Abstract

With formidable technological progress, lung-on-chips provide new opportunities to probe at true scale the pulmonary environment and deliver biomimetic platforms. Microfluidic airways have transformed the landscape for exploring in vitro respiratory physiology and advance basic research and translational medicine. Since drug screening methods are still overwhelmingly conducted in animal models, lung-on-chips offer the prospect of tangible alternatives. Lined with human cells, within a physiologically-faithful architecture, these can help reduce the need for animal studies and offer more relevant human models. We are leading major developments in lung-on-chips, with the first artificially-breathing acinar networks that capture physiologically-realistic respiratory flows. Our acinus-on-chip represents the first in vitro tool enabling quantitative monitoring of inhaled aerosols at the acinar scales. The life-size model lung allows direct and time-resolved observations of airborne particle trajectories and deposition patterns. We are expanding such platforms to recapitulate biological barrier functions of the airway epithelium following inhalation exposure, including pathogenic aggression. Airway cells can be collected from biopsy and cultured in devices allowing for advanced diagnostics in addition to monitoring patient’s cell response to different drugs. Our models may provide off-the-shelf kits geared to end-users for a wide range of toxicity assays and drug screens.

Biography

Dr Josué Sznitman joined the Department of Biomedical Engineering at the Technion – Israel Institute of Technology, in October 2010 as an Assistant Professor (tenure-track). In November 2016, he was promoted to Associate Professor with tenure. He directs the Technion Biofluids Laboratory.

Dr Sznitman graduated from MIT with a BSc in Mechanical Engineering (2002), followed by a Dr. Sc. (2008) at the ETH Zurich. In 2008, he joined the University of Pennsylvania as a Postdoctoral Fellow and moved to the Department of Mechanical & Aerospace Engineering at Princeton University as a Lecturer and Research Associate, appointed by the Princeton Council of Science & Technology. Dr Sznitman has published over 60 peer-reviewed articles and is a co-inventor on several patents.

In addition, he is a member of the Editorial Board of Biomicrofluidics (AIP) and the Journal of Biomechanics (Elsevier), and serves as an Academic Editor for the journal PLoS One. Among his accolades, Dr Sznitman was awarded the Young Investigator Award (2015) by the International Society of Aerosols in Medicine (ISAM) for a researcher under 40 and most recently the 2018 Emerging Scientist Award in Drug Delivery to the Lungs (The Aerosol Society, UK). Since joining the Technion, he has raised over $3.5 million in competitive funding, including a prestigious European Research Council (ERC, Horizon 2020) Starting Grant (2016) and a Proof-of Concept (PoC) Grant (2018). Dr Sznitman is also the co-founder of Gradtrain Ltd., an online education consultancy.

Tuesday, 26 February 2019 ǁ Time: 3:00 pm – 4:00 pm ǁ Venue: MSE Meeting Room (N4.1-01-28) ǁ Hosted by: Associate Professor Joachim Loo

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