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Combined therapeutic medical device and stem cells for regenerative nanomedicine

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In our group, we explore a new generation of smart living implants combining not only active therapeutics but also stem cells, as a novel strategy to regenerate stabilized cartilage and avoid prosthesis, by achieving regeneration of its subchondral bone foundation, requirement which is failing today in the clinic. In our group, a unique nanotechnology strategy is used to entrap, protect, and stabilize therapeutic agents into polymer coatings: nanoreservoirs, covering nanofibres of implantable nanofibrous membranes for bone and cartilage regeneration. Upon contact with cells, therapeutic agents become available through enzymatic degradation of the nanoreservoirs. As cells grow, divide, and infiltrate deeper into the porous membrane, they trigger slow and progressive release of therapeutic agents that, in turn, stimulate further cell proliferation. The nanoreservoirs technology enables to reduce the quantities of required therapeutic agent (compared to soaked membranes for instance) thereby reducing costs. Clinical trial: phase 1 Horizon 2020, (FR, UK, SP, SW) will be submitted. Feasibility and safety assessment of a therapeutic implant based on an active polymeric wound dressing and autologous mesenchymal stem cells derived from bone marrow for the treatment of femoral cartilage isolated lesions

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