HISTOMORPHOMETRIC ANALYSIS OF CANINE TRABECULAR BONE IN THE OSTEOPOROTIC CONTEXT

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Introduction

The mechanical properties of bone are determined by its size and by structural elements – such as the cortical thickness or the number of trabeculae – within the bone. Like humans, animals can suffer from bone fractures due to existing structural changes. We therefore performed a histomorphometric analysis to determine structural alterations in bones.

Bone histomorphometry is an essential technique for examining the processes of bone disease [1]. Osteoporosis is the most common bone disease and is associated with an increased risk of fractures [2]. This analysis may provide valuable information regarding bone structure.

The purpose of this research was to examine the lumbar vertebrae of dogs using histomorphometric analysis and to compare findings with previously published human histomorphometry data.

Methods

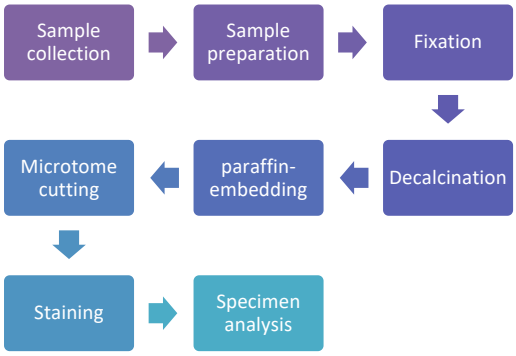

Figure 1: Experiment protocol

In our investigation, we examined the lumbar vertebrae (L1 and L2) of five castrated females without musculoskeletal disorders. All necessary bioethical permissions were received. The protocol for the experiment is included in Figure 1. Following preparation work, we used *OsteoidHisto* software to conduct this research [3]. You can see how the calculations were done in Figure 2. We measured and calculated the following structural parameters: bone volume/tissue volume (BV/TV); trabecular number (Tb.N); and trabecular width (Tb.Wi) [4]. Following our calculations, we compared our values with findings from other research using human osteoporotic vertebrae.

Results

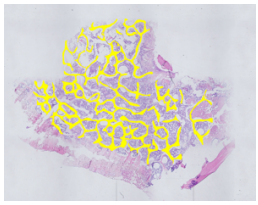

Figure 2: OsteoidHisto software BV/TV calculation

Following analysis, we determined that BV/TV (%) was 16.12 ± 3.06 and 16.08 ± 2.1 in L1 and L2, respectively, while Tb.Th was 25.49 ± 2.93 µm and 25.04 ± 2.28 µm in L1 and L2, respectively. We estimated Tb.N of 6.3 and 6.4 in L1 and L2 vertebrae, respectively. The widths of L1 and L2 were nearly identical at 2.55 µm and 2.50 µm, respectively.

Discussion

The term osteopenia is used more frequently than the word osteoporosis in the animal literature [5]. However, since decreasing bone density increases the risk of fractures, it is critical to assess structural bone alterations. A study of the human medical literature suggests that while risk factors for osteoporotic fractures such as hypoestrogenism or an unbalanced diet are relevant, risk factors vary in animals [6].

References

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