

Contents

Part 1: Anatomy, Physiology, and Pathology of the Breast

1	Development, Anatomy, and Physiology of the Mammary Gland.....	2
	<i>F. Baum</i>	
1.1	Development	2
1.2	Anatomy	2
1.3	Physiology	2
	Bibliography	3
2	Tumor Formation	4
	<i>F. Baum</i>	
2.1	Mutation, Carcinogenesis, and Angiogenesis	4
2.2	Risk Factors	4
2.3	Genetic Risk Factors	5
2.4	Prevention	6
2.4.1	Primary Prevention	6
2.4.2	Secondary Prevention	6
2.4.3	Tertiary Prevention	6
2.5	Epidemiology, Incidence, and Mortality	6
	Bibliography	7
3	Pathology of Benign and Malignant Changes in the Breast.....	9
	<i>J. Rueschoff</i>	
3.1	Benign Changes	9
3.1.1	Histological Principles	9
3.1.2	Nonneoplastic, Nonproliferative Diseases of the Breast	9
3.1.3	Benign Tumor-Forming Diseases	11
3.2	Malignant Changes in the Breast	19
3.2.1	Classification of Malignant Breast Tumors (WHO Classification, B-Categories)	19
3.2.2	Prognostic and Predictive Factors	20
3.2.3	Papillary Lesions	24
3.2.4	Ductal Carcinoma In Situ	25
3.2.5	Microinvasive and Invasive Breast Carcinoma	26
3.2.6	Tumors of the Nipple	29
3.2.7	Malignant Mesenchymal Tumors and Lymphomas of the Breast	29
3.2.8	Metastatic Tumors	30
3.3	Acknowledgments	31
	Bibliography	31

Part 2: Breast Diagnostics

4	Nonimaging Diagnostics	34
	<i>U. Fischer</i>	
4.1	History	34
4.2	Informed Consent	34
4.3	Self-Examination	34
4.4	Inspection	34
4.5	Palpation	35
	Bibliography	40
5	Mammography.....	41
	<i>U. Fischer</i>	
5.1	Technique and Methods	41
5.1.1	Principles of X-ray Mammography	41
5.1.2	Components of a Mammography System	41
5.1.3	Exposure Parameters	43
5.1.4	Image Quality	43
5.1.5	Analog Mammography	44
5.1.6	Digital Mammography	45
5.1.7	Radiation Exposure	54

5.2	Parameters and Positioning	55	5.3.1	Terminology	62
5.2.1	Standard Projections	55	5.3.2	Tissue Density in a Mammogram According to the ACR BI-RADS Atlas	63
5.2.2	Supplementary Views	57	5.3.3	Interpretation Criteria	64
5.2.3	Galactography	58	5.3.4	BI-RADS Classification of Mammography	68
5.2.4	Mammography of the Male Breast	61	5.3.5	Normal Findings in the Mammogram	74
5.2.5	Quality Assurance in Parameters and Positioning	61		Bibliography	74
5.3	Interpretation of Mammograms	62			
6	Breast Ultrasonography	77			
	<i>S. Luftner-Nagel</i>				
6.1	Technique and Methods	77	6.2.1	Terminology	84
6.1.1	Basic Principles	77	6.2.2	Tissue Type in Sonography	84
6.1.2	Device Adjustments	79	6.2.3	Evaluation Criteria	85
6.1.3	Examination Technique	79	6.2.4	BI-RADS Classification of Breast Ultrasonography	89
6.1.4	Ultrasound Techniques	81	6.2.5	Normal Findings in Sonography	92
6.1.5	Quality Assurance	84		Bibliography	93
6.2	Evaluation	84			
7	Magnetic Resonance Imaging of the Breast	94			
	<i>U. Fischer</i>				
7.1	Technique and Methods	94	7.2.1	Terminology	101
7.1.1	Basic Principles	94	7.2.2	Perfusion Pattern	101
7.1.2	Tumor Detection	95	7.2.3	Findings in the T1-Weighted Precontrast Image	101
7.1.3	Equipment	95	7.2.4	Findings in the T2-Weighted Image	102
7.1.4	Timing of the Examination	95	7.2.5	Findings in the T1-Weighted Contrast-Enhanced Image	102
7.1.5	Patient Positioning	96	7.2.6	Evaluation Criteria	103
7.1.6	Measurement Parameters	96	7.2.7	BI-RADS Classification of MRI of the Breast	104
7.1.7	Image Postprocessing	97	7.2.8	Normal Findings in MRI of the Breast	107
7.1.8	Implant Evaluation	99		Bibliography	107
7.1.9	Nonestablished Examination Techniques	100			
7.2	Evaluation	101			
8	Imaging of Breast Lesions	110			
	<i>U. Fischer and S. Luftner-Nagel</i>				
8.1	Benign Findings	110	8.1.17	Seroma	128
8.1.1	Cysts	110	8.1.18	Hematoma	129
8.1.2	Inflamed Cysts	110	8.1.19	Fat Necrosis (Oil Cyst)	130
8.1.3	Complex Cysts	111	8.1.20	Abscess	131
8.1.4	Myxoid Fibroadenoma	112	8.1.21	Postoperative Scars	132
8.1.5	Fibrotic Fibroadenoma	114	8.2	Findings with Ambiguous Biological Potential	133
8.1.6	Adenoma	116	8.2.1	Papillomas	133
8.1.7	Hamartoma	116	8.2.2	Radial Scars	135
8.1.8	Lipoma	117	8.2.3	Atypical Ductal Hyperplasia	135
8.1.9	Mammary Fibrosis	119	8.2.4	Phyllodes Tumors	136
8.1.10	Adenosis of the Breast	120	8.2.5	Cysts with Intracystic Proliferation	138
8.1.11	Fibrocystic Condition of the Breast	121	8.2.6	Lobular Intraepithelial Neoplasia	139
8.1.12	Adenomyoepithelioma	122	8.3	Intraductal Carcinoma	141
8.1.13	Acute Nonpuerperal Mastitis	124	8.3.1	Ductal Carcinoma In Situ (Low Grade)	141
8.1.14	Chronic Nonpuerperal Mastitis	125			
8.1.15	Intramammary Lymph Nodes	125			
8.1.16	Pseudoangiomatous Stromal Hyperplasia	126			

8.3.2	Ductal Carcinoma In Situ (Intermediate Type)	141	8.4.5	Mucinous Carcinoma	148
8.3.3	Ductal Carcinoma In Situ (High Grade)	141	8.4.6	Invasive Papillary Carcinoma	150
8.4	Invasive Tumors	143	8.4.7	Sarcomas	152
8.4.1	Invasive Ductal Carcinoma	143	8.4.8	Triple-Negative Carcinoma	152
8.4.2	Invasive Lobular Carcinoma	145	8.4.9	Paget's Disease of the Nipple	152
8.4.3	Tubular Carcinoma	147	8.4.10	Inflammatory Carcinoma	154
8.4.4	Medullary Carcinoma	147	8.4.11	Systemic Diseases Involving the Breast	155
9	Breast Intervention	158			
	<i>F. Baum</i>				
9.1	Biopsy	158			
9.1.1	Objective of Percutaneous Tissue Sampling	158	9.2	Localization	166
9.1.2	Percutaneous Tissue Sampling Equipment and Implementation	158	9.2.1	Objective of Pretherapeutic Localization	166
9.1.3	Interventional Imaging	161	9.2.2	Equipment and Implementation	170
9.1.4	Classification of Findings	164	9.2.3	Quality Assurance	172
9.1.5	Tumor Seeding and Mechanical Tumor Induction . .	166		Bibliography	173
9.1.6	Quality Assurance	166			
Part 3: Prevention and Therapy of Breast Cancer					
10	Examination Concepts	176			
	<i>U. Fischer</i>				
10.1	Prevention	176	10.4	Pretherapeutic Local Staging	183
10.2	Early Breast Cancer Detection (Secondary Prevention)	176	10.5	Pretherapeutic Peripheral Staging	184
10.2.1	Mammography Screening	177	10.6	Follow-up Care	184
10.2.2	Individualized Examination Concepts	180	10.7	Implant Evaluation	185
10.2.3	Early Detection in Women with a High-Risk Profile .	181	10.8	Evaluation of the Male Breast	185
10.2.4	Future Concepts of Early Breast Cancer Detection .	182		Bibliography	185
10.3	Diagnostic Work-up	183			
11	Surgical Treatment of Breast Carcinoma	187			
	<i>T. Kuehn</i>				
11.1	Significance of Surgery in the Context of Multimodal Treatment of Breast Carcinoma	187	11.4.1	Procedure for Clinically Negative Node Status	195
11.2	Types of Breast Carcinoma	187	11.4.2	Procedure for Clinically Positive Nodal Status	195
11.2.1	Lesions of Uncertain Biological Potential (B3 Lesions)	187	11.4.3	Procedure for Clinically Negative Node Status and Positive Sentinel Node	195
11.2.2	Preinvasive Carcinoma (Ductal Carcinoma in Situ; B5a)	187	11.5	Secondary Breast Reconstruction	196
11.2.3	Invasive Carcinoma (B5b)	187	11.5.1	Timing the Reconstruction: Primary vs. Secondary Reconstruction	196
11.3	Surgical Treatment of the Primary Lesion	189	11.5.2	Alloplastic Reconstruction (Implant Reconstruction)	197
11.3.1	Oncologic Aspects	189	11.5.3	Autologous Reconstruction (Reconstruction Using Endogenous Tissue)	197
11.3.2	Technical Aspects	189	11.5.4	Nipple Reconstruction	199
11.4	Lymph Node Surgery	192		Bibliography	200

12	Medical Treatment of Breast Cancer	201		
	<i>M. Hellriegel and G. Emons</i>			
12.1	Basic Principles and Objectives	201	12.4.1	Endocrine Therapy in Premenopausal Patients with Distant Metastases
12.2	Adjuvant Drug Therapy	201	12.4.2	Endocrine Therapy in Postmenopausal Patients with Distant Metastases
12.2.1	Adjuvant Chemotherapy	201	12.5	Endocrine Maintenance Therapy after Completing Chemotherapy
12.2.2	Neoadjuvant Therapy	202	12.6	Chemotherapy of Metastatic Breast Cancer Combined with New Agents
12.2.3	Adjuvant Endocrine Therapy	204		Bibliography
12.2.4	Antibody Therapy	207		
12.3	Medical Treatment in Locoregional Recurrence	207		
12.4	Medical Treatment of Distant Metastases	208		
13	Radiotherapy of Breast Cancer	212		
	<i>C. F. Hess</i>			
13.1	Adjuvant Radiotherapy after Breast-Conserving Surgery	212	13.5.3	Shortened Treatment Time: Alternative Fractionation Schemes
13.2	Adjuvant Radiotherapy after Mastectomy	212	13.6	Acute Side Effects and Complications of Adjuvant Radiation Therapy
13.3	Effectiveness of Adjuvant Radiation Therapy: Prognostic Factors	213	13.6.1	Acute Side Effects
13.4	Integration of Adjuvant Radiotherapy into the Multimodal Treatment Concept	213	13.6.2	Late Complications of Radiation Therapy
13.5	Target Volume and Dose Concept	213	13.7	Planning and Implementing Radiation Therapy
13.5.1	Clinical Target Volume: Former Tumor Region, Mammary Gland, Chest Wall, and Regional Lymph Channels	214	13.8	Radiotherapy in Primarily Inoperable Tumors, Recurrences, and Metastatic Disease
13.5.2	Partial Breast Irradiation	215	13.9	Summary
				Bibliography
14	Management of a Diagnostic Breast Center	220		
	<i>F. Baum</i>			
14.1	Expertise	220	14.3.3	Breast MRI Room
14.2	Equipment	220	14.3.4	Rooms for a Second Ultrasound Unit and for Interventional Procedures
14.3	Facility Design	221	14.3.5	Recovery Room
14.3.1	Doctor's Consultation Room	221	14.4	Ambiance
14.3.2	Mammography and Sonography Rooms	221	14.5	Communication
15	Logistics in an Interdisciplinary Breast Center	225		
	<i>G. Emons</i>			
15.1	Background	225	15.4	Outlook
15.2	Structure of a Certified Breast Center	225		Bibliography
15.3	Treatment Pathways in a Breast Center	225		
16	Counseling Techniques and Psychosocial Support	228		
	<i>H. Lorch, A. Kuechemann, and J. Rueschoff</i>			
16.1	Compliance	228	16.1.1	Quality of the Medical Services

16.1.2	General and Personal Requirements	228	16.3.1	Station 1: Registration	230
16.1.3	Structural, Organizational, and Procedural Components	228	16.3.2	Station 2: History and Physical Examination	231
16.1.4	Interactive and Communicative Competence	228	16.3.3	Station 3: The Diagnostic Procedure	232
16.2	Communication	228	16.3.4	Station 4: Communication of Results and Concluding Consultation	235
16.2.1	General Principles of Communication	229	16.4	Summary	235
16.2.2	Communication: Dealing with the Patient	229		Bibliography	235
16.2.3	Communicating Results to the Patient	230			
16.3	The Patient's Flow through the Department	230			
	Index				237