Exploring the Regenerative Capabilities of Concentrated Growth Factors: From Structure to Osteogenic Differentiation

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Concentrated Growth Factors (CGF) represent new autologous blood-derived biomaterial, attracting growing interest in the field of regenerative medicine. In this study, the chemical, structural and biological characterization of CGF was achieved. CGF molecular characterization was performed by GC/MS to quantify small metabolites and by ELISA to measure growth factors release; structural characterization was carried out by SEM analysis and immunohistochemistry; CGF has been cultured and its primary cells were isolated for the identification of surface markers by flow cytometry, Western blot and real-time PCR. The osteogenic differentiation of CGF primary cells was evaluated through matrix mineralization by alizarin red staining and mRNA quantification of specific markers by real-time PCR. We found that CGF has a complex inner structure capable of influencing the release of growth factors, metabolites and cells. These cells, which could regulate the production and release of the CGF growth factors, show stem features and are able to differentiate into osteoblasts. These data highlight interesting new perspectives for the use of CGF in regenerative medicine.