

ELEVATED ADIABATIC T_{1ρ} AND T_{2ρ} IN ARTICULAR CARTILAGE ARE ASSOCIATED WITH PHYSICAL SYMPTOMS AND FOCAL KNEE LESIONS IN EARLY OSTEOARTHRITIS

V. Casula, M.J. Nissi, J. Podlipská, M. Haapea, S. Saarakkala, E. Lammentausta, A. Guermazi and M.T. Nieminen

Research Unit of Medical Imaging, Physics and Technology, POB 50, FIN-90029 University of Oulu

email: victor.casula@oulu.fi

Osteoarthritis (OA) is the most common cause of joint disability. Radiography and arthroscopy are mostly insensitive to early stages of OA. Recently, the role of Magnetic resonance (MR) imaging in OA diagnostics has significantly increased. Preclinical studies have shown the superior sensitivity of rotating frame relaxation times in assessing cartilage degeneration as compared to free precession relaxation times [1-3]. In the present study the potential of adiabatic T_{1ρ} and T_{2ρ} techniques [4] in detecting early osteoarthritis was investigated. A total of 30 subjects (age range: 50-70 y) were selected from the OKOA (Oulu Knee Osteoarthritis Study) cohort, including 15 patients with early radiographic signs of OA (Kellgren–Lawrence grade 1-2) and 15 volunteers with no physical signs of OA, matched for age and sex. Physical symptom data were obtained by WOMAC questionnaire from all the subjects [5]. Patients and volunteers underwent 3 T knee MR imaging (Skyra, Siemens) and adiabatic T_{1ρ} and T_{2ρ} relaxation times of articular cartilage were measured. Furthermore the MR images of all the subjects were separately evaluated for pathological changes including osteophytes, cartilage lesions, bone marrow lesions, meniscal tear. Adiabatic T_{1ρ} and T_{2ρ} were compared between patients and volunteers (Mann-Whitney nonparametric test). Further comparisons were similarly performed dividing the study participants according to different signs of osteoarthritis, including physical symptoms and presence of focal lesions in the joint structures. Increased adiabatic T_{1ρ} and T_{2ρ} of articular cartilage were associated with different clinical signs of early OA. Different sensitivities of adiabatic T_{1ρ} and T_{2ρ} to OA signs were found in different cartilage subregions, suggesting that the techniques may provide complementary information regarding the progression of OA. Based on these findings, adiabatic T_{1ρ} and T_{2ρ} are suitable for in vivo osteoarthritis research and clinical use.

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