

An RNAi-enhanced Logic Circuit for Highly Specific Cancer Detection and Destruction

Technology #14321

Applications

This invention may be applied to the targeted destruction of cancer cells.

Problem Addressed

Current cancer treatments utilize a non-specific approach which inflicts damage on healthy tissue during the process of killing cancer cells. In addition, this general approach often requires multiple treatments causing further damage to healthy cells. This invention uses a RNAi-enhanced genetic logic circuit for targeted destruction of cancer cells while leaving healthy tissue unharmed.

Technology

This invention is a viral vector that includes a RNAi circuit capable of deciphering the cellular transcriptome, which calculates levels of targeted biomarkers and determines whether cells are either healthy or cancerous by evaluating internal cell state through mRNA expression patterns specifically the overexpression of Gata3, NPYIR and TFFI in cancerous cells. Both the siRNA target site and the biomarker mRNA can bind to the siRNA produced by the synthetic construct. In cancerous cells, which have high levels of biomarker, siRNA will be effectively titrated away protecting the mRNA from degradation. Once a cell is deemed cancerous, pro-apoptotic proteins such as Bax or Bak may be expressed to kill the cell. A mutant integrase delivers the RNAi logic circuit into the nucleus with high efficiency, but does not allow for genomic integration. While viral DNA persists in the cell, the RNAi-based logic computation to determine cancer vs. not cancer will proceed, but after a sufficient amount of time, the viral DNA will be degraded. This further protects healthy cells and ensures their survival, viability, and operations are not affected.

Advantages

- Targeted destruction of cancer cells
- Protection of healthy cells from therapy

Categories For This Invention:

Life Sciences

Biotechnology

Health

Clinical Applications

Oncology

Synthetic Biology

Therapeutic (Synthetic Biology)

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