



Captions for the Figures of the Cover

- 1 Sagittal section of the brain, spin echo, T1-weighting: occult vascular malformation of the brainstem.
 - 2 Sagittal section of the cervical spinal cord, spin echo, T1-weighting: enhancement of a hemangioblastoma (→) located at the level of C1-C2, after gadolinium injection.
- 3 Coronal section of the abdomen and pelvis, spin echo, T1-weighting: normal subject.
 - 4 Sagittal section of the knee, spin echo, T1-weighting: normal subject.

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Magnetic Resonance Imaging

Basis for Interpretation

Translated by
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With 122 Illustrations

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Foreword

Magnetic Resonance Imaging (MRI) is a rapidly evolving technique which is having a significant impact on medical imaging. Only a few years ago, although Nuclear Magnetic Resonance (NMR) was well known as an important analytical technique in the field of chemical analysis, it was effectively unknown in medical circles.

Following the initial work of PAUL LAUTERBUR and RAYMOND DAMADIAN in the early 1970s demonstrating that it was possible to use NMR to produce images, progress in the medical fields was relatively slow. Recently, however, with the availability of commercial systems, progress has been very rapid, with increasing acceptance of MRI as a basic imaging technique, and the development of exciting new applications.

MRI is a relatively complex technique. First, the image depends on many more intrinsic and extrinsic parameters than it does of in techniques like X-radiography and computed tomography, and secondly, the intrinsic parameters such as T1 and T2 are conceptually complex, involving ideas not usually described in traditional medical imaging courses. In order to produce good MR images efficiently, and to obtain the maximum information from them, it is necessary to appreciate, if not to fully understand, these parameters. Furthermore, knowledge of how the image is produced helps in appreciating the origin of the artifacts sometimes found in MRI due to effects like patient motion and fluid flow.

Dr. SIGAL has used his experience, gained as one of the first European Radiologists to become intensively involved with MRI in a clinical setting, to produce a clear basic guide to MRI. The book leads the reader, in a simple tutorial style, through the basic physics of MRI and develops criteria for choosing, for example, the correct pulse sequence for a specific study. The significance of these, criteria is illustrated by many examples drawn from the authors experience. This book will provide a valuable introduction to the subject, both for those who plan to use the technique extensively in the future and for those who simply feel that they should understand the basics of this new imaging modality.

December 1987

DEREK SHAW, BSc. PhD.

Preface

This book is an introduction to Magnetic Resonance Imaging (MRI) for radiologists and doctors wishing to understand for themselves the results of examinations as well as the ever greater amount of literature published on this new technique. It aims at helping anyone unfamiliar with MRI to begin to interpret the images. Therefore, I only mention the basic principles that should be known for this interpretation. Since my objective was mainly didactic, I sometimes had to use educational patterns, some of which are only an approximation of physical reality.

I intentionally pass over the technological aspect of imaging itself as far as it has no direct effect on interpretation (however, I briefly mention signal localization in an appendix), as well as techniques, such as spectroscopy and non-hydrogen imaging, which are not yet part of "routine" MRI.

Eight exercises, allowing the readers to test the knowledge they have acquired, are presented at the end of this book.

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ROBERT SIGAL, M. D.

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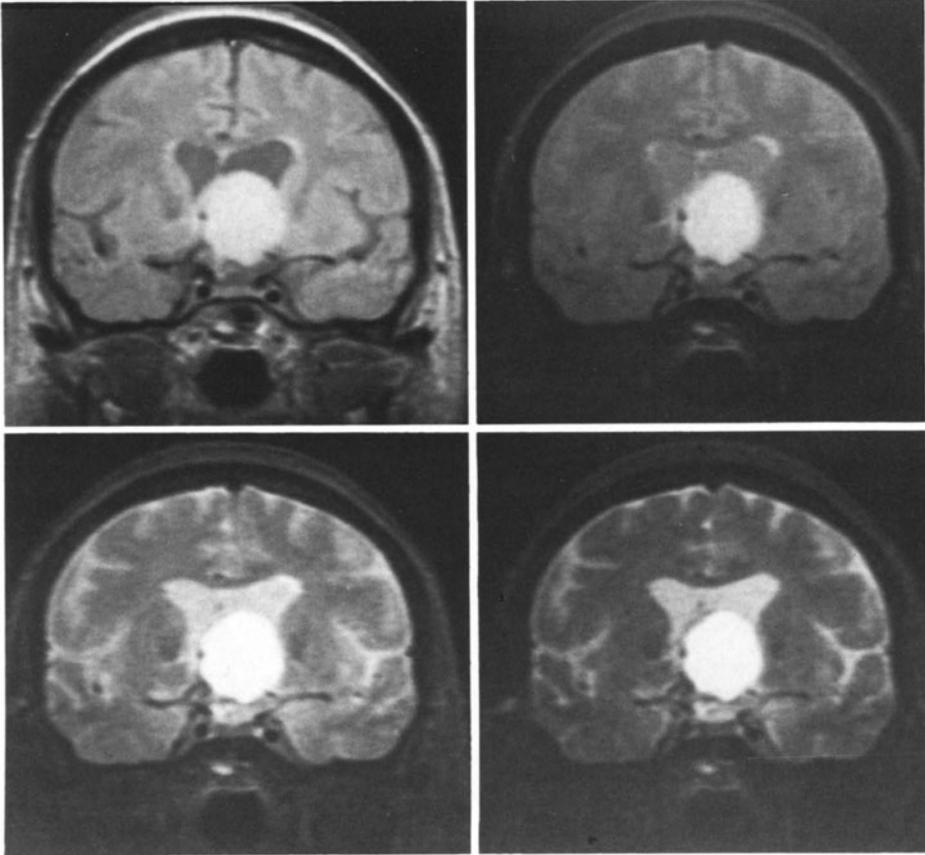


Fig. 1.1. Coronal sections of the brain. Suprasellar craniopharyngioma