PR-I-6. The Effects of Peptide-coated Surface on Osseointegration of Titanium Implants in Rabbits

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Background

As the nature of the implant surface was recognized to be a critical factor for osseointegration (Albrektsson et al. 1981), investigations in the last 15 years have studied the effect of increasing surface microroughness on bone apposition (Buser 2001). Nonetheless, the manner in which titanium interacts with bone is complex, and depend not just on surface topography. Other factors such as the chemical composition of the surface play a crucial role in the early stages of bone formation. For tissue integration to be promoted, the surface of the implant must support the initial attachment and spreading of bone cells, followed by more persistent cellular adhesion, which involves secretion and assembly of an extracellular matrix (Howlett et al., 1994). Pre-coating with fibronectin is a means of promoting cell attachment to surfaces.

Materials and methods

Four mature New Zealand white rabbits were used for the experiment. The flat surface on the lateral aspect of the proximal tibia was selected for implant placement. On the right leg of rabbit, two rough surface implants were installed, and on the left leg, two rough surface implants with peptide(FF5;oligopeptides including fibrin-binding sequence of fibronectin) coating were installed. One was for the histomorphometric analysis, and the other was for evaluation of the removal torque value(RTV) in each leg. The animals were sacrificed after healing periods of 2, 4, 8, and 12 weeks, respectively. For the removal torque testing, a specially manufactured adapter with a square shape was used, which fit precisely onto the head of implants. The removal torque test was performed by applying a counter-clockwise rotation to the implant, about its axis. For the histologic and histomorphometric examination, histologic specimens were made. After microscopic ex-

amination, a photograph of each slide was taken using a digital camera, and the resulting images were saved on a computer. Computer-assisted histomorphometric measurements of the bone-implant contact were obtained using an automated image analysis system.

Results

The RTVs of test group had a tendency to be higher than that of control group. The difference between test and control of 2-week healing was largest. In the case of 4, 8, 12-week healing, the difference was not significant.

The BIC of test group had a tendency to be higher than that of control group. The difference between test and control of 2-week healing was largest. In the case of 4, 8, 12-week healing, the difference was not significant.

Conclusion

Within the limit of our experiment, it is concluded that the surface treatment of implant with synthetic oligopeptide based on fibrin binding sequence of fibronectin stimulate bone apposition in the early stages of bone healing following implant placement.