

The goal of *Bone Densitometry in Growing Patients: Guidelines for Clinical Practice* is to provide both clinicians and technologists with a practical guide for the use of densitometry in pediatrics. The importance of investigating and improving children's bone health has been established, but the tools to carry out this work are still in development.

At this time, the most available clinical technique is dual-energy x-ray absorptiometry, commonly referred to as DXA. Despite its limitations, DXA is a widely used and well-described method of bone health assessment in adult medicine, and its use is rising rapidly in pediatrics. To date, however, no published texts have adequately addressed the complicated issues encountered when investigating children using DXA. This likely reflects the complexities of performing DXAs in younger patients and the lack of consensus concerning acquisition and interpretation of data in growing children.

Although much information is still needed to optimize the use of DXA in children, we are aware that its use is exponentially increasing and that treatment decisions are often based on the information thus gathered. We therefore felt compelled to merge all available data and expert opinion into a document that will hopefully serve both as a guidebook for centers employing the technique and as a springboard for future developments in this important field.

Work on this book began at the Second International Conference on Children's Bone Health, held in Sheffield, England in 2002. Pediatric bone experts from Europe, Australia, New Zealand, Canada, South Africa, and the United States met to define and address controversies in the acquisition and interpretation of DXA scans in pediatric patients. At subsequent sessions, in conjunction with the American Society for Bone and Mineral Research in 2003 and 2004 and the Third International Pediatric Bone Health meeting in 2005, this working group continued its efforts to discuss best practices in the field of pediatric DXA. As in any field in which research is sparse and opinions are plentiful, there were invigorating debates and fruitful discussions.

Much time was spent outlining numerous uncertainties, including the optimal skeletal sites for scanning, the analysis, the selection of normative data, and the interpretation of the bone mineral data. Each of these variables can affect the results of a study and may lead to misinterpretations of results. When the treatments were limited to optimizing vitamin D and calcium intake and physical activity, the potential for misinterpretation was an important but lesser concern. However, now bisphosphonates and other drugs used to treat osteoporosis in the elderly are being prescribed increasingly in children, despite a lack of data establishing their efficacy and safety in pediatric patients. Many decisions to start these medications are based

on the results of DXA scans. When therapeutic decisions rely on erroneous information, such as the diagnosis of “osteoporosis” based upon an adult scanning protocol and normative data (T-scores), there can be serious consequences.

Therefore, although numerous controversies remain, our group of experienced pediatric bone researchers and clinicians agreed on the need to develop guidelines for performing and interpreting DXAs in clinical pediatric practice. Our panel of international authors has extensive background in pediatric DXA and has published in their areas of expertise. Each chapter has been revised in response to reviews by the editors and an additional panel of four external reviewers to ensure an even broader scope of expertise. We are extremely grateful to all of the valued authors and reviewers cited in the Contributors section.

Bone Densitometry in Growing Patients: Guidelines for Clinical Practice is directed at technologists and clinicians with some prior knowledge of DXA theory and technique. For those less familiar with DXA, we recommend as valuable resources the comprehensive texts written by Dr. Syndey L. Bonnick, *Bone Densitometry in Clinical Practice: Application and Interpretation, Second Edition* and *Bone Densitometry for Technologists, Second Edition* (Humana Press). Although these texts focus on DXA procedures in adults, they provide an essential foundation for work in this field.

This text begins with an introduction of general concepts regarding bone health in children. We have also included a brief overview of all the currently available densitometry techniques used in evaluating children, but we then focus primarily on DXA because it is the most widely used method for bone density assessment in clinical practice. Subsequent chapters discuss the indications for DXA studies in children and the optimal methods for acquiring, analyzing, interpreting, and reporting these scans. Current and future research applications of DXA and other modalities for studying pediatric bone health are also discussed. At the end of each chapter, we have added Key Points to emphasize the themes discussed. Please remember that these are not meant to stand alone—they cannot replace a thorough read of the discussion contained in the text.

Appendices were added to serve as a “resource center,” with information including websites, manufacturer details, and pediatric-specific reference data. The Appendices also contain sample requisition forms and information sheets for patients, which have been generously contributed from various existing pediatric DXA centers. We have included some specific information from the three major DXA manufacturers, but we have not tried to recreate operator manuals, which must be followed for optimal DXA performance.

Recommendations throughout the book are evidence-based whenever there are sufficient data to support a conclusion. When conclusive data are lacking, recommendations reflect the consensus opinions of the assembled bone experts who contributed to this book. For some issues, expert consensus has not been achieved. In these instances, two or three common practices are described and supported to allow

you to select an appropriate method for your center. When faced with choosing among several recommended techniques, it is important to be consistent once a method is chosen and that it is imperative that the specific method be documented in the patient's report.

Changes in DXA and other densitometry methods are inevitable in coming years, and other noninvasive modalities are likely to emerge to better predict bone strength. However, at this time, DXA remains the gold standard in the clinical setting for assessing bone health in children and adults. Our hope is to optimize the current use of DXA in children as a tool in the clinical management of bone fragility. Ultimately, this may improve the process of identifying and monitoring children at risk for low bone mass, leading to the development of appropriate intervention and treatment programs for this population.

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