

Atmospheric plasma enhances wettability and cell spreading on dental implant metals

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Abstract

OBJECTIVES:

Treatment regimens, which predictably support re-osseointegration of implants with peri-implantitis, are needed. Increased wettability may be an important factor for re-osseointegration. In this study, a cold atmospheric pressure gas-discharge plasma was applied to reduce water contact angles on titanium discs with different surface topography and to improve the spreading of osteoblastic cells.

MATERIAL AND METHODS:

An argon plasma jet with different oxygen admixtures was used to treat titanium discs with different topologies, i.e. machined, SLA[®], SLActive[®], diamond bur-treated or Airflow[®]-treated. Water contact angles were measured before and after plasma treatment. The spreading behavior of human osteoblastic cells was investigated.

RESULTS:

Contact angle of titanium discs (baseline values: 68°-117°) were significantly reduced close to 0° irrespective of surface topography after the application of argon plasma with 1.0% oxygen admixture for 60 s or 120 s. The cell size of osteoblastic cells grown on argon-oxygen-plasma-treated titanium discs was significantly larger than on non-treated surfaces ($p < 0.001$) irrespective of surface topography.

CONCLUSIONS:

Plasma treatment reduced contact angle and supported spreading of osteoblastic cells. The application of cold plasma may be supportive in the treatment of peri-implant lesions and may improve the process of re-osseointegration.