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Photofunctionalization: “Revitalizing Dental Implant Surfaces” - A Histomorphometric Animal Study

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ABSTRACT

Objective: Photofunctionalization is a very recent development introduced for rapid, chairside conditioning of dental implants for superosseointegration without altering any morphologic features. All the surface properties that had been lost due to biological aging can be revitalized using this cutting-edge light technology by doing a surface conditioning of the implant immediately before surgical placement. This study attempts to compare and evaluate the degree of osseointegration of UV treated (photofunctionalized) and non UV -treated dental implants surface by histomorphometric analysis in a rabbit model. **Methods:** Proximal femoral condyle of nine New Zealand white rabbits (*Oryctolagus cuniculus*) were implanted with one UV treated and one non-treated implant per animal. All the implants were tapered dental implants (3.2 mm diameter and 8mm length) coated with Calcium phosphate by Resorbable Blast Media (RBM) technique. Photofunctionalisation was carried out using UV chamber [GENESIS LAMINAR FLOW-240-260nm] prior implantation of the study group. Histomorphometric analysis was done after 12 weeks of implantation using Image J software. **Results:** The bone implant contact and bone volume density were analysed using unpaired t test. There was a statistically significant difference in the bone implant contact and bone volume density between the two groups. The mean difference in bone implant contact was 30.2144 ($p=0.000$). Histologic and histomorphometric analysis revealed higher percentages of bone implant contact as well bone volume densities for the UV photofunctionalized dental implants. The newly formed bone was much denser and continuous along the UV-treated implant surfaces at 12 weeks suggesting that photofunctionalisation of titanium enables more rapid and complete establishment of bone-titanium integration. A need to popularize photofunctionalisation as a cost-effective method to promote superosseointegration (biologic capacity) of indigenous dental implants by reducing the healing time and increasing the success rate justifies the study.

Keywords: photofunctionalization, implants, histomorphometric study