# COLLAGEN - MODIFIED CHITOSAN HYDROGELS FOR PRIMARY DERMAL FIBROBLAST ENCAPSULATION AND APPLICATION IN SOFT TISSUE REGENERATION

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Obtaining tissue engineered products assumes translating the *in vivo* into *in vitro* by combining natural with synthetic or modified materials. One approach refers to cell encapsulation into hydrogels that are able to mimic the extracellular matrix (ECM) by offering an optimal microenvironment for normal cell functioning, cell-cell interaction, signaling and by presenting adhesion cues for cells, such as the RGD sequence naturally found on collagen [1].

ECM plays numerous roles for anchorage dependent cells and this is why mimicking ECM using tissue engineering techniques can be very difficult. Collagen and polysaccharides are major components of the ECM, having structural role and stimulating cell proliferation, cell migration and adhesion. In this work mix of atelocollagen and partially oxidized chitosan was investigated for the potential to form biocompatible hydrogels which allow cell encapsulation, in the attempt to obtain artificial skin. In the designed tissue engineered construct atelocollagen was used as structural compound to form 3D fibrilar scaffold while oxidized polysaccharide as crosslinker (*Figure 1).*

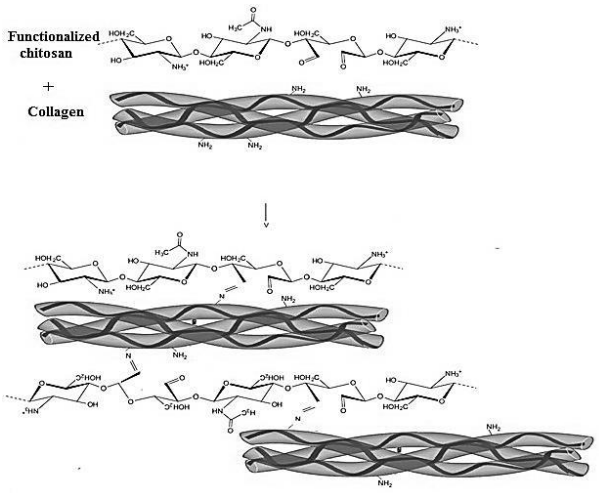


**Figure 1.** The reaction of the collagen crosslinking with functionalized chitosan)

Three ratios of oxidizing agent ($NaIO_3$)/ chitosan were tested in the aim to obtain different degree of functionalization for chitosan [2]. Each degree was used to form hydrogels with different proportions of modified chitosan/atelocollagen. The obtained hydrogels were morphologically assessed (light microscopy, scanning electron microscopy - SEM), tested for cytotoxic action (cell viability assays) and ability to host primary dermal fibroblasts (fluorescent live/death analysis, SEM and Alamar Blue proliferation assay).

Data analysis confirmed that the obtained hydrogels have fibrilar structure, highly biocompatible properties (maintain 90-100% cell viability) and the ability to maintain morphology, viability and proliferation of the entrapped fibroblasts.

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