EFFECT OF NON-THERMAL ATMOSPHERIC PRESSURE PLASMA JET ON HYDROPHILICITY AND CELLULAR ACTIVITY OF SLA-TREATED TITANIUM SURFACE

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Along the many surface treatment of titanium (Ti) for dental implant, sandblasted with large-grit corundum and acid etched (SLA) treatment on titanium is one of the most popular choices of surface treatment in recent years due to its excellent ability in osseointegration. However, despite such popularity, poor surface wettability of SLA treated titanium has been the main downside and many attempts were carried out to resolve this problem.

Hence, the aim of this study was to investigate the effects of nitrogen based non-thermal atmospheric pressure plasma jet on SLA treated titanium with regard to increase in hydrophilicity and cellular activity.

The SLA-treated Ti specimens (10 mm D × 2 mm H) were exposed to the nitrogen based non-thermal atmospheric pressure plasma jet for 2 or 10 minutes, whereas the control groups were not exposed to the plasma. The contact angle was measured using a video contact angle measuring system for wettability up to 24 hours after plasma exposure, and chemical state of the elements that exist with Ti surface was observed with an X-ray photoelectron spectroscopy (XPS).

Cellular activity on the specimens was evaluated using murine pre-osteoblastic cell line (MC3T3-E1), where the cellular attachment and proliferation were measured by MTT assay after 4 hours, 1, 3 and 7 days.

The results indicated that there was significant ($P<0.05$) increase in hydrophilicity and cellular activity by the effect of the nitrogen based non-thermal atmospheric pressure plasma jet on SLA-treated Ti surfaces.

Hence, it was concluded that the addition of procedure with the nitrogen based non-thermal atmospheric pressure plasma jet treatment just before implantation of SLA-treated Ti into oral defect sites could improve the success of dental implant surgery.