The Structural and Functional Dynamics of DICER

Prof. Tuan Anh Nguyen

Associate Professor

Division of Life Science

Hong Kong University of Science and Technology

Abstract

MicroRNAs (miRNAs) are vital regulators of gene silencing, and their dysregulation is a major driver of diseases, including cancer. At the heart of miRNA generation lies the DICER enzyme, a critical protein whose mutations are closely linked to various pathologies. In this seminar, I will share our latest findings on how DICER operates at the molecular level across multiple species. By combining high-throughput enzymatic assays with advanced cryo-EM structural imaging, our team has uncovered new details regarding DICER's structure, functional mechanics, and disease-causing mutations. Ultimately, these discoveries not only deepen our understanding of miRNA production but also establish a foundation for engineering optimized short hairpin RNAs (shRNAs) to drive gene silencing therapies.

Biography

Dr. Tuan Anh Nguyen is an Associate Professor at the Hong Kong University of Science and Technology (HKUST). Originally from Vietnam, he earned his Ph.D. in Biochemistry from KAIST and completed his postdoctoral training at Seoul National University. His research investigates the molecular mechanisms of RNA-interacting proteins, with a specific focus on microRNA (miRNA) biogenesis. By integrating biochemistry, bioinformatics, and cryo-EM, Dr. Nguyen's lab decodes how primary and precursor miRNAs interact with key processing enzymes like DROSHA and DICER. Recognized by the Croucher Innovation Award and featuring publications in top-tier journals like *Nature* and *Cell*, his work aims to understand miRNA-related diseases, such as cancer, and advance the design of novel gene-silencing technologies.