

8th International Conference on
TISSUE SCIENCE AND REGENERATIVE MEDICINE
September 11- 12, 2017 Singapore



Nadia Benkirane-Jessel

*French National Institute of Health and Medical Research, France
Université de Strasbourg, France*

Combined therapeutic medical device and stem cells for regenerative nanomedicine

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 nanofibers 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.

Biography

Nadia Benkirane-Jessel is a Research Director and Head of the Osteoarticular and Dental Regenerative Nanomedicine laboratory at INSERM (French National Institute for Health and Medical Research), France. She has received her PhD from University Louis Pasteur, France for the work on development of pseudopeptides as synthetic vaccines. She has then held a Postdoctoral position in collaboration with the Institut Pasteur, France, working on immunotherapy HIV and another Postdoctoral position on the application of modified peptides as vaccines against FMDV (Plum Island Animal Disease Center, ARS, USDA, Greenport, USA). She has joined the INSERM U595 in 2002 as a Post-doctorate and received a Diploma to direct the research (HDR) in 2004. She possesses expertise in diverse fields of molecular and cellular biology, immunochemistry, tissue engineering and biomedical engineering. In the last 10 years, she focused her research on the bio-functionalization of multilayered polyelectrolyte architectures with emphasis on the use of these architectures to induce specific cellular responses and gain control over cell proliferation and differentiation. She has 138 peer-reviewed publications in high impact factor journals, 5 chapter reviews and 5 international patents and is a regular referee for a number of scientific journals.

Nadia.jessel@inserm.fr

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