

Evaluation of the Quadrupole Peak determinants in the NMRD profile of biological tissue. A relaxometric study of model samples.

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One of the most peculiar characteristic shown by the ¹H-NMRD profiles of biological tissues is represented by the appearance of the Quadrupole Peaks (QPs) in the 0.5–3 MHz range. QPs result from the presence of immobilized proteins because of the quadrupolar coupling of ¹⁴N nuclei that influences ¹H relaxation via ¹H-¹⁴N dipole-dipole interactions [1]. There is not much knowledge about the relationship between the nature of the tissue and the peaks characteristics, except preliminary interesting data indicating differences in the QP region between healthy and unhealthy tissue in the case of osteoarthritis and fibrin/fibrinogen-related malignant diseases [2].

Here the dynamic of model samples (lysine and glutamic acid poly-peptide chains and their mixture, lysozyme enzyme, BSA) have been studied to clarify the role of electrostatic interaction and secondary protein structure in determining the QPs.

The acquired data indicate that the QP position can be influenced by the aminoacidic composition of protein but not by the secondary protein structure.

References

- [1] Fries PH and Belorizky E (2015) J Chem Phys 143, 0442021
- [2] Broche LM *et al.* (2011) Magn Reson Med 68, 358; Broche LM *et al.* (2012) Magn Reson Med 67, 1453