

Annual Conference on Bioscience

September 12-13, 2016 Berlin, Germany

Variations in mineral crystallites of bone at distinct skeletal sites and its relationship with diseases like osteoporosis

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Introduction: Human bone forms the skeleton framework of the body. The mineral component of bone together with the orientation of its crystallites at different levels of Hierarchy is responsible for the mechanical strength and resistance of bone to external stresses and strains. Studies have revealed that among various bones, calvaria are seen to be more resistant to mechanical stresses and bone diseases like osteoporosis.

Aim & Materials: To investigate the property of skull bone, we took post-pubescent rat samples of ulna, calvaria and whale rostrum.

Methods: The collected samples were analyzed through, Synchrotron X-ray diffraction. We put the bone samples into XMAS beam line for the interpretation of data through synchrotron. We then analyzed the interpreted data by ESRF (European Synchrotron Radiation Facility) software, Fit2d and fitted the curves by ORIGINS and SIGMAPLOT for plotting the graphs. We then did SEM of the rat ulna and calvaria samples and the images for whale rostrum were collected (images courtesy of Zhen Li and Jill Pasteris at University of Washington) and compared.

Results: Our results demonstrated a greater orientation of crystallites in rat calvaria and whale rostrum, than in ulna samples. This increased orientation may be due to functional adaptability, age and the amount of external stresses, which cause this bone to be resistant.

Conclusion: In summary we have shown that the resistance offered by skull bones to stresses and strains and diseases like osteoporosis is partly due to the orientation of the bone crystallites.

Biography

Hasan Baber has completed his BDS from Baqai Medical University and MSc in Oral Biology from Queen Mary University of London. He has also acquired a Post Graduate Diploma in Healthcare Management from Cambridge Regional College, UK. Currently he is an Assistant Professor at Dow University of Health Sciences, Department of Oral Biology, Pakistan. He is an active Member of American Dental Association, International Academy of Dental Research, British Society of Restorative and Implant Dentistry. Recently he won best research presentation award on Annual research day, presented by Chairmen Higher Education Commission of Pakistan. He has multiple local and international publications to his credit. His current work is on identifying specific period onto pathogens in type-II diabetic patients having periodontitis.

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