PURDUE INNOVATES | Office of Technology Commercialization

Triggerable Oxygen Nanobubbles for Drug Delivery, Diagnosis, and Enhanced Survival

Nanosized, cargo-bearing oxygen bubbles enable enhanced imaging at low intensity and controlled drug release upon a higher-intensity ultrasound trigger for improved cancer diagnosis and therapy.

Ultrasound has a broad clinical utility in prostate cancer diagnosis because of its diagnostic capabilities, ease of use, portability, and ability to reveal fluid flow and structure of anatomy in vivo. Several commercial ultrasound contrast agents exist, but are synthesized using fluorinated gases or air and have sizes in the micron range. Past efforts have at most synthesized ~500 nm-sized particles and primarily functioned as a contrast agent. These large particles fail to take advantage of the enhanced permeability and retention (EPR) effect.

Researchers at Purdue University have capitalized on the broad clinical utility of ultrasound. This technology is the first nanosized oxygen- and cargo-bearing bubbles that can be tuned to first image at a low intensity and selectively release cargo upon an ultrasound trigger at a higher intensity.

Advantages:

-Enhanced permeability and retention inside tumor vasculature.

-Controlled drug release

-Avoids immune system response.

-Transport of material through the encapsulating layer.

Potential Applications:

-Pharmaceutical industry

-Medical/Healthcare

-Cancer drug delivery and diagnosis

-Therapy for cancerous tumors

Technology ID
2015-IRUD-66920

Category
Materials Science & Nanotechnology/Nanomaterials & Nanostructures
Pharmaceuticals/Computational Drug Delivery & Nanomedicine

Authors
Pushpak N Bhandari
Joseph Irudayaraj

Further information
Patrick Finnerty
pwfinnerty@prf.org

View online

TRL: 3

Intellectual Property:

Provisional-Patent, 2014-10-02, United States | Provisional-Patent, 2014-11-05, United States | Provisional-Patent, 2015-04-14, United States | Utility Patent, 2015-10-02, United States | CIP-Patent, 2018-03-07, United States | DIV-Gov. Funding, 2020-04-17, United States

Keywords: Ultrasound contrast agents, nanosized bubbles, cargo-bearing bubbles, controlled drug release, enhanced permeability and retention, EPR effect, cancer drug delivery, ultrasound triggered therapy, medical imaging, prostate cancer diagnosis