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### Imaging biomarkers of pain in knee osteoarthritis

**Statement of the Problem:** Pain is an important feature of osteoarthritis and is the most common presenting symptom. Multiple standardized measures have been developed to assess pain. The etiology of pain in osteoarthritis is unclear, however, and is likely to be heterogeneous. Osteoarthritis is recognized as being a disease of the whole joint. Cartilage is aneural, but the subchondral bone, the periosteum, peri-articular ligaments, peri-articular muscle, synovium and the joint capsule are all richly innervated and may be sources of nociceptive pain in osteoarthritis. Central sensitization may also play a role in chronic knee pain. The complexity of pain in osteoarthritis is highlighted by the apparent lack of correlation between individual's report of pain and the changes seen on knee radiographs. Advances in magnetic resonance imaging (MRI), however, have improved our understanding of the relationship between pathology and the structural changes to cartilage, subchondral bone and the surrounding soft-tissues of joint in osteoarthritis. Relationship between morphologic features and knee pain is dependent on the specific MRI feature and method of assessing knee pain. Cross-sectional studies suggest that morphologic changes on MRI such as bone marrow lesions (BMLs), effusion-synovitis, denuded bone area and meniscal extrusion are associated with frequent knee pain and weight-bearing pain, whereas longitudinal studies suggest that incident frequent knee pain is associated with new bone marrow lesions, new denuded bone area, or enlarging bone marrow lesions and development of inflammation such as effusion-synovitis or Hoffa synovitis. Recent studies have advanced our understanding of potential etiologies for osteoarthritis-related pain and have helped to identify potential targets for pharmacologic and non-pharmacologic treatments.

### Biography

Dr. Kwoh's research group has had a long interest in the epidemiology of a broad spectrum of rheumatic and musculoskeletal diseases, with a particular focus on the epidemiology of, and outcome assessment in osteoarthritis. He is currently engaged in several lines of research examining biomarkers, early indicators, pain, outcome assessment, and the examination of risk factors for the development and progression of osteoarthritis. His current work focuses on the identification of biomarkers for outcomes in knee osteoarthritis. One line of research examines quantitative and semi-quantitative assessment of imaging features on MRI that are associated with the incidence of radiographic knee osteoarthritis or progression to total joint replacement. Another line of research examines the characterization of knee pain patterns and MRI features associated knee pain in osteoarthritis.

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