Abstract Submitted
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**Plasma Biomedicine in Orthopedics** SATSOHI HAMAGUCHI, Osaka University — Various effects of plasmas irradiation on cells, tissues, and biomaterials relevant for orthopedic applications have been examined. For direct application of plasmas to living cells or tissues, dielectric barrier discharges (DBDs) with helium flows into ambient air were used. For biomaterial processing, on the other hand, either helium DBDs mentioned above or low-pressure discharges generated in a chamber were used. In this presentation, plasma effects on cell proliferation and plasma treatment for artificial bones will be discussed. First, the conditions for enhanced cell proliferation in vitro by plasma applications have been examined. The discharge conditions for cell proliferation depend sensitively on cell types. Since cell proliferation can be enhanced even when the cells are cultured in a plasma pre-treated medium, long-life reactive species generated in the medium by plasma application or large molecules (such as proteins) in the medium modified by the plasma are likely to be the cause of cell proliferation. It has been found that there is strong correlation between (organic) hydroperoxide generation and cell proliferation. Second, effects of plasma-treated artificial bones made of porous hydroxyapatite (HA) have been examined in vitro and vivo. It has been found that plasma treatment increases hydrophilicity of the surfaces of microscopic inner pores, which directly or indirectly promotes differentiation of mesenchymal stem cells introduced into the pores and therefore causes faster bone growth. The work has been performed in collaboration with Prof. H. Yoshikawa and his group members at the School of Medicine, Osaka University.

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