
Preface

Radiation dose in CT is the second edition of our textbook titled *Radiation Dose from Adult and Pediatric Multidetector Computed Tomography*. The second edition of this textbook was necessitated by continued technologic advances in multidetector-row computed tomography (MDCT) since the first edition as well as by development of new and promising radiation dose reduction technologies. Despite these developments, MDCT still poses challenges in radiological protection to the extent that CT radiation dose has been labelled by some as one of the topmost patient safety concerns. Applications and use of MDCT continue to proliferate with emergence of newer clinical indications; requests of clinicians for high diagnostic confidence as provided by MDCT are factors contributing to a continuous increase in the collective radiation dose from diagnostic CT imaging.

The first edition of the textbook dealt with radiation issues with MDCT in two parts. The first part was preceded with detailed discussions on the clinical use and expansion of CT in modern medical practice. In Part I, the book provided a comprehensive approach to perceived and potential risks of low radiation dose, influence of CT technical factors on the radiation dose, and technologic developments for optimization and reduction of the radiation dose per acquisition. In Part II, a comprehensive clinical approach of radiation dose justification, optimization, and reduction was provided, covering the fields of pediatric, head and neck, chest, abdomen, cardiovascular, bone and joint, and interventional MDCT. Finally, a detailed discussion on the balance between the risks and benefits of screening for cancer using low-dose MDCT was presented in the field of lung cancer and colon cancer.

The second edition of the textbook has recent and updated information about the two parts presented in the first edition. Several new chapters from renowned international radiation experts have been added to embellish the second edition, which now boasts seven parts including an online only Interactive Atlas-based teaching part which has four additional chapters for understanding the effect of CT radiation dose on image quality and lesion detection and appearance. In the second edition, Part I deals with technologic advances in MDCT and updates on clinical expansion in use of MDCT. Part II deals with risk issues with CT, and several technical aspects of CT radiation dose management with new chapters on iterative reconstruction techniques, noise reduction filters, hardware developments for dose optimization, tube potential adjustments for dose reduction, and an unbiased perspective on the use of shielding devices in CT. A new chapter on radiation dose recording and auditing has also been added to this part.

Practical and clinical approaches to dose optimization in different radiology subspecialties are presented in Part III of the second edition, which has been enhanced by addition of a chapter based on issues with CT scanning in pregnant patients. Part IV deals with radiation issues and dose reduction strategies for lung and colon cancer screening CT protocols. Part V presents perspectives of several regulatory bodies, organizations, and campaigns on CT radiation dose including the IAEA, FDA, ICRP, Image Gently, and Image Wisely. This part also includes two chapters on software for estimating CT dose and risks, and on discussion of guidelines for appropriate use of CT. Part VI brings entirely new content to the second chapter with four new chapters from major CT vendors outlining their CT radiation dose reduction and optimization technologies.

Several international experts, from Europe and North America, selected for their important contributions to the scientific literature, have contributed to this book with a common objective of providing readers with a comprehensive, up-to-date, practical, clinical, and well-documented approach on radiation dose optimization and reduction, suitable for daily MDCT practice.

Among the three editors, Denis Tack, is a general radiologist subspecialized in MDCT, and Pierre Alain Gevenois is Chest radiologist and Professor of medical imaging at the Faculty of Medicine and the School of Public Health of the University of Brussels, Belgium. Their researches deal with radiation dose reduction with MDCT, and quantification of pulmonary emphysema and pulmonary edema by computed tomography. The new editor, Mannudeep K. Kalra is a Chest and Cardiac radiologist at the Massachusetts General Hospital and an Assistant Professor at Harvard Medical School in Boston with key interest in CT radiation dose research and education.

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