The evaluation of antibacterial activity of TiN sputter coating and plasma nitriding on titanium implant

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Peri implantitis which is one of etiologic factors associated with implant failure is mostly caused by bacteria, and can be prevented by inhibiting bacterial adhesion on implant surface. The aim of this study was to evaluate the response of Streptococcus mutans (S. mutans) and Porphyromonas gingivalis (P. gingivalis) via crystal violet staining assay on titanium surface modified by TiN sputter coating and plasma nitriding on titanium. The specimens were divided into 3 groups; polished titanium (control group), titanium modified by DC magnetron sputtering (group TiN-Ti), and titanium modified by plasma nitriding (group N-Ti). The surface characteristics of specimens were observed by using the nanosurface 3D optical profiler and field emission scanning electron microscope. Group TiN-Ti were showed TiN layer 1.2 μm in thickness and group N-Ti was identified as plasma nitriding with X-ray photoelectron spectroscopy. Roughness average (Ra) of all specimens values ≤0.2 μm, threshold Ra, which has no effect on bacterial adhesion. No significant differences of S. mutans adhesion between the surfaces of control, group TiN-Ti, and group N-Ti (P>0.05). In the result of the adhesion of P. gingivalis, there was no statistically significant difference between group TiN-Ti and control group, while group N-Ti had statistically significant higher absorbance level than the other groups (p<0.05). This indicates that too much thin modified surface could not influence the bacterial adhesion because of deficient of masking effect. Therefore TiN layer must be thick enough to make masking effect but also surface roughness values under “threshold Ra”, 0.2 μm.

Biography
Hyun-Pil Lim is an Associate Professor and the clinical director in department prosthodontics at Chonnam National University School of Dentistry, Gwangju, Korea. He received his dental degree from Chonnam National University School of Dentistry and completed his prosthodontic training and doctorate from Chonnam National University School of Dentistry. He is the director of The Korean Academy of Prosthodontics (KAP) and Korean Academy of Stomatognathic Function and Occlusion. He has published more than 30 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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