An in-vitro study of the sterilization of titanium dental implants using low intensity UV-radiation

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Received 20 November 2004; accepted 20 January 2005

KEYWORDS
Bacteria;
Dental implant;
Osseointegration;
Titanium oxide;
Sterilization

Summary Objectives. Commercial titanium dental implants are coated with nanostructured TiO\textsubscript{2}. The aim of the research reported in this paper was to assess whether the TiO\textsubscript{2} at the surface of a dental implant is sufficiently photocatalytic to eradicate bacteria when illuminated with low intensity light.

Methods. The photocatalytic activity of dental implants was established by studies of the photoelectron enhanced decomposition of Rhodamine B. In vitro studies to establish the influence of irradiation with UV light on implant that is immersed in a solution containing \textit{Escherichia Coli} were performed.

Results. It was demonstrated that under low intensity irradiation, 49 \textmu W cm\textsuperscript{-2}, bacteria are killed at a rate of approximately 650 million per cm\textsuperscript{2} of implant per minute. Significance. The results indicate that illumination of dental implants with UV light may be a suitable treatment for periimplantitis.

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Introduction

Dental implants are today successfully used in dentistry for oral rehabilitation supporting mobile or fixed prostheses. Beside undisturbed osseointegration and an adequate prosthetic design, the clinical success of dental implants could be jeopardized by bacterial infection inducing mucositis or periimplantitis [1-3]. Various methods have been proposed for the treatment of periimplantitis including access flap procedures, the use of locally or systemically administered antimicrobial agents, as well as decontamination of the exposed implant surfaces [4,5]. The eradication of pathogenic microorganisms from implant surfaces is a key step for the successful treatment of a failing implant. Several methods for the cleaning of a failing implant surfaces have been described.