PATENT

Injectable material for the regeneration of articular cartilage

Market sector: Advanced therapies, tissue engineering, biomaterials

Type of opportunity: licensing and/ or co-development

Scope of the problem

In the regeneration of the articular cartilage, various subchondral bone stimulation techniques are used. These surgical techniques are based on injuring the bone below the site of cartilage damage inducing bleeding that opens a path for the migration of pluripotent, mesenchymal cells with chondrogenic capacity, able to produce new cartilaginous tissue. However, very often the tissue formed does not have the structure or properties of the articular cartilage (hyaline cartilage) but rather it looks more like fibrocartilage, softer, which is not functional in the joint and degenerates with time. One of the reasons why the cells that arrive at the defect site are not able to generate the correct tissue is that the biomechanical environment they find is not adequate. Different implants have been developed that aim to protect the cells and transfer to the cells the dynamic compression loads to which the joint is subjected in a similar way as in healthy tissue, but their efficiency is still not fully demonstrated.

Patient need addressed: regeneration of articular cartilage

Our innovation:

- New strategy for the regeneration of articular cartilage based on an injectable material whose implant in the site of a cartilage defect would be combined with a subchondral bone stimulation technique
- The material consists of a mixture of synthetic microspheres, SMs (biodegradable polymer), and autologous microspheres, AMs (produced from the patient's own tissue)
- A bleeding at the defect site is produced by microfracture, nanofracture or drilling of the subchondral bone
- The mixture of the two types of microspheres is injected and soaked in the blood being embedded in the blood clot. Next, the defect is covered with a synthetic membrane that sticks to the clot, covering the defect
- The surgical procedure can be performed by arthroscopy
- Within three months, in a rabbit knee model, the organism has displaced the biomaterial and a tissue with the histological aspect of the native one and a fully functional articular surface has replaced the defect

Competitive advantages: This innovative system creates a biomechanical environment in the place of the cartilage defect that is favorable for the chondrogenesis. Pluripotent cells easily invade the place of regeneration. No extracorporeal manipulation of cells is needed. Release of growth factors from the autologous microspheres can be performed.

Market size/ opportunity: The global market value of tissue engineering products was $10785 million in 2016 and is estimated to reach $22287.9 million in 2025 (BIS Research, 2018). The tissue engineering products are the 22.8% of the total advanced therapies products developed as of 2016 (JMAHP Experts, 2018).
Market value of regenerative biomaterials worldwide was $6.13 billion in 2017 and is estimated to reach $12.09 billion in 2021 (BIS Research, 2018).

Intellectual property

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