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Magnetic nanoparticles in regenerative medicine from cell tracking to guided tissue engineering

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The use of nano-scale materials, particularly of magnetic nanoparticles (MNP) has evolved as an increasing field of research in life sciences. In the past two decades, various iron oxide based MNPs are being explored for applications in magnetic separation, magnetic resonance imaging (MRI), drug delivery, as tracking agents within the emerging field of cell therapy, for guided tissue engineering as well as for hyperthermia (HT) applications. Our research focus on the development of proprietary Fe-Cr-Nb-B MNPs for local delivery of HT aiming the treatment of solid malignancies, for magnetic enhanced cell delivery as well as for magnetic guided tissue engineering. Medium and long term interaction of MNPs with human mesenchymal and stem cells of various origins (bone marrow, adipose tissue) was investigated in regard with their proliferative, differentiation and immune modulatory potential. Cell viability, proliferative as well as mesenchymal lineage differentiation potential was unaffected by the presence of bare as well as chitosan coated MNPs of clinically relevant amount (1-2 mg/mL). Particle retention inside the cell was demonstrated up to 28 days with several particularities related to cell type. We are currently investigating MNP loaded cell behavior after exposure to magnetic field.

Biography

Luminita Simion Labusca is a Medical Doctor, Consultant in Orthopedics and Traumatology. She has completed her PhD in Regenerative Medicine. She has worked as Medical Practitioner, Clinical Researcher and Scientist involved in basic science in various national and international institutes in Belgium, Ireland, Denmark and as well as in South Korea. Scientifically, she has had international collaboration across multitude of EU and US. She has both EU wide and international recognition as a Scientist in Orthopedic and Traumatology, Sports Medicine, Regenerative Medicine, Cell Biology. She is a Reviewer in several international scientific journal boards. She has edited special issue of international peer reviewed journals. She is a Founding Member of Regenero, Romanian Regenerative Medicine Association.

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