

Nanoparticles and Imaging Methods for MRI-Guided Stimuli-Responsive Theranostics

Tech ID: 29985 / UC Case 2017-846-0

SUMMARY

UCLA researchers from the Department of Medicine have developed novel nanoparticle and imaging methods for the MRI-guided targeted delivery of therapeutic agents.

BACKGROUND

Magnetic Resonance Imaging (MRI) is a widely used diagnostic imaging platform for both anatomical and functional imaging. MRI is increasingly being used in clinical practice to guide, control, and monitor thermal ablation of diseased tissues by non-invasive high-intensity focused ultrasound (HIFU) or minimally invasive near-infrared (NIR) light inside the MRI scanner. However, MRI-guided delivery of targeted agents remains the subject of early stage exploration.

INNOVATION

UCLA researchers have developed novel MRI-guided stimuli-responsive mesoporous silica nanoparticles (MSNs) for targeted delivery of therapeutic agents. New developments in nanoparticle technology have been combined to deliver materials to specific sites of interest at a cellular level, enhance imaging contrast, and enable controlled release of encapsulated agents. With these engineered nanoparticles, MRI can now be used to spatially identify diseased tissue with enhanced dual contrast imaging, and then locally activate the release of therapeutic agents in a controlled signal-targeted manner.

APPLICATIONS

- ▶ Enhanced dual contrast imaging
- ▶ Precision delivery of therapeutic agents

ADVANTAGES

- ▶ Orders of magnitude greater contrast enhancement and detection performance
- ▶ Precise nanoparticle size uniformity and control
- ▶ High nanoparticle stability
- ▶ High agent uptake capacity
- ▶ Accurate on-demand activation of agent release

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	2022-016090	05/26/2022	2017-846
European Patent Office	Published Application	3938204	01/22/2022	2017-846

RELATED MATERIALS

- ▶ Ambrogio MW, Thomas CR, Zhao YL, Zink JI, Stoddart JF. Mechanized silica nanoparticles: A new frontier in theranostic nanomedicine. *Acc Chem Res* 2011;44:903–13. doi:10.1021/ar200018x; PMID:21675720.
- ▶ Li Z, Barnes JC, Bosoy A, Stoddart JF, Zink JI. Mesoporous silica nanoparticles in biomedical applications. *Chem Soc Rev* 2012;41:2590–605. doi:10.1039/C1CS15246G; PMID:22216418.

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OTHER INFORMATION

KEYWORDS

Theranostics, MRI, nanoparticles, drug delivery, high-intensity focused ultrasound, near-infrared light, targeted-agent delivery, MRI-guided

CATEGORIZED AS

- ▶ **Medical**
 - ▶ Diagnostics
 - ▶ Imaging
 - ▶ Therapeutics
- ▶ **Nanotechnology**
 - ▶ NanoBio

RELATED CASES

2017-846-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ [Mesoporous Silica Nanoparticle Based siRNA/Drug Delivery System](#)

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