Novel MRI Contrast Agent (Yeda)

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Summary

Novel reporter gene for magnetic resonance imaging applications.The ability to image the duration and location of gene expression in vivo and noninvasively is imperative for the future of biology and clinical medicine. Magnetic Resonance Imaging (MRI) is a widely used noninvasive clinical diagnostic tool that offers views into deep tissues at exquisite spatial resolution. Recently, MRI has emerged as a valuable tool for monitoring the expression of genes by utilizing metal-complexed MRI agents to display transgene activity in vivo. However, administration of metal complexes into tissues and cells is challenging. Intra-cellular metalloproteins such as Ferritin have been utilized as endogenous MRI contrast agents, but offer relatively low sensitivity. The present technology provides a novel Ferritin-based transgene with enhanced MRI contrast.

Applications

Non-invasive imaging of gene expression in transgenic mice models.
Monitoring target gene expression in pre-clinical studies.
Long-term cell labeling and tracking.
Visualization of cellular- and gene-based therapeutics.

Advantages

Does not require delivery of exogenous substrate.
Enhanced MRI contrast over current Ferritin-based reporters.
Conversion to magnetite is achieved in physiological conditions and not by synthetic modification or by extreme heating.

echnology's Essence

erritin, the main Iron storage intracellular protein, contains a paramagnetic ferryhydrate core, and thus was roposed as an endogenous MRI reporter gene. However, Ferritin provides relatively low sensitivity. One way o increase sensitivity of Ferritin is to convert the non-crystalline ferrihydrate in its core into crystal magnetite s has been done chemically, to form magneto-ferritin. The current method enhances the magnetic properties f Ferritin by engineering a Ferritin protein fused to a bacteria-derived peptide. This novel recombinant fusion rotein facilitates conversion of ferrihydrate into crystal magnetite and by this induces MRI contrast. The new onstruct can serve for monitoring delivery and differentiation of cells in vivo in cellular based therapy.

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