I. Literature review on UV irradiated implant

A wide range of researches and developments for surface processing had been carried out to increase the success rate of implant including shortening of the healing time for osseointegration, fortification of resistance against infection around the implant and application for difficult cases lack of insufficient initial bone contact area between the apical bone and implant, etc. In particular, interest on appropriate surface finishing of implant for elderly with poor osseous tissues due to rapid aging of population in Korea society and coverage of the cost of implant under the National Health Insurance Plan, thereby reducing the financial burden individuals have to bear. Recently, alkalized with large grit and acid etched (SLA) surface finishing that not only increased the mechanical surface but also optimized the biocompatibility of the implant surface to appear to be recognized as the most generalized surface finishing. However, even the SLA surface finishing evaluated to have most stable surfaceroughness for the implant and UV-friendly displayed manifested biocompatibility of baking after that interact with integration of bone and implant due to adhesion of organic matters such as hydrocarbon in the air at time passes after surface processing. In order to resolve this issue, UV irradiated implant has been introduced. This is a fact that has been researched and utilized since several years ago by professor Ogawa of UCLA, USA. It has been reported that removing organic matters from implant surface through UV irradiation could enhance the integrative ability of bone and implant. Moreover, with UV irradiation, the surface roughness of an implant is increased, thereby enhancing the bond strength between the implant and bone. The integration ability of bone and implant could be increased due to the bone and implant adhesion. However, in order to use the SLA surface finishing as a means of overcoming the limitations of implant processing by beginning with theoretical foundation, this study reviews the clinical application of UV irradiated implant as a means of overcoming the limitation in surface processing by beginning with theoretical and literature review.

I. Literature review on UV irradiated implant

1. Biological Aging

2. Photofunctionalization

3. Superhydrophilicity

4. Effect of UV photofunctionalization

5. Suppression of inflammation around the implant

6. Overcome the Limitation in Surface Processing of Implant! UV Irradiation

7. UV Photofunctionalization

8. UV Irradiation Droped to 20% Level after 10 Minutes of UV Irradiation

9. Removal of organic matters such as hydrocarbon

10. Superhydrophilic implant surface after more than 1 month of surface processing becomes 40~50% of the implant surface prior to UV irradiation dropped to 20% level after 10 minutes of UV irradiation with no change even if the duration of UV irradiation is increased.

11. Fig.4-2: Photofunctionalization of Titanium Implants / Takahiro Ogawa, 2014

12. Implants / Takahiro Ogawa, 2014

13. Subjective and objective evaluation of integration ability of bone and implant

14. Fig.4-4: Intraoral photograph. A, UV group after 96 days, B, non-UV group after 100 days, C, non-UV group after 30 days, D, UV group after 100 days 96 days after dental function.

15. Light microscopic images of titanium disks before and after UV photofunctionalization. These images show peri-implant tissue at 3 weeks after photofunctionalization. Images before photofunctionalization are shown of 10μL of water on acid-etched implant surfaces (left) and sandblasted titanium (right). In contrast, there was no observation of bone absorption in the top portion of the UV photofunctionalized implant and it could be observed that the interface between the bone and the implant was maintained. (Fig. 5) Resultantly, UV irradiation appears to suppress the progress of inflammation around the implant. Effect of Ultraviolet Irradiation of the Implant Surface on Progression of Periimplantitis-A Pilot Study in Deer (Kakuda et al., 2010)