



**FY 2024 Armenise-Harvard Dean's Basic Science Grant**

## **FY 2024 Armenise-Harvard Dean's Basic Science Grant Report**

As we reported last year, when the Dean's Basic Science Grant also was used to support the artificial intelligence (AI) initiative, Harvard Medical School (HMS) is at the forefront of exploring how AI technologies can enhance health care. As an identified up-and-coming area of need, the FY24 Dean's Grant (\$500,000) was once again used towards AI. Dean George Q. Daley has said that to remain at the cutting edge of medical education, the School must prepare physicians of the future, who will practice in an environment rich in cognitive support resources powered by artificial intelligence tools. Therefore, HMS needs to respond proactively and systemically to the advent of advanced AI—especially generative AI.

It is particularly challenging to incorporate aspects of a field that is evolving in real time and at real speed, but the Dean realizes that developing AI is a key towards allowing a new generation of biomedical investigators and clinical providers to improve access to high-quality care and treatments for everyone.

As the Dean noted in his State of the School remarks this fall, “creative and cautious implementation of AI is already boosting clinical efficiency, augmenting the scientific method, accelerating therapeutic discovery, and enhancing medical education. In the past year, HMS has been gearing up to make the most of this inflection point in history.” The School is working to incorporate generative AI into all its activities, from MD, graduate and external education to basic science research.

In education, students are being taught to use AI models wisely and ethically, placing a high premium on curating and *verifying* AI-generated knowledge. This is essential, as students become proficient in employing AI algorithms to optimize diagnosis and treatment strategies, while maintaining vigilance to corroborate the information. Examples in education: a course on AI in Medicine for entering HST students, who we anticipate will engineer many new AI applications in bioscience and health care. And students in our MD Pathways program are using large language models in the classroom as “tutors.”

On the research side, the BioPlex Project, is an effort to profile protein-protein interactions for all human proteins. In an upcoming paper, Professor of Cell Biology Steve Gygi, Chair of Cell Biology Wade Harper, and Instructor in Cell Biology Ed Huttlin will describe an exciting outcome of this work: a structural view of the entire human interactome. This is a remarkable achievement, made possible by the AI tool AlphaFold.

## Faculty Supported by Dean's Basic Science Grant in FY 2024



### **Marinka Zitnik, PhD**

Assistant Professor of Biomedical Informatics, Harvard Medical School  
Associate Member, Broad Institute of MIT and Harvard

Marinka Zitnik, PhD, is an assistant professor in the HMS Department of Biomedical Informatics, where she leads a research lab that investigates foundations of AI to enhance scientific discovery and facilitate individualized diagnosis and treatment in medicine. Her algorithms and methods have had a tangible impact, garnering the interest of government, academic, and industry researchers, and have put new tools in the hands of practitioners. A *Nature* paper titled “Scientific Discovery in the Age of Artificial Intelligence,” described how natural intelligence algorithms can sift through mountains of scientific literature and analyze diverse data modalities—including images and sequences—in a way that humans cannot, connecting and synthesizing ideas to yield novel discoveries.

She has received awards from International Society for Computational Biology, Bayer Early Excellence in Science Award, Amazon Faculty Research Award, Google Faculty Research Scholar Award, Roche Alliance with Distinguished Scientists Award, Sanofi iDEA-iTECH Award, Rising Star Award in Electrical Engineering and Computer Science (EECS), and Next Generation Recognition in Biomedicine. Dr. Zitnik received the Kavli Fellowship by the US National Academy of Sciences and the Kaneb Fellowship award at Harvard Medical School.

Dr. Zitnik received her bachelor's degree, double majoring in computer science and mathematics, and then graduated with a Ph.D. in Computer Science from University of Ljubljana three years later, while also researching at Imperial College London, University of Toronto, Baylor College of Medicine, and Stanford University.



**Vikram Patel, MMBS, PhD**

Paul Farmer Professor and Chair of Global Health and Social Medicine, Harvard Medical School

Vikram Patel, MMBS, PhD is head of the department of Global Health and Social Medicine and co-leads the GlobalMentalHealth@Harvard initiative. His lab's research studies have multiple components that encompass a broad range of themes, all focused on the goal of contributing to the reduction of the global burden of suffering of mental health problems across the life course. Projects include such areas as: Neurodevelopmental Disorders, Youth Mental Health, Maternal Mental Health, Adult Mood Disorders, Mental Illness. The lab's mission is as follows:

*We are dedicated to advancing mental health equity globally and reducing the burden of mental disorders. Through pioneering digital solutions, task-sharing model, and collaborative strategies, we strive to expand access to effective interventions, enhance the quality of care across the lifespan, and promote inclusivity within communities worldwide.*

Their current research focus includes developing and evaluating digital-technology-enabled approaches to train providers, assess cognitive development and mental health, and assist management of self-care. A notable application of Dr. Patel's group is the deployment of AI-based psychiatric tools to predict the effects of adverse childhood experiences.

Dr. Patel has served on several WHO expert and Government of India committees, including the WHO High Level Independent Commission for Non-Communicable Diseases and Mental Health. Dr. Patel holds a PhD from the University of Oxford. In addition, he holds an Honorary Doctorate from Georgetown University and an Honorary OBE from the UK Government.





**Isaac (Zak) Kohane, MD, PhD**

Chair, Department of Biomedical Informatics, Harvard Medical School  
Marion B. Nelson Professor of Biomedical Informatics, Harvard Medical School  
Editor-in-Chief, *NEJM AI*

On the medical education side, HMS is preparing students to become future leaders who employ AI to meet the public health goals of the next half century. The School has developed a PhD track for AI in Medicine within the Department of Biomedical Informatics, chaired by the inimitable Zak Kohane. Dr. Kohane served as co-author of the Institute of Medicine Report on Precision Medicine that has been the template for national efforts. He develops and applies computational techniques to address disease at multiple scales: from whole healthcare systems as “living laboratories” to the functional genomics of neurodevelopment with a focus on autism.

Over the last 30 years, Kohane's research agenda has been driven by the vision of what biomedical researchers could do to find new cures, provide new diagnoses and deliver the best care available, if data could be converted more rapidly to knowledge and knowledge to practice. At the same time, the new insights afforded by 'omic-scale molecular analyses have inspired him and his collaborators to work on re-characterizing and reclassifying diseases such as autism, rheumatoid arthritis and cancers. In many of these studies, the developmental trajectories of thousands of genes have been a powerful tool in unraveling complex diseases. Kohane has published several hundred papers in the medical literature and authored the widely used books *Microarrays for an Integrative Genomics* (2003) and *The AI Revolution in Medicine: GPT-4 and Beyond* (2023).

In 1987, Kohane earned his MD/PhD from Boston University and completed his post-doctoral work at Boston Children's Hospital, where he has since worked as a pediatric endocrinologist. He joined the faculty at Harvard Medical School in 1992, serving as Director of Countway Library from 2005 to 2015 and as Co-Director of the Center for Biomedical Informatics during the same period, before it became the Department of Biomedical Informatics in July 2015. He is a member of the Institute of Medicine and the American Society for Clinical Investigation.