IJAE
Vol. 120, n. 1 (Supplement): 107, 2015
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

# A synergic effect of alginate and hypoxia-inducing ions on chondrogenic differentiation in adipose derived mesenchymal stem cells

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Cartilage is a highly organized tissue with complex biomechanical properties, but since it has a poor intrinsic capacity of self-healing, injuries at this site usually lead to several problems, often ending in disabling symptoms. Although, different approaches have been proposed, even now cartilage repair represents a great challenge for orthopaedic surgeons (1, 2). One of the promising approach is given from tissue engineering, employing the combination of biomaterials and cell therapy to develop new therapeutic strategies.

In this paper, we describe the behaviour of human adipose derived mesenchymal stem cells encapsulated into Ca/Co alginate beads as potential chondrogenic inducing biomaterial tacking advance on the synergy between alginate matrix and $Co^{+2}$ ions without employing other expensive growth factors such as TGFbs or BMPs.

Cells were cultured up to 3 weeks into alginate beads at different Ca/Co ratio, Calcein/Ethidium assay was performed to evaluate cell viability, light, and transmission electron microscopy were carried out to check the cells behaviour. The expression of chondrogenic markers such as sox9, collagen type II, and versican was investigated by Real Time PCR. The expression of hif1mRNA was investigated to check the capability of $Co^{+2}$ ions to induce a chemical hypoxia. Results showed an high cell viability at high Ca/Co ratio value of alginate beads. Real Time PCR data reveal a different cells behaviour on chondrogenic marker expression.

In conclusion, the synergic effect of alginate and $Co^{+2}$ ions can represent a valid strategy for chondrogenic differentiation of stem cells.

## References

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Keywords

Stem cells; chondrogenic differentiation; alginate.