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COLLAGEN I-COATED TITANIUM SURFACES FOR BONE IMPLANTATION

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Abstract

Biological interactions at the tissue/implant material interface can be modulated by surface-linked cell-signalling biological molecules. Collagen type I, the main extracellular matrix protein of bone tissue, has been widely investigated in biomolecular surface modification of bone-contacting titanium implant devices. Literature reports on the biological effects of collagen-based coatings are, however, often contradictory. From a biomolecular surface-engineering perspective, a possible explanation is that the definition “collagen-coated surface” encompasses widely different molecular and supramolecular structures: adsorbed collagen, covalently linked collagen, crosslinked collagen, fibrillar versus monomeric collagen, and many other variation of this theme. Relevant details are not always described and proper surface characterization is often lacking. This chapter attempts to build up a rational frame of reference to describe surface modification of implant devices by collagen type I from a surface chemistry point of view, as well as to discuss relevant implications for process design.