Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M22-057LC
Published: 9/12/2022

Inventors

Vikram Kodibagkar

Babak Moghadas

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Hypoxia-Targeting Contrast Agent

-

Hypoxia can affect the outcome of many different pathologies. It influences the tissue microenvironment and alters tissue and cell function. It affects tissue implants, neurological outcomes in TBI, tumor invasiveness and metastasis as well as immune system responses, to name a few. Subsequently, detecting and studying hypoxia is quite important. The current approaches to study hypoxia are either invasive or inaccurate. Noninvasive means, such as magnetic resonance imaging (MRI), may provide a viable alternative to current approaches for studying hypoxia.

Common small molecule MRI contrast agents are based on gadolinium, which is a strongly paramagnetic heavy metal. Although it is widely used, serious concerns have been raised about using Gd-based contrast agents on patients with impaired kidney function. Further, recent studies have shown Gd accumulation in bone and brain tissue in patients receiving this contrast agent. Alternative contrast agents are needed that are non-toxic and safe to use on all patients.

Researchers at Arizona State University have synthesized a novel iron-based hypoxia-targeting small molecule contrast agent. This contrast agent can be used with MR imaging to detect hypoxic regions that could be a result of cancer, stroke, and other related injuries. This contrast agent allows for both imaging of hypoxic regions which could result from tumor, stroke, injury, etc., as well as enable perfusion MRI. Because this contrast agent is not Gd-based, it may be better suited for patients with impaired kidney function and be safer overall for patients undergoing MR imaging.

Potential Applications

- Contrast agent for imaging perfusion and hypoxia related to:
  - Cancer
  - Stroke

- Heart disease
- TBI
- Injuries
- Success of transplanted tissue or implanted devices

Benefits and Advantages

- Non-invasively visualize hypoxic regions in the body
- Has a high T2 relaxivity: T2 = 89.9+/-11.2 ms
- Cytocompatibility for up to 8h or direct exposure to cells
- Increase cellular uptake
- In vitro studies showed T2 values of exposed cells under hypoxic conditions significantly reduced, which is attributed to chemical reduction and binding of certain moieties on the contrast agent

For more information about this opportunity, please see

Moghadas - Dissertation - 2021

For more information about the inventor(s) and their research, please see

Dr. Kodibagkar's departmental webpage