

Structural Changes and Molecular Mechanisms of Bone Remodelling in the Tibial Subchondral Bone Plate and Trabecular Bone during the Development of Osteoarthritis: *Method Optimization*

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ABSTRACT

*Objectives/Research Problem:* Osteoarthritis (OA) is a degenerative joint disease. Previous studies have shown that the structural changes of osteoarthritic subchondral bone are associated with rapid bone remodelling, and differed between its two regions; subchondral bone plate (Sbp) and trabecular bone (Tb). Despite the extensive studies in human and animal models of OA, the molecular mechanisms that underlie the differences between these two regions have yet to be determined. Hence, the present study aims to determine the expression of osteoprotegerin (OPG) and receptor activator of NF- $\kappa$ B ligand (RANKL), and structural changes of Sbp and Tb during development of OA in Dunkin Hartley (DH) guinea pigs.

*Materials and Method:* In order to achieve these aims, optimisation of new research protocols need to be performed. Three male DH guinea pigs were purchased from the Laboratory Animal Research Unit (LARU), UKM and kept at the Animal House, Kulliyah of Allied Health Sciences, IIUM. During the acclimatisation period, the animals were feed with cabbage, pellet and water ad libitum as recommended by LARU. The weight, behaviour, food and water consumption of each animal were monitored and recorded daily. The animals were administered with 20 mg/kg of calcein via intraperitoneal (IP) injection at 8 days and 1 day before euthanasia. Next, the right and left tibia were dislocated and fixed in TRizol and 10% neutral buffer formalin for two weeks, respectively. The right tibia was used for molecular analysis, while the left tibia underwent micro-computed tomography (micro-CT) scanning.

*Results and Discussion:* The current data showed that the initial diet was not suitable since the animals had suffered severe diarrhoea and reduction in body weight. The quality of micro-CT image scanned at 9  $\mu$ m was suitable for structural analysis of Sbp and Tb.

*Conclusion:* The above findings can therefore serve as basis for the actual research protocols.

KEYWORDS: Guinea Pigs, Osteoarthritis, Subchondral Bone Plate, Trabecular Bone

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