



Evaluation of interfacial force between osteoblast cells and Hap-Amino acid complex coating by atomic force microscopy

Sarita Morakul¹, Yuichi Otsuka^{2,*}, Yukio Miyashita¹, and Yoshiharu Mutoh²,

¹Nagaoka University of Technology, Department of Mechanical Engineering, 1603-1
Kamitomiokamachi, Nagaoka, Niigata Prefecture 940-2188

²Department of System Safety, Nagaoka University of technology

* Corresponding Author: otsuka@vos.nagaokaut.ac.jp

Abstract.

This study aims at observing adhesive forces between osteoblast cells and Hydroxyapatite (HAp) coating. In order to improve the biocompatibility for dental implants and orthopaedic surgery, the cell adhesion mechanism should be considered. Recently in our research group has developed HAp-Amino acid fluorescent complex using CIP, which demonstrated an enhancement of antibacterial performance during light irradiation. However, differences in cell adhesion mechanism between cell and its complex coating has not been revealed yet. Therefore, it is necessary to investigate the cell adhesive force mechanism to control adhesion behaviour of cell onto implant surface aiming to enhancing biocompatibility. Atomic Force Microscopy (AFM), we could successfully evaluate the surface mechanical properties of commercially pure titanium, HAp coating, complex HAp-phenylalanine coating and complex HAp-tryptophan coating, respectively. Especially Young's modulus of HAp-Amino acid complex was compatible with the one of amino acid, which indicated that the mechanical property of surface can be adjusted using the complexation method. Adhesion force between cells with those surfaces were measured using fixation technique of cells onto the surface of cantilever, and measured adhesive forces were different with/without complex. AFM measurements in medium to detect breakage of adhesion between living osteoblast on the surfaces of coating were also conducted to discuss the difference in adhesive force by cell's condition.

Keywords: Fluorescent complex coating, HAp-amino acid complex, cell adhesive force, AFM and biocompatibility