Bone-like Apatite Formation on Ultrafine-Structure in Modified Electrolytic Solution

Jae-Myung Jang* and Han-Cheol Choe
Department of Dental Materials, college of Dentistry, Chosun University, Korea(E-mail: hcchoe@chosun.ac.kr)

초 록: Surface modifications are commonly utilized to adjust the properties of the titanium and its alloy surface to the specific needs of the medical applications, but there are disadvantages such as poor osteoconductive properties and low adhesion of bone cell to implant surface. In order to improve these disadvantages, changes in surface properties have an important effect on osseointegration during implantation. In this paper we applied new technological method for improving a unique surface modification using the characteristic of an electrolytic Solution. Thus, in the electrolyte containing NaF in Na2SO4, TiO2 nanoporous was uniformly formed, and HAp nanoparticles were electrodeposited around the TiO2 nanopores, but in the electrolyte containing NH4F in (NH4)H2PO4, the coarse protrusions including HAp nano particles were regularly deposited onto the TiO2 barrier layer. The surface characteristics and the distributed elements and have been investigated by EDS analysis, and ultra-fine structure of surface are carried out using FE-SEM. To investigate the behavior of the anion, the analysis of chemical states was performed by XPS, and the narrow spectrums for Ti2P, Ca 2p, and P 2p seems to be almost similar depending on the characteristics of the electrolyte solution respectively. In addition, Ca 2p spectrum could be resolved into two peaks for Ca 2p3/2 and 2p1/2 at 347.4 and 351.3 eV, which are related to hydroxyapatite. And, the P peak can also be deconvoluted into two peaks for P1/2 and P3/2 levels with binding energy 134.2 and 133.4 eV, respectively. From the result of soaking test, the apatite morphologys were well-formed onto the modified surface according to the different conditions. (This work was supported by NRF: 2015H1C1A1035241 & NRF: No.2008-0062283 ; hcchoe@chosun.ac.kr).