Programmable Control of Metabolism in Synthetic Cells

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Technology description

Background

Synthetic biology is an interdisciplinary field that combines the various branches of biology and engineering to build artificial biological systems for research and medical applications. A vital feature of biological systems is that their synthetic cells must emulate if they are to be deployed in non-pristine environments. Currently, the field of synthetic biology has developed tools to control the expression of individual genes. However, this current technology lacks the ability to adjust the global behavior of a system in response to environmental conditions. As a result, there is a need to develop synthetic regulatory systems that can dynamically adapt their behavior to survive environmental stresses. This would benefit any type of system where synthetic cells need to adapt to changing and potentially hostile chemical environments.

Technology Description

Researchers at the University of New Mexico have explored the integration of a novel protein as a programmable mechanism for controlling the metabolism of synthetic cells. The integration of the novel protein can produce synthetic cells with the capability to adapt their overall resource consumption in response to environment signals, thereby enhancing their ability to carry out tasks such as environmental or biochemical monitoring and control. This discovery helps meet current needs within the field of synthetic biology leading to the furthering of research and development within a wide range of disciplines and can be applied to the monitoring of biochemical or environmental systems as well as applications in drug delivery within living organisms.

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Application area

Capable of efficiently adapting to behavior based on environmental changes
Can be used to demonstrate programmable sequestration of RNA molecules and the effect of RNA sequestration on translational activity within the synthetic cell
Improves ability to monitor biochemical or environmental systems
Applications also include uses in drug delivery within living organisms, where the synthetic cells would need to adapt to changing and potentially hostile, chemical environments

Institution

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