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(多層カーボンナノチューブによる表面修飾は陽極酸化チ
タンの骨伝導性を促進する)

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Multiwalled carbon nanotubes coating accelerates osteoconductivity of anodized titanium

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Abstract

Because of their excellent mechanical, electrical and biocompatible properties, multiwalled carbon nanotubes (MWCNTs) are employed for tissue engineering. Recent studies have also revealed that CNTs provide a preferable surface for cell adhesion and growth. Osteoblast-like cells adhere well and grow on the MWCNT-coated collagen sponge better than on the non-coated sponge. On the other hand, titanium is commonly used as a biomaterial for dental implants because of its excellent mechanical and biocompatible properties. Various surface modifications, *e.g.* anodization and apatite coating, are employed for current dental implants to achieve earlier osseointegration. The purpose of this study was to coat anodized titanium with MWCNTs (CNT-Ti) and investigate the effects of this successfully CNT-Ti on osteoconductivity. Human osteosarcoma cells, Saos2, were cultured on CNT-Ti discs. CNT-Ti wires were implanted in the bone marrow space in femurs of rats for 2 and 4 weeks, and histological and histomorphometric evaluations were carried out. The anodized Ti could be coated homogeneously with MWCNTs. Saos2 cells on CNT-Ti showed prompted proliferation.

After 7 days, the DNA content of the cells on CNT-Ti was significantly higher than for other specimens. Animal experiments revealed that the bone contact ratio on the CNT-Ti was significantly higher than on the anodized Ti alone. Thus, surface modification with MWCNTs accelerated the osteoconductivity of anodized Ti.