

FINAL MASTER PROJECT PROPOSAL



Title

Development of electrospun polymeric membranes for the treatment of degenerative joint diseases

Supervisor(s)

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Summary of the project

Degenerative joint diseases, such as osteoarthritis and joint damage or loss due to trauma, are a great challenge in regenerative medicine as they involve the loss of cartilage and bone, hindering the healing of the joint. The incidence of these pathologies is predicted to sharply increase in the next years, especially in developed countries as the population grows older, the rate of obesity increases and life style is more inactive. Their symptomology involve pain, stiffness, inflammation, loss of mobility and the subsequent reduction in life quality. However, current treatments are only palliative without achieving the regeneration of the joint and resulting in joint replacement. With this scenario, the need to find more efficient and customized treatments is imperative.

In the last years, the development of biocompatible polymeric scaffolds by electrospinning has focused attention due to their potential application as effective scaffolds even for targeted drug delivery in many tissue engineering applications. The possibility to fabricate these scaffolds provide biocompatible and controlled and targetable drug release possibilities, providing the required support for tissue regeneration and achieving customized treatments to fulfil efficient healing.

The main objective of this proposal is to fabricate electrospun scaffolds with three different layers to address the complexity of joints in order to regenerate at the same time cartilage and bone.

The specific objectives are:

1. Synthesis and characterization of electrospun scaffolds based in polycaprolactone, hydroxyapatite and hyaluronan.
2. Fabrication of the three layers' scaffolds.
3. Study of the cytocompatibility of the synthesized scaffolds.