

ABSTRACT:

The Therapeutic Potential of Nucleic Acid-Binding Polymers in Inflammatory Diseases

Inflammation serves as a well-orchestrated physiological response, functioning as a critical defense mechanism to alert the organism to tissue damage and initiate the restoration of homeostasis. However, when this response becomes dysregulated, transitioning into a chronic state, it can contribute to the pathogenesis of a broad spectrum of debilitating diseases. While conventional pharmacotherapies remain the mainstay of treatment, biomaterials are emerging as a compelling alternative approach. Biomaterials offer a promising strategy for targeted delivery of therapeutic agents to inflamed sites, thereby enhancing their bioavailability and minimizing potential systemic side effects. Additionally, they can act as scavengers, directly suppressing inflammation by sequestering pro-inflammatory factors. In this presentation, I will delve into the application of nucleic acid-binding polymers as a multifaceted strategy for combating inflammation. These polymers possess the unique capability to not only effectively neutralize pro-inflammatory nucleic acids but also serve as versatile therapeutic carriers for drug delivery. Through an exploration of their mechanisms of action and therapeutic potential, this presentation will highlight the promise of nucleic acid-binding polymers as a novel approach for managing inflammatory diseases.

BIOGRAPHY:

Dr Leong is the Samuel Y. Sheng Professor of Biomedical Engineering at Columbia University. He is one of the pioneers in developing multifunctional nanocarriers for delivering drugs, antigens, proteins, siRNA, and DNA to cells. He graduated with a B.S. from the University of California, Santa Barbara, followed by a Ph.D. from the University of Pennsylvania, both in Chemical Engineering. Dr. Leong's current research encompasses nonviral gene editing in vivo, biomaterials for inflammation modulation, and human-tissue chips for disease modeling and drug development. His publication record includes around 500 manuscripts, an h-index of 138, and over 73,000 citations. He also holds more than 60 issued patents. Dr. Leong's contributions have been recognized by his election to the USA National Academy of Engineering, the National Academy of Inventors, and the National Academy of Medicine. Other recent awards include the Society for Biomaterials' Founders Award (2022), the IEEE-EMBS Career Achievement Award (2023), and the IEEE Biomedical Engineering Award (2024). Dr. Leong has been serving as the Editor-in-Chief of the journal Biomaterials for the past decade.

UPCOMING SEMINARS:

9/26- Dr. Cunjiang Yu - *University of Illinois, Urbana-Champaign*
10/10- Dr. Lauren Black- *Tufts University*
10/24- Dr. Hakimek Ebrahimi-Nik- *Ohio State*
10/31- Dr. Svenja Illien-Junger- *Emory University*
11/7- Dr. Jeff Lichtman- *Harvard University*
11/14- Dr. Kelly Langert- *Loyola University Chicago*

DEPARTMENT OF BIOMEDICAL ENGINEERING

2024 FALL SEMINAR SERIES

Kam W. Leong, Ph.D.

Samuel Y Sheng Professor
Columbia University, New York, NY

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