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Heparan sulfate of the glycosaminoglycan matrix as key regulators of stem cells properties: Toward new strategies for the treatment of degenerative diseases

Patricia Albanese

University Paris-Est Créteil, France

Sulfated glycosaminoglycans (GAGs) such as heparan sulfate (HS) and chondroitin sulfate (CS) are very important macromolecules involved in homeostasis regulation of cell niches in numerous tissues. They are associated to core protein and constitute the superfamily of heparan sulfate proteoglycans (HSPGs) and CSPGs present on the cell surface and in the Extracellular Matrix (ECM). They are known to play fundamental roles on self-renew, clonogenicity, proliferation, differentiation, migration and survey of numerous cell types. Such functionality is linked to their ability to interact with heparin binding proteins (HBPs), including growth factors, cytokines and chemokines. Interactions of sulfated GAGs with HBPs ensure the link to their high affinity receptors and then participate to crucial cell signaling pathways. The specificity of these interactions is linked to precise sulfation pattern of the disaccharides that constitute GAGs. According to the tools of our glycomic platforms we are able to purify and characterize GAGs species, as well as their chemical signature and functionality on HBP and cells. Since many years, our team demonstrated that GAGs structural modifications are involved in regulation of physiological processes during aging and in regulation of pathological ones, such as vascular remodeling and inflammation, during degenerative diseases. The characterization of these glycanic targets permit also to propose innovative therapeutic strategies based on the use of matrix products to optimize current limiting steps of therapeutic uses of stem cells: Mobilization for purification, clonogenicity for amplification and survey for engraftment in basically deleterious degenerative context. We propose to illustrate such strategies by examples of our results in brain, vascular and osteo-articular systems.

Biography

Patricia Albanese is Professor in Cell Biology and Biochemistry in UPEC. She studies GAG effects on stem cells properties and biomaterials association for Tissue Engineering application in regenerative medicine. She has obtained numerous grants from french government and patient foundations, as well as institutional and industrial supports, as main coordinator of projects to develop associated matrix and cellular therapeutic products. She has 25 Publications in international journals and 1 patent her credit, and experiences in management of researchers and students (MD, engineers, Post-Doc, Ph-D, Master). She collaborates with chemists and polymerists on GAG tools development (Pr. D. Papy-Garcia, Head of CRRET lab) and has strong collaborations with rheumatologist clinicians and academic teams that master pre-clinical murine models of degenerative pathologies (AP-HP Hospital and Inserm). CRRET lab is a 35 people unit that has all the facilities for characterization of polysaccharides on glycomic platform, molecular interaction analysis, cell culture, flow cytometry, histology, animal models.

albanese@u-pec.fr

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