COMPUTATIONAL RESEARCH in BOSTON and BEYOND SEMINAR

Harnessing computationally discovered CRISPR systems for transcriptome engineering and human health

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ABSTRACT:

CRISPR systems have enabled substantial progress towards the manipulation of DNA for studying genetics and gene therapy. We extend this utility to RNA by leveraging the computationally discovered RNA-targeting CRISPR systems Cas13 for applications including diagnostics and targeting RNA in live cells. We demonstrate that Cas13 can be engineered for RNA knockdown, RNA binding, and RNA editing in mammalian cells. For diagnostic applications, we combine Cas13a with isothermal amplification to establish a CRISPR-based diagnostic, providing rapid DNA or RNA detection with attomolar sensitivity and single-base mismatch specificity. We use this Cas13-based molecular detection platform, termed SHERLOCK, to detect specific strains of Zika and Dengue virus, distinguish pathogenic bacteria, genotype human DNA, and identify cell-free tumor DNA mutations. Our results establish CRISPR-Cas13 as a flexible platform for RNA targeting with wide applicability for studying RNA in mammalian cells and detecting nucleic acids, and demonstrate the value of computational mining for new molecular tools.

FRIDAY, DECEMBER 1, 2017
11:00 AM – 12:00 PM
Building 32, Room 144
(STATA)

Pizza and beverages will be provided.

http://math.mit.edu/crib

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