White Paper WP-2
Chemical stability of SurfLink® Dental treated implants

1. Introduction

SurfLink® Dental surface treatment by NBMolecules® has been designed to overcome the shortcomings of today's calcium phosphate coatings whilst maintaining the biomimetic phosphate-like groups which are presented to the surrounding bone [1]. The aim of the study was to verify that SurfLink® remains securely bound to the implant surface over a wide pH range. Changes in the elemental composition were measured by XPS.

2. Materials and Methods

SurfLink® Dental treated titanium (grade 4) dental implants were incubated in pH solutions ranging from pH 1 to 9. The implants were incubated at 37°C for either 30min or 24h. Elemental composition of the surface after incubation was assessed by X-ray photoelectron spectroscopy (XPS, Axis Ultra spectrometer, Kratos, Manchester, UK). Plotting the Phosphorous/Titanium ratio of atomic concentrations allowed the comparison of samples incubated in different solutions.

3. Results

After incubation at either 30min or 24h in the different pHs (Figure 1) only small differences equivalent to the expected experimental variation were observed in the elemental composition of the implant surface.

In contrast to calcium phosphate coatings, SurfLink® Dental forms a monolayer which is covalently bound to the titanium surface [2]. Thus, the risk of dissolution, delamination, and particle release into the body, observed with calcium phosphate coatings [3,4,5], is avoided with SurfLink® Dental over a wide pH range.

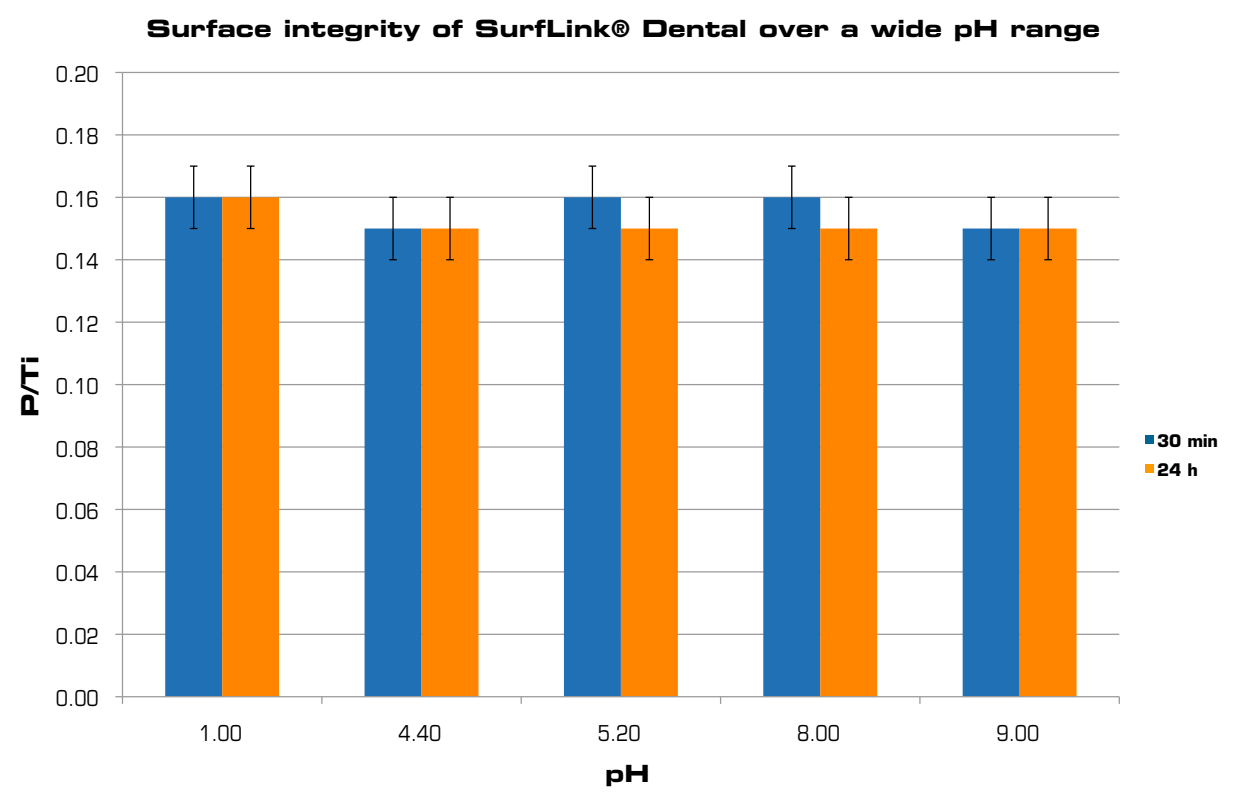

Figure 1: Phosphorous/Titanium (P/Ti) atomic concentration ratios measured by XPS are plotted as a function of pH and incubation time. No significant changes in surface composition were noted. Thus SurfLink® remains firmly bound to the dental implant surface between pH 1 and 9.

4. Conclusion

SurfLink® remains firmly bound to the dental implant surface between pH 1 and 9. The shortcomings of today's calcium phosphate coatings whereby degradation leads to dissolution and delamination under certain physiological conditions are avoided by using SurfLink® Dental surface treatment by NBMolecules®, which promises long-term implant stability over a wide pH range.

5. References

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[4] C.-W. Yang et al., Biological and Biomedical Coatings Handbook: Processing and Characterisation, **2011**, Sam Zhang Edition, CRC Press, Chapter 6.
[5] W. Yongsheng, Biological and Biomedical Coatings Handbook: Applications, **2011**, Sam Zhang Edition, CRC Press, Chapter 1.