Development of Advanced Scaffolds and Polymeric Systems for Improved Cell and Tissue Growth

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The recent concern related to skin compromised patients, apart from the nature of the condition itself, such as wounds, chronic ulcers, or burns among others, has triggered and highlighted the importance of the development of artificial skins available in allogeneic donor tissue banks and/or scaffolds, composed by a wide variety of biocompatible, biodegradable and bioactive biomaterials. Within this context, tissue engineering has been in expansion as an attempt to overcome difficulties faced in such situations. The application of scaffolds, produced or not by nanotechnology, in the skin of a patient induces cells to proliferate and get organized on extracellular matrix regenerating tissue. Ionizing radiation is a particularly useful technology capable of promoting sterilization and cross-linking of the scaffold structure thus offering several possibilities for the development of advanced systems suitable for cell growth. Taking into account the variety of clinical applications of tissue engineering, the aim of this study was to investigate by means of histological tests, chemistries and non-destructive tests, the interaction of mesenchymal stem cells grown in vitro in conjunction with different frameworks in order to understand how the mesenchymal stem cells behave in different niches. Among those collagen, PVA, chitosan, PDLLA scaffolds were the systems of choice and γ-irradiation was applied for sterilization of the systems, as well as cross-linking for the PVA based scaffold. Thus this work allowed the achievement of dermo-epidermic matrices populated by epidermal cells that make up the skin and will contribute to the development of a more robust and useful material to be used in several treatments.