Various types of superparamagnetic particles have been utilized for cell labeling and subsequent in vivo tracking of cell migration via magnetic resonance (MR) imaging techniques. Historically, MRI contrast agents have included iron oxide nanoparticles (e.g. <50nm ultrasmall superparamagnetic iron oxide particles [USPIOs] and >50nm superparamagnetic iron oxide nanoparticles [SPIOs]).

Micron-sized iron oxide particles (often referred to as MPIOs in the literature) offer enhanced sensitivity as even single MPIOs in single cells have been detected via MRI.1-3 MPIOs may be polymer-based particles that are also internally loaded with fluorescent dyes, thereby enabling confocal fluorescence microscopic detection of histologic samples as well.

The migration of a variety of cell types has been studied using MPIOs including (but not limited to): neural progenitor cells,4-6 olfactory ensheathing cells,7 mesenchymal stem cells,8-11 hepatocytes,1-3 hematopoietic stem cells,11 lymphocytes,11,12 macrophages,13-15 endothelial,16 embryonic stem cells,17 smooth muscle cells,16 and tumor cells.5,18

Most of the cell types studied to date endocytose MPIOs readily. However, some cell types are instead surface-labeled with particles via antibody-mediated binding interactions.17 In many cases, cells are labeled ex vivo and then tracked via MRI after transplantation into live animals or tissue phantoms. In vivo cell labeling and tracking has also been cited by a few different groups.4,5,13

In more recent years magnetic particles have also been used as a means to steer cells to a target region of interest in vascular tissue phantoms.19-21 Termed magnetic resonance targeting, this technique makes use of the magnetic field gradient inherent to MRI systems to deliver and track the migration of magnetic particle-labeled cells.

A number of our superparamagnetic particles types have been employed for tracking labeled cells via MRI, e.g. fluorescent magnetic encapsulated and classical,1-18 BioMag19-21, ProMag22-23, and COMPEL2,6,17. Please note that, our magnetic particles are not manufactured as contrast agents per se. They are not supplied as sterile suspensions, and should be washed / sterilized before being exposed to cells (see Product Data Sheet 726 for sterilization protocols).

REFERENCES:


**PRODUCT ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Cat. Code</th>
<th>Description</th>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC03F</td>
<td>Classical Magnetic Polymer, fluorescent</td>
<td>1, 5, 10, or 100mL</td>
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<tr>
<td>ME03F</td>
<td>Encapsulated Magnetic Polymer, fluorescent</td>
<td>1, 5, 10, or 100mL</td>
</tr>
<tr>
<td>ME04F</td>
<td>Encapsulated Magnetic Polymer, fluorescent</td>
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<tr>
<td>UMC3F</td>
<td>COMPEL™ Magnetic COOH modified, fluorescent</td>
<td>1, 5, 10, or 100mL</td>
</tr>
<tr>
<td>UMC4F</td>
<td>COMPEL™ Magnetic COOH modified, fluorescent</td>
<td>1, 5, 10, or 100mL</td>
</tr>
</tbody>
</table>

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**RELATED BANGS LITERATURE:**

- Tech Support Doc 726, Decontaminating Microspheres
- TechNote 203, Washing Microspheres
- TechNote 103, Fluorescent / Dyed Microspheres
- TechNote 102, Magnetic Microspheres
- TechNote 102A, Magnetic Particle Product Lines
- Product Data Sheet 715, ProMag®
- Product Data Sheet 705, COMPEL™
- Fluorescence Spectra Brochure