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Sommario/riassunto

Tissues and organs have, although sometimes limited, the capacity for endogenous repair, which is aimed to re-establish integrity and homeostasis. Tissue repair involves pro- and anti-inflammatory processes, new tissue formation and remodelling. Depending on the local microenvironment, tissue repair results either in scar tissue formation or in regeneration. The latter aims to recapitulate the original tissue structure and architecture with the proper functionality. Although some organisms (such as planarians) have a high regenerative capacity throughout the body, in humans this property is more restricted to a few organs and tissues. Regeneration in the adult is possible in particular through the existence of tissue-resident pools of stem/progenitor cells. In response to tissue damage, these cells are activated, they proliferate and migrate, and differentiate into mature cells. Angiogenesis and neovascularization play a crucial role in tissue repair. Besides providing with oxygen and nutrients, angiogenesis generates a vascular niche (VN) consisting of different blood-derived elements and endothelial cells surrounded by basement membrane as well as perivascular cells. The newly generated VN communicates with the local stem/progenitor cells and contributes to tissue repair. For example, platelets, macrophages, neutrophils, perivascular cells and other VN components actively participate in the repair of skin, bone, muscle, tendon, brain, spinal cord, etc. Despite these observations, the exact role of the VN in tissue repair and the underlying mechanisms are

still unclear and are awaiting further evidence that, indeed, will be required for the development of regenerative therapies for the treatment of traumatic injuries as well as degenerative diseases.