



Increased vertebral bone marrow fat content can be associated with vertebral fractures and back pain

Rafael García-Cañas[^], Carlos Rodríguez-Moro[^]

Spine Unit, Hospital Ruber Internacional, Madrid, Spain

Correspondence to: Rafael García-Cañas, MD, PhD. Spine Unit, Hospital Ruber Internacional, C/de La Masó n° 38, 28034 Madrid, Spain.

Email: garciacanas@icloud.com.

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In their letter to the editor, Yi Xiáng J. Wáng and colleagues have studied the quantification of vertebral bone marrow fat (BMF) content among two different communities of women over 65 years with significant differences in the prevalence and severity of osteoporotic vertebral fractures (OVF) (1).

Although Rome Caucasian women have a higher prevalence of OVF, with a greater number of vertebrae affected, and a more severe fracture pattern than Hong Kong Chinese women, the authors of the study did not find significant differences in the bone marrow fat content of the third lumbar vertebra, using MR spectroscopy, between both communities (1).

Despite of patients who sustained OVF have increased BMF content, there are few publications that have concluded that bone marrow fat composition might be higher in patients with osteoporosis (2) or type 2 diabetes mellitus (3). And to date, only one study has correlated higher marrow fat content with lower trabecular bone mineral density (BMD) and an association with prevalent vertebral fracture, but only in men (4). Nevertheless, some authors have proposed the MR spectroscopy of spinal bone marrow fat as an imaging tool for BMD-independent fracture risk assessment (5,6).

Beyond vertebral BMF content, there are several factors that must be considered when we delve into the study of the pathophysiology of the OVF in women from different communities. Age, ethnicity, BMI and sociodemographic aspects as women's situation in the labour market, work-

family gender roles or social consideration of women, which include participation in social life, sports (7) or free time activities, can differ widely between different population groups. Moreover, nutritional status and regional diet style can impact profoundly on BMF content (8,9). In addition, comorbidities such as anorexia nervosa, diabetes mellitus or osteoporosis are often associated with changes in marrow adiposity (10). And finally, prescribed osteoporosis medications as bisphosphonates or teriparatide can significantly affect on BMF content (11,12). Even although all the previously described aspects can have an impact on BMF content, they can be considered as potential biases that should be taken into consideration when researchers try to correlate vertebrae bone marrow composition and vertebral fractures.

Another interesting finding from the study of Wáng and colleagues, which deserves a commentary, is that patients with back pain had a higher lumbar BMF than that of healthier community subjects (1).

In this sense, some authors have demonstrated an association between lumbar vertebral BMF content and paraspinal muscle fat composition (13,14), and at the same time a correlation between paraspinal muscle fat infiltration with a higher number of vertebral fractures and a lower BMD (14-16). It is worth highlighting the study published by Elysee *et al.* where the authors found that global sagittal malalignment is related to fat infiltration of the posterior vertebral musculature throughout the lumbar and thoracic

[^] ORCID: Rafael García-Cañas, 0000-0001-9427-4114; Carlos Rodríguez-Moro, 0000-0002-9211-8828.

spine in patients with adult spinal deformity (17). And in relation to this, numerous studies have demonstrated a relationship between sagittal spinal imbalance and back pain (18,19). Therefore, it seems that there may be a relationship between vertebrae BMF content and back pain, but we need further research in this area, in order to provide us a better understanding of the impact of the fat replacement in spinal bone marrow on back pain.

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