

Isolated Focal T2 Elevation of Patellar Cartilage on T2 Maps: Prevalence and Correlation with Arthroscopic Findings

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Introduction: Although isolated T2 hyperintensity of cartilage is frequently encountered on clinical MRI examinations, the significance of this finding is uncertain. Elevated cartilage T2 has been correlated with increased water content (1) and changes of the type II collagen matrix consistent with early structural damage (2). However, using standard clinical techniques, the finding of T2 elevation in the absence of surface irregularity does not correlate well with arthroscopic findings (3). The purpose of this study is to use high-field T2 mapping techniques to determine prevalence of isolated focal MRI T2 elevation of patellar cartilage in symptomatic and asymptomatic subjects, and to correlate focally elevated cartilage T2 with arthroscopic findings.

Methods: A prospective evaluation was performed in 27 patients scheduled for arthroscopic knee surgery (age 18–67, mean: 40.7 years) and an age-matched population of 24 asymptomatic volunteers (age: 24–62, mean: 39.1 years). MRI T2 maps of the patellofemoral joint were obtained using a Bruker 3.0T MR scanner with a TR/TE: 1500/8-88 ms, 3 mm section thickness and in-plane pixel resolution of 0.55 mm. For analysis, the patella was divided into 3 sites: medial facet, median ridge, and lateral facet. Color T2 maps of patellar cartilage were analyzed subjectively to identify sites of focal T2 elevation that involved less than full cartilage thickness. These focal lesions were scored as to whether T2 elevation was contiguous with the articular surface (*superficial*) or limited to subsurface cartilage (*deep*). For arthroscopy subjects, T2 results were correlated with arthroscopic scoring using the Beguin and Locker grade.

Results: Representative color T2 maps are presented in *Figure 1*. As presented in *Table 1*, focal T2 elevation was observed in 48% of arthroscopy patients, and 33% of asymptomatic volunteers with a similar distribution of deep and superficial lesions. For arthroscopy subjects, cartilage with deep T2 elevation was graded normal in 3 of 4 sites, and as having chondromalacia (B&L grade I) in 1 site at arthroscopy. For superficial T2 elevation the cartilage was arthroscopically normal in 4 sites, chondromalacia in 2 sites (B&L Grade I), superficial fissures in 4 sites (B&L Grade II), deep fissures in 3 sites (B&L Grade III), and exposed bone in 1 site (B&L Grade IV).

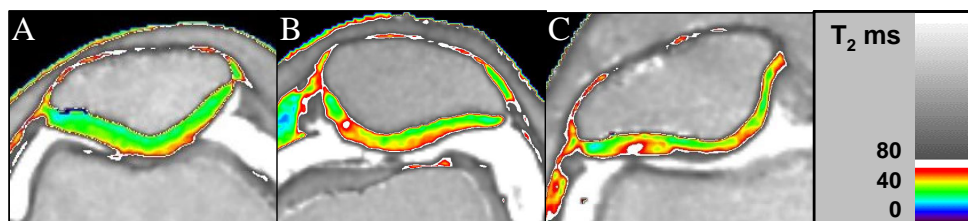


Figure 1: Representative cartilage T2 maps for (A) normal T2 map (*arthroscopy: normal*), (B) focal deep T2 elevation (*arthroscopy: normal*), and (C) focal superficial T2 elevation (*arthroscopy: superficial fibrillation: B&L Grade II*)

Table 1: Prevalence of focally elevated cartilage T2 lesions: Number of subjects (%) and patellar cartilage sites (%) analyzed

Cohort	N	Deep Lesions		Superficial Lesions		Total Lesions	
		Subjects	Sites	Subjects	Sites	Subjects	Sites
Arthroscopic	27	4 (15%)	4 (5%)	10 (37%)	14 (17%)	13 (48%)	18 (22%)
Asymptomatic	24	1 (4%)	2 (3%)	7 (29%)	8 (11%)	8 (33%)	10 (14%)

Discussion: In this relatively young population, focal sites of elevated cartilage T2 are common and have similar prevalence in asymptomatic patients, suggesting a low association with clinical symptoms. Cases where elevated T2 is contiguous with the articular surface are frequently associated with focal damage identified at arthroscopy, and represent a broad spectrum of severity. Less frequently, focal T2 elevation is confined to the deep radial zone and often appears normal at arthroscopy (*Figure 1B*). Additional studies are needed to determine the clinical significance of these lesions and if they progress to more advanced levels of damage.

References:

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