Blood vessels are concentrated within the implant surface concavities : a histologic study in rabbit tibia

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Abstrak

Angiogenesis plays a key role in bone formation and maintenance. Bone formation has been reported to initiate in the concavities rather than the convexities in a hydroxyapatite substratum and the implant threads of dental implants. The aim of the present study was to evaluate the number of the blood vessels inside the concavities and around the convexities of the threads of implants in a rabbit tibia model. A total of 32 thread-shaped implants blasted with apatitic calcium phosphate (TCP/HA blend) (Resorbable Blast Texturing, RBT) (Maestro, BioHorizons®, Birmingham, AL, USA) were inserted in 8 rabbits. Each rabbit received 4 implants, 2 in the right and 2 in left tibia. Implants were retrieved after 1, 2, 4, and 8 weeks and treated to obtain thin ground sections. Statistically significant differences were found in the number of vessels that had formed in in the concavities rather than the convexities of the implants after 1 ($p = 0.000$), and 2 weeks ($p = 0.000$), whilst no significant differences after 4 ($p = 0.546$) and 8 weeks ($p = 0.275$) were detected. The present results supported the hypothesis that blood vessel formation was stimulated by the presence of the concavities, which may provide a suitable environment in which mechanical forces, concentrations and gradients of chemotactic molecules and blood clot retention may all drive vascular and bone cell migration.