

POSITRON EMISSION TOMOGRAPHY.

Martin Reivich, Abass Alavi, Eds., New York, Alan R. Liss, Inc., 1985, 478 pp, \$79.50

This book which has 54 contributors surveys the present state of theoretical and technical development of this technique emphasizing areas of application in neuroscience. The basic theoretical principles of quantitative autoradiography to the measurement of biochemical processes in vivo are described first by Louis Sokoloff. Progress and trends in the technology of PET are reviewed, covering instrumentation, accelerator-produced and radionuclide precursor labeled compounds, and positron emitter generators. Reconstruction algorithms for processing scanning data are examined, as are methods for three-dimensional analysis and display of these images. Theory and methods for the clinical measurement of local cerebral blood flow, glucose consumption, oxygen consumption, protein synthesis, and pH are presented, and the assumptions and limitations of these methods are critically reviewed. Both dynamic and steady state methods for the measurement of local cerebral blood flow and oxygen consumption are described. Single photon emission tomography is also described and compared with PET. Its principles, instrumentation, and methodology are examined and its use in various brain disorders is reviewed.

Applications of PET measurements for the study of stroke, epilepsy, aging and dementia, psychiatric disorders and brain tumors, as well as for studies of the heart, lungs, and systemic tumors are discussed. The use of PET in studying the processing of sensory and cognitive stimuli is explored, and the hypothesized close couple among cerebral blood flow, oxygen consumption, and glucose utilization is examined. Pharmacokinetic studies of patterns of concentration, distribution, and retention of radiolabeled pharmaceuticals in the brain are described. The relationship between nutritional blood flow and metabolic processes is considered as a means of identifying qualitative and quantitative differences between normal and neoplastic tissues.

This book will be of interest to radiologists, neurologists and cardiologists, clinical physiologists, research scientists and clinicians involved with PET in the fields of nuclear medicine, biophysics, biochemistry, oncology, and computer science. The educational level of this book is advanced and it is probably more appropriate as a library resource, although researchers in the field might want to have it as a personal reference. The text and illustrations are of very high quality and each chapter is well referenced.

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AN INTRODUCTION TO EMISSION COMPUTED TOMOGRAPHY, (Report #44).

E.D. Williams, Ed., London, The Institute of Physical Sciences in Medicine, 1985, 65 pp, £9.50

This small paperback was published by the publishing arm of the Hospital Physicists' Association with the stated aim of "... presenting information which should be available to someone who is using or introducing tomography, selecting equipment for it, or wishing to develop a clinical application..." For the most part the book fulfills its objective. However, the terseness forced upon the authors by the constraint of covering single photon, seven pinhole, rotating collimator and positron tomography in 65 pages sometimes interferes with the readability of the material. Outside of the discussion of the basic theory of filtered-back projection which contains a strange admixture of "simple concepts" and esoteric mathematical expressions, the level of discussion is appropriate to an overview. The writing style is very consistent throughout the book, a characteristic that is difficult to attain in any multi-author text, and one for which the editor is to be commended.

The text does cover an extremely broad range of topics and generally does it very well. Both basic concepts and some very practical considerations for the use of the technology are provided. The clinical application section is pretty much limited to a short literature review (with 39 references) and is divided into the various organ systems.

If one was going to pick at nits the complaint could be made that the book is too short. There are a number of instances in which an additional paragraph might have clarified a concept or an application. Having read the whole book it is still not clear what a 'partial volume effect' is or what an 'impedance estimator' does.

Although the briefness of the discussions might be more confusing than educational to the completely uninitiated, this little book is a very excellent overview and would serve as a fine precis for those with at least a nodding familiarity with the broad concepts of tomography. On a page per dollar scale the book might be considered expensive but it is a high quality publication and would be an excellent addition to the library of anyone interested in the field, particularly those involved in the often frustrating task of teaching others about this complex technology. The extensive references (158 references and an 11-item bibliography) alone would provide a good start to an in-depth training course.

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NCRP REPORT No. 83, THE EXPERIMENTAL BASIS FOR ABSORBED-DOSE CALCULATIONS IN MEDICAL USES OF RADIONUCLIDES.

National Council on Radiation Protection and Measurements, Bethesda, NCRP Publications, 1985, 109 pp, \$13.00

What is the liver dose for an adult undergoing a SPECT liver/spleen imaging study? What dose would an embryo receive if the mother undergoes a gallium study? Are there important dosimetric differences between ^{201}Tl and ^{82}Rb when