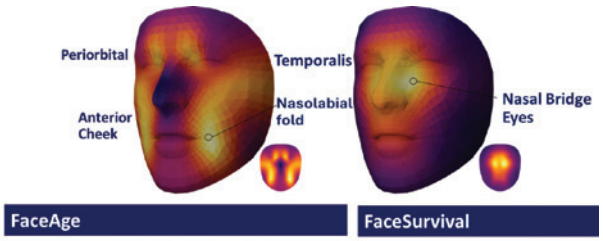


Figure 2: Saliency mapping identifies what portions of the face are most important for the predictions made by the FaceAge and FaceSurvival algorithms and illustrates the independence of the two algorithms.

Facial Health Recognition AI: A Vision for Health

Raymond Mak, MD
Director of Clinical Innovation, Department of Radiation Oncology, Brigham and Women's Hospital; Associate Professor, Harvard Medical School
rmak@mgb.org

Facial appearance is an instantly accessible, non invasive signal of underlying physiology and health. Clinicians frequently use patient chronological age (age based on date of birth) for clinical decision-making, which is incorporated into many commonly used decision support tools across medicine, but also rely on subjective assessments of each patient's biological age and overall health to refine decision making.

Building on this insight, we have developed and clinically validated multiple artificial intelligence (AI) algorithms to automatically quantify health status from simple face photographs, including a foundation model trained on >40 million face photos, and two fine tuned downstream algorithms: FaceAge quantifies biological age, and FaceSurvival predicts an individual's mortality risk.

FaceAge underwent a two-stage, age-balanced fine-tuning on 749,935 public images, ensuring optimal performance across the full adult age-range, while FaceSurvival was fine-tuned on face photos of 34,389 cancer patients (Figure 1). Model robustness across different image conditions (e.g. cosmetic surgery) and independence (saliency mapping; Figure 2) were tested extensively.

For age estimation on healthy individuals, FaceAge had the lowest mean absolute error (MAE) of 5.1 years on public datasets, outperforming benchmark algorithms with accuracy across the full human age span. Both algorithms were clinically validated as independent prognostic factors even after adjusting for known clinical factors in large cancer patient cohorts from two independent cancer centers (MGB and Maastricht). In cancer patients, FaceAge outperformed a prior facial age estimation model in survival prognostication. FaceSurvival demonstrated robust prediction of mortality, and the highest-risk quartile had more than triple the mortality of the lowest. In a proof-of-principle clinical use case, FaceAge improved the ability of clinicians to prognosticate at the end-of-life.

AI can convert an everyday selfie into actionable clinical data, enabling access to novel, low-cost biomarkers to improve decision making in oncology and across medicine. By embedding FaceAge and FaceSurvival into EHRs and digital patient-facing applications, we can unlock novel objective "digital vital signs" at the point-of-care and at home to personalize care.

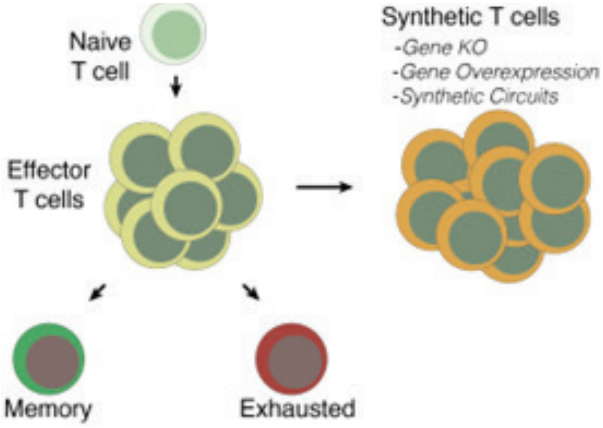


Figure 1: T cells naturally differentiate from naïve to effector T cells upon encountering cognate antigen and then form memory T cells when the antigen is eliminated. In chronic viral infections and tumors, T cells become exhausted due to chronic exposure to antigen and immunosuppression and do not form memory. Engineering strategies such as gene deletion, overexpression, or synthetic transcriptional response circuits can be used to engineer synthetic T cells that do not become exhausted.

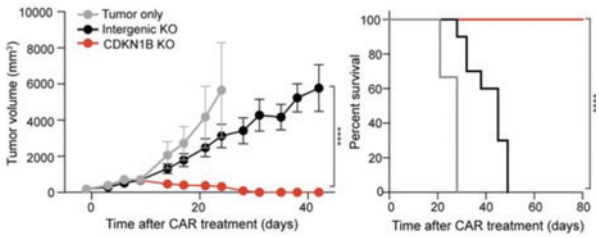


Figure 2: Tumor volume over time (left) and survival (right) for RPMI-8226 multiple myeloma tumors treated with intergenic control sgRNA CAR T cells (gray), CDKN1B KO CAR T cells (red), or no treatment (black). CDKN1B KO CAR T cells mediate complete control of tumor growth in 100% of mice.

Engineering Next Generation CAR T Cell Therapies for Solid Tumors

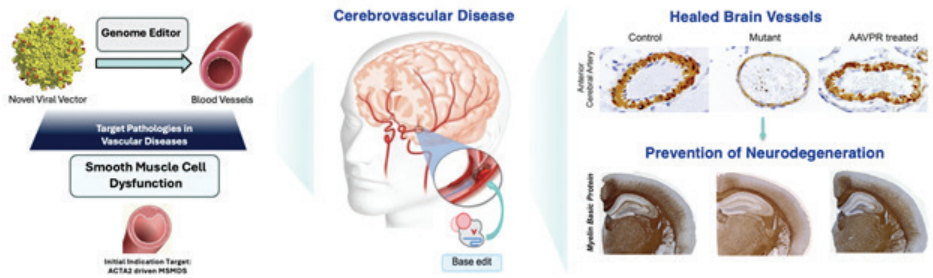
Robert Manguso, PhD
Associate Professor of Medicine, Mass General Cancer Center & Harvard Medical School; Co-Director Tumor Immunotherapy Discovery Engine, Broad Institute
rmanguso@mgh.harvard.edu

Cell-based immunotherapies have revolutionized the treatment of B cell and plasma cell-derived malignancies and are beginning to impact solid tumors, with TCR T cell therapy and TIL therapy recently approved in synovial sarcoma and melanoma. Despite this progress, the development of CAR T cell therapies for solid tumors has been slow and marked by several failed clinical trials for solid tumors such as pancreatic and ovarian cancer.

CAR T cell efficacy in solid tumors is limited by a process called T cells exhaustion, which is the progressive dysfunction of T cells in the harsh immunosuppressive tumor microenvironment. T cell exhaustion is an evolutionarily programmed state of dysfunction that exists to protect the host from T cell-mediated immunopathology during chronic infections. To maximize the therapeutic potential of CAR T cells, we must genetically engineer the T cells to prevent T cell exhaustion and dysfunction and create synthetic T cells that do not activate this maladaptive program (Fig 1).

We have built a high-throughput in vivo CRISPR screening platform to rapidly identify the modifications that most effectively enhance CAR T cell efficacy in tumors. Our in vivo screen in a BCMA+ model of multiple myeloma identified that deletion of the cell cycle checkpoint CDKN1B/p27 dramatically improves the persistence of CAR T cells in myeloma tumors and leads to durable control of multiple myeloma preclinical models (Fig 2). Thus, in vivo screens can be used to rapidly identify the most critical regulators of CAR T cell function in tumors and prioritize genetic modifications that should be tested in clinical trials.

We are extending the platform to solid tumor models, using gain-of-function approaches, and screening to identify tumor-intrinsic checkpoints that limit CAR T cell killing. Together these approaches will provide an unprecedented level of understanding of the complex molecular circuitry that governs T cell function in tumors and instructions for how to rewire it for therapeutic purposes.



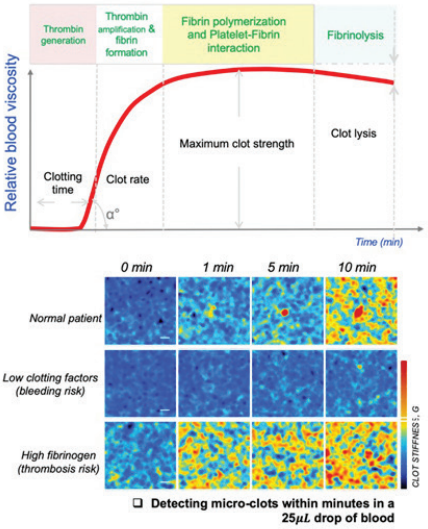
Precision Long-term Therapies for Genetic Vasculopathies that Lead to Stroke, Aortic Dissections, MI, Severe Disability, and Death in Children

Patricia Musolino, MD, PhD
Co-Director, Pediatric Stroke and Cerebrovascular Service, Massachusetts General Hospital; Associate Professor of Neurology, Harvard Medical School
pmusolino@mgb.org

Vascular pathology underlies >80% of cardiovascular and cerebrovascular disease and remains the leading cause of death and disability in the world. Current treatments aimed to reduce vascular risk factors such as cholesterol, diabetes and blood pressure failed to timely heal already damaged blood vessels and prevent stroke, MI and aortic dissections. Genetic vasculopathies are accelerated and severe forms of vascular disease that converge on shared mechanisms of vascular damage and dysfunction with sporadic vascular disease. A major barrier to developing precision long-term therapies has been the lack of vessel-targeting therapeutic modalities.

To bridge this gap, we combined novel viral and non-viral vascular targeting delivery vehicles with genome editor engineering to correct a genetic mutation that cause one of the most severe forms of vascular disease in humans caused by mutations in the ACTA2 gene. Children born with ACTA2 driven smooth muscle dysfunction syndrome (MSMDS) experience devastating outcomes, including early-onset stroke, aortic dissection, and heart attack, typically resulting in severe disability and death before age 30. To meet the urgent clinical need of these patients, our team developed experimental models that recapitulate the human disease, a vasculotropic adeno-associated viral (AAV) vector and a BESPOKE genome editor. Our research has shown that giving this novel therapy to MSMDS mice intravenously corrects the ACTA2 mutation, normalizes vessel wall function, improves survival and prevents stroke and neurodegeneration. Additionally, we developed a complementary assay to show that the therapy is precise and effective, causing no noxious off-target effects in the treated cells.

We aim to initiate first-in-human trials in the near future as we complete ongoing IND-enabling studies. This work lays the groundwork for treating more common vascular conditions by validating next-generation gene delivery and editing platforms. By transforming therapeutic realities for children with MSDMS and related vasculopathies, our strategy opens new commercial avenues in rare disease gene therapy and accelerates breakthroughs in broader vascular medicine.



Actionable coagulation profiling at the point-of-need

Precision Coagulation Profiling at the Point-of-Need: A New Era in Bleeding and Thrombosis Prevention

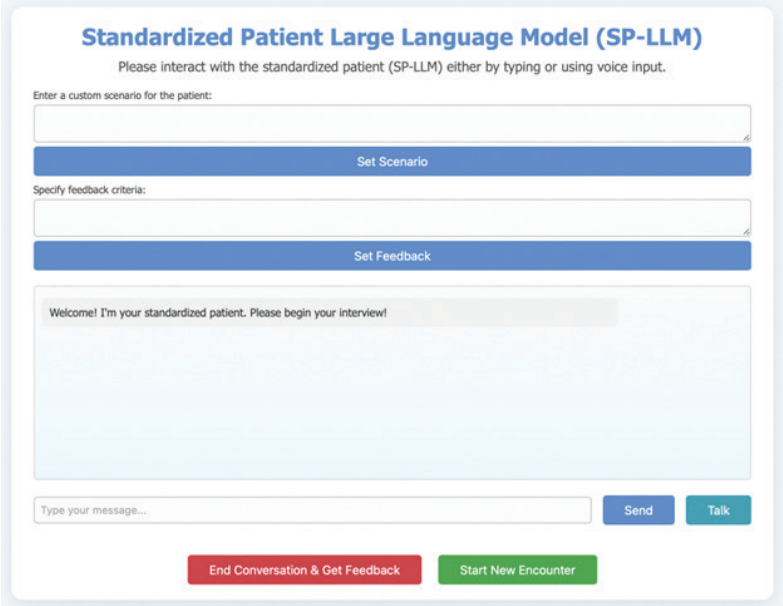
Seemantini Nadkarni, PhD
Principal Investigator, Wellman Center for Photomedicine, Mass General Brigham;
Associate Professor of Dermatology, Harvard Medical School
snadkarni@mgh.harvard.edu

Impaired blood coagulation is a frequent cause of bleeding and thrombosis following acute trauma and surgery, and is a leading cause of preventable in-hospital death. Early identification and frequent monitoring of defective coagulation are essential to manage the delicate balance between bleeding and clotting in patients at risk. However, traditional laboratory tests are slow and reflect historic coagulation states at the time of blood collection – not real-time at the point of treatment. These delays can significantly increase mortality risks. The staggering impact of impaired coagulation on patient outcomes thus demands timely, decisive, and actionable coagulation profiling at the point-of-care to enable precise coagulation management and prevent fatal complications.

To address this gap, we developed iCoagLAB, a hand-sized coagulation profiler that rapidly delivers results at the patient's bedside. iCoagLAB works by measuring clot viscoelasticity from light scattering patterns (laser speckle) to comprehensively quantify the patient's coagulation function. Using just 25μl of blood, within 10 minutes iCoagLAB delivers comprehensive coagulation parameters and decisive scores for bleeding or thrombosis risk, enabling physicians to make timely, tailored and data-driven decisions. on transfusions or anticoagulant therapy.

Since its first demonstration in 2014, iCoagLab has been validated in over 2,500 patient samples, featured in 30+ peer-reviewed publications, and is protected with a robust IP portfolio. Now advancing toward scale-up manufacturing and regulatory approval by our new company, Coalesenz, Inc., iCoagLab addresses a growing $6B global coagulation testing market. With rising cardiac interventions and an aging population, the cardiovascular segment alone is projected to grow ~10% annually. Given the critical need, high clinical impact, and market potential, our initial focus is on cardiovascular patients. Following clinical adoption in the cardiovascular market, we will expand into trauma, liver transplant, high-risk orthopedic and obstetric surgeries, stroke clinics, and neonatal cardiac units.

With a first-in-class solution, strong clinical data, and clear commercial traction, the iCoagLAB technology is poised to lead the future of precision coagulation diagnostics.



The Future Patient Persona: Democratized, Scalable Medical Education Enabled by Generative AI

Arya Rao
MD-PhD Candidate, Harvard Medical School
asrao@mgh.harvard.edu

Standardized patient (SP) encounters provide medical trainees with opportunities to practice communication and clinical reasoning skills in structured, simulated settings. Although well-established and educationally effective, SP programs are resource-intensive, difficult to scale, and often limited in the number and diversity of cases learners can access. Despite clear evidence that structured, repeated practice improves clinical performance, most students engage with only a small number of SP cases during training.

To address these limitations, we developed the Standardized Patient Large Language Model (SP-LLM), a domain-specialized, agentic AI platform designed to simulate SP encounters that can be tailored to specific learner levels and institutional curricula. SP-LLMs generate contextually rich patient personas capable of realistic verbal interaction, affective nuance, and dynamic case progression, mirroring the complexity of actual clinical encounters. The platform delivers immediate, structured feedback aligned with established competency frameworks, while maintaining flexibility to address individualized learning goals.

Preliminary pilot testing has demonstrated strong feasibility and educational value. In a two-week cultural dexterity curriculum for general surgery residents, SP-LLMs adapted from Brigham and Women's Hospital's Provider Awareness and Cultural Dexterity Toolkit for Surgeons received high ratings across domains of realism, emotional fidelity, and communication skills development. In a separate implementation, a surgical oral examination simulator powered by SP-LLM and populated with MIMIC-IV clinical vignettes was similarly well-received, with clerkship students reporting strong perceived educational value, clarity of feedback, and enhanced exam preparedness. SP-LLMs will be formally deployed in the Harvard Medical School curriculum during the 2025–2026 academic year.

SP-LLMs are low-cost, infinitely reusable, and fully adaptable to local pedagogical needs, making high-fidelity clinical training accessible at scale. By providing structured, formative practice unconstrained by geography or clinical volume, SP-LLMs democratize and expand access to diverse patient scenarios and support a more equitable, scalable, and competency-based model of medical education. We are seeking partners to support the broader deployment and commercialization of SP-LLMs across institutions and educational settings worldwide.

Scaling the McCance Brain Care Score for Population-Level Prevention of Dementia, Stroke, and Depression and Other Common Age-Related Conditions

Jonathan Rosand, MD
Founder, Global Brain Care Coalition; Director, Brain Care Labs, Mass General Brigham; Professor of Neurology, Harvard Medical School
jrosand@mgb.org

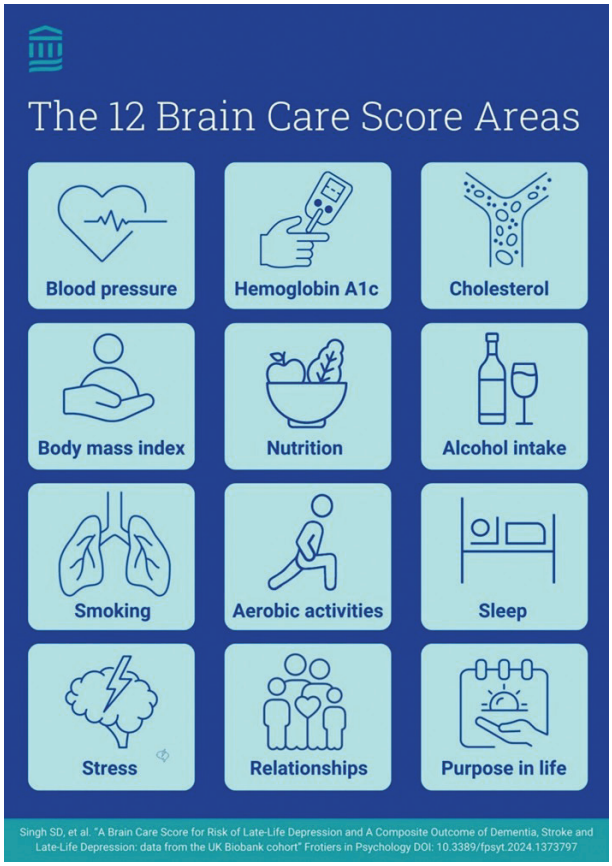
We face a slow-moving pandemic of dementia, stroke, and late-life depression (DSD) that is responsible for the greatest number of disability-adjusted life years lost worldwide and an estimated $2.3 trillion in annual economic burden. Decades of research demonstrate that to up to 45% of dementia, 75% of stroke and 35% of depression cases can be prevented by addressing modifiable risk factors including hypertension, inactivity, sleep, and social isolation.

To translate this science into action, our MGB team co-developed the 21-point McCance Brain Care Score (MBCS) with patients, caregivers, and clinicians to answer their simple question: "How can I take care of my brain so I don't develop dementia (or stroke or depression)?" The MBCS distills decades of evidence into simple, actionable direction for daily choices known to reduce risk of these common age-related brain disorders. What's more, this single, user-friendly assessment also correlates with reduced risk of cardiovascular disease, and multiple cancers. Validated in clinical and population cohorts, the MBCS has been widely embraced by the public, including a feature in The New York Times.

Embraced for its empowering effect, the MBCS has galvanized a global learning health system: the Global Brain Care Coalition (GBCC). With over 100 organizations in 20 countries, the GBCC is using real-world data and implementation science to scale MBCS adoption, measure outcomes, and incorporate data in a continuous feedback loop of improvement.

To support this effort, the GBCC is building the Brain Care Companion (BCC), an AI-powered, digital platform that guides users through personalized brain health journeys—from initial assessment to goal-setting, tracking, and adaptive interventions. The BCC aims to become a global standard for monitoring brain health and preventing brain disease, arming citizens with evidence-based, personalized care in a direct-to-consumer approach that can partner with formal healthcare.

Anchored in prevention science and powered by global collaboration, the MBCS offers a transformative approach to preventing brain disease and promoting healthy aging across the globe. In the near-term, the BCC platform aligns with CMS's GUIDE model, which provides reimbursement to providers and caregivers for dementia-related care planning and coordination. We seek partners to co-develop, integrate with EHRs, and expand implementation domestically and globally.



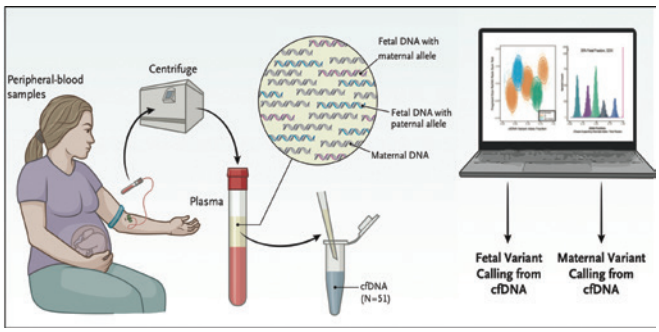


Figure 1: Workflow of Noninvasive Fetal Exome Sequencing (NIFS). Figure adapted from Brand et al., NEJM (2023)

Noninvasive Fetal Sequencing: A Simple Maternal Blood Test that Enables Comprehensive Prenatal Genetic Screening

Michael Talkowski, PhD
Director, Center for Genomic Medicine, Mass General Brigham; Professor of Neurology, Harvard Medical School
mtalkowski@mgh.harvard.edu

Non-invasive prenatal testing (NIPT) has enabled the detection of fetal chromosomal aneuploidies, such as trisomy 21 (Down syndrome), by providing a fetal screening method that requires only a maternal blood sample. The uptake of NIPT has been staggering, now approaching ~50% of all pregnancies in the US and most developed countries. In parallel, the landscape of genetic testing has dramatically shifted with technologies that now survey all human genes and mutations using complete genome and/or exome sequencing (GS/ES). Standard NIPT is blind to all these sequence variants and submicroscopic copy number variants (CNVs) of clinical relevance to fetal and/or maternal health. Consequently, the diagnostic gold standard for high-resolution genetic testing still requires an invasive medical procedure on the mother, such as amniocentesis, despite high cost, infrastructure demands, and procedural risks to both fetus and mother. A comprehensive noninvasive fetal screen would thus represent a paradigm-shifting advance for maternal-fetal medicine and could provide access to all expectant mothers worldwide.

To address this unmet need, our team at MGH has developed a noninvasive fetal sequencing (NIFS) platform capable of sequencing and interpreting ~23,000 protein-coding genes directly from a maternal plasma sample. After demonstrating technical feasibility on 51 samples in a proof-of-principle study (Brand et al., NEJM) and have now completed a large-scale validation against prospective invasive fetal sequencing. In an analysis of 577 maternal plasma samples (9-38 weeks of gestation), NIFS achieved over 96% sensitivity and 97% precision compared to ES/GS following an invasive procedure. Compared to this gold standard, NIFS confidently detected 95.3% of all diagnostic variants, including 100% of clinically relevant CNVs all of which were missed by NIPT. NIFS also identified unexpected and clinically important pregnancy situations, such as a maternal bone marrow transplant, molar pregnancy, and fetal twin demise. Moreover, NIFS provided a maternal carrier screen with a reportable finding in 58.3% of mothers.

Overall, NIFS offers a scalable, noninvasive platform for comprehensive prenatal genetic screening. By removing the need for invasive procedures, this technology has the potential to open access to complete fetal and maternal genetic screening to all pregnant persons. Our approach sets the stage for the utility of genetic screening as a tool for longitudinal precision healthcare and, together with commercial partners and the clinical expertise of our team, offers re-interpretation services of a 'genome for life'. NIFS is thus positioned to redefine clinical practice in maternal-fetal medicine, with significant commercial and healthcare system implications.

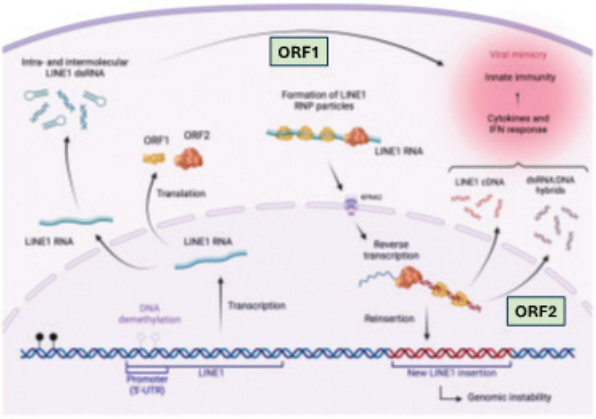


Figure 1: LINE1 retrotransposon working model. LINE1 repeat RNA expression is induced through epigenetic changes. LINE1 RNA is translated into ORF1 and ORF2 proteins, which bind and process repeat RNAs with the ability to reinsert into the genome. The balance of these repeat RNA and DNA species induces innate immune responses similar to a viral infection.

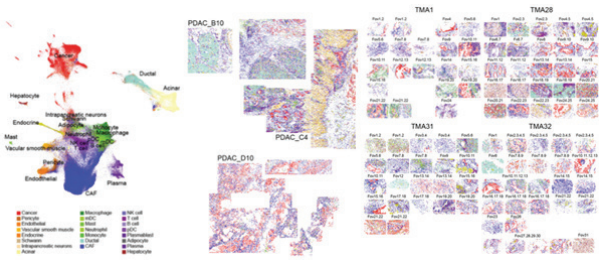


Figure 2: Spatial Molecular Imaging of LINE1 and Coding Genes in Human PDAC Left: UMAP clustering and cell annotation of 46 human PDAC samples. Right: Spatial mapping of every cell type.

Unlocking the Dark Genome: Targeting LINE1 to Activate Innate Immunity in Cancer

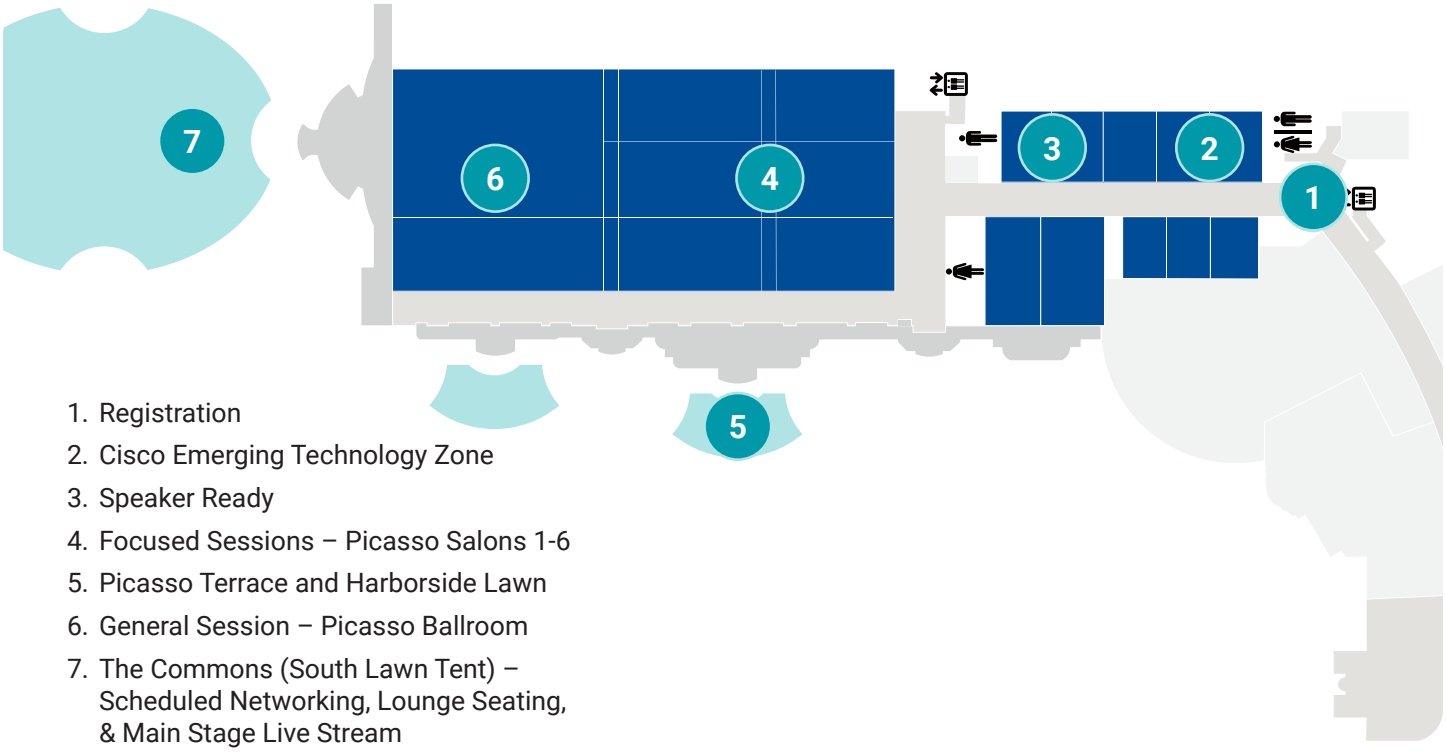
David Ting, MD
Associate Clinical Director of Innovation, Mass General Cancer Center; Associate Professor of Medicine, Harvard Medical School
dting1@mgh.harvard.edu

The non-coding parts of the genome, or "dark genome" is composed primarily of repeat elements, and the aberrant expression of these sequences is a common feature found in cancer, neurodegenerative disease, autoimmune disorders, and ageing. The majority of these are non-coding RNAs that have shown the ability to stimulate a viral-like innate immune response. One of these, the long interspersed nuclear element 1 (LINE1) retrotransposon is composed of ORF1, a ribonucleotide protein, and ORF2, a reverse transcriptase and endonuclease, which allow for the replication and movement of LINE1 and other repeat elements in the genome analogous to a retrovirus (Fig. 1). However, the impact of LINE1 on viral-like innate immune responses has not been well explored.

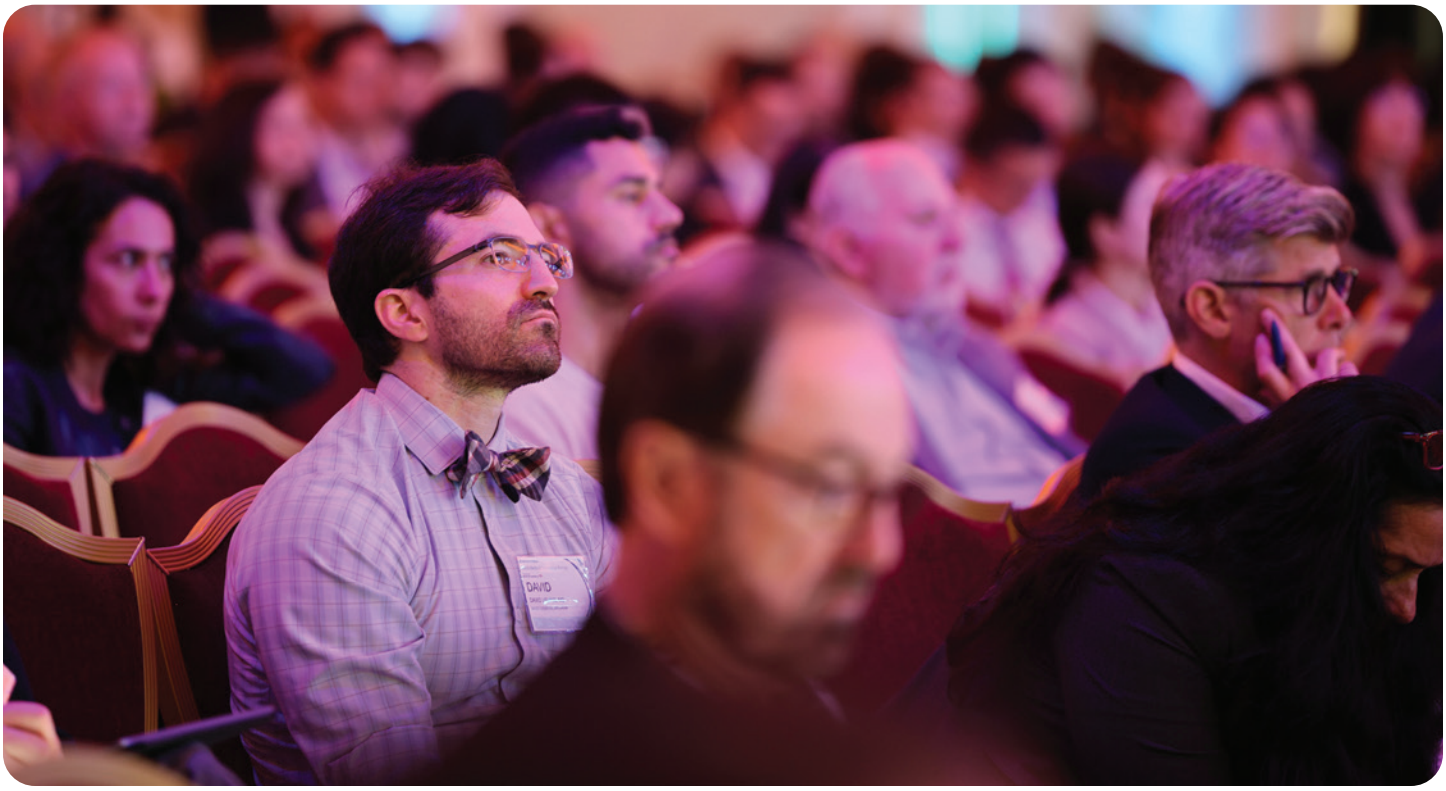
Using spatial molecular imaging (You et al. Cell 2024), we have recently characterized the expression of LINE1 RNAs in pancreatic ductal adenocarcinoma (PDAC). This revealed that LINE1 RNA expression drives cellular plasticity in tumor cells and induces dysfunction in the responding microenvironment cells (Fig. 2). This broader viral-like infection of the microenvironment suggested that targeting of LINE1 could impact tumor cells directly, as well as the immune response to them. We suppressed LINE1 ORF1 protein expression using shRNA, which led to repeat RNA mediated induction of innate immune responses. This led to significant PDAC cancer cell toxicity and alterations in the tumor microenvironment in a mouse model of PDAC (You et al. Cancer Discovery 2025). In addition, we found increased sensitivity of PDAC cell lines to conventional combination chemotherapy (FOLFIRINOX) and newer KRAS inhibitors.

Our results demonstrate a critical and previously uncharacterized role of LINE1 ORF1 as a suppressor of innate immunity and as an attractive novel immune oncology and therapeutic resistance target for PDAC. We are looking for strategic partners and investors to develop inhibitors of LINE1 ORF1 and other dark genome targets as novel cancer therapeutics.

Map.



1. Registration
2. Cisco Emerging Technology Zone
3. Speaker Ready
4. Focused Sessions – Picasso Salons 1-6
5. Picasso Terrace and Harborside Lawn
6. General Session – Picasso Ballroom
7. The Commons (South Lawn Tent) – Scheduled Networking, Lounge Seating, & Main Stage Live Stream



Sponsors.

PRESENTING

Bank of America
Charlotte, NC

Bank of America is one of the world's leading financial institutions, serving individual consumers, small and middle-market businesses and large corporations with a full range of banking, investing, asset management and other financial and risk management products and services. The company provides unmatched convenience in the United States, serving approximately 66 million consumer and small business clients with approximately 4,300 retail financial centers, approximately 17,000 ATMs, and award-winning digital banking with approximately 41 million active users, including approximately 32 million mobile users. Bank of America is a global leader in wealth management, corporate and investment banking and trading across a broad range of asset classes, serving corporations, governments, institutions and individuals around the world. Bank of America offers industry-leading support to approximately 3 million small business households through a suite of innovative, easy-to-use online products and services. The company serves clients through operations across the United States, its territories and approximately 35 countries. Bank of America Corporation stock (NYSE: BAC) is listed on the New York Stock Exchange.

www.bankofamerica.com

STAKEHOLDER

Amgen
Thousand Oaks, CA
www.amgen.com

STRATEGIC

Astellas
www.astellas.com

Cisco
www.cisco.com

Philips
www.philips.com

Siemens Healthineers
siemens-healthineers.com/en-us

COLLABORATOR


Join us in
2026
Innovation continues on a global scale.
September 22–23, 2026
WESTIN BOSTON SEAPORT DISTRICT
worldmedicalinnovation.org

Mass General Brigham

World Medical Innovation Forum

In partnership with
BANK OF AMERICA

Discover.
Connect.
Invest.

Mass General Brigham

World Medical Innovation Forum

In partnership with
BANK OF AMERICA

Mass General Brigham Innovation
massgeneralbrigham.org/innovation