

# BIOMECHANICS, BIOENGINEERING & AUDIOLOGY

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## Research of nanostructural surface-modified titanium implants for bone healing: Analysis of characteristics, hemocompatibility and histology in rabbits

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We investigated the early tissue response and osseointegration following implantation of surface-modified titanium implants in a rabbit model. The surface morphologies of biodenta surface-treated (BST) implants were characterized using scanning electron microscopy (SEM). Hemocompatibility was assessed by blood dripping and immersion tests. Moreover, biomechanical properties were evaluated using computer-aided programs with a three-dimensional model. In our animal experiment, implants were inserted into the trabecular bone of 12 rabbits. Each rabbit received two implants: untreated and BST implants. The results showed that surface treatment significantly altered bone-to-implant contact (BIC). At 12 weeks, BST implants exhibited significantly higher BIC values than untreated implants. BST implants exhibited enhanced osseointegration, particularly during the early stages of bone healing. Thus, our results demonstrated that biodenta surface treatment provided a reliable surface modification for dental implants.

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## Current total knee arthroplasty implants are not designed to precisely fit the knees of Asian population

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The mismatch between the implants and the morphology of the knee was one of the main reasons for the need to redesign implants in order to improve postoperative function. The present study was conducted to compare the dimensions of the implants with those of the resected knees using intraoperative morphological data. Anthropometric data were obtained during total knee arthroplasty from February 2010 to June 2015. The dimensions of the resected femur and tibial surfaces was measured and compared with the dimensions of the implants. It was found that mediolateral (ML), middle anteroposterior (AP), medial anteroposterior (MAP) and lateral anteroposterior (LAP) dimensions of the resected proximal tibias showed significant differences according to gender. Compared with currently used tibial implants, the smaller implants showed tibial ML under-sizing and the larger implants showed tibial ML overhang. There was also a significant difference between the genders with respect to the anterior lateral condylar height (ALCH) ( $p < 0.05$ ). When the dimensions of the the anterior medial condylar height (AMCH) and ALCH were compared with those of the native knee, the ALCH was smaller than the native knees (1.3 mm in male, 0.7 mm in female), but the AMCH was larger than the corresponding condyle (1.8 mm in male, 1.8 mm in female). The results of this study demonstrate that current total knee arthroplasty implants are not designed to precisely fit the knees of Asian population. A more anatomic shape of the implants should be designed to obtain improved performance.

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