Influence of the cross-linking process on obtaining innovative hybrid materials with hydrophilic-hydrophobic properties for tissue regeneration

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Cross-linking is an important process in biomedical engineering as it is used to modify the physical properties of various biomaterials. It involves the formation of covalent bonds between polymer chains, which can increase the strength and stability of the material[1]. Particularly in tissue engineering, cross-linking can be used to obtain stable scaffolds that can support the growth of cells[2]. However, it is important to note that the cross-linking process has to be carefully controlled to avoid negative effects on biocompatibility and cellular response. Excessive cross-linking can make the material too rigid, preventing cells from attaching and growing properly. Additionally, some cross-linking agents can be toxic or trigger an immune response[3].

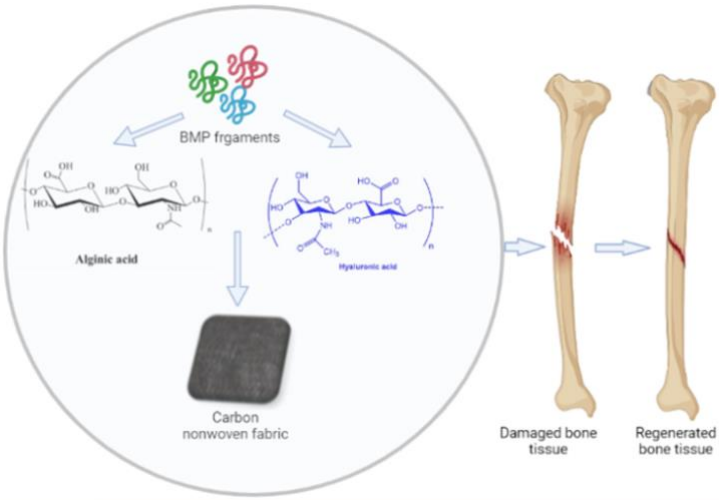

Fig. 1 Scheme of preparation hybrid material for tissue regeneration.

An attempt was made to obtain hybrid materials based on carbon nonwovens with a layer of cross-linked hyaluronan modified with peptides that are fragments of BMP proteins[4]. A variety of cross-linking methods were tested to find the most optimal method from the perspective of the possibility of coating the hydrophobic carbon nonwoven with a hydrophilic hyaluronic acid layer. It was found that chemical cross-linking of polysaccharides is an effective method for the deposition of a polar active substance on the surface of a hydrophobic carbon nonwoven fabric, and the final materials are much more biocompatible compared to the unmodified material based on carbon nonwoven[5].

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