

## OSTEOARTHRITIS

## Concentrated efforts to detect early OA

The early stages of osteoarthritis (OA) are associated with structural changes to the articular cartilage, including a loss of proteoglycans from the extracellular matrix (ECM). Proteoglycan loss correlates with reduced sodium concentrations, as measured by sodium MRI. A new method to increase the sensitivity of sodium MRI has been described by Madelin *et al.* in the *Journal of Magnetic Resonance*. “Although sodium MRI is the standard for assessing glycosaminoglycan content in the articular cartilage, the currently available methods are unable to distinguish between free sodium ions from synovial fluid and joint effusion in the knee joint, which leads to significant errors in quantitation,” explains lead investigator Ravinder Regatte.

The researchers tested the ability of a magnetization-prepared 3D ultrashort TE radial sodium MRI sequence to suppress the signal from free sodium, thereby concentrating the signal from the bound sodium in the ECM of the cartilage. Following calibration of the method

on the knee from a human cadaver, the investigators tested it on five healthy participants and observed a suppression of the fluid sodium signal. Two kinds of inversion pulses were also compared for fluid sodium suppression. Overall, an adiabatic pulse was more reliable than a rectangular pulse, which the authors attribute to its robustness against  $B_0$  and  $B_1$  inhomogeneities. Indeed, the researchers are currently working to optimize the adiabatic inversion recovery sequence, with the ultimate goal of refining the method to detect proteoglycan loss in early OA. “We are currently recruiting patients with OA, and individuals who have undergone surgical cartilage repair, in order to evaluate the new method and quantify the sodium content,” says Regatte.

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**Original article** Madelin, G. *et al.* Sodium inversion recovery MRI of the knee joint *in vivo* at 7T. *J. Magn. Reson.* doi:10.1016/j.jmr.2010.08.003