Miltenyi Biotec

FeraTrack™ Direct

MRI contrast agent for *in vitro* labeling

5 tracking experiments	130-104-185
25 tracking experiments	130-104-186

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1. Description

This product is for research use only.

Components	**1×200 µL FeraTrack Direct Contrast Particles** MRI cell tracking agent (superparamagnetic iron oxide [SPIO] nanoparticles) or **5×200 µL FeraTrack Direct Contrast Particles** MRI cell tracking agent (superparamagnetic iron oxide [SPIO] nanoparticles)
Capacity	**For 5×10^6 total cells, up to 5 tracking experiments** or **for 25×10^6 total cells, up to 25 tracking experiments.**
Product format	FeraTrack Direct Contrast Particles are supplied in a sterile PBS/EDTA buffer solution with an iron concentration of 45 mM.
Appearance	FeraTrack Direct Contrast Particles are a black to reddish-brown aqueous solution of dextran-coated SPIO nanoparticles.
Storage	Store protected from light at 2–8 °C. The expiration date is indicated on the vial label.

For laboratory and animal research use only. Warning: Not for human or animal therapeutic or diagnostic use. Make sure to comply with all laws and regulations governing research on animals.

1.1 Background information

Magnetic resonance imaging (MRI) is the most frequently used technique for serial *in vivo* cell tracking applications due to high resolution of soft tissues, which makes it especially useful for imaging of the brain, muscles, or the heart.[1] In order to improve detectability of transplanted cells and produce a strong contrast against surrounding tissue, intracellular labeling of cells with iron oxide particles before transplantation has been described.[2] FeraTrack Direct Contrast Particles are SPIO nanoparticles specifically formulated for direct uptake from cell culture medium without the need of transfection reagent. Uptake of FeraTrack Direct Contrast Particles was proven by Prussian Blue staining, MRI, and electron microscopy. Biocompatibility was assured by cell expansion and differentiation assays of intracellularly labeled cells. Once within cells, SPIOs can induce decreased signal intensity on T1, T2, and T2*-weighted images.[3]

1.2 Applications

FeraTrack Direct Contrast Particles are optimized for *in vitro* labeling of cell lines (e.g. NIH-3T3, Jurkat), primary cells (e.g. T cells), and stem cells (e.g. mesenchymal stem cells) independent of an additional transfection reagent.

1.3 Physico-chemical properties

Compound: dextran-coated ferumoxide (Fe_3O_4).
Mean particle size: 150 nm (hydrodynamic diameter, intensity weighted).
Dosage: 100 µg Fe / 1×10^6 cells.

1.4 Quality control

FeraTrack Direct Contrast Particles are tested for absence of microbial contamination by Thioglycate and Caso-Bouillon sterility testing.

1.5 Requirements

- Polystyrene cell culture dish, e.g., 6-well plate
- Standard CO_2 incubator
- Cell culture medium
- Phosphate-buffered saline (PBS)

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2. Protocol

2.1 General advices

▲ Read the entire protocol before starting.

▲ Ensure sterile handling of FeraTrack Direct Contrast Particles and cells.

▲ Removal of serum and antibiotics from medium is optional. FeraTrack Direct Contrast Particles can be taken up from cell culture media containing up to 10% serum.

▲ Standard animal handling procedures and local regulations must be followed in case of *in vivo* application of labeled cells.

2.2 Preparation of cells

1. Adherent cells: plate 0.5–1×10^6 cells per 9 cm^2 cell culture dish (6-well plate) in 2 mL culture medium one day before labeling to ensure 90% confluency at the time of labeling.
2. Suspension cells: plate 0.5–1×10^6 suspension cells per 9 cm^2 cell culture dish (6-well plate) in 2 mL culture medium at least 10 minutes prior to labeling.

2.3 Intracellular magnetic labeling

1. Add 40 µL of the FeraTrack Direct Contrast Particles dropwise to the cells.
2. Incubate cells at 37 °C for 4–6 hours in a CO_2 incubator.
3. After 4–6 hours wash cells twice with PBS.
4. Add cultivation medium to labeled cells for subsequent cultivation steps or harvest cells for alternative downstream applications.

   ▲ **Note:** Cell type–dependent, efficiency of intracellular labeling may be increased by adaption of FeraTrack Direct Contrast Particles volume and incubation time.

3. References

1. Rogers, W. J. *et al.* (2006) Technology inside: *in vivo* cell tracking by use of MRI. Nat. Clin. Pract. Cardiovasc. Med. 10: 554–562.
2. Hoehn, M. *et al.* (2007) Cell tracking using magnetic resonance imaging. J. Physiol. 584: 25–30.
3. Bulte, J. W. and Kraitchman, D. L. (2004) Iron oxide MR contrast agents for molecular and cellular imaging. NMR Biomed. 17: 484–499.

Refer to **www.miltenyibiotec.com** for all data sheets and protocols. Miltenyi Biotec provides technical support worldwide. Visit www.miltenyibiotec.com for local Miltenyi Biotec Technical Support contact information.

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