



The 21th Biomechanics Seminar

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京都大学 再生医科学研究所 東館5F ルーフテラス

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演 題 : **Analysis of preferential orientation of biological apatite crystallites in bone and strategy for regeneration of anisotropic bony tissue**
骨配向性の解析と異方性骨組織再生のための方法論

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Abstract: The bone mechanical property depends on both bone quantity and quality corresponding dominantly to bone mineral density (BMD: density of biological apatite) and the integrity of the internal architecture, respectively. BMD is correlated with bone strength, but is not an index accounting for all of bone mechanical properties. Thus, new indices representing the bone quality have been investigated so far because bone is a well-organized hierarchical composite at various scale levels. Since BMD refers to the density of BAp, but the crystallographic orientation of BAp crystallites corresponds to the rotated degree of BAp crystallite, these two parameters are independent. In other words, BAp orientation is a possible bone quality parameter. Thus, our group is focusing on the preferential alignment of BAp *c*-axis orientation as a bone quality parameter under normal, pathological, and regenerated bones using the microbeam X-ray diffraction system.

We aimed at the following three topics about the preferential alignment of BAp *c*-axis: (1) evaluation of the degree of BAp orientation; (2) control of BAp orientation based on metal biomaterial design; (3) and clarification of the mechanism for producing the BAp orientation *in vivo* or *in vitro*. In this presentation, our results regarding these three topics are introduced.