

MRI-Based Characterization of Pelvic Masses: A Physics Perspective

Nowadays, magnetic resonance imaging (MRI) is frequently used in diagnosis, due to its non-invasiveness on the one hand and its high soft tissue contrast on the other. Due to these attributes, MRI is an important method for the characterization of pelvic masses.

This study explores the role of various MRI sequences in characterizing pelvic masses, focusing on the physical principles underlying tissue contrast, signal intensity variations, and diffusion properties. Image quality is closely related to the trade-off-parameters, spatial resolution, signal-to-noise ratio and total scan time. Balancing these factors can be challenging but understanding the physical principles and their applicable limits can aid in their optimal use. These aspects are important in the characterization of pelvic masses where the appropriate selection of sequences and parameters plays a crucial role in differentiating benign from malignant tumors and establishing an accurate diagnosis. The present study examines the impact of sequences selection and parameters optimization on image quality and highlights how the resulting images with different contrast mechanisms (e.g., T1-weighted, T2-weighted, Dixon, Diffusion-weighted imaging, STIR) contribute to the differentiation of various pathologies.

In conclusion, this study provides a deeper understanding of how parameters and sequences influence the quality of acquired images, as well as an integrated medical perspective, contributing to the enhancement of diagnostic and clinical management of pelvic masses.

Keywords: MRI, pelvic tumors, gynecological tumors, diffusion-weighted imaging, Dixon, STIR.

Primary authors: Dr CHILOM, Claudia (Department of Electricity, Solid Physics and Biophysics, Faculty of Physics, University of Bucharest); Dr CAZACU, Nicoleta (Smeeni Chronic Disease Hospital); Dr ADRIAN, Cosmin (Clinical Emergency Hospital Bucharest); Dr MINOIU, Costin (Clinical Emergency Hospital Bucharest); Dr GÎRBAN, Marilena (Smeeni Chronic Disease Hospital)

Presenter: Dr CAZACU, Nicoleta (Smeeni Chronic Disease Hospital)