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POSTER N. 85

ELASTIN-LIKE RECOMBINAMERS FOR MULTI-MODAL DRUG DELIVERY SYSTEMS

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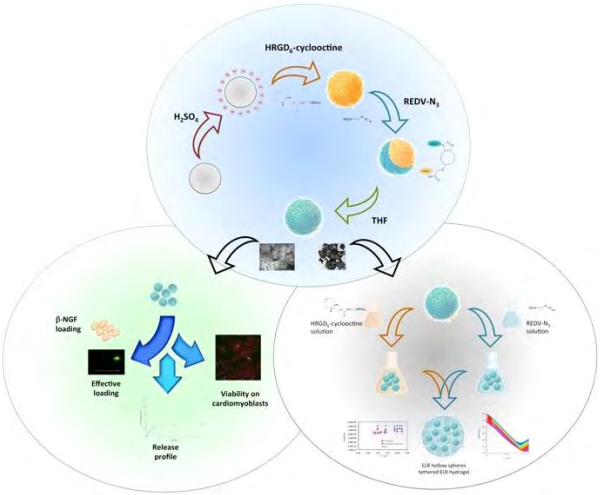
Elastin is a protein with a key role in most of mammalian tissues and it is widely expressed in the extracellular matrix present over myocardium, cartilage and skin. Its elastogenic feature relies on the main cellular components of the tissue network, for instance, endothelial cells, fibroblasts, chondrocytes and keratinocytes [1]. Although elastin is physiologically synthesized at a young age in humans, its lack in natural synthesis causes a disadvantage throughout aging. A clever strategy to overcome such an issue is based on the development of genetically-engineered elastin-mimicking peptides fabrication, so-called elastin-like recombinamers (ELRs). This is an elegant strategy aimed for balancing the low availability ofnatural elastin and fine-tuning the biomaterial structuring and behaviour. Relevant advances in thefield are associated with the investigation of the morphological, mechanical, *in-vitro* and delivery- related properties of ELRs-based systems, fabricated in the form of either hydrogel or microspheres. Different scaffold constructs are studied herein, i.e., microspheres, hydrogel and microsphere-integrated hydrogel, in order to assess their delivery suitability and thoroughly understand the hierarchical complex structuring mechanisms. We used two ELRs (1- $HRGD_6$-cyclooctyne, 2-REDV-N_3) modified with the two different reactive groups needed to form hydrogels *via* a copper-free click-chemistry reaction and functionalized with two different bioactive sequences RGD and REDV that would promote cell adhesion. In this study, the most stable and optimal concentration ratio of ELRs-based hollow spheres exhibited no reduction in cellular metabolic activity. The sacrificial template-based method [2] allowed us to engineer hollow spheres with a first layer of the ELRs $HRGD_6$-component, followed by a second layer of the ELRs REDV-component, by click-chemistry. The ELRs hollow spheres-tethered ELRs hydrogel was prepared by adding the pre-fabricated ELRs hollow spheres priorthe hydrogel click reaction. The hydrogel construct was studied with rheology, NMR and SynchrotronRadiation SAXS (SRSAXS). Hollow spheres were characterized by TEM, SEM, DLS and FT-IR. Drug upload and release were assessed by means of ELISA, confocal microscopy and all constructs were successfully tested for cell metabolic activity, revealing no cytotoxicity.



ELR-based hollow microspheres were fabricated and successfully entrapped into an ELR-hydrogel matrix. Release studies have been conducted to validate the ELRs-based platform suitability as drug delivery system.

References

[1] Rodriguez-Cabello, et al., Methods Mol Biol., 811, 17 (2012);
[2] Dash, B.C., Mahor, S., J Control Release, 152(3), 382 (2011)

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