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MATERIALS FOR THERAPEUTIC DELIVERY

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Host: Prof. Dr. Aránzazu del Campo

Growth factors (GFs) are signaling molecules that play essential roles in tissue development by driving cell differentiation, cell migration and proliferation, and have potential clinical utility in regenerative medicine. However, commercial products containing growth factors are rare and their use is very restricted, with several safety warnings issued by regulatory bodies due to their side effects. This is because GFs need to be administered at supraphysiological doses, due to their short half-life and rapid clearance in vivo. This talk will present engineered hydrogels for GF delivery. These materials are inspired in the mechanism by which the extracellular material in natural tissues sequesters and coordinates GF availability in vivo. The developed hydrogels loaded with ultralow amounts of GFs (vascular endothelial growth factor or bone morphogenetic protein-2) promote angiogenesis in vitro and osteogenesis in vivo. In combination with a commercial material, the new hydrogels improved bone regeneration in veterinary patients.

In the context of drug delivery devices, engineered living therapeutic materials represent an innovative concept for sustainable, sustained and on-demand delivery of therapeutic proteins. However, they also present a significant challenge in terms of their many possibilities to interact, adapt, evolve and eventually modify their targeted tissue. Within the Leibniz ScienceCampus, I am developing preclinical models to investigate and predict the performance and safety of living materials in medical contexts, with a current focus on the interactions with epithelial barriers. The results of my work will contribute to develop a roadmap for risk assessment and translation of engineered living materials into advanced and safe therapeutic products in the future.