

Bone resorption in periimplantitis: The role of the **RANK/RANKL** system

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_Periimplantitis is an inflammatory process occurring in tissues around an osseointegrated and functioning implant. It is the main reason for implant loss at a later stage, due to the loss of the supporting bone.^{1,2} Detailed epidemiological studies have not been carried out yet. Roos-Jansaker et al.³ could show a prevalence of 16% in their prospective study based on 294 patients. Warning experts forecast a dramatic increase of this complication for the next years, as a result of the demographical development and the increase of the number of implantations. A periimplantitis can develop from a reversible, plaque induced mucositis together with redness and swelling, which is restricted to periimplant soft tissues.^{2,4-6} Then, additional progressive bone resorption and clinical inflammatory parameters like deep probing depth, bleeding on probing and pus can be found. The primary etiological factor is a bacterial infection via oral plaque caused by bad oral hygiene. Proved co-factors are marginal parodontopathies, smoking, genetic risks or minimal keratinized periimplant mucosa.^{7,8} There is no evidence for the involvement of further

factors like systemic diseases, fractures of implants or the role of prosthetic components, alveolar ridge defects or pre-implantological augmentative procedures.⁸ The known structural characteristics of the periimplant subepithelial soft tissue (e.g. scarring, collagen fibers which do not insert and run parallel to the implant surface, lack of vessels), which favor transmigration of pathogens and inflammation also play an important role in pathogenesis. It is still a subject of controversé discussion, whether biomechanically induced functional factors, e.g. occlusal overloading or parafunction can be seen as independent causes, or only as co-factors of the inflammatory process.⁷ Animal experiments have shown that periimplantitis can be induced around implants even without prosthetic components. Experiments in a dog model proved that under inflammatory conditions a significant periimplant loss of bone occurred with or without occlusal loading. However, after intense loading bone loss was increased.⁹ Bone loss can be observed in patients as horizontal or vertical bowl-, funnel- or cleft-like defects (Figs. 1, 2). Schwarz and

Fig. 1_ Periimplantitis, regio 24, implant loosening, female, 60 years.

Fig. 2a, b_ Pyogenic periimplantitis, regio 46, implant loosening, male, 58 years, heavy smoker.



Fig. 1



Fig. 2a



Fig. 2b