ULTRASOUND CONTRAST AGENTS BASED ON BIOLOGICAL GAS NANOPARTICLES
Tech ID: 24015 / UC Case 2013-086-0

PATENT STATUS

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<td>Published Application</td>
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BRIEF DESCRIPTION

Many important biological processes – ranging from simple metabolism to complex cognition – take place deep inside living organisms, yet our ability to study them in this context is very limited. Technologies such as fluorescent proteins and optogenetics enable exquisitely precise imaging and control of cellular function in small, translucent specimens using visible light, but are limited by the poor penetration of such light into larger tissues. In contrast, most non-invasive technologies such as magnetic resonance imaging (MRI) and ultrasound – while based on energy forms that penetrate tissue effectively – lack the needed molecular precision.

To address this need, researchers at UC Berkeley have bridged the gap by engineering new molecular technologies that connect penetrant energy to specific aspects of cellular function in vivo, including the development of highly sensitive molecular reporters for ultrasound based on genetically encoded gas nanostructures from buoyant microorganisms. Gas vesicles (GVs) are gas-filled protein-shelled compartments ~200 nm in size that exclude water but are permeable to gas. UC researchers have shown that GVs produce ultrasound contrast based on the echogenicity of their hollow interiors, enabling them to be sensitively detected in vitro and in vivo. Whereas the physics of conventional microbubble contrast agents dictates sizes larger than one micron and half-lives shorter than a few hours, GVs are nano-sized and inherently stable, enabling a broader range of biological applications. Furthermore, the unique mechanical properties and genetic diversity of GVs enable multiplexed imaging and dynamic biosensing.

SUGGESTED USES

» Ultrasonic imaging

ADVANTAGES

» Optimized for ultrasound technologies, leveraging a platform that is superior spatial and temporal resolution and lower cost compared to other non-invasive techniques

» Unique physical properties and genetic diversity enable multiple modes of imaging and multiplexing

» High sensitivity and stable performance

» Readily detected in vitro and in vivo

RELATED MATERIALS


ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Genetically Encoded Reporters for Hyperpolarized Xenon MRI
- Hydrogels For Cell Derivation and Transplantation
- 3D System For Differentiation Of Oligodendrocyte Precursors From Pluripotent Stem Cells
- Self-Inactivating Targeted DNA Nucleases For Gene Therapy
- Novel 3D Stem Cell Culture Systems
- Directed Evolution Of AAV Vectors That Undergo Retrograde Axonal Transport

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KEYWORDS

ultrasound, ultrasonic, contrast agent, gas vesicles, microbubble contrast, magnetic resonance imaging, MRI, nanotech, nanotechnology, microbubble contrast agent, biosensing, non-invasive, sonography, imaging, nanoparticle, gas

CATEGORIZED AS

» Imaging

» Medical

» Medical

» Diagnostics

» Imaging

RELATED CASES

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