

Table of Contents

- Foreword
- Preface
- Acknowledgements

1. Introduction

Nº 3 099



UNIVERSIDAD NACIONAL DE ENTRE RÍOS
FACULTAD DE INGENIERÍA
CENTRO DE MEDIOS BIBLIOTECARIA

Section I. Basic Principles of NMR

2. Nuclear Spin, Nuclear Magnetic Moment	5
3. Simple Quantum Model of Nuclear Spin: Parallel & Antiparallel Protons	10
4. Classical Model of Nuclear Spin: Precessional Motion, Larmor Frequency	16
5. Simple Quantum Model of Magnetic Resonance: Radio Waves & Photons	20
6. Classical Model of Magnetic Resonance: 90° & 180° Pulses	26
7. The Magnetic Resonance Signal, Free Induction Decay (FID)	36

Section II. Relaxation & Image Contrast

8. T1 Relaxation, The Exponential Function	41
9. The Physical Basis of T1 Relaxation	47
10. Image Contrast Due to T1 Relaxation, Saturation-Recovery	54
11. T2 Relaxation, T2 vs. T2*	59
12. The Physical Basis of T2 Relaxation, Comparison of T2 and T1 Relaxation, Dependence of T1 & T2 on the Larmor Frequency	67
13. The Spin-Echo Pulse Sequence, Separation of T2 from T2*	73
14. Image Contrast with the Spin-Echo Pulse Sequence: T2-Weighted, T1-Weighted, & Proton Density Weighted Images	80
15. Inversion-Recovery: Maximum T1 Contrast or Additive T1 & T2 Contrast	94
16. Paramagnetic Substances: Contrast Media & Naturally Occurring Substances	106

Section III. MR Imaging Methods

17. The MR Image, Spatial Information from the MR Signal	117
18. Slice Selection & Orientation, Magnetic Field Gradients	119
19. Spatial Information Within the Slice, Two-Dimensional Fourier Transform (2D FT)	128
20. Increased Efficiency: Multislice, Multiecho, & 3D FT Methods	146
21. Fast Imaging: Small Flip Angles & Gradient Echoes	152
22. The Signal Intensity of Flowing Blood & CSF	166
23. Effects of Chemical Shift in MRI	179
Symbols & Abbreviations	191
References	195
Index	199