

Animal experimental study of the healing of endosteal implants with vacuum titanium spray and calcium phosphate coating

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_Dental implants are often the only possibility for incorporating a functional denture in patients with marked jaw atrophy or following cancer surgery of the oral cavity. A crucial factor for the success of endosteal implants is the degree of bone deposition on the implant. This is considerably influenced by the bone density in the local tissue. The cortex is thinner in the maxilla compared with the mandible and the cancellous pattern is finer.⁵¹ Long-term clinical and experimental investigations have demonstrated statistically significantly that the success rate of implants is much poorer in the maxilla compared with the mandible.⁶¹

The long-term success of oral endosteal implants requires both osseointegration and a permanent close bond with the soft tissues. This biological behaviour is influenced to a very great extent by the surfaces of the introduced biomaterials, as characterised by the macro-, micro- and nanostructure, along with the chemical composition.¹⁹ When the implant site is of good bone quality and the patient is healthy, treatment with oral endosteal implants has a high rate of long-term success^{2,11,19} so that this form of therapy is now regarded as a scientifically accepted part of dental-

management.¹⁷ Since the introduction of oral endosteal implants, an unloaded healing period of three to six months has become established, depending on the quality of the implant bed. Modified surface structures, which enable osseointegration to be accelerated, might contribute to the early functional loading capacity and are therefore an important aspect of clinical research. The possible influence of the surface on the long-term success of oral endosteal implants is apparent when the surfaces of failed explanted implants are examined.⁴⁵ Apart from modification of implant insertion, modified surfaces are recommended in difficult implant sites in augmented or very spongy bone and are provided by manufacturers.⁵⁴ Scientific investigation to detect a positive correlation between certain surface characteristics and healing behaviour and the time the implants remain in place in vivo is so far lacking.⁵⁴ Because of the greater fracture strength with a simultaneously relatively low weight and excellent corrosion resistance, and because of the spontaneous formation of a passivating oxide layer, titanium has become established as a material for implants. Although the exact mechanism of the bone-titanium

Fig. 1_ Diagram of the bone-implant contact regions.

Fig. 2_ Example of analysis of BIC (bone-implant contact) using the Bioquant method.

