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Reprogramming ASCs into endothelial cells to induce angiogenesis in ischemic tissue

Abstract:

Peripheral artery disease is growing in global prevalence. Its most severe form, critical limb ischemia (CLI), is associated with high rates of limb loss, morbidity, and mortality. Adequate angiogenesis, as a compensatory mechanism in response to ischemia, may increase oxygen and nutrient supplies to tissues and protect their function. Therapeutic angiogenesis has been the most promising therapy for treating ischemic diseases. In recent years, stem cell transplantation has been recognized as a new technique with therapeutic angiogenic effects on ischemic diseases. Adipose-derived stem cells (ASCs), characterized by their ease of acquisition, high yields, proliferative growth, and low immunogenicity, are an ideal cell source. ASCs could repair and regenerate damaged tissue by direct differentiation and by their secretome, whereas many other approaches rely only in cell-secreted paracrine factors. However, its clinical use has been hampered by the recognition of different factors such as aging, cardiovascular diseases risk factors and metabolic disorders, which negatively affect pluripotency and self-renewal capacities of ASCs, showing impaired angiogenic potential. Indeed, the spontaneous regenerative capacity for ASC self-renewal appears to be regulated by the anatomical white adipose tissue reservoir. Preconditioning ASCs by overexpression of endothelial transcription factors, will differentiate ASCs into ECs increasing their capacity to form new blood vessels. Reprogramming ASCs into ECs will be a novel therapeutic prospect for treating ischemic diseases.

Biography

Gemma Arderiu has been working in biomedical research for more than 25 years with a well-established career in the scientific, clinical, and academic aspects on cardiovascular diseases joining institutions like Hospital Clinic (Barcelona), Theodor Kocher Institute (Bern – CH), UCSF (San Francisco – US) and ICCC (Barcelona). Currently, she supervises the research line “Impact of neovascularization on ischemic processes and angiogenesis in cardiovascular disease” at the Institut de Recerca de Sant Pau-IIB Sant Pau (Barcelona). During all these years, her interest has been to improve the health and well-being of patients around the world focusing on the discovery of new therapeutic targets to treat bleeding disorders and ischemic diseases.