題名:Cytotoxicity Assessment of Bone Grafting Materials.

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摘要:Collagen was covalently linked to the surface of Titanium (Ti) by a surface modification process involving deposition of a thin film from hydrocarbon plasma followed by acrylic acid grafting. The composition and properties of surface-modified Ti were investigated by a number of surface sensitive techniques: XPS, ATR-IR, atomic force microscopy and AFM force-separation curves. In vitro tests were performed to check samples cytotoxicity and the behavior of osteoblast-like SaOS-2 cells. In vivo experiments involved 12 weeks implants in rabbit muscle as general biocompatibility assessment and 1-month implants in rabbit bone to evaluate the effect of surface modification on osteointegration rate. Results of XPS measurements show how surface chemistry is affected throughout each step of the surface modification process, finally leading to a complete and homogeneous collagen overlayer on top of the Ti samples. AFM data clearly display the modification of the surface topography and of the surface area of the samples as a consequence of the grafting and coupling process. AFM force-distance curves show that the interfacial structure responds by shrinking or swelling to variations of ionic force of the surrounding aqueous environment, suggesting that the aqueous interface of the biochemically modified Ti samples has enhanced degrees of freedom as compared to the inorganic surface of plain Ti. As to biological evaluations, the biochemically modified Ti samples are safe in terms of cytotoxicity and in vivo biocompatibility assessment. SaOS-2 cells growth rate is lower on collagen modified

surfaces, and no significant difference is detected in terms of alkaline phosphatase production as compared to control Ti. Importantly, implants in rabbit femur show a significant increase of bone growth and bone-to-implant contact in the case of the collagen modified samples, confirming that biochemical modifications of Ti surface can enhance the rate of bone healing as compared to plain Ti.