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Book Reviews

The Physics and Radiobiology of Fast Neutron Beams

By D.K. Bewley.

Bristol, Hilger, 1989, 189 pp. ISBN 085274093X. £29.50.

FIFTY YEARS have passed since the first patient was treated with fast neutrons, but this form of therapy is still a matter of dispute. This is the opening remark on the book's jacket, summarising the present state of neutron therapy. Early experience, as usual, was exciting, but enthusiasm waned with the first reports on complications, progressively enlarging the gap between advocates and detractors. Although the author undoubtedly belongs to the first group, this book is certainly not a defence for the use of fast neutrons in the treatment of cancer (indeed the title has changed as compared to a previous issue, which was co-authored with Dr Mary Caterall, 10 years ago) but rather an extremely well documented review of all technical, physical and radiobiological aspects of neutron therapy. This new book was undoubtedly necessary since major technical advances have been made in the last 10 years. Modern neutron facilities can now compete in physical terms with high energy linacs (good depth dose distribution, sharp penumbra, adequate shielding, isocentric mounting etc), making it possible to investigate the contribution of fast neutrons in the treatment of cancer.

The first five chapters deal in detail with the technique of neutron production, including the latest advances in neutron therapy equipment (beam collimation, collimator shielding, multileaf collimators, isocentric beam mounting, etc). Neutron dosimetry is extensively discussed, pointing out the complexity of accurate absorbed dose calculations, separation of gamma and neutron components, difficulty in the design of tissue-equivalent materials as well as other aspects (neutron interactions, kerma in tissues and kerma ratios, penetration in tissues). The lack of a unified dosimetric protocol, as well as the disparity among neutron generators, has impaired the development of multi-centric cooperative trials in Europe. In an attempt to unify the different approaches, intercomparison dosimetric and radiobiological protocols have been proposed, in which Bewley played a leading part with the Hammersmith staff of physicists, physicians and radiobiologists. These technical chapters are therefore not only a discussion on the basis of literature data, but also reflect the contribution of the author.

A short chapter on radiation quality summarises the available data relevant to the medical use of fast neutrons, along with measurements of staff exposure in various neutron therapy centres.

The conclusions may be modified by the new recommendations that the ICRP is preparing (e.g. change in the Q factor and reduction of the maximal annual dose). There is also discussion of the radiation hazard of neutrons, including the risks of carcinogenesis and genetic damage to humans receiving low doses. This risk remains difficult to quantify since, so far, an agreement on the genetic value of Q, the quality factor, has not been reached. Arguments are presented which could help in its definition.

Discussion of the radiobiology of neutrons is clear and well documented. The rationale for neutron therapy is examined

systematically, considering the biological arguments for and against the use of neutrons in radiotherapy, including discussion of the radiobiological characteristics which would make tumours suitable for neutron therapy. However, although the alteration of RBE with neutron energy is described, its impact on the sensitivity of biological tissues to fractionation or low-dose irradiation is not dealt with, despite recent publications from the team of Louvain-la-Neuve. This chapter also contains a discussion on the controversial issue of the expression of the gamma component in fast neutron beams. The gamma component, however, is greatly reduced with new high-energy generators.

The review of clinical experience with neutron therapy includes a consideration of possible future treatment schedules, planned in the light of present radiobiological knowledge including the use of neutrons in mixed schedules (photon-neutrons).

The Physics and Radiobiology of Fast Neutron Beams is a complete, well documented and well structured book. It provides a valuable basis for a discussion of the place of neutron therapy.

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Cancer of the Pancreas

Edited by J.P. Neoptolemos.

From Bailliere's Clinical Gastroenterology Series (International Practice and Research). London, Harcourt Brace Jovanovich, 1990, 1008 pp. ISBN 0702014702. £27.50.

THIS is an excellent little book on an important and somewhat neglected subject. The presentation of each section is orderly and attractively laid out so that the book is easily read. While the overall message remains remarkably grim, there is a positive attitude imparted by most of the contributors, with objectivity not being lost by the clinicians who regularly manage this exceedingly difficult problem in which palliation remains the norm.

There are potentially exciting new developments on the molecular biology front, and the chapter from Lemoine and Hall is a major feature of the book. Three of the thirteen chapters concentrate on different aspects of diagnosis from serum markers and endoscopic ultrasound through to radionuclide scanning.

Various aspects of the surgery of pancreatic cancer are objectively reported in four chapters from different technical as well as geographical viewpoints i.e. from two Japanese teams, one American and one British. The various aspects of endoscopic stenting are reviewed by Huibregtse in the final chapter of the book, following a series of chapters on chemotherapy, radiotherapy and the role of sex hormones in diagnosis and potential therapy of pancreatic cancer.

I find much to commend in the book. It is a readable, up to date and an international contribution to the understanding of cancer of the pancreas.

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