

Assessment of Feline Bone Mineral Density; Quantitative Computed Tomography

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Purpose: Computed tomography has been widely investigated and applied in recent years as a means for noninvasive quantitative bone mineral determination in human medicine. The usefulness of computed tomography for measurement of bone mineral lies in its ability to provide a quantitative image and, thereby, measure trabecular, cortical bone, centrally or peripherally. However, there is no study about measurements of bone mineral density (BMD) by using quantitative computed tomography (QCT) in normal cats. The aim of this study is to assess age-related change and anatomic variation of BMD using quantitative CT in normal cats.

Materials and Methods: Seventeen normal cats were included in this study and divided into three groups according to age of less than 1 year (n=4), 2-5 years old (n=10), and over 6 years (n=3). Computed tomographic scan of each vertebra from 12th thoracic to 7th lumbar spine and pelvis, with bone-density phantom (50, 100, 150 mg/cm³, calcium hydroxyapatite, CIRS phantom OR) was performed. On the central transverse section, the elliptical region of interest (ROI) was drawn. For each ROI, the mean Hounsfield unit value was recorded; by use of the bone-density phantom and linear regression analysis ($r^2 > 0.95$), those value were converted to equivalent BMD.

Results: Mean bone mineral density value of thoracic vertebra (651.3 ± 100.4 mg/cm³) was significantly higher than that of lumbar vertebra (520 ± 119.5 mg/cm³). Also, the present study showed that the maximum BMD occurred at the level of T12, T13, and L1 in all groups. There was a statistically significant difference of mean BMD value among three groups at the level of T12 ($P < 0.001$), T13 ($P < 0.001$), and L4 ($P = 0.013$), respectively. In addition, there was no significant difference between mean BMD value of left and right iliac body, (485.1 ± 140.4 mg/cm³) and (482.1 ± 148.2 mg/cm³), respectively.

Conclusion: The present study suggests that age-related change and anatomic variation of BMD value be considered when assessing bone mineral density by using quantitative CT in cats with bone disorders.

Keywords: bone mineral density, cat, quantitative computed tomography

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