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Role of the extracellular matrix in tissue regeneration and development of a new class of therapeutic agents in regenerative medicine

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Abstract

Heparan sulfates (HS) are key elements of the extracellular matrix (ECM), which store and protect various cell communication peptides (CCP). HS play a central role in tissue homeostasis, by modulating the bioavailability of CCP hence controlling the cell migration and differentiation required for healing processes. Tissue injury will lead to destruction of cells and surrounding ECM are destroyed. CCPs synthesized by inflammatory and circulating cells can then promote tissue repair, but with a loss of tissue quality, leaving scars or fibroses. We have engineered biodegradable nano-polymers mimicking the HS. They bind to the structure proteins of the damaged ECM, and to the CCP produced by healthy neighboring cells, thereby restoring the ECM microenvironment and tissue homeostasis. This matrix therapy approach has considerably improved the quality of healing in various animal models with reduction or absence of fibrosis resulting in a real regeneration process. These HS mimetics have therefore been named RGTA, for ReGeneraTing Agents. The RGTA technology has been validated in over 80 published preclinical studies and is now marketed as a human healing agent both for corneal and skin ulcers. RGTA are in development for moretissue injuries including mucosis, tendon, and muscle. Altogethers these study underline the potential of RGTAs as a new therapeutic class in the field of regenerative medicine, simple safe and exploiting our natural potential without need for exogenous cells supply but can combine with cell therapy to restore cellular microenvironment and favor homing.

Biography

Denis Barritault graduated in Math and Physics, completed his Ph.D. in biochemistry in Paris University. Post doctoral in molecular immunology at Pasteur Institute and NYU as NIH Fogarty Fellow he joined INSERM unit in Paris as developmental biologist. He made the first description and patents of FGF extracted from retina in 1979 and 82 as skin and cornea healing agent, became full professor at Paris East University in 1985, founded and directed a CNRS Laboratory on cell and tissue regeneration until 2003. He is now President of OTR3, Emeritus Professor and author in over 200 publications and 29 patents.