



Does concentrated growth factors (CGF) coated titanium implants improve osseointegration?

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Background

Concentrated growth factor (CGF), introduced by Sacco in 2006, is a third-generation platelet concentrate obtained by centrifugation of whole blood samples. The solid CGF produced from this process is composed of a fibrin mesh, platelets, leukocytes, growth factors and CD34-positive stem cells. Coating dental implants has been attempted to accelerate new bone formation at the host-implant interface. Biological coating, such as the coating of titanium implants with different growth factors showed favorable effects on cells residing in the implant bio-environment and on bone healing. Here, we set to examine the effect of concentrated growth factors (CGF) on implant osseointegration in big animal model.

Methods:

CGF-coated and uncoated dental implants were implanted in mandible of 6 male beagle dogs. Under general anesthesia, bi-lateral extraction of six mandibular teeth (premolars and molars) were performed using atraumatic surgical technique. Four to six weeks later, venous blood of each beagle dog was drawn into three custom-made implant centrifugation tubes centrifuged at 2700 rpm for 7-10 minutes, leading to production of CGF-coated implants. Next, each animal subject received CGF-coated implants at the right mandibular side and uncoated implants serving as controls were implanted at the left side. A CT examination was performed after implantation. At the end of the 6-weeks study, the implantation sites were harvested and the bone implant contact (BIC), defined as the direct bone-to-implant interface, and was calculated by histological evaluation and Micro-CT.

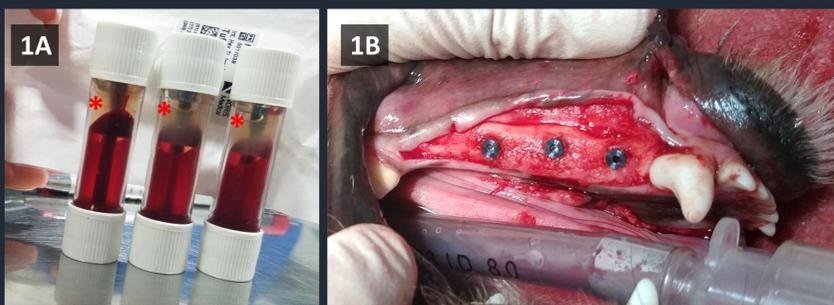


Figure 1 – Implant surgeries. (A) - Custom-made dental implant chambers centrifuged with whole blood, with CGF layer coating the implants (red asterisk). (B) – implants after insertion into dogs jawbones.

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Results

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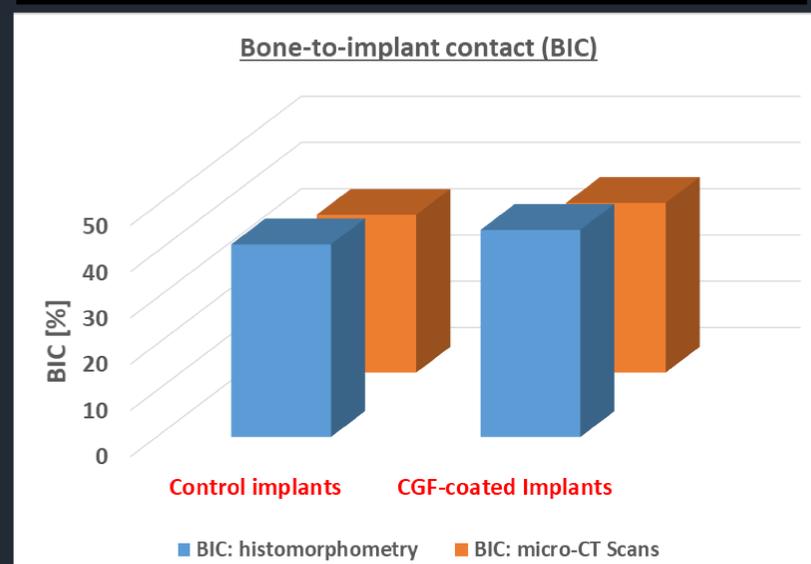
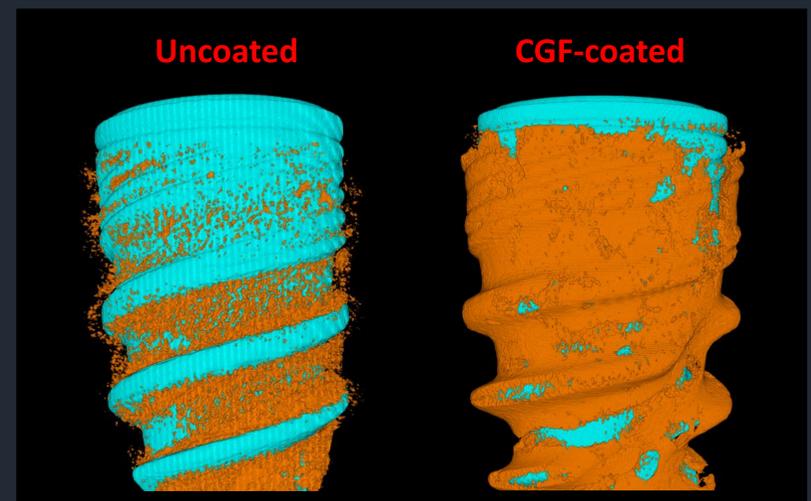


Figure 2 – Analysis of bone formation around dental implants. (A) – 3D reconstruction scanned dental implant specimens, with segmented new bone forming around the implants (orange). (B) – Quantification of 2D histomorphometric and 3D micro-CT based imaging of dental implants specimens harvested at the end of the *in-vivo* study.

Conclusions

The use of CGF-coated implants shows superiority in osseointegration over the control group.