HOT-SCAFF Extended:

NIR-responsive scaffolds for deliberate regulation of transgene expression in bone tissue engineering

ADRESSED PATHOLOGY: Trauma, bone regeneration

GENERAL OBJECTIVE:

This project will continue testing the hypothesis that bone regeneration can be enhanced by remote control of the temporal and spatial patterns of regenerative molecule production. To this aim, cryogels or ELRs containing in their composition different photothermal nanostructures will be prepared. The mechanical properties of these scaffolds will make them suitable for bone tissue engineering applications. Upon NIR-laser irradiation, the resulting local heating will activate the production of regenerative factor/s from cells incorporated in the scaffold that harbor a heat-activated and ligand-dependent gene switch. This method will be used to control the production pattern of two different growth factors (GF). Murine mesenchymal cell lines containing a rapamycin-dependent switch will be used to control the expression of the GF. The tissue intermediates will be characterized in vitro and tested in an animal model of orthotopic ossification.

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