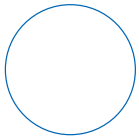

K **:** Bone marrow lesions; Knee osteoarthritis; Joint effusion; Weight-bearing pain; Pain assessment; Magnetic resonance imaging (MRI)

I

Knee osteoarthritis (OA) is a prevalent degenerative joint disease characterized by progressive cartilage degradation [1], subchondral bone changes, and synovial inflammation. One of the major challenges in managing knee OA is its associated pain, particularly during weight-bearing activities, which significantly impacts patients' quality of life and functional abilities. Recent advancements in imaging techniques, such as magnetic resonance imaging (MRI), have enhanced our understanding of the pathological changes in knee OA [2]. Among these changes, bone marrow lesions (BMLs) and joint effusion have emerged as critical factors influencing pain perception. BMLs, which are indicative of subchondral bone edema, have been linked to increased pain severity and may reflect underlying inflammation and microtrauma [3]. Similarly, joint effusion, characterized by an accumulation of synovial fluid in the joint space, is often associated with increased intra-articular pressure and inflammatory processes, contributing to discomfort during weight-bearing activities. Despite the growing evidence supporting the relationship between these factors and pain in knee OA, the independent contributions of BMLs and joint effusion to weight-bearing pain remain inadequately explored. Understanding these associations is crucial for developing targeted interventions aimed at alleviating pain and improving function in individuals with evidence aluf

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This study highlights the significant and independent associations between bone marrow lesions and joint effusion with weight-bearing pain in individuals with knee osteoarthritis. Our findings demonstrate that both factors contribute notably to pain severity, suggesting they play critical roles in the pathology of knee OA. Recognizing the independent effects of bone marrow lesions and joint effusion can