



Chemical & Physical Sciences

UNIVERSITY OF TORONTO

MISSISSAUGA

COLLOQUIUM SEMINAR SERIES

HACKING LIFE: REPROGRAMMING LIVING CELLS WITH GENE EDITING



featuring S. Bill Kim

Assistant Professor, Department
of Chemistry, York University

DNA serves as the instruction manual of the cell. Genome editing technologies allow researchers to modify DNA sequences within the genomes of living cells, presenting unprecedented opportunities not only for understanding the complex interplay between genotype and phenotype but also for fixing genetic mutations that give rise to debilitating diseases. This advancement was facilitated by the discovery and adoption of CRISPR-Cas9, an RNA-guided DNA endonuclease system that localizes to specific genomic locations and creates targeted double-stranded DNA breaks. Although highly useful, the CRISPR-Cas9 system initially did not allow for efficient and precise sequence manipulation in cells. In this presentation, I will describe novel approaches to expand the utility and capabilities of CRISPR systems through engineering protein fusions with other domains that cooperate with CRISPR to achieve novel editing outcomes. Using this approach, we have engineered various types of 'base editors', which can create precise single base modifications in DNA, and 'base diversifiers', which can create diverse nucleotide outcomes for screening applications. Our suite of technologies in genome editing and genome diversification will enable biomedical and industrial applications impacting society. As an example, I will focus on the use of CRISPR technologies for advancing agricultural biotechnology, addressing the pressing need for food security in the face of climate change.

Wednesday, April 2, 2025 | 3:15pm

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