

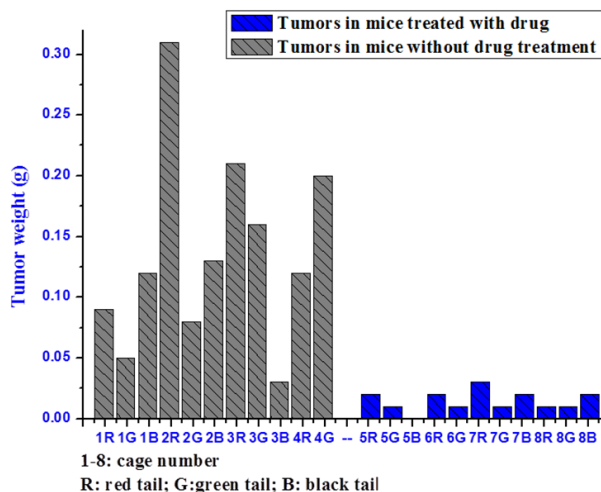


Novel Anticancer Pro-Drugs Activated by Hydrogen Peroxide OTT ID #1277

TECHNOLOGY

Dr. Xiaohua Peng has used a synergistic combination of synthetic chemistry and biological techniques for the development of new anticancer agents that target the tumor microenvironment. Specifically, she has designed pro-drug compounds containing “triggers” that are activated by high levels of hydrogen peroxide deep inside a tumor. The compounds contain multiple potent effectors, some of which have been designed to cause DNA damage within the tumor leading to cell death. Several of these compounds have undergone initial testing through the National Cancer Institute’s NCI 60-Cell Line Screen, and show promise in causing cell growth inhibition or death in Leukemia, Non-Small Cell Lung Cancer, and breast cancer. In vitro cytotoxicity assays with H₂O₂ inducible compounds have shown growth inhibition of cancer cells at less than 1 micromolar and they induced apoptosis in primary leukemic lymphocytes. A nude mouse xenograft trial for breast cancer showed significant decreases in tumor size in treated mice.

Cancer therapies are often as toxic to healthy cells as to cancer cells. A major focus in the development of new therapeutics is to exploit differences in cancer cells so that therapies can be highly targeted to avoid unwanted side effects. Cancer cells are known to exhibit increased intrinsic oxidative stress such as hydrogen peroxide. Dr. Peng’s ROS-activated triggers provide a new alternative for clinical use. These pro-drugs are designed to undergo tumor-specific activation to release compounds that cause DNA inter-strand cross-links, which are deleterious to cancer cells because they block DNA replication and transcription. These compounds are ideal for cancer treatment due to their lack of toxicity in the body until they are located within the tumor microenvironment.



FEATURES/BENEFITS

- **Safer** – Prodrugs are specifically designed only to be toxic for cancer cells
- **Specific activation** – Targeted specifically to the tumor microenvironment
- **Versatile** – The triggers can be added to a wide variety of already known cancer drugs
- **Multifunctional** – The compounds contain multiple effectors for fighting cancer cells
- **Better drug properties** – Prodrug design can aid in pharmaceutical problems of poor solubility, poor chemical stability, insufficient absorption, inadequate blood-brain barrier permeability, and pre-systemic metabolism



Technology Overview



INTELLECTUAL PROPERTY

United States Utility Patent, Anti-Cancer Agents: [8,637,490](#) and [8,962,670](#)

This technology is part of an active and ongoing research program and is seeking partners for development of the final product. It is available for developmental research support/licensing under either exclusive or non-exclusive terms.

MARKET

In the last decade, oncology has been one of the largest segments in the pharmaceutical market, with a major focus on targeted agents specific to tumors. Global oncology spending hit \$91 billion last year and is growing at 5% annually. The NIH estimates that the overall costs of cancer in 2010 were approximately \$264 billion. Targeted cancer drugs now make up 46% of cancer sales. Cancer is the second most common cause of death in the US, only exceeded by heart disease, accounting for nearly 1 in every 4 deaths.

INVENTORS

Xiaohua Peng, Yunyan Kuang, Sheng Cao, Yibin Wang

Dr. Xiaohua Peng is an Associate Professor in the Department of Chemistry and Biochemistry at the University of Wisconsin-Milwaukee. She received her Ph.D. from the University of Osnabrueck in Germany from Department of Biochemistry. She conducted Post-doctoral research at Johns Hopkins University. Her research interests include the design and synthesis of new antitumor, anticancer, and antiviral agents and the production of mechanistic probes for studying DNA damage.

For further information please contact:

Jessica Silvaggi, Ph.D.

Senior Licensing Manager
UWM Research Foundation
1440 East North Avenue
Milwaukee, WI 53202
Tel: 414-906-4654
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