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A potential breakthrough in osteoarthritis treatment: Alternative method for cartilage repair by mesenchymal stem cells

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Osteoarthritis treatments such as mosaicoplasty and autologous chondrocyte implantation are frequently used but remain debatable. Mesenchymal stem cell (MSC) therapy has become the main focus of tissue engineering research to achieve functional replacement of articular cartilage. Results showed that MSC originated from bone marrow, adipose tissue, and synovial produce mostly hypertrophic cells.

Purpose: Investigate whether degenerated cartilage holds viable subpopulation of MSC which has the potential to regenerate hyaline cartilage.

Methods: Cells were removed and proliferated in cell culture for 3 weeks from 10 osteoarthritic tibial plateaus. The prevalence of chondrocytes, osteocytes, MSC and hypertrophic chondrocytes was studied. Differentiation capacity of cells into chondrocytes, osteocytes and adipocytes was investigated. Formation of each cell line was determined by Masson trichrome staining for bone and cartilage, HES staining and nil red staining for lipids. Tissues were histologically classified to different grades based on Mankin's scale.

Results: Following 3 weeks of cell culture, the average cell proliferation rate was up to 5 fold. Expression of the MSCs marker CD 105 showed a 6 fold increase in grade 3 and 4 compared to grade 1. MSC marker CD 166 showed only a one fold increase between these grades. Hypertrophic cartilage marker (Collagen type I) increased by 32 fold in grade 3 and 4 compared to grade 1. Cells from all grades had the capacity to form cartilage, bone and adipose tissue.

Conclusion: Results indicate the presence of viable and proliferative cells with progenitor-like characteristics that may represent novel solutions to articular cartilage repair.

Biography

Mazor M is a double masters graduate having obtained a degree in Molecular Biology from the Faculty of Science, University of Zagreb, Croatia and in Bioindustrial technology from the Faculty of Science, University of Orleans, France. She is currently a PhD student at the Centre for Treatment & Prevention of Osteoporosis and Arthritis at Orleans University France. She is also working as a Lecturer in Molecular Biology for the Masters in Muscular Skeletal Pathology at the Faculty of Science, Orleans University France.

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