In Brief: Guiding cancer cells to their fate

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It is often said that the best way to spur change is to work within the system. Here, researchers create control devices based on RNA, which can be used to synthetically rewire cellular behavior, making the cells more sensitive to a drug that causes cell death.

The work highlights the promise of RNA as a platform for engineering synthetic systems to control gene expression and the use of such techniques to treat disease; in particular the possibility of using gene therapy to program cancerous or diseased cells toward death.

Stephanie Culler and colleagues used short segments of RNA to create programmable control devices that, when triggered by the presence of certain proteins, rewired gene expression pathways and changed the behavior of human cells.

In the experiment, the researchers linked stimulation of a key signaling pathway to the expression of a gene that confers sensitivity to the drug ganciclovir, which induces programmed cell death.

Their RNA control device rewired the pathway and prompted cells to detect a cancer-associated marker and activate production of a protein that sensitizes them to an anti-cancer drug.

The results show that this RNA device can be used to reroute cell signaling pathways and guide cells to a particular fate.

A related Perspective discusses the implications of this work on creating

a single framework for building synthetic gene regulation systems.

More information: "Reprogramming Cellular Behavior with RNA Controllers Responsive to Endogenous Proteins," by S.J. Culler et al, Science, November 26, 2010.
www.sciencemag.org/content/330/6008/1251.abstract

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