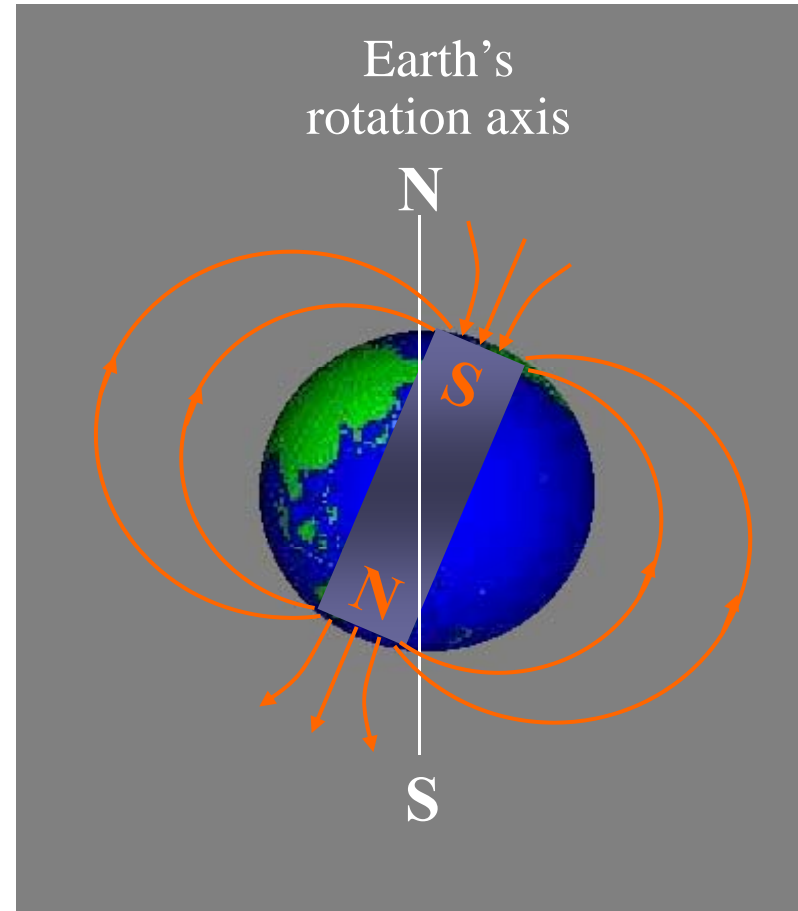
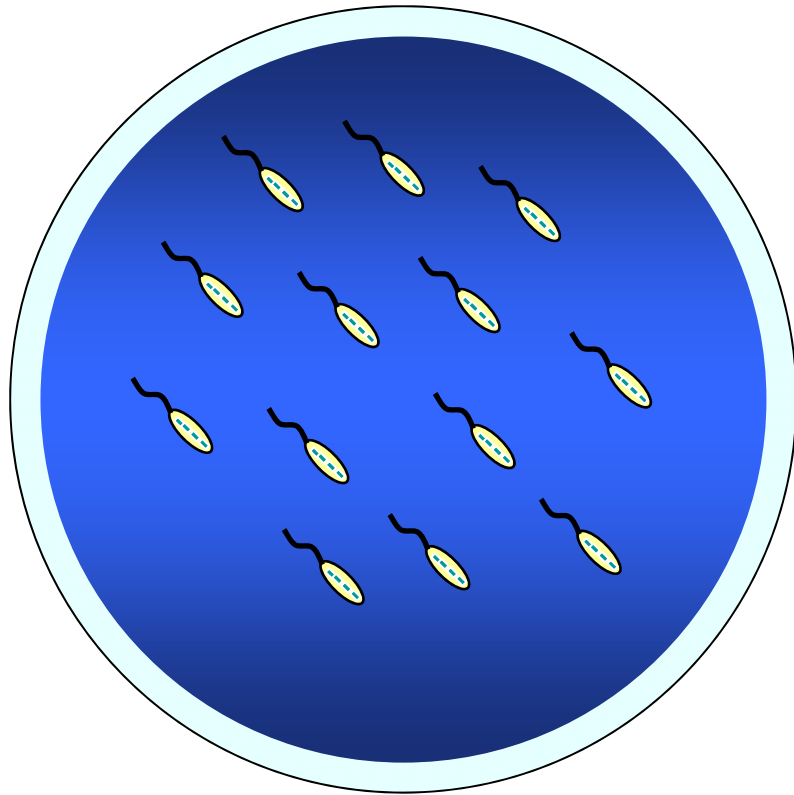
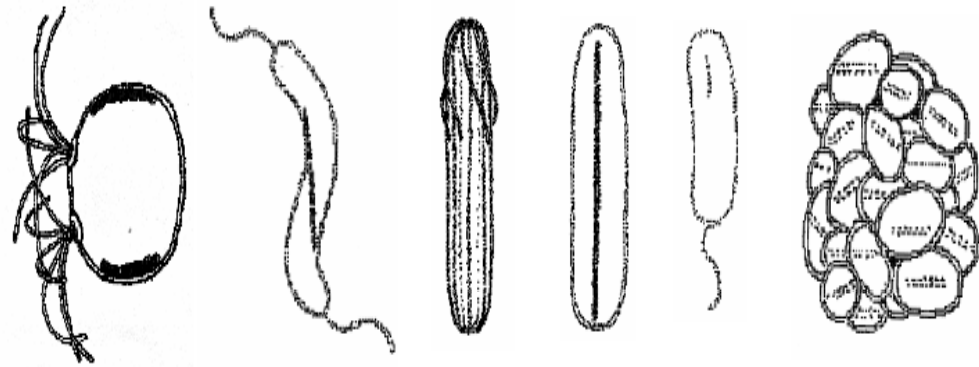
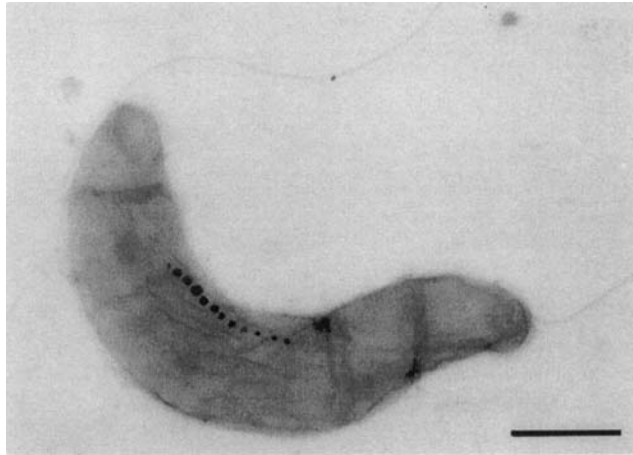


Magnetic Bio-Nanoparticle

Magnetic Bacteria

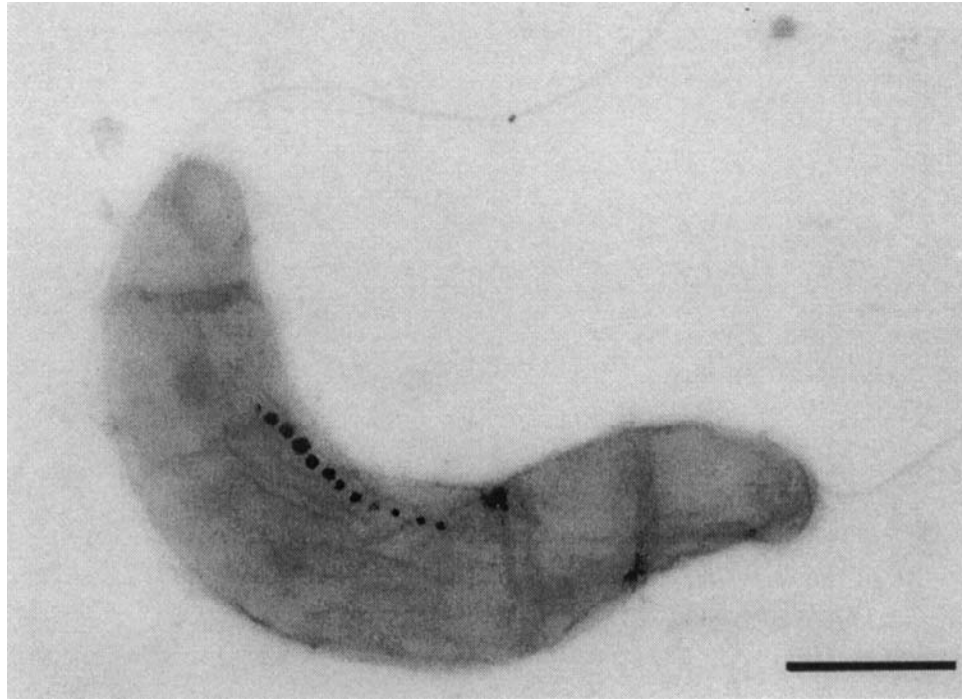


Magnetic Bacteria



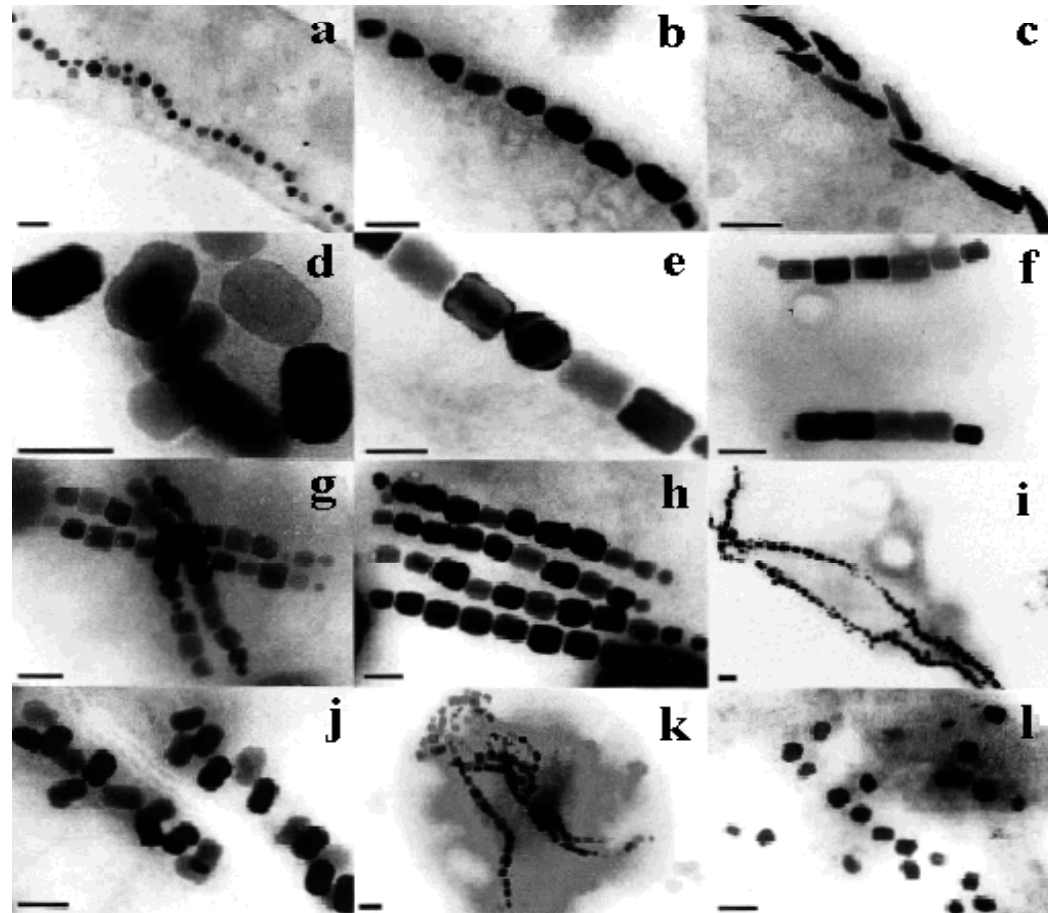
- Various morphology
- Found in the sediment layer of river, lake, and sea
- Swim along geomagnetic field lines – “magnetotaxis”

Magnetic Nanoparticle



- ◆ align themselves along the magnetic field line using magnetite (Fe_3O_4)
- ◆ swim using flagella

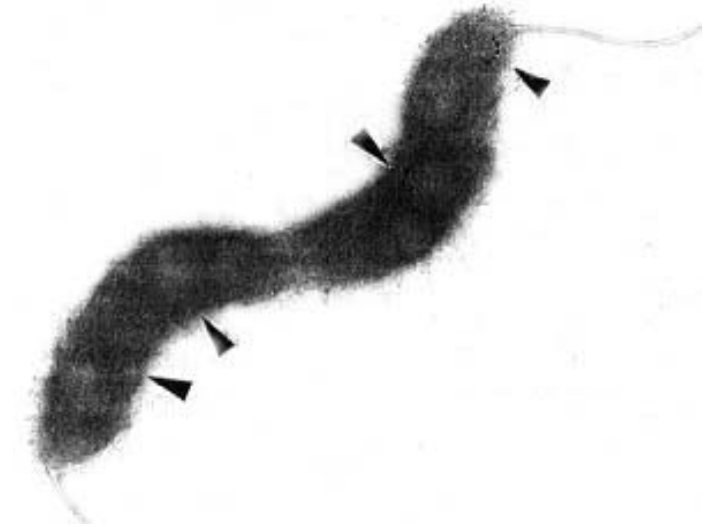
Magnetic Nanoparticle



❖ The bar is equivalent to 100 nm.

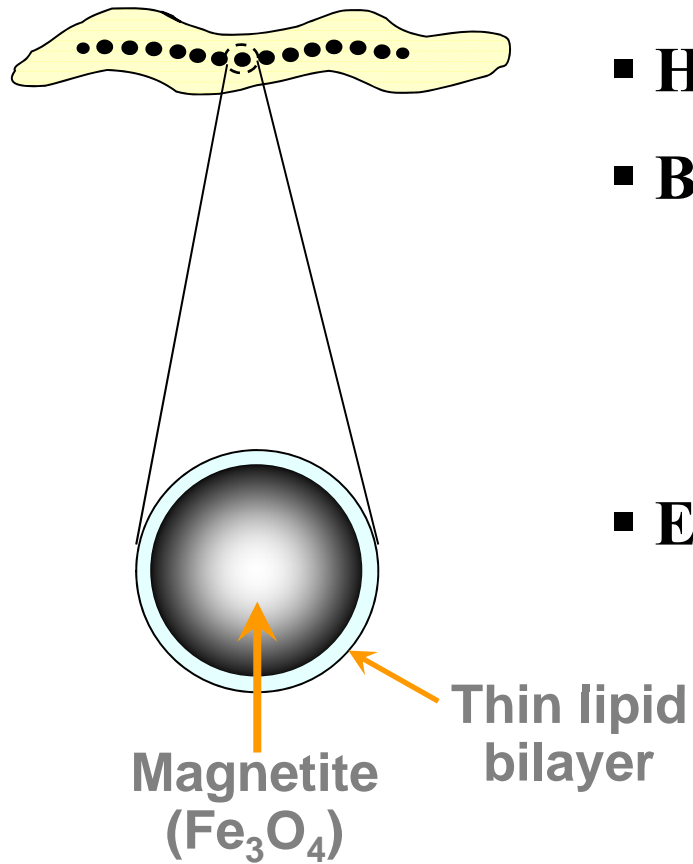
Magnetospirillum sp. AMB-1

Magnetospirillum sp. AMB-1

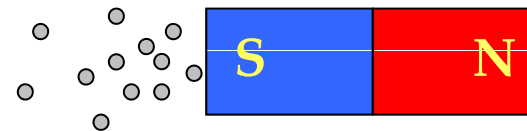


- ◆ Aerotolerant strain
- ◆ Cell size: approximately $3 \mu\text{m} \times 0.5 \mu\text{m}$
- ◆ Magnetite (Fe_3O_4) particles
 - ❖ about 15 particles per cell
 - ❖ average diameter of 50 nm

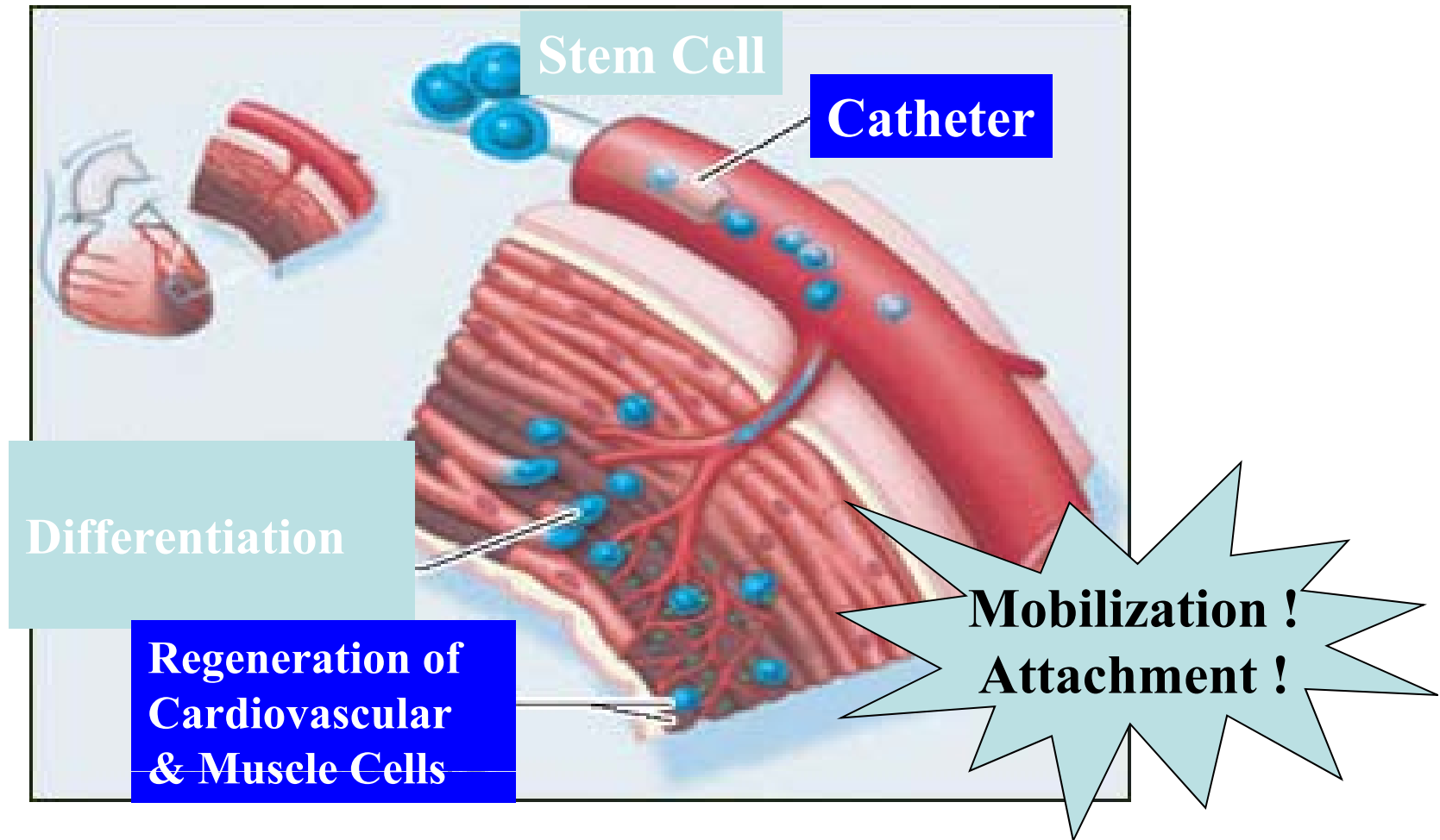
Magnetic Nanoparticle



- Homogeneous shape and size (50 nm)
- Biocompatible surface (lipid bilayer)
 - Hydrophilic
 - Dispersion
- Easy collection from cell using magnet

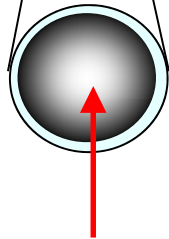
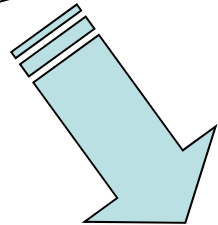


Stem Cell Therapy for Cardiac Regeneration

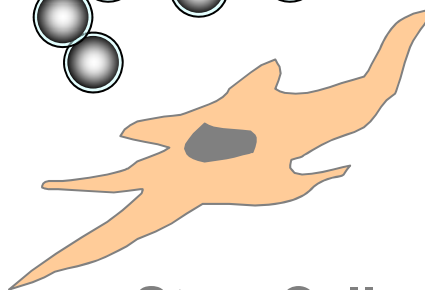
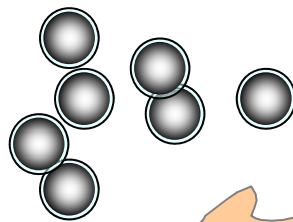


Strategy to Guide/Fix Stem Cell

Magnetic Bacteria

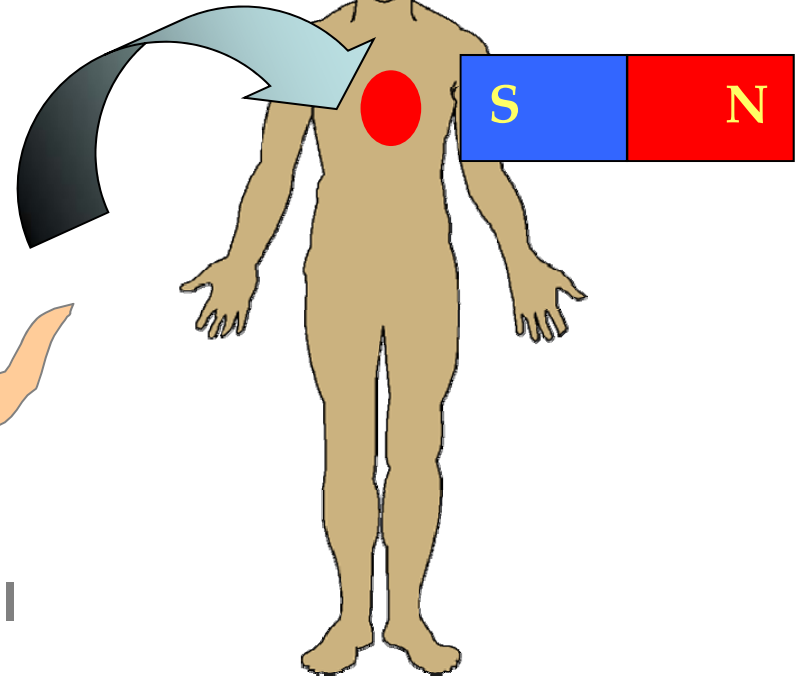


Magnetic
Bio-Nanoparticle



Stem Cell

Guide & Fix



Isolation of Magnetic Nanoparticle

Magnetic bacterial culture (7 days)



Centrifuge (12,000 rpm, 20 min)



Resuspension in PBS (pH 7.4)



Sonication (more than 5 times)



Separation (using a magnet)

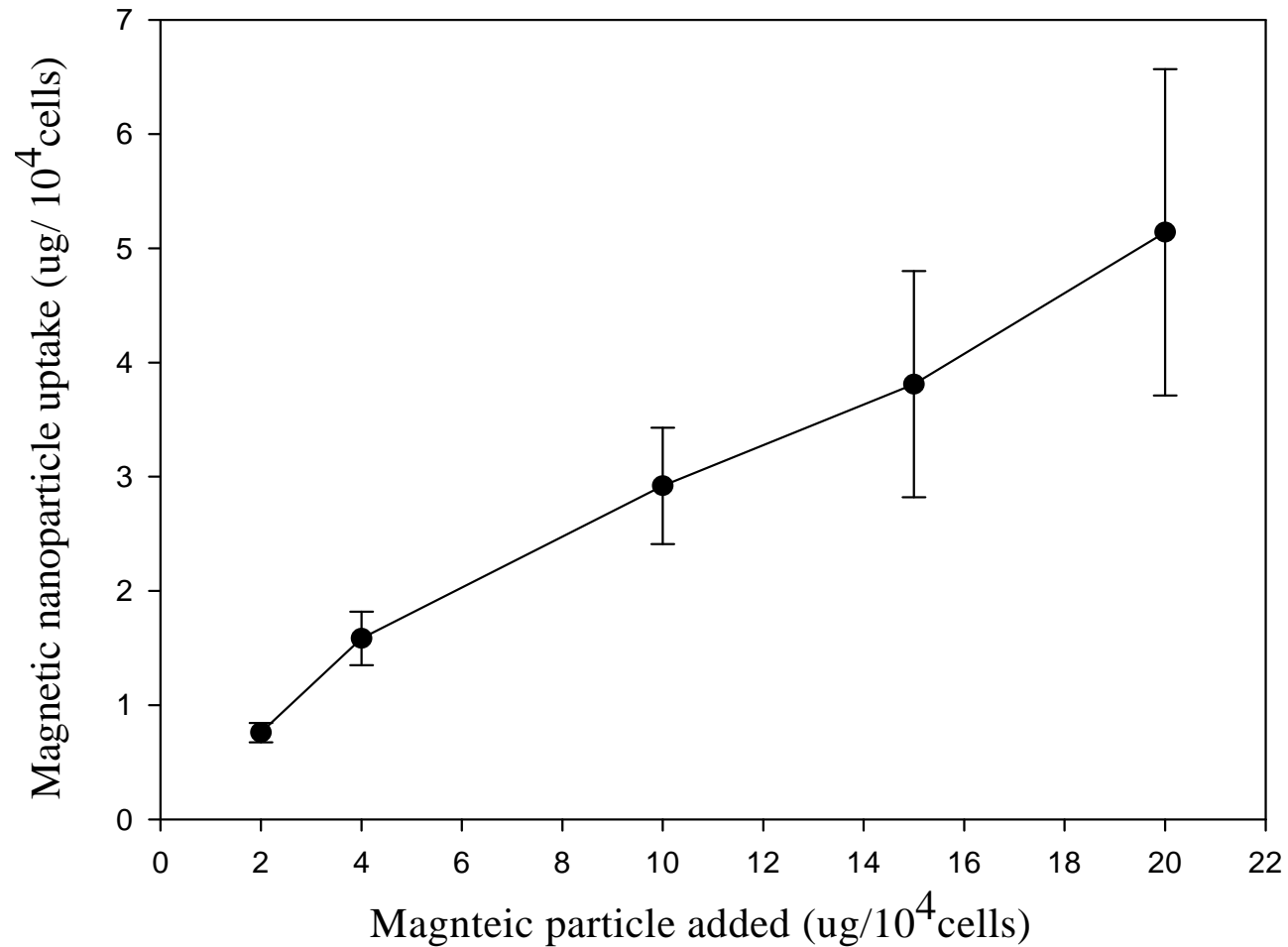


Washing with PBS

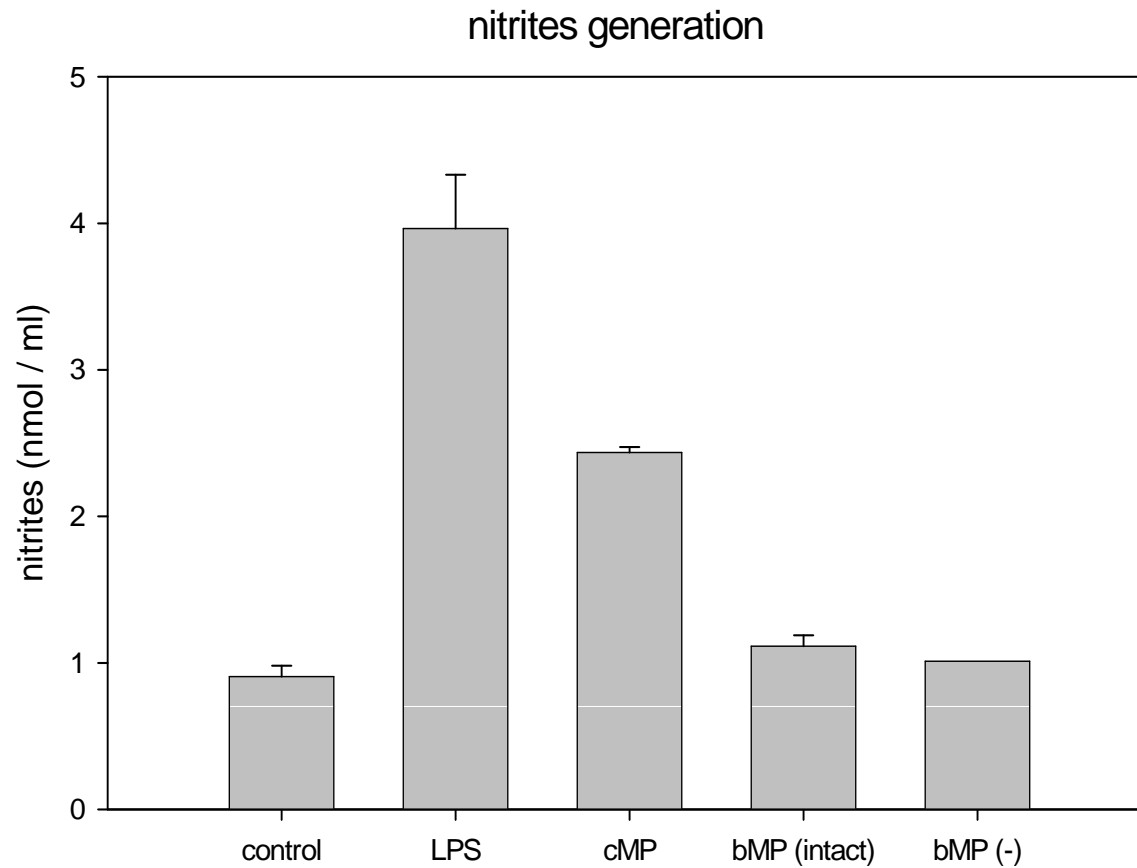


Storage in PBS

Transfection of Stem Cells with Magnetic Nanoparticles



Immunogenicity of bMP on RAW 264.7



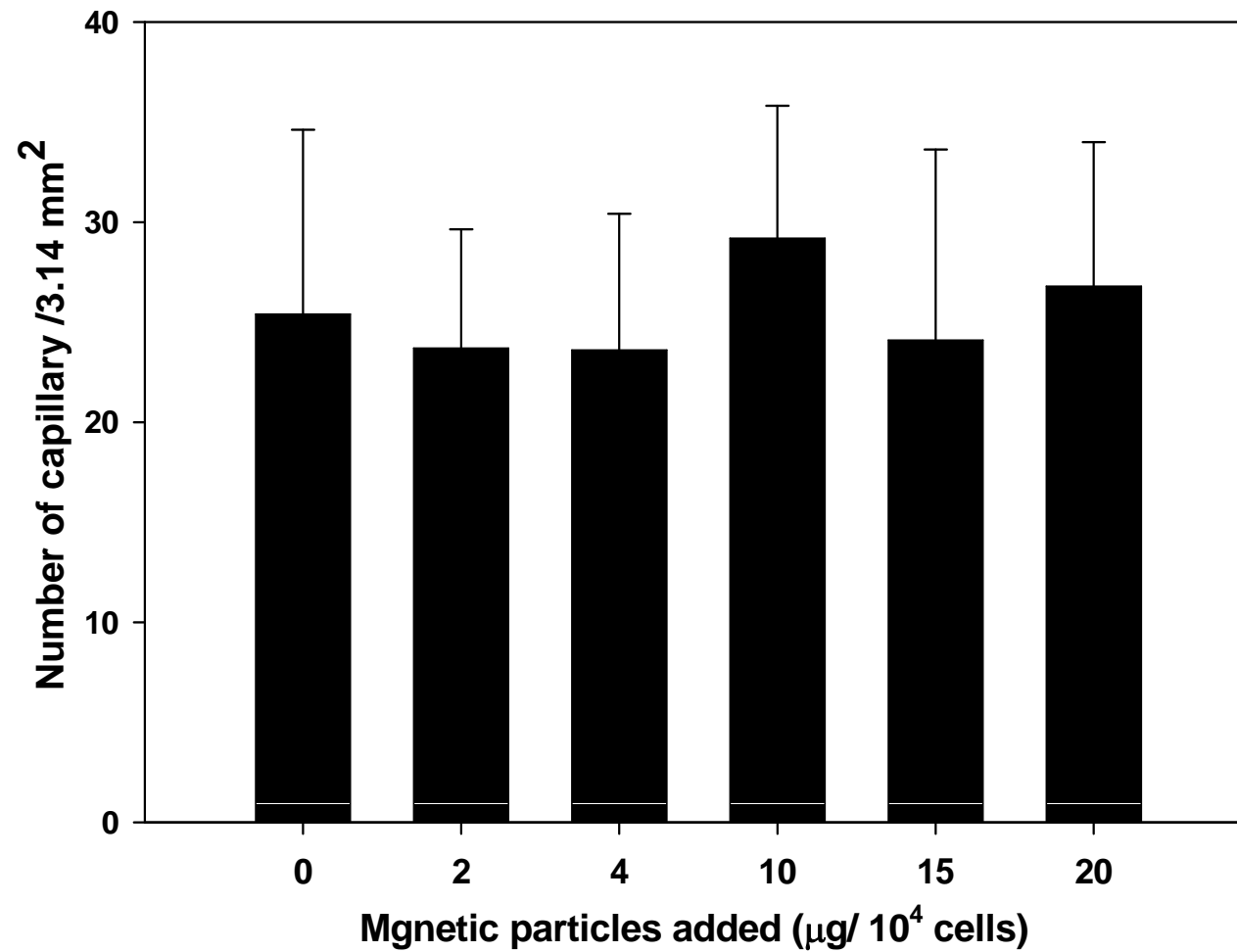
- bMP(-)

- : 24h Incubated w/
Proteinase K

- MNPs conc. : 10ug/ml

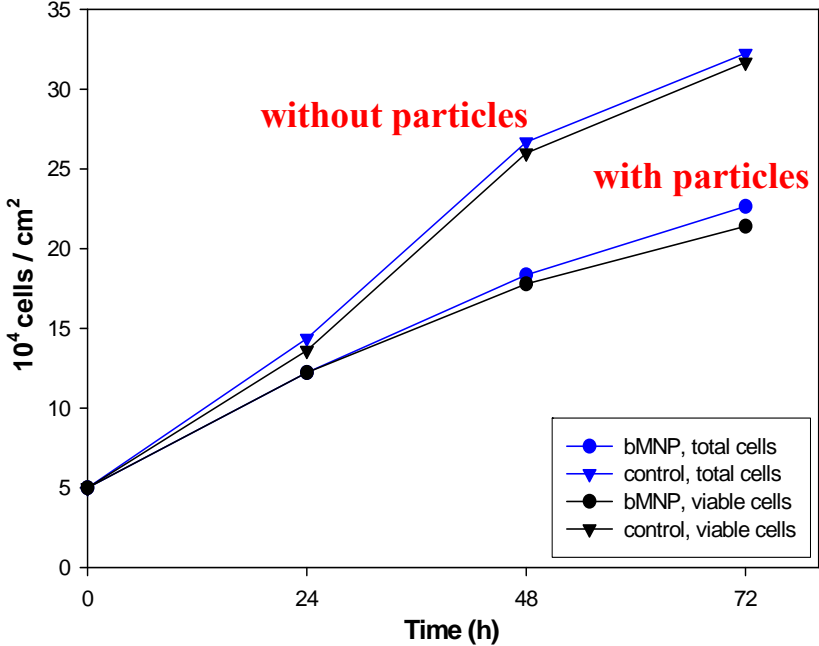
- LPS conc. : 0.1ug/ml

- 24h incubated w/ MNPs

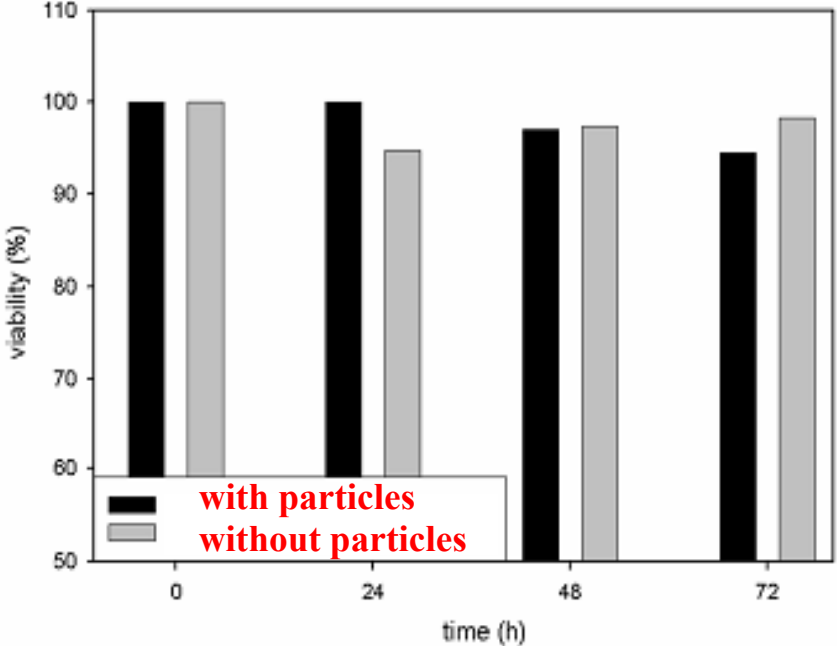


Cell Culture with Magnetic Nanoparticles

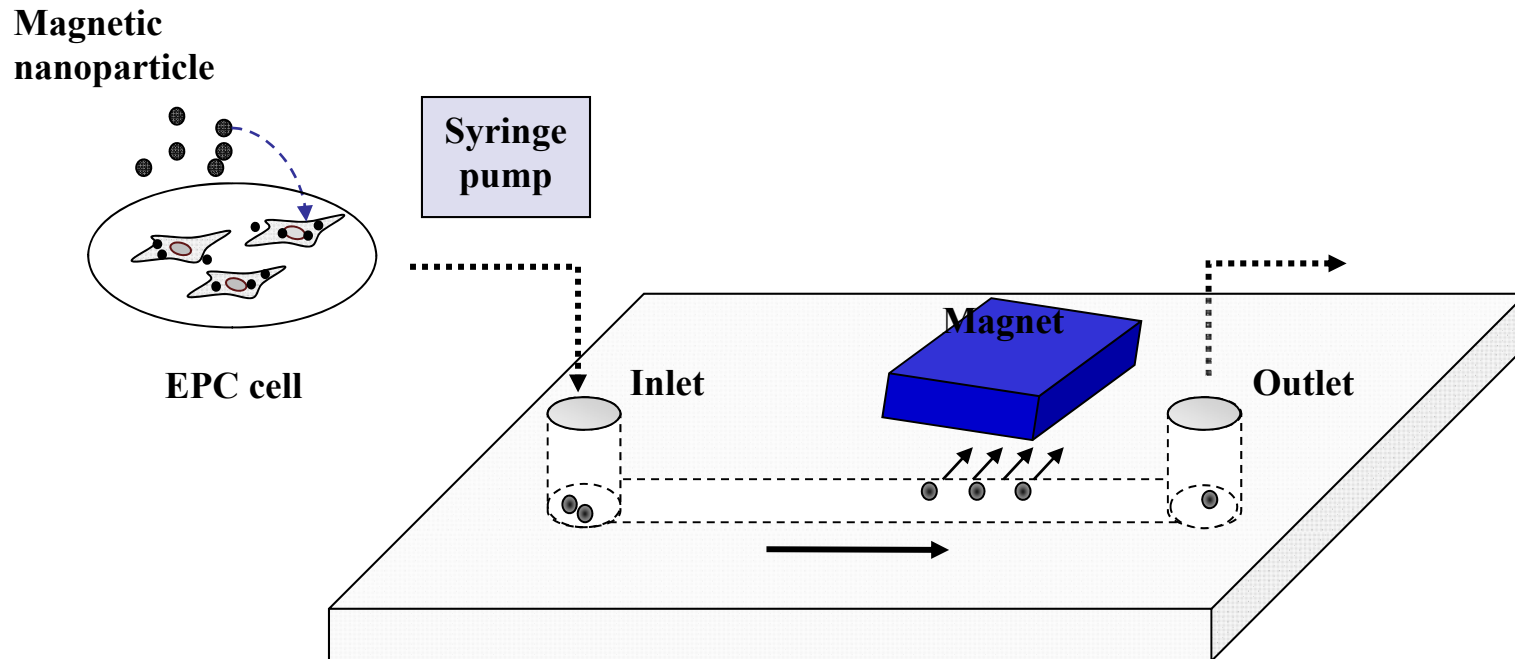
Growth of PC12 Cell



Viability of PC12 Cells



Trapping of Stem Cells with Magnetic Nanoparticles in Flow System



Trapping of cells using magnet

