

Preface

The *European Guidelines for Quality Assurance in Breast Cancer Screening and Diagnosis* of the European Commission (Perry et al. 2004) pertain basically to mammography, and very little to adjunctive methods. But the early detection of breast cancer can be effective only when the three pillars—clinical investigation, mammography, ultrasound—are united within a structured, quality-assured program. The German *S3 guidelines* (Albert et al. 2003, 2008; Kreienberg et al. 2008) come closest to meeting this requirement. The European and American guidelines are very similar to each other but are basically limited to mammography. Professor Klaus-Dieter Schultz and his team were instrumental in introducing the S3 guidelines, which were revised in 2008 to become the quality standard throughout Germany. The German and English editions of this atlas were therefore dedicated to Professor Schultz, whose sudden death left a gaping hole in the German Senology Society. I credit Professor Schultz with many valuable ideas that set my professional horizon during my years of working with him in the Society.

Rigorous efforts at early detection (secondary prevention) as well as adjuvant surgical and medical treatments (tertiary prevention of recurrence and metastasis) have significantly improved the survival rates and mortality rates for breast cancer throughout the world during the past 25 years. These factors do not account for the declining aggressiveness of malignant tumors that has been documented in recent decades.

Primary prevention, or the prevention of gradual malignant tumor development in response to tumor-stimulating biological or synthetic agents, is not yet a reality. This atlas is concerned with *secondary* cancer prevention.

The illustrations in this book do not include mammograms that display obvious tumors with associated palpable nodules. There are very good textbooks and atlases of mammography that present images of this kind (for example, Barth and Prechtel 1991; Tabar et al. 2000; Fischer and Baum 2005). A great many of the mammograms in this book show only minimal changes or no abnormalities at all, which makes the ultrasound findings all the more impressive by comparison. This is typical of the cases that are seen outside of screening programs. I have focused mainly on difficult cases illustrating the diagnostic hurdles and forensic pitfalls that are encountered in breast diagnosis. I hope that even experienced colleagues will find this book a valuable teaching aid.

I could not illustrate everything that would be important in routine situations—the scope of modern breast diagnosis is too extensive. But the book is intended to show how important it is to know *all* the diagnostic possibilities in the breast, not only mammography.

Because such high standards are placed on the technical quality of mammograms throughout the world, our radiologic technologist, **Elfi Steinhilber**, contributed a special section dealing with *mammographic positioning and quality assurance*. Using the PGMI system, physicians and their assistants who perform mammography can rate the technical quality of their mammograms as “perfect,” “good,” “moderate,” or “inadequate.” This section pertains to both

conventional and digital mammography and should be required reading for every breast diagnostician.

My computer expert, **Oliver Wild**, authored the section on *digital full-field mammography*. He explains the advantages of this technology for screening and modern diagnostic testing and for making a detailed comparison of current and previous mammograms—primary digital images as well as images that have been secondarily scanned into the computer.

A section written by my practice partner, **Dr. Johannes Herrmann**, gives readers the opportunity to interpret subtle mammographic changes (*in mammographic case presentation and training in interpretation*). These images simulate a screening situation. Some of the mammograms show only minimal changes or appear normal despite the presence of a breast tumor. This section illustrates the limitations of mammograms and shows that mammography alone is (outside of screening) no longer the gold standard and can yield optimum results only in concert with other modalities. Typical *screening cases* are also illustrated.

Recall the publications of Nakama et al. (1991), Gordon and Goldenberg (1995), Teboul and Halliwell (1995), Kolb et al. (2002), and Leconte et al. 2003 to understand the possibilities of ultrasound, and the 2006 study by Dr. Wendie Berg of Johns Hopkins University (Berg et al. 2008), in which mammography plus breast ultrasound detected almost one-third more cancers than mammography alone. So what are we waiting for?

It should be added that ultrasound may yield false-positives that prompt unnecessary interventions, but this does not alter the fact that ultrasound reduces interval cancers and improves the prospects for a cure. Mammography generates a significantly higher rate of false-positive findings (30%), which cause serious distress for the affected women. The addition of ultrasound eliminates approximately 50% of recalls, fully compensating for the 5% rate of false-positive sonographic findings. *Fine-needle aspiration* (FNA) is particularly useful for identifying false-positive ultrasound findings at low cost and very quickly (Berg et al. 1962; Zajicek 1974; Schönendorf 1977; Lindholm 1999; Orell 1999; Frohwein 2002).

The section on *screening and tumor progression* underscores this theme by showing how tumors that were missed on previous mammograms can be detected retrospectively on the basis of relatively subtle findings. Every breast diagnostician has missed a tumor or delayed its diagnosis at one time or another. This should not be a frequent occurrence, however. We practitioners cannot treat the concept of *interval cancer* as an abstraction; sometimes we must explain in a court of law why we missed a tumor that may have harmed our patient.

Other sections in this book deal with breast cancer in young women and during pregnancy. Diseases of the male breast are also addressed.

We examine the pitfalls of pre- and postoperative diagnosis and the possibilities and limitations of breast diagnosis in the *postoperative care* setting. Performed by nonscreening radiologists and

gynecologists, these follow-up examinations require special expertise in the differential diagnosis of mammographic, sonographic, and MRI findings.

Breast implants are included because of the growing numbers of women who present with these devices after breast-conserving therapy. These cases cannot be adequately evaluated by single-view mammography, and we must obtain a second view or even a third view in selected cases. Familiarity with different types of implant is essential in order to be able to make an accurate differential diagnosis.

We take a critical look at imaging modalities that either are used as a matter of course or are withheld from patients due to their high cost. These include *magnetic resonance imaging* (MRI), *positron emission tomography* (PET), and PET/CT. Why should MRI be used only in patients with lobular carcinoma to define tumor extent and evaluate the healthy breast, merely because MRI has been identified as the best *evidence-based* modality for lobular cancer detection? MRI should be available for the preoperative analysis of *all* malignant tumors, especially in younger women, if it will advance treatment planning. Most doctors would not think twice about evaluating the knee joint or a little finger with MRI. Why, then, is there a reluctance to apply this modality to breast cancer, with its many therapeutic challenges and potential for recurrence?

We touch on the importance of dedicated, *certified breast centers* as an effective approach to early cancer detection and treatment. These breast centers have been an important factor in the worldwide decline of breast cancer mortality. Centers are springing up everywhere in the world, which is a positive development (Kreienberg et al. 2008).

It is unacceptable for a woman to be referred to a hospital for cancer treatment simply because the referring physician is a friend of the department head. The international care standard for breast cancer treatment is met only at a specialized care center where all diagnostic and therapeutic information is coordinated, archived, and reviewed at multidisciplinary case conferences—a place where all therapeutic options are available and can be practiced in an optimal way. *Digital patient databases* are essential in this setting, although security and confidentiality issues have kept them from being established on a broad, interdisciplinary scale.

The *axilla* is a region of profound importance. Untold misery has resulted from aggressive, often unnecessary, axillary lymph node dissections (with or without irradiation) in breast cancer patients. The worldwide introduction of the sentinel node biopsy has spared many women the sufferings of arm edema, axillary foreign-body sensation, and radiating pains. My former colleagues **Dr. Brigitte Koellner** and **Dr. Petra Zimmer** have dealt with this topic for years. They introduced the sentinel node biopsy at Esslingen Hospital 10 years ago and worked with the gynecology chief *Professor Dr. Thorsten Kuehn* and his team to optimize the procedure. I extend special thanks to **Dr. Koellner** for writing the section on the *sentinel lymph node procedure*.

Acknowledgments

An atlas of this kind is always a team effort. Many have helped me in bringing the book to completion, including those who worked in the background. I am particularly indebted to my secretary, *Cornelia Wahl*, who typed the manuscript and made revisions from her

home while caring for her child. I also express sincere thanks to my assistants *Hatice Kara* and *Derya Celik*, *Heide Scherbaum*, *Milka Leovac*, and *Tuğçe Yiğit*. They painstakingly collected the published mammograms and sonograms, scanned them into the computer, and looked up numerous case histories.

I am grateful to my colleagues *Professor Dr. Thorsten Kuehn*, chief of gynecology at Esslingen Hospital, and *Professor Dr. Stefan Kraemer*, who succeeded me as head of the radiology department at Esslingen Hospital, for providing me with valuable suggestions and illustrative materials. I thank *Dr. Hans-Helmut Dahm* and his partner *Dr. Joern Straeter* for providing some of the cytology illustrations and a large portion of the histologic illustrations that were included in this book. I supplemented these illustrations with material from the collections of the leading German breast pathologists of recent decades, *Professor Roland Baessler* (Fulda, Germany) and *Professor Klaus Prechtel* (Starnberg, Germany), with whom I worked for years and still maintain friendly ties. They provided me with illustrations for this atlas, and their contribution is gratefully acknowledged.

I also thank the former director of St. Joseph Hospital in Haan, *Dr. Heinz Uedelhoven*, who left me a large portion of his valuable mammogram and sonogram collection for use in scientific publications. I have put several of these images to excellent use in the atlas.

I express special thanks to the radiologist *Dr. Volker Frohwein* of Landstuhl, Germany, now retired. As a radiologist and cytologist (an extremely rare combination!), he was an enthusiastic, life-long collector of cytologic specimens from the breast. He published his experience with breast cytology in the paper *Frühdiagnostik des Mammakarzinoms* (2002). *Dr. Volker Frohwein* supplied most of the cytologic specimens pictured in this atlas.

One could hardly expect that images collected over a period of decades would consistently satisfy today's quality standards. For this reason, I have replaced earlier images of poorer quality, and the materials from *Dr. Frohwein* were valuable in this regard. MR images of marginal quality have been replaced wherever possible by similar images acquired with a 1.5-tesla scanner and the latest coil technology. *Dr. Stefan Kraemer* helped me with this task.

I appreciate the help of my two former doctoral candidates *Coscina Weining* and *Oskar Weining-Klemm*, who analyzed my case files from the past 10 years to identify the most economical and effective early detection strategies as part of their doctoral dissertation. I am pleased to note that they found only a 1.5% incidence of interval cancers.

My daughter, **Andrea Barth**, not only edited this book time and again, making stylistic revisions and offering excellent organizational suggestions, but also helped me with the statistical materials. She has thus made a valuable contribution to the concept of the book. My son, **Dr. Stephan Barth** (St. Johann, Austria), did extensive literature research that was necessary to ensure that the contents of the atlas were up to date. He also revised the chapter on breast cancer in males.

I thank the staff at Thieme Publishers, especially *Gabriele Kuhn-Giovannini*, and *Elisabeth Kurz* for their work in producing the English edition. I extend special thanks to the translators of the book, *Terry Telger* and *Julie Foster*, and to the copy editor *Len Cegiłka* for his excellent work.

Finally I would like to thank all the retired department heads at Esslingen Hospital for decades of friendly cooperation and wish them all the best.

Volker Barth, MD