

Magnetic nanoparticles and their interaction with living organisms

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ABSTRACT: The paper here describes the magnetic nanoparticles and their applications. The special features of magnetic nanoparticles are also explained here. These nanoparticles will be cheap and eco-friendly.

KEYWORDS: cancer therapy; cytoplasm; economical; vesicles

Nanoparticles are very small with a size about 1–100 nm^[1]. The nanoparticles have immense applications in food, agriculture and medical fields. The nanoparticles produced by the biological approach are very economical and eco-friendly.

The magnetic nanoparticles (MNPs) have magnetic properties and are formed from metal oxides^[2]. The MNPs are synthesized by *Magnetospirillum gryphiswaldense*, *M. magnetotacticum*, *M. magneticum*, *Magnetococcus* sp., *Magneto-ovoid*, etc. These are called magnetotactic bacteria which have special features and they can form magnetosomes. The formation of magnetosomes involves four steps: i) formation of magnetosome vesicles; ii) uptake of iron (Fe) by the bacterial cell; iii) transport of Fe inside the vesicles; and iv) biomineralization of magnetite or greigite. The special feature of these magnetotactic bacteria is that their cytoplasmic membrane contains magnetite (Fe₃O₄) and greigite (Fe₃S₄)^[3].

The interactions of MNPs and bacteria are attachment of the MNPs to the surface of cell membrane and formation of invaginations. After this, the MNPs enter the cytoplasm and are enclosed in magnetosomes. Finally, the MNPs are localized to the Golgi complex and are fully internalized into the cells. There is also a report where MPNs aggregate on the surface of the bacterial cell^[4,5]. Till date, the exact mechanism behind the interaction of MNPs with the microbial cells is not yet clear.

Hence, research is needed in the area for the study of MNPs and their interaction the microbial cells.

Conclusion

The MNPs will have immense applications in various fields and this will be significant.

Conflict of interest

The author declares that there is no conflict of interest.

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