Introduction

In 1895, Roentgen's historic discovery of X-rays launched diagnostic medical imaging – a service that has saved the lives of millions of patients and, reinforced by a century of progress, continues to do so today. The significance of this new discovery was immediately recognised; it was used widely and enthusiastically. But as time passed, some latent hazards become apparent: it was discovered that X-ray exposures could trigger changes within the body's cells, altering their function and possibly proving fatal.

Medical imaging science addresses these conflicting issues, and this book aims to encourage students to adopt as central features of their own practice:

- improving image quality, to ensure maximum diagnostic information,
- minimising potential harm to patients during their imaging examinations, and
- eliminating all danger to staff.

Chapters 1-5 cover X-ray imaging, from conventional procedures through to computed tomography (CT). Especially for readers whose previous studies of physical science have been limited, commentary notes, recognisable by their grey background, accompany the main text of the first four chapters. These offer definitions of terms, explanation of principles and discussion.

Three further chapters explain the imaging modalities based on gamma radiation (RNI), ultrasound and nuclear magnetic resonance (MRI). Technically, specialised imaging modalities stand well apart from conventional X-ray imaging. This fact has tended to

exclude them from the early years of a radiography curriculum. But now, as their availability expands, first-choice use of CT, RNI, MRI and ultrasound imaging suggests that students should learn about them sooner. Chapters 5–8 have been specially written as introductions to these modalities' principles and vocabularies.

Throughout the book, the burden of facts and figures has been deliberately limited; the aim has been to adopt a 'light touch'. Opinions may differ on what needs to be known (or not), about some topics. For example, though automated equipment's time and labour-saving facilities unquestionably benefit patients and staff alike, they raise an important question for students and those concerned with their education. If equipment is modelled on the 'Just switch on and use!' principle, to what extent should the saved time and labour be devoted to learning the secrets behind its automation? Anxious reactionaries will insist on deep and thorough study. Liberated technophobes will simply keep the service engineer's telephone number handy. This book tries to follow a pragmatic course. I hope readers will find it accessible rather than daunting, and interesting rather than boring. It can, of course, be treated as a quick-access resource for coping with the temporary challenges posed by exams and assignments. But longer-term use is suggested as preferable – particularly if what it offers is integrated with other learning resources: complementary textbooks, journals, research papers, official reports and the increasingly huge range of facilities available via the Internet.

Above all, if it helps to bring benefits to some of your patients and reduce the risks to others, its writing – and your reading – will have been worth the effort.