

# Magnetosomes as Cellular Markers for Magnetic Resonance Imaging

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## Technology description

### Technical Summary

As magnetic resonance imaging continues to gain favor as a medical diagnostic tool, scientists and physicians seek new ways to improve the resolution of this equipment. Although sites of tumors and other pathologies are often distinct or abnormal in composition relative their surrounding tissues providing a natural contrast, the diagnostic capability of MRI can be improved if additional exogenous, targeted contrasting agents are administered to the patient prior to the scan. Currently, the market bares a number of magnetic contrasting agents including gadolinium and synthetic iron oxide particles, however these elements are not specifically targeted and can not distinguish between living and dead cells. One innovative solution to these short-comings lies in harnessing the potential of magnetotactic bacteria. These bacteria generate membranous organelles composed of magnetic crystals known as magnetosomes which they use to orient themselves in geomagnetic fields. When bacterial magnetosome genes are transfected into eukaryotic cells they are sufficient to induce production of eukaryotic magnetosomes in these cells, and Emory investigators have identified an array of novel applications for this discovery. Various magnetosome-producing cell lines can be designed to target or interact with specific cell types *in vivo*, and following injection into a patient, the location, migration, and proliferation of these cells can be tracked with MRI. The vectors can be transfected into diagnostics cells lines or therapeutic lines such as stem cells. Alternatively, the vector's promotor can be modified and production of magnetosomes (or magnetic properties) can be used a marker in genetic screens.

## Application area

Magnetosomes can be used as a contrasting agent in MRI or markers for geneexpression.

## Advantages

Vector constructs were engineered containing the minimum sequencenecessary to generate bacterial magnetosomes in eukaryotic cells.

Magnetosome-producing cells can used in disease diagnosis, therapy, and as a research tool.

Institution

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