

Book Review

Introduction to Radiobiology

M. Tubiana, J. Dutreix, A. Wambersie and D.K. Bewley.
Basingstoke, Taylor and Francis, 1990. 361 pp. ISBN 0 85066 763 1 £19.00.

THIS PUBLICATION is a new English translation of a French textbook, originally published in 1986. From the outset it should be stated that the book is clear in layout, with a large amount of well-collated information contained within a small 372-page paperback format. As is clear from the title, the prospective purchasers are trainees in radiology, radiation medicine and nuclear medicine, plus scientists involved with cancer or radiation. Overall, they will be reasonably pleased with their purchase, as long as they are prepared to work hard in both understanding new concepts or extracting specific information. This is not a easy read, nor a bland overview of the subject.

The layout of the book progresses in a logical way from the initial deposition of energy by radiation, radiation chemistry and subcellular biology; through cellular radiology, normal tissues and tumours, hypoxia, fractionation, chemical modifiers and high linear energy transfer and finally to the whole-animal effects of radiation. This covers the syllabus of radiobiology with the possible exception of radionuclide therapy. The subheadings are also reasonably informative.

To my mind, obtaining information from specific sections was heavy going. The use of figures is extensive, but most of them are packed with information which will prove difficult to digest for the genuine beginner. I think this represents a dilemma for all "introductory" texts: to include material and hence be a good source for further inquiry; or to omit for ease of reading. This dilemma could be solved by the use of concise chapter summaries. The reader could then compare his understanding of the chapter with the authors' intentions, and return to the misunderstood sections.

The chapters on physics and chemistry present a standard view. The role of the direct versus the indirect effect of ionising radiation on DNA is discussed, but their importance *in vivo* omitted. In living cells, indirect radical action only occurs within a small domain (25 nm); radical migration is limited and water is relatively excluded from packed DNA within chromatin. Thus, the difference between these modes of action may have no relevance to the cell. The chapter about the effects of radiation on DNA has been expanded to 50 pages to reflect the increased interest of this subject in recent years. This covers a broad range of issues but could, in my opinion, be expanded further to cover even more up to date developments in the subject. This is the area of radiobiology which is going to expand the most, and if this were reflected by the book, it would stand clear of its rivals.

One comment particularly relevant to this chapter is that certain important statements are made dogmatically, as if they were not the subject of any further debate. For example, the authors state that a "double-strand break involves the breakage of the two strands of DNA at points less than three nucleotides apart". This statement is not referenced and not supported

by any experimental evidence. A double-strand break can be produced by a large variety of lesions clustered within a domain of DNA. To define the nature of the broken end is extremely difficult, and will remain the subject of investigation and debate for many years to come. The authors further suggest that double-strand breaks can be produced by single events or the interaction of two independent particles. This represents the thesis of Chadwick and Leenhouts in their book *The Molecular Theory of Radiation Biology* (1981) but the debate has moved on a considerable way since then. Goodhead has long argued that the likelihood of two independent ionisations occurring in the same DNA domain is extremely low. The nature of the relationship between induced damage and dose should be discussed more in this context. These are relatively small points in the context of the whole book, but reflect a slight disappointment with the coverage of this most exciting area of radiobiology.

Cell survival curves are well covered: the authors seem much happier in this subject. The marked cell cycle effects upon cell survival seems to beg further discussion of how differences in cell cycle distribution could affect the nature of the cell survival curve of asynchronous populations. The sections on tissues and tumours are good. This partly reflects the more static nature of these subjects. The sections on fractionation, hypoxia and sensitisers provide a good balance of scientific discussion and clinical trials. Indeed, the later sections of the book seem to read more easily and still provide the necessary information.

Overall, this is a well balanced book, and good value in paperback. It rates well alongside established competitors. My criticism is that the early chapters are heavy going and the molecular radiobiology section is still too brief, with some inaccuracies.

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Letters

Yolk Sac Tumour of the Vagina with Hepatoid Differentiation

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Patrizia Sapere and Gaetano De Rosa

THE YOLK sac tumour (YST) is the rarest among the malignant childhood tumours of the vagina [1-3]; this, probably, has been reported in the literature as neoplasm of various terminology and often underdiagnosed [2]. We document a peculiar case of