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BIOENGINEERING

PRESENTS

Bottom-up Engineering of Eukaryotic Regulatory Systems

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ABSTRACT:

A major goal of synthetic biology is to predictively reshape cellular phenotype by introducing artificial regulatory network connections. While the practice of constructing synthetic circuitry is relatively well established in model prokaryotic systems, the pace and progress of engineering has been much slower for eukaryotic cells. In this presentation, I will describe our recent efforts at creating network engineering frameworks for both synthetic transcriptional (genetic circuits) and post-translational (phosphorylation-based signaling circuits) networks that are both inspired by and compatible with native networks found in eukaryotic cells. In each case, we showcase modular, scalable solutions which utilize simple molecular components that can be assembled into circuits that exhibit sophisticated, natural-like behavior. Furthermore, we introduce strategies for rapidly sampling circuit design space to quickly converge on behaviors that fulfill a particular design goal. Our engineering strategies are broadly applicable, and point toward a universal toolkit for reprogramming the ability of eukaryotic cells to sense, process, and transmit information for important industrial or therapeutic purposes.

BIOGRAPHY:

Dr. Caleb Bashor is a Postdoctoral Research Fellow in the Howard Hughes Medical Institute at the Institute for medical and Engineering Science, MIT. He received a BA in Biochemistry from Reed College in 1999 and a Ph.D. in Biophysics from University of California, San Francisco in 2010.