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Stereological Analysis of Heart Ventricles During the Development of Osteoarthritis in Dunkin Hartley Guinea Pigs

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ABSTRACT

Introduction: Osteoarthritis (OA) was attributed to mobility issues which implicate an increased workload of the heart. This imposed greater stress on the ventricular wall, resulting in a maladaptive reaction known as left ventricular hypertrophy (LVH). Previous studies suggested that OA patients are susceptible to developing cardiovascular diseases, but its association with LVH is not yet established. Therefore, the present study aims to determine changes in nucleus diameter and ventricular cardiomyocytes' density along with the morphology of the heart ventricles during the development of OA in Dunkin Hartley (DH) guinea pigs. **Methods:** The histological images of the DH knee joint were taken at 10, 20 and 30 weeks old and were assessed on the degree of articular cartilage degeneration using Osteoarthritis Research Society International (OARSI) scoring. The stereology method was used to determine the nucleus diameter (ND), cardiomyocytes' density (CD), the ventricles wall's thickness (VT) and volume of the ventricular chamber (VV). **Results:** The result showed that the severity of OA increased as DH grew old. Across the time points, ND, CD and VV chamber increase at the left and right ventricles, whereas VT increases only in the left ventricular chamber ($p<0.05$). The left ventricle presented a slightly greater ND, CD and VT and a smaller ventricular chamber than the right ventricles. Findings suggested that DH's heart showed hypertrophy, yet none significantly associated with OA scores ($p>0.05$). **Conclusion:** Since this preliminary study indicates the possibility that LVH is present in OA individuals it is suggested that further investigation should be conducted.