

A novel hairpin-structured DNAzyme for miRNA-specific gene regulation in living cells

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We developed a hairpin-structured DNAzyme for gene regulation that can be activated by miRNAs, which are vital potential biomarkers for diagnosis of human disease and prognosis during clinical treatments as well as indicators for cellular status. This technology utilizes RNA-cleaving DNAzyme for the cleavage of mRNA of interest only in the presence of specific miRNA. The hairpin-structured DNAzyme also serves as a biosensor for miRNA expression by utilizing the quenching ability of gold nanoparticles. By applying this technology to mRNAs of anti-apoptotic proteins, we induced apoptosis in HeLa cells in response to specific miRNA expression. This technology presents a platform for programming cellular behavior with respect to the cellular state represented by miRNA expression.