

Optimization of Cobalt–Chromium (Co–Cr) Scaffolds for Bone Tissue Engineering in Endocrine, Metabolic and Immune Disorders

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Abstract

Approximately 50% of the adult global population is projected to suffer from some form of metabolic disease by 2050, including metabolic syndrome and diabetes mellitus. At the same time, this trend indicates a potential increase in the number of patients who will be in need of implant-supported reconstructions of specific bone regions subjected to inflammatory states. Moreover, physiological conditions associated with dysmetabolic subjects have been suggested to contribute to the severity of bone loss after bone implant insertion. However, there is a perspective evidence strengthening the hypothesis that custom-fabricated bioengineered scaffolds may produce favorable bone healing effects in case of altered endocrine or metabolic conditions. This perspective review aims to share a comprehensive knowledge of the mechanisms implicated in bone resorption and remodelling processes, which have driven researchers to develop metallic implants as the cobalt-chromium (Co-Cr) bioscaffolds, presenting optimized geometries that interact in an effective way with the osteogenetic precursor cells, especially in the cases of perturbed endocrine or metabolic conditions.

Keywords: 3D-printed scaffolds; cobalt-chromium (Co-Cr) bioscaffolds; customized medicine; endocrine metabolic and immune disorders; regenerative medicine; tissue engineering; translational medicine..

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