

The influence of handling and storage conditions on the surface contamination of titanium dental implants.

Neil Meredith and Fredrik Engman
Neoss Research Report

Abstract: It has been reported that the adsorption of hydrocarbons namely Carbon into dental implant surfaces during production and sterilisation may be deleterious to their biologic activity. This investigation reports on the levels of carbon implants arising from conditions simulating implant sterilisation

Introduction

This investigation was specifically designed to investigate the effect of implant packaging and sterilisation on hydrocarbon adsorption on implant surfaces. A number of workers have reported that high surface carbon levels may impair the biological activities and osseointegration around dental implants.

30° without packaging, B in Neoss glass vials and C in commercially available plastic packaging (Nobel Biocare AB; Gothenburg, Sweden). Six implants were analysed using a PHI 660 Scanning Auger Microprobe (SAM). The electron beam was defocused to cover a larger area of the implant surface thereby lowering radiation damage and attaining a more true average surface composition.

Materials and Methods

Grade 4, commercially pure titanium implants were manufactured. They were immediately blasted with an inert media, acid etched, cleaned using a proprietary cleaning technique and immediately stored in hermetically sealed glass transport packaging. One of the major physical changes occurring during exposure to ionising radiation as part of a sterilisation process is an elevation in temperature by 30° for approximately 2 hours. Implants were then divided into three groups; A was subjected to

Results

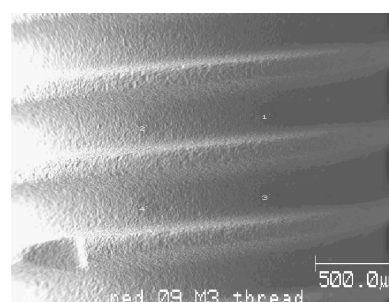
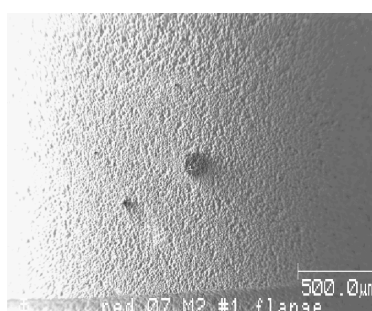
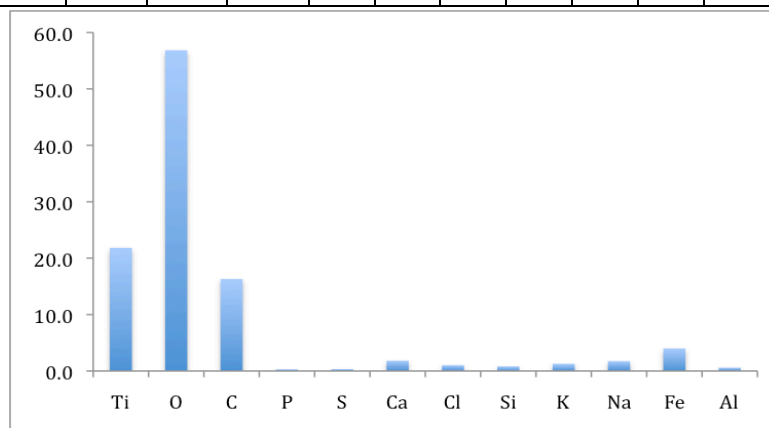
Quantitative AES analysis results by sample in atomic % are presented in Table 1 and graphically in Figure 1.

Conclusions

- Implant surfaces exhibited low levels of carbon and trace elements post manufacturing and storage.
- This indicated optimal conditions for wetting and blood clot formation in line with other dental implant systems

Table 1.

	Ti	O	C	P	S	Ca	Cl	Si	K	Na	Fe	Al
Mean	21.8	56.8	16.3	0.3	0.3	1.8	1.0	0.8	1.3	1.8	4.0	0.6
Std. Dev	2.1	4.6	2.9	0.1	0.1	1.4	1.3	0.3	1.5	0.9	3.8	0.3



SEMS showing AES analysis positions for the flange and threaded portion of one of the test implants M4.

