# Performance of zirconia implants

**Nairn H. F. Wilson[1] and Igor R. Blum[2]**

## A commentary on

**Lorenz J, Giulini N, Holscher W, Schwiertz A, Schwarz F, Sader R.** Prospective controlled clinical study investigating long-term clinical parameters, patient satisfaction, and microbial contamination of zircona implants. *Clin Implant Dent Relat Res* 2019; **21:** 263–271.

## Practice point

Zirconia implants of the type investigated, may in certain situations be considered an alternative to metallic implants. However, implants should continue to be viewed as a substitute rather than a replacement for natural teeth.


## Abstract

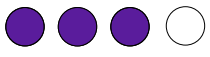
**Design** A prospective, controlled clinical study, conducted at least in part in practice, to compare approximal plaque index (API), sulcus bleeding index (SBI), periodontal probing depth (PPD), probing attachment level (PAL), creeping or recession of the mucosa/gingiva (CR/REC) and pink esthetic (PE) scores between Z-look 3 Implant System dental implants (Z-Systems, Oensingen, Switzerland) and adjacent natural teeth as controls over a mean follow-up period of 7.8 years (range: 6.1–9.7 years). The peri-implant marginal bone levels (MBL) at implant placement and follow-up visits were determined by panoramic radiography and recorded for comparison. Microbial contamination of the implants and control teeth was investigated using Paro Check 20 (Greiner Bio-one, Frickenhausen, Germany; Institute for Mikro-ecology, Herborn-Horbach, Germany). A validated questionnaire to assess patient satisfaction provided data to complement the clinical findings. The study, which lacks a clearly stated hypothesis, was approved by the ethics committee of the University Hospital in Frankfurt, Germany (No. 118/08).

**Sample selection** Thirty-eight 'healthy' adult, partially edentulous patients (15 females, 13 males) with a mean age of 63.5 years (range: 39–80 years of age) were included in the study. A total of 106 zirconia implants were placed in these patients. No details of power calculations or inclusion/exclusion criteria are provided other than 'healthy' and partially edentulous.

**Data analysis** SPSS for Windows statistical software was used for data analysis. The Gaussian distribution was analysed using the Kolmogorov-Smirnov test. As most of the data was 'non-normally' distributed, non-parametric tests were applied. The level of significance was set at 0.05. The Wilcoxon signed-ranks test was used for comparison of the API, SBI, PPD, PAL, CR/REC and microbial data. The analyses could be considered appropriate for the intended purpose.

**Results** The findings presented pertain to 83 implants (38 maxillary and 45 mandibular) and 570 control teeth in 28 patients who remained in the study. The 26% attrition in patients and 22% attrition in implants available for investigation was attributed to 'decease and relocation'. Such attrition was presumably anticipated and factored into power calculations given the mean age of the patients being 63.5 years at the beginning of the study. A survival rate of 100% is reported with 'no major complications' despite 'biological impairment' having been observed in one patient, resulting in increased bone resorption, PPDs and recession/attachment loss affecting both implants and control teeth. The zirconia implants had a statistically significant lower plaque accumulation ($P$ <0.01) compared to control teeth, whereas peri-implant PPDs were significantly higher around the implants ($P$ <0.01). It is reported that the data presented 'underlines the tissue-friendly properties of zirconia implants'. The mean peri-implant bone resorption (1.2 mm) associated with the implants was interpreted as moderate 'without indication for a growing peri-implantitis'. The microbial analysis 'revealed no statistically significance difference in the total number of bacteria within the peri-implant sulcus when compared to corresponding regions of the CT' (control teeth)'. Several bacteria in the 'red complex', considered to play a vital role in the development of periodontitis, were detected in significantly higher numbers around zirconia implants when compared to control teeth. The results presented are difficult to put into context not knowing how the zirconia implants were restored and loaded in function, and in the absence of information on the maintenance regimes followed by the patients. It would certainly appear that the patients had good oral health both at the outset and throughout the duration of the study.

**Conclusion** Given the limitations of the study and its reporting, it is suggested in the conclusion that 'the superiority of zirconia implants regarding plaque affinity and soft-tissue compatibility could be proven' is not fully supported. Similarly, the conclusion that 'the findings of the present prospective study could prove the ability of zirconia implants to replace missing teeth with maintenance of peri-implant hard- and soft-tissue health' is not considered to be fully supported. That said, the study does demonstrate that in selected patients, assumed to have and to maintain good oral health, zirconia implants of the type investigated may be found to have good clinical performance, assuming the implants investigated were all restored at an appropriate time following placement and were in function throughout the duration of the study.


**GRADE rating** 

## Commentary

Clinical research conducted at least in part in practice, on the performance of zirconia implants is to be welcomed. Reading

through the paper it is frustrating and disappointing not to have more information on the management and use of the implants following placement and the maintenance care received by the patients through the course of the study. The detailed microbial investigations and analysis, while interesting, yielded relatively little except the need to do more research on 'red complex' bacteria and dental implants. The use of orthopantograms for detecting peri-implant bone changes is not ideal. This has also been acknowledged by the authors as a weakness of the study. The discussion is generally good and more balanced than the conclusion which, as indicated above, includes elements which are not fully supported by the size, length and findings of the study.

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**Author Affiliations**

*[1]Director, King's College Maurice Wohl Dental Centre & Head, Department of Primary Dental Care, Consultant, Specialist & Reader in Restorative Dentistry, King's College Hospital Dental Institute*

*[2]Emeritus Professor of Dentistry, King's College London, London, UK.*

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