

## Book Review

### MRI from A to Z

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#### A PHD STUDENT'S PERSPECTIVE

As a first year postgraduate student of a multidisciplinary PhD encompassing radiation physics (radiotherapy), MRI, computer science and mathematics I was excited by the prospect of a “quick fix” to one of my subject areas. Particularly the one comprising the most weird and wonderful acronyms and technical names of them all; OOPS, SENSE, COSY, Double Donut and VIBE to name a few! When I heard about the book, I expected a dictionary; brief definitions and summaries of the many (and frequently tricky) technical terms I am uncovering in MRI. And, whilst “MRI from A to Z” certainly does what it says on the box (or cover), it is much more than a simple dictionary of terms. Definitions are not merely stated but extended and illustrated with explanations, examples, figures, diagrams, cross-references, references to further material and real practical applications, culminating in not only a clear and concise but also comprehensive reference; a very useful and user-friendly scientific, technical, clinical and practical guide to MRI.

The book is sold as a “Definitive Guide for Medical Professionals”, the intended audience being student, trainee and professional alike. As a relative novice to MRI I found the main glossary an accessible introduction to MRI (and related techniques e.g. spectroscopy) concepts but also noted more advanced and specialised entries and explanations including references to more in-depth literature (books, journals and websites) currently beyond the scope and requirement of my expertise.

In addition to being a general guide to MRI theory the book also serves as a technical reference, with (different) manufacturer-specific terms e.g. “MEDIC”, a Siemens multi-echo sequence. Some definitions are explained quantitatively, with formulae stated where appropriate. Appendices provide further detail of constants, symbols and equations. General statistical techniques useful to image processing and data analysis such as “p-value” and “Bonferroni Correction” are included along with examples of their application to MRI. Alternative names for various terms are given where appropriate including conventions, and units and notation also appear as entries in the main glossary. I particularly liked the use of diagrams to visualise abstract concepts such as the notion of relaxation in different frames of reference. As a physicist I found the inclusion of basic, relevant medical, anatomical and physiological terminology helpful. Such explanations are accompanied by examples of how MRI relates specifically to the monitoring, diagnosis, characterisation or treatment planning of the described biology.

In actual fact, the entire “MRI experience” is covered, from basic principles, clinical, practical, procedural and safety issues such as “contraindications” and “orbit x-rays” with a mention of MRI “urban myths” to the discussion of data storage devices and engineering design such as magnet design and siting requirements. Some general physics and mathematics essential to understanding MRI (in addition to much MR-specific physics) is presented, explanations of a magnetic dipole and Fourier Transform for example. Once again, the

relevance of any general scientific or technical point to MRI is exemplified.

If I were forced to describe a weakness of the book (which I shall strive to do in order to write a balanced review!) it would be the positioning of the “grey boxes”. These text boxes provide interesting, additional information incorporating historic, academic and anecdotal notes but are distributed non-systematically through the book. A consequence of this may be that a reader using the text as a reference rather than a cover to cover read may inadvertently miss the “bonus” material.

A personal example of the usefulness of the book was my search for a concise overview of  $k$ -space, “an array of numbers whose Fourier transform is the MR image”. Other textbooks I had dipped into either used it without explanation or delved too deeply into the “Whys and Wherefores” and lost me in detail. “MRI from A to Z” however,

presented the review I was looking for along with citation of more in-depth literature.

For my own work the book will be an extremely useful and efficient reference, facilitating understanding of the “bigger picture”. I can then seek out additional detail through the references and further reading recommendations made by the author. I believe “MRI from A to Z” is well balanced for a wide audience but as a student I can say with confidence that I will use it enthusiastically as a guide and reference. As far as I’m aware there are no similar overviews available (a “definitive guide” indeed!). I would (and will) highly recommend it to both fellow students and professional colleagues.

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