

# MIT Center for Biomedical Innovation BioACCESS Global Health Seminar on Meeting the Challenge of Ensuring Global Access to Insulin

## February 19, 2019 3:00 PM – 4:30 PM

## Location: 68-180 (MIT Campus), 31 Ames Street, Cambridge, MA

Diabetes is characterized by elevated blood glucose levels, leading to numerous health complications, as well as detrimental socioeconomic burden as a result of both direct (e.g. medication, glucose testing) and indirect (e.g. productivity loss, lifestyle changes) costs. Globally, the number of adults with diabetes has increased from 108 million in 1980 to 422 million in 2014, with the number of type 2 diabetics expected to rise to 511 million by 2030. An increase in the projected demand for insulin, required for all type I and 20-30% of type II diabetic patients, will exacerbate already existing barriers hindering sustained access. This is especially concerning in low-and-middle income countries, where prevalence has been rising more rapidly. China and India alone account for close to 45% of the total diabetes burden today.

This seminar aims to:

- Convene a community interested in improving access to healthcare in resource-limited settings
- Explore the supply-side and demand-side barriers hindering sustained access to high-quality, affordable diabetes management, especially insulin
- Identify areas ripe for innovation to inform the design of cost-effective interventions aimed at improving population health

Target Audience:

• MIT CBI community (academia, industry, regulators), students, and others interested in this topic.

3:00 – 3:10 PM	Introduction to MIT CBI, BioACCESS, and framing of the seminar MIT Center for Biomedical Innovation
3:10 – 4:10 PM	PresentationsDr. Veronika J. Wirtz, Associate Professor, Department of Global Health, Boston University School of Public Health & Director, World Health Organization Collaborating Center in Pharmaceutical PolicyDr. A.J. Kumar, Chief Scientific Officer, Jana CareAlex Abramson, PhD Candidate, Langer Lab, MITDr. Amy Moran-Thomas, Alfred Henry and Jean Morrison Hayes Career Development Assistant Professor of Anthropology, MIT
4:10 – 4:30 PM	Q&A / Discussion



## Presenter Abstract

#### Dr. Veronika J. Wirtz

The prevalence of diabetes has increased rapidly over the last four decades, from 108 million in 1980 to 422 million in 2014, in particular in low and middle income countries. Patients affected by diabetes in low and middle income countries tend to be diagnosed at younger age. The increasing burden of diabetes has large social and economic consequences at household, community and country level. Many countries lack resources including effective policies to create a conducive environment for prevention and high quality of care. This presentation will highlight the key factors that influence access to medicines for diabetes, including trade, manufacturing and market authorization as well as financing, procurement and medicine prescribing.

## Dr. A.J. Kumar

Jana Care builds point-of-care tests for the diagnosis and management of chronic diseases. These tests include HbA1c and glucose, which are important tests for diabetes. In addition to diagnostic tests, Jana Care provides digital management programs through the Habits apps to empower patients to make lifestyle changes and better adhere to their medical care programs. Jana Care's devices are used in over 1,000 clinics in India and are used in screening programs at major events like the Kumbh Mela. Over 200,000 patients have benefited from our tests for screening, diagnosing, and monitoring diabetes. Our technology addresses a key gap in diabetes care in emerging economies where approximately 50% of diabetics are undiagnosed.

## Alex Abramson

Biomacromolecules transformed our capacity to effectively treat diseases; however, their rapid degradation and poor absorption in the gastrointestinal (GI) tract generally limits their administration to parenteral routes. An oral biologic delivery system must aid in both localization and permeation to achieve systemic drug uptake. Inspired by the leopard tortoise's ability to passively reorient, we developed an ingestible self-orienting millimeter scale applicator (SOMA) that autonomously positions itself to engage with GI tissue and deploys milliposts fabricated from active pharmaceutical ingredients directly through the gastric mucosa while avoiding perforation. We show that the drug in our device remains stable for 16 weeks at 40°C, removing the need for refrigeration. We also conduct in vivo studies in rats and swine supporting the materials and method's safety and, using insulin as a model drug, demonstrate that the SOMA delivers similar API plasma levels to subcutaneous millipost administration.



## Dr. Amy Moran-Thomas

According to the International Diabetes Federation, diabetes now kills more people each year than AIDS and breast cancer combined, and the majority of these deaths take place in contexts of scarcity. Yet many of the key technologies for treating diabetes—such as insulin assemblages and glucose measurement technologies—were initially designed for use in affluent contexts. This talk presents an ethnographic perspective on the growing mismatch between imagined users of these therapies and those who need them today for survival. Exploring some societal and historical dimensions of how these technologies are circulating in the world today, this presentation takes an anthropological perspective to reflect on how realities of new users and global equity issues might be better taken into account in the design phases of developing diabetes care technologies.

## Presenter Biography:

## Dr. Veronika J. Wirtz

Veronika J. Wirtz, MSc, PhD is an Associate Professor in the Department of Global Health at the Boston University School of Public Health, where she is also Director of the World Health Organization Collaborating Center in Pharmaceutical Policy. Her research focuses on health system strengthening and program evaluations of medicines access and utilization. Between 2014 and 2016 she was the Co-Chair of The Lancet Commission on Essential Medicine Policies which published its report *Essential Medicines for Universal Health Coverage* in Fall 2016. She has worked as a technical advisor for various international organizations, among them the World Health Organization, the Pan American Health Organization, the World Bank, the Global Fund to fight AIDS, Tuberculosis and Malaria. She is a Visiting Professor of the National Institute of Public Health (INSP), Mexico where she was a faculty member between 2005 and 2012. She received her training as a pharmacist from Albert-Ludwigs-University in Freiburg, Germany and her Master in Clinical Pharmacy and PhD from the University of London, UK.

## Dr. A.J. Kumar

A.J. Kumar is the Chief Scientific Officer at Jana Care, where he leads the research team to create new, affordable point-of-care diagnostics tests for chronic diseases. A.J. received a B.S. in physics at Stanford and then spent 2 years in rural South Africa with the Peace Corps. Upon returning to the U.S., he completed his PhD in applied physics at Harvard and worked on the development of a point-of-care test for sickle cell disease while under the guidance of Prof. George Whitesides. He has served as a consultant on diagnostics for companies and on a scientific advisory board on protein diagnostics for the Bill and Melinda Gates Foundation. He is passionate about harnessing new technologies to improve human health for all.



## Alex Abramson

Alex Abramson is a Ph.D. Candidate in Chemical Engineering at MIT studying under Professor Robert Langer. His research focuses on developing ingestible robotic capsules for oral biologic drug delivery and other therapies. Alex has worked closely with Novo Nordisk pharmaceuticals and gastroenterologist Giovanni Traverso to develop a commercially viable and safe oral insulin pill with a comparable efficacy to subcutaneous injections. His work, published in Science, has received considerable press coverage from such news outlets as the New York Times, NPR and Wired. He is also involved in the public health sector and has performed research on quantifying the quality of life impact that innovations in the biomedical space have on patients worldwide.

## Dr. Amy Moran-Thomas

Amy Moran-Thomas is a cultural anthropologist, interested in the human and material entanglements that shape global health and medicine in practice. She received her PhD in Anthropology from Princeton University in 2012, and held postdoctoral fellowships at Princeton and Brown University before coming to MIT as Assistant Professor of Anthropology in 2015. She teaches classes at MIT about health and society, technology and culture, and "the social lives of medical objects." Her forthcoming book, *Traveling with Sugar: Chronicles of a Global Epidemic* (UC Press, October 2019), offers a humanistic account of the global diabetes epidemic.