



The 2023 CMBE Young Innovators: ChatGPT Gets the Final Word

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We recently held the 2023 CMBE Young Innovators invited platform sessions at the Biomedical Engineering Society Annual Conference in Seattle, WA, and they were a smashing success. As you may recall in the editorial introducing the August special issue, we called on ChatGPT to organize the 12 invited papers of the issue into a logical order, as well as determine the order of talks for the BMES conference, in what may be a first in the annals of scientific publishing and academic conferences. In preparation for the BMES conference sessions, and to continue the theme of large language model (LLM)-assisted organization, we invited ChatGPT to craft a colorful introduction for each speaker, blending elements of their individual research together with details of their home state and/or institution. These LLM-generated introductions were recited before each speaker's presentation, to the delight of our speakers and session attendees alike (Fig. 1). We have reproduced the introductions below, for posterity (ChatGPT text indented in the next paragraphs following each title and name). Perhaps these descriptions will encourage you to seek out the published papers from the August 2023 special issue! Self-nominations for the 2024 Young Innovators special issue are now being accepted, until November 10, 2023, and next year's issue will be co-edited by Michael King, Rob Raphael, and Joyce Wong. See you at the 2024 BMES conference in Baltimore, MD, and the CMBE Conference in San Juan, Puerto Rico!

The Young Innovators of Cellular and Molecular Bioengineering: Part I

Friday, October 13, 2023, 2:00 – 3:30pm
Room 434

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Session chairs: Alisa Morss Clyne and Owen J.T. McCarty

2:00 – 2:15: Optogenetic Modulation of Arrhythmia Triggers: Proof-of-Concept from Computational Modeling (Patrick Boyle)

Like the Emerald City's skyline, Dr. Boyle's laboratory harnesses the power of MRI scans to fuel their "virtual heart" simulations, peering into the hidden intricacies of cardiac health. With a dedication as unwavering as the Puget Sound's waves crashing against the shore, they uncover the root causes of disease and craft innovative treatment strategies.

2:15 – 2:30: Peristalsis-Associated Mechanotransduction Drives Malignant Progression of Colorectal Cancer (Shreya Raghavan)

In the heart of Texas, the Raghavan Lab at Texas A&M is like a skilled rancher, tending to the intricate landscape of micro-tissues and environments. They scrutinize the intricate dance of stem cells and immune warriors, akin to wrangling a herd of cattle, to decipher the mysteries of cancer's spread and the magic of regenerative healing.

2:30 – 2:45: Elucidating Mechanotransduction Processes During Magnetomechanical Neuromodulation Mediated by Magnetic Nanodisc (Gabriela Romero)

Dr. Romero grapples with the formidable barriers of the blood-brain barrier, akin to the historic walls of the Alamo, and combats the swift currents of cerebral fluids, much like the steady flow of the San Antonio River.

2:45 – 3:00: Altered Caveolin-1 Dynamics Result in Divergent Mineralization Responses in Bone and Vascular Calcification (Joshua Hutcheson)

Dr. Hutcheson's dedication to understanding cardiovascular tissue dynamics is as relentless as the Florida summer sun. Like an intrepid explorer in the



Figure 1. Each CMBE Young Innovator was presented with a plaque by one of our session chairs at the 2023 Biomedical Engineering Society annual conference.

heart of the Everglades, he delves deep into the intricate interplay of mechanical and molecular forces driving vascular calcification and aortic valve disease.

3:00 – 3:15: Engineering Extracellular Vesicle-based Therapies for Valvular Heart Disease (Natalia Higuera-Castro)

With precision and skill comparable to the Buckeye's plays on the football field, she delves into the development of novel extracellular vesicle (EV)-based nano-

carriers, aiming to tackle issues like lung inflammation, brain injury, and low back pain.

3:15 – 3:30: A 3D Human Lymphatic Vessel-on-Chip Reveals the Roles of Interstitial Flow and VEGF-A/C for Lymphatic Sprouting and Discontinuous Junction Formation (Esak Lee)

Just as the gorges carve through the landscape, Dr. Lee's research delves deep into the morphogenesis and intricacies of lymphatic and blood vessels, exploring the very foundations of life. Just as the gorges are a

living testament to the power of nature, the lab's 3D organ-on-chip systems and advanced cellular and molecular tools breathe life into their research.

The Young Innovators of Cellular and Molecular Bioengineering: Part II

Friday, October 13, 2023, 4:00 – 5:30pm

Room 434

Session chairs: Owen J.T. McCarty and Alisa Morss Clyne

4:00 – 4:15: Engineering of Trophoblast Extracellular Vesicle-Delivering Hydrogels for Localized Tolerance Induction in Cell Transplantation (Jessica Weaver)

Like a skilled desert gardener cultivating hardy succulents, she specializes in the creation of functional and immune-protected tissue and cell grafts. Her research, much like the saguaro cacti's towering presence, focuses on the development of safe, translatable technologies.

4:15 – 4:30: Bio-adhesive Macroporous Hydrogels for In Situ Recruitment and Modulation of Dendritic Cells (Hua Wang)

Much like the fertile fields of Illinois, the Wang laboratory is a crucible of potential and growth in the realm of cellular engineering. They strive to cultivate a deeper understanding of how cells can be harnessed, much like farmers tend to their fields, to enable precise delivery of therapeutics and orchestrate delicate intercellular interactions.

4:30 – 4:45: Amelioration of Subglottic Stenosis by Anti-microbial Peptide Eluting Endotracheal Tubes (Riccardo Gottardi)

Just as the Liberty Bell symbolizes freedom and progress, the Gottardi Lab's priority target is to engineer cartilage for laryngotracheal reconstruction. This ambitious mission seeks to offer infants and children afflicted with subglottic stenosis the opportunity to breathe freely once more, liberating them from the confines of a tracheostomy.

4:45 – 5:00: siRNA Lipid-Polymer Nanoparticles Targeting E-Selectin and Cyclophilin A in Bone Marrow for Combination Multiple Myeloma Therapy (Michael Mitchell)

The Mitchell Lab at the University of Pennsylvania is like a powerhouse team in the heart of Philly's sports scene. Just as the city's athletes combine skill, strategy, and heart on the field, their research team brings together biomaterials science, drug delivery, and cellular and molecular bioengineering to tackle biological barriers head-on. They're like the Eagles, Flyers, Phillies, and 76ers rolled into one, using their collective expertise to score game-changing breakthroughs in human health.

5:00 – 5:15: Irradiated Mammary Spheroids Elucidate Mechanisms of Macrophage-Mediated Breast Cancer Recurrence (Marjan Rafat)

In the heart of Tennessee, the Rafat research team is like a country band, harmoniously blending engineering and cancer biology to uncover the secrets behind tumor recurrence and metastasis. Just as Nashville is known for its rich musical tapestry, they weave together concepts from both fields to create a symphony of scientific discovery.

5:15 – 5:30: Amyloid- β pathology-specific cytokine secretion suppresses neuronal mitochondrial metabolism (Elizabeth Proctor)

The Proctor laboratory blends experimental techniques from molecular biophysics with multi-plexing systems biology methods and -omics, just like in a well-crafted chocolate bar. Just as the keystone locks a structure in place, their multivariate mathematical modeling and machine learning techniques secure vital insights into disease interactions.

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