

BIOENGINEERING & BIOMEDICAL ENGINEERING RESEARCH SEMINAR

DIGITIZING THE HUMAN EMBRYO



Dr. Hadi Shafiee
Associate Professor at Harvard Medical School

Since the first successful birth from in-vitro fertilisation (IVF) in 1978, advancements in embryo culture systems, micromanipulation, imaging, and genomics have improved the process. However, IVF still faces challenges, as nearly 70% of patients do not achieve live births in the first cycle, and about 30% discontinue treatment. The inefficiencies are attributed to variability in medical practice and the subjective nature of manual embryo grading and visual assessments for critical decision points, such as embryo selection for transfer. Deep learning artificial intelligence (AI) with convolutional neural networks (CNNs) has the potential to revolutionize IVF and assisted reproductive technology. In this talk, we briefly discuss how these AI applications act as a second eye, objectively evaluating embryonic development, tracking embryos throughout the IVF process, and providing morphological assessments to guide clinical decisions. We also discuss some of the challenges ahead of us in deploying reliable AI solutions for IVF applications.

Dr. Hadi Shafiee is an Assistant Professor of Medicine at Brigham and Women's Hospital, Harvard Medical School. He graduated from Isfahan University of Technology, Iran (BSc) in 2001 and University of Tehran, Iran (MSc) in 2003 with degrees in Mechanical Engineering. He received his Ph.D. in Biomedical Engineering and Mechanics from Virginia Polytechnique Institute and State University in 2010. After receiving trainings in the development of devices for cell sorting and pathogen detection at Virginia Tech and Harvard-MIT Division of Health Science and Technology, he started his own lab at BWH, HMS in 2014. Dr. Shafiee's lab strives to develop innovative diagnostic tools to address unmet clinical challenges through integrating biology/medicine, micro- and nanotechnology, consumer electronics, and artificial intelligence. He has published over 50 peer-reviewed papers with h-index of 36 and over 4600 citations, and has given more than 100 invited lectures. He has more than 20 issued or pending patents, most of which are now exclusively licensed to companies such as Fuji Film Inc. and Verility Inc. His lab has been funded by the NIH, Massachusetts General Brigham, Brigham and Women's Hospital, Harvard School of Public Health, and American Society of Reproductive Medicine. He is the chair of the AI framework validation at the AIFertility Society. His work has been recognized by some of the major news outlets including CNN, theguardian, Boston Globe, CBS News, STAT, New York Times, etc. He has more than 80 mentored more than 80 postdoctoral research fellows, and undergraduate and graduate students.

Sept 29, 2023 at 1:30PM

Zoom Meeting ID: 830 7128 8396



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