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Vertebral body anomalies on bone density scans in younger and older retired rugby players: the UK Rugby Health project

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Introduction

[Lumbar spine](#) (LS) bone mineral density measured by [dual energy X-ray absorptiometry](#) (DXA) may be abnormally elevated by conditions in or around the spine. The International Society for Clinical [Densitometry](#) recommends excluding [vertebrae](#) if there is a focal structural abnormality (FSA) affecting some but not all of the scanned vertebrae, or if there is a T-score discrepancy (>1.0 SD difference in bone density between adjacent vertebrae). Anomalies can include [osteoarthritis](#) and degenerative changes, and fracture which have previously been reported in retired rugby players ([Hind et al., 2014](#); [Davies et al., 2017](#)).

Objective

To quantify [vertebral body](#) exclusions in a UK cohort of younger and older retired rugby players.

Methods

Retired rugby players (77 males; 10.6 yrs post retirement) aged 50 years or over ($n = 27$, 57.2 ± 7 years; 175.8 ± 7.6 cm; 94.9 ± 16.9 kg) and under 50 years ($n = 50$; 40.1 ± 6.2 years; 182.1 ± 6.4 cm; 101.9 ± 13.8 kg) received one DXA scan of the anteroposterior lumbar spine (L1-L4; Lunar iDXA™; GE Healthcare, WI; Encore software v 15.0). A DXA scan of the dual [femur](#) was also performed. T-scores were evaluated for those aged over 50 years, and Z-scores for those aged under 50 years ([ISCD, 2015](#)). Each LS scan was evaluated in consensus by two experienced densitometrists and vertebrae were excluded where there was evidence of a FSA or a T/Z-score discrepancy. If more than two vertebrae were excluded, the scan was defined un-reportable.

Results

In retired rugby players aged >50y, 18 (67%) scans required vertebral body exclusion. There were 41 exclusions and seven scans were un-reportable. In younger retired players (<50y), 17 (34%) scans required vertebral body exclusion. There were 27 exclusions and two scans were un-reportable. The eventual mean LS T-score for >50 y was 0.1 ± 1.4 . The mean LS Z-score for <50 y was 0.3 ± 1.2 . The mean hip T-score was -0.4 ± 1.4 and the mean Z-score was 0.3 ± 1.1 .

Conclusion

In this cohort of UK retired rugby players, a high number of vertebral body anomalies were identified. Therefore, our findings demonstrate the need for care when interpreting lumbar spine bone density DXA scans. We also suggest that vertebral body exclusions apply to Z-scores as well as T-scores where there is evidence of FSA or BMD discrepancy. It is recommended that hip scans are conducted alongside lumbar spine BMD scans in former athletes where the prevalence of degenerative changes can be high.