

Development of new evaluation method for diseased, defected and regenerated bone and its clinical application

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【Outline of survey】

Since bone defects and bone diseases are serious problem for old generation, development of new evaluation and regeneration methods of diseases of their hard tissues has been required. . Biological apatite (Ap) and collagen fibril are predominant in calcified tissue of a body such as bone or tooth, and the combination and microstructure of these substances affect mechanical, chemical and biological properties. In this work new evaluation method will be developed focusing on unique alignment and texture of biological apatite crystallites in diseased and regenerated bone using microbeam X-ray diffractometer instead of bone density. New evaluation technique and X-ray diffraction method are also developed for clinical application.

Effects of applied stress and magnetic field on preferential alignment and texture of Ap in regenerated bone will be evaluated and an (effective method for regeneration of bone will be developed.

【Expected results】

Preferential alignment and texture of biological Ap of each calcified tissue change depending on shape and applied stress. Effects of applied stress and shape can be obtained in regenerated bone. A new technique to examine regeneration process and mechanical properties of the bone can be obtained by preferential alignment of biological apatite using microbeam X-ray diffraction analysis. A design of regenerated bone and improvement of mechanical properties can be performed by control of preferential alignment of Ap during regeneration under applied stress and magnetic field.

【References by the principal researcher】

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【Term of project】 FY 2005 - 2008

【Budget allocation】 78,200,000 yen

【Homepage address】 <http://www.mat.eng.osaka-u.ac.jp/mse3/>