

## Book Review

### Image-guided IMRT

T. Bortfeld, R. Schmidt-Ulrich, W. De Neve, D.E. Wazer (Eds.)

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124 illustrations (96 in colour); 2006; Hardback; £115.50*

Twenty six years on from the conception of arguably the most significant development in radiation oncology: intensity modulated radiotherapy (IMRT),<sup>1</sup> implementation into clinical practice is becoming internationally widespread, with image-guided and adaptive radiotherapy being hot topics. Image guidance is particularly important in IMRT, where incorrect deposition of precisely sculpted 3D dose could have at best sub-optimal and at worst disastrous consequences.

By its very nature, IMRT has always been image-guided, but advancing recent developments have perpetuated a very real need for a dedicated textbook; functional guided target delineation and temporal adaptive radiotherapy ('4D') being at the forefront of this movement. Such evolving techniques are currently pursued at few centres, but this is likely to change as our understanding develops along with the technology to realise truly precise and individualised IMRT.

'Image-guided IMRT' serves universally as an introduction, guide and practical reference to this exciting field for clinicians, physicists and researchers alike. The book covers concepts and fundamentals of IMRT preceding image-guided techniques and anatomy specific details, with up-to-date contributions from distinguished experts throughout.

The four editors of the book have all made significant contributions to the research and development of IMRT, including image-guidance.

Thomas Bortfeld, the editorial physicist, is one of the key developers of IMRT, recently publishing a commanding review.<sup>2</sup> He developed the first optimisation formulation with quadratic objective function and gradient descent method<sup>3</sup> used in the very first MLC-based IMRT in 1995<sup>4</sup> and now the standard in commercial inverse planning. He also developed one of the first step-and-shoot algorithms for MLC delivery<sup>5</sup> and was the first to use dose-volume limits in inverse planning.<sup>6</sup> The remaining three editors—all clinicians—Rupert Schmidt-Ullrich, Wilfried De Neve and David Wazer have likewise played pioneering roles in the development of IMRT, particularly with regard to biological guided therapies.

The book comprises contributions from no less than 80 experienced and authoritative physicists and clinicians summarising current literature as well as sharing personal experience from around the world, encompassing the USA, UK, Canada, Belgium, Germany and The Netherlands.

'Image-guided IMRT' is systematically divided into three major sections: (I) Foundations, (II) Advanced Image-guided and Biologically Guided Techniques and (III) Clinical. Part I gives a topical overview incorporating theoretical and practical information on the IMRT process starting with the rationale of doing IMRT right through to mastering the final quality assurance checking of plans. Part II is the material implied by the title i.e., advanced imaging modalities such as positron

emission tomography, magnetic resonance imaging and functional techniques, as well as adaptive technologies and strategies for '4D' treatments. Part III consists of practical insight and recommendations for IMRT in the most prolific disease sites i.e., head and neck, central nervous system, lung, breast and prostate.

The diversity of authorship augments the usefulness for both clinicians and physicists interested in exploring the possibilities of IMRT in research and clinical capacities, as well as for those departments already using IMRT, by serving as a handbook.

A comprehensive and readable textbook, totally unique in its extensive and up-to-the-minute presentation of the rapidly prospering field of image-guided IMRT.

## References

1. Brahme A, Roos JE, Lax I. Solution of an integral equation encountered in rotation therapy. *Phys Med Biol* 1982; 27(10):1221–1229.
2. Bortfeld T. IMRT: a review and preview. *Phys Med Biol* 2006; 51(13): R363–R379.
3. Bortfeld T, Burkelbach J, Boesecke R, Schlegel W. Methods of image reconstruction from projections applied to conformation radiotherapy. *Phys Med Biol* 1990; 35(10):1423–1434.
4. Ling CC, Burman C, Chui CS, et al. Conformal radiation treatment of prostate cancer using inversely-planned intensity-modulated photon beams produced with dynamic multileaf collimation. *Int J Radiat Oncol Biol Phys* 1996; 35(4):721–730.
5. Bortfeld TR, Kahler DL, Waldron TJ, Boyer AL. X-ray field compensation with multileaf collimators. *Int J Radiat Oncol Biol Phys* 1994; 28(3):723–730.
6. Bortfeld T, Stein J, Preiser K. Clinically relevant intensity modulation optimization using physical objectives. In: 12th International Conference on the Use of Computers in Radiotherapy. Salt Lake City, Utah, 1997.

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