

Targeted Contrast Agents for Enhanced Magnetic Resonance Imaging

Metal-free sugar-based MRI contrast agents offer safer imaging for patients with kidney disease and tunable biological targeting.

Case ID:
SJSU ID 2024-006

IP Position:

Patent Pending

Development Status:

TRL 6-7: Representative model or prototype system, which is tested in a relevant environment.

Opportunity

Partners sought for development and prototype testing.

Category(s):

Medical Imaging, Biotechnology, Materials Science, MRI, contrast agent, Molecular Imaging, Healthcare

Keywords:

MRI contrast agents, sugar-derived compounds, 6-oxoverdazyl radicals, ORCA, stable radical, paramagnetic, non-toxic, targeted imaging, gadolinium alternative

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1.0

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Technology Overview

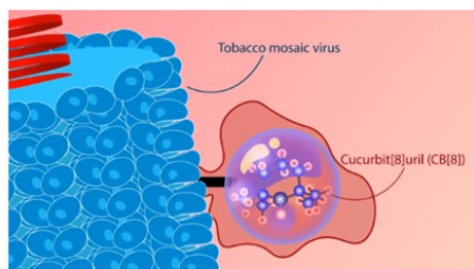
- This invention introduces a novel class of MRI contrast agents derived from sugar molecules, specifically utilizing 6-oxoverdazyl radicals. These sugar-based compounds are designed as metal-free alternatives to traditional gadolinium-based agents. The core innovation lies in the stable radical located on the sixth carbon of sugar molecules, preserving the ring structure and enhancing biological compatibility.
- This approach provides significant safety advantages, especially for vulnerable patients, and offers the potential for targeted imaging applications, such as tumor detection or organ-specific diagnostics. By avoiding heavy metals, these sugar-derived agents also reduce the regulatory and health barriers associated with MRI diagnostics.

Key Features & Benefits

- **Metal-free and non-toxic, safe for patients with renal issues**
- **Tunable chemical structure for targeted imaging applications**
- **High chemical and biological stability during imaging procedures**
- **Reduced regulatory burden and increased patient safety**
- **Potential for responsive or activatable imaging capabilities**

Potential Applications

- **Neurology:** Safe imaging of blood-brain barrier and neurodegenerative diseases
- **Oncology:** Tumor-specific contrast enhancement
- **Cardiology:** Vascular imaging without renal screening concerns
- **Renal and hepatic diagnostics:** Ideal for patients with impaired kidney or liver function
- **Pediatric and repeat MRI applications** where cumulative toxicity is a concern



UT Dallas researchers made a previously ineffective MRI contrast agent brighter and last longer by covering it in a molecular cage called a cucurbituril and attaching it to a tobacco mosaic virus. The research is explained in this short video produced by the journal Chemical Science, a publication of the Royal Society of Chemistry. Watch the video on the Royal Society of Chemistry website.