Books review

Nuclear Cardiology. Oxford Specialist Handbook

Edited by Andrew Kelion, Parthiban Arumugam, and Nikant Sabharwal. Oxford University Press, United Kingdom; 2017: 293 pages, 17 tables, and 67 figures. Second edition. ISBN: 9780198759942.

This is a good, concise, updated, modern guide to radionuclide cardiac imaging (nuclear cardiology) presented in a convenient pocket format. Renewed and updated in this second edition, the book is well-structured and has multiple figures, diagrams and images in gray-scale, some of which are reprinted in color and high-resolution in the center pages. It is easy to read, with good explanations, as it provides enough information, data, and findings without the chapters being too long.

The book's content can be divided into 3 sections.

The first covers the principles of physics, instrumentation, dosimetry, tomographic image obtainment with single-photon emission computed tomography/computed tomography (SPECT/CT) gamma camera–including the new gamma cameras with solid-state detectors (semiconductors) –tomographic reconstruction, with filters and reconstruction methods, as well as image interpretation and report writing. It describes clearly the current usefulness of equilibrium radionuclide ventriculography as a benchmark of reproducibility for serial imaging (primarily in oncology).

The second section focuses on myocardial perfusion imaging, which includes all types of stress tests: exercise testing on treadmill or bicycle, pharmacological testing with dipyridamole, adenosine, dobutamine, and also regadenoson (a recently approved selective A2A receptor agonist), as well as combined tests (submaximal exercise + pharmacological). The acceptance criteria for stress testing and the criteria for a positive test are defined. The book gives an excellent explanation of the acquisition protocols for myocardial perfusion imaging with different radionuclides, both ^{201}Tl and technetium (^{99m}Tc-tetrofosmin, ^{99m}Tc-MIBI), with 1-day and 2-day protocols, plus a clear description of the criteria for myocardial perfusion image interpretation, with evaluation of defect intensity, location, extent and reversibility, for both diagnostic and prognostic studies. It also explains SPECT/CT attenuation correction technology, from the technical principles required to the problems it can cause, and the differences in the interpretation of images with or without attenuation correction. It deals with the use of polar maps to facilitate in evaluation the location and extent of perfusion defects, their segmentation (into the 17 recognized segments) and their quantification, and it describes the various different more widely-available programs that generate them (eg, Cedars, Emory, and Corridor). It also defines and organizes the use of gated SPECT for calculating ventricular volumes and left ventricular ejection fraction, but does not include a recommendation on evaluating synchronization of gated SPECT with the left ventricle.

Chapter 10 deserves special mention, as it provides clinical input in the form of different clinical situations for SPECT myocardial perfusion scanning and an overview of current guidelines.

The third section gives a modest evaluation of some of the new radionuclide imaging techniques, specifically ^{123}I-mIBG scintigraphy of cardiac sympathetic innervation as an independent prognostic indicator in heart failure (although it does not go into its use in malignant ventricular arrhythmias) and phosphonate derivative scintigraphy, which is a highly accessible, cheap and fast technique for the evaluation of transthyretin cardiac amyloidosis. Finally, it goes on to look at positron emission tomography imaging, starting with a brief description of detection systems, annihilation photon detection mechanisms, the radiopharmaceuticals for positron emission tomography, but mainly for myocardial viability evaluation with ^{18}F-FDG as a tool for identifying hibernating myocardium, quantitative myocardial perfusion studies (specifying the different radiopharmaceuticals used), and ^{18}F-FDG cardiac inflammation/infection studies. There is more focus on the diagnosis of sarcoid cardiac damage than on the assessment of prosthetic valve or intracardiac device-related endocarditis, which have both been in the guidelines since 2015, although it does not go into detail and has just one poor-quality image.

In summary, this pocket book is completely updated, with good coverage of most of the new indications currently in nuclear cardiology, with greater emphasis (compared with the first edition) on attenuation correction scans and SPECT-CT and detailing the advantages of the new semiconductor equipment and the clinical implications of its use. This second edition of Nuclear Cardiology provides an essential, precise, summarized text for a clear understanding of nuclear cardiology, both for clinical users (nuclear cardiologists and radiologists) and for cardiologists who have not had previous access to such expertise on the subject.

Santiago Aguadé-Bruix
Cardiología Nuclear, Hospital Universitari Vall d'Hebron, Barcelona, Spain

E-mail address: saguade@vhebron.net

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