



Innovative Theranostics for Cancer Diagnosis and Treatment

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Applications

Cancer diagnostics and anticancer drugs and therapies.

Target Problems

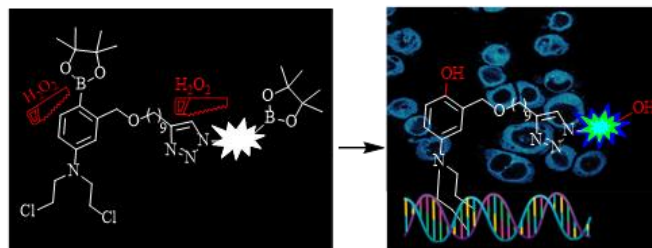
Triple-negative breast cancer and other cancers remain challenging to treat due to the lack of tumor-selective therapies and the inability of many current treatments to visualize or monitor their activity in real-time, leading to significant side effects and limited efficacy.

Solution

UWM researchers have developed hydrogen peroxide-responsive theranostic agents that combine cancer diagnosis and treatment into a single platform. The compounds selectively activate in cancer cells with elevated H_2O_2 levels to release DNA-damaging agents while simultaneously enabling fluorescence-based imaging. This approach provides a more precise, targeted cancer therapy with built-in real-time monitoring capability.

Key Benefits

- **Selective activation** in cancer cells: Produces 60–80-fold higher DNA damage in cancer cells with elevated H_2O_2 than in normal cells.
- **Reduced toxicity** to normal, healthy cells: Demonstrates ~12-fold greater cytotoxicity toward cancer cells than normal cells, indicating an improved therapeutic window.
- **Real-time** fluorescence monitoring of drug activity: Generates >1,000-fold fluorescence signal enhancement upon H_2O_2 activation, enabling sensitive, real-time visualization of prodrug activation.



About this Technology

This technology uses small-molecule theranostic agents that combine a masked DNA-alkylating drug with a fluorescence reporter in one structure. The molecules are inactive under normal conditions but activate in response to elevated hydrogen peroxide in cancer cells. Activation removes the masking group, restoring DNA-damaging activity while turning on fluorescence to show where and when the drug is active. By exploiting higher oxidative stress in tumors, the system enables selective activation, minimizing effects on normal cells. This integration of targeted therapy and real-time imaging allows direct monitoring of drug distribution, activity, and mechanism in living cells.

Stage of Development

This technology is at the preclinical stage, with compounds tested in human breast cancer cells. Drug absorption, distribution studies, and testing in animal models are underway.

Partnering Opportunity

We are seeking SBIR, startup or strategic pharma partners, to help advance development of these compounds.

Intellectual Property (IP)

Patent pending. Protected and managed by the UWM Research Foundation.

Lead Inventor

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