

# Index

Page numbers in *italics* refer to figures.

## A

accessory breasts 199  
 acini 23, 25  
 ACR *see* American College of Radiology  
 adenomas  
   lactating *see* lactating adenomas  
   pure 164  
 adenosis, breast  
   mammography 113, 125, 355, 358  
   sonography 163–164, 182–186  
   *see also* sclerosing adenosis  
 ADH *see* atypical ductal hyperplasia  
 adolescent girls  
   breast ultrasound 156, 159–160  
   screening 109  
   *see also* younger women  
 advanced breast cancer, locally 325–326, 403, 403–404  
 age  
   diagnosis of breast cancer 15, 15, 16  
   precancerous lesions and 34–35  
   radiation-induced cancer risk and 16, 16  
 alcohol consumption 9, 18, 33  
 allergic reactions, radiolabeled colloid 311  
 American College of Radiology (ACR)  
   grades, breast density 8, 33, 98–99  
   guidelines and standards 230, 231, 239  
 anaplastic carcinoma, diffuse 72, 73  
 anatomy, breast 23, 24  
 angiosarcoma *see* Kaposi sarcoma  
 antiestrogen therapy 14, 34  
 apocrine carcinoma 69  
   screening pitfalls 140–141, 362, 362  
 arm edema 193, 197, 371  
   prevention 307, 308  
 artifacts 133, 359, 359  
 asymmetry, breast 46–47, 346  
 athletic activities *see* sports activities  
 atypical ductal hyperplasia (ADH)  
   34–35, 36–37, 345, 345  
   differential diagnosis 44–45, 51–52, 346  
   fine-needle aspiration 237  
   intracystic papilloma with 52–53, 347  
   preoperative localization 301–303, 397  
   treatment 46  
   *see also* ductal carcinoma in situ  
 atypical lobular hyperplasia (ALH) 58  
 axilla  
   mammography and ultrasound  
     193–198, 194–200  
   physical examination 198

axillary lymph node dissection 21, 308  
   after sentinel node biopsy  
     312, 312–313, 398  
   alternative to 311  
   morbidity 5, 307, 308, 308  
 axillary lymph node metastases 20, 21–22  
   after refusal of chemotherapy  
     278–279, 391  
   ductal carcinoma in situ 45  
   follow-up examination for 335, 337, 407  
   magnetic resonance imaging 202  
   mammography 200, 372  
   palpation 90  
   sentinel lymph node biopsy 311  
   ultrasound 195, 198, 199, 371, 371, 372  
 axillary lymph nodes 407, 408  
   normal 195, 371  
   sentinel biopsy *see* sentinel lymph  
   node biopsy

## B

bilateral tumors 120–121, 356  
   mammographic screening 139–140, 362, 362  
   undetected 148–149, 365  
 biopsy 3, 230–239  
   complications 231, 234, 234–235  
   cost comparisons 239, 251, 253, 254  
   evaluation of different methods  
     251–254, 254  
   magnetic resonance imaging (MRI)-  
     guided 254–256, 255  
   open surgical 239, 256  
   possibilities, limitations and risks  
     256, 257–261, 383–384  
   during pregnancy 283  
   procedure 231–235, 232–234  
   stereotactic guidance *see* digital  
   stereotactic biopsy  
   ultrasound-guided 235–246  
   *see also* core-needle biopsy; fine-needle  
   aspiration biopsy; sentinel lymph node  
   biopsy; vacuum biopsy  
 BIRADS classification 99, 156  
 blood clot, intracystic 248, 382  
 Bloom–Richardson grading system 74  
 bone marrow biopsies 22  
 bone scans, radionuclide 337, 340  
 BRCA1 gene mutations 10, 14, 16–17  
 BRCA2 gene mutations 10, 14, 16–17

breast awareness 15–16  
 breast centers 4, 5–6  
   quantitative criteria for  
     well-functioning 299  
 breast-conserving treatment 5  
   ductal carcinoma in situ 46–51, 48–50,  
     346, 346–347  
   lymphedema after 320, 400, 400–401  
 breastfeeding 7, 33  
   *see also* lactation  
 Breast Imaging Reporting and Data System  
 (BIRADS) classification 99, 156  
 breast ultrasound 153–193

## C

CAD *see* computer-aided detection  
 calcifications 110  
   after reduction mammoplasty  
     321–322, 401  
   artifactual 133, 359, 359  
   benign 137, 361, 361  
   biopsy 69, 238, 249, 250, 256, 382  
   BIRADS classification 99  
   changes over time 41, 41, 42–43  
   diagnostic difficulties 44, 44–45,  
     46–47, 346  
   diagnostic tests 265, 385  
   differential diagnosis 68–69  
   ductal carcinoma in situ 37, 38–39,  
     40, 40, 41–43  
   invasive carcinoma 62  
   invasive ductal carcinoma 67, 67–69, 68  
   lobular carcinoma in situ 39  
   mixed tumors 72, 72  
   preoperative localization 301–303, 397  
   specimen radiography 305–307, 306  
 carcinoma in situ 34–35  
 carcinoma of unknown primary  
 (CUP syndrome) 202, 259, 384  
 carcinomatous lymphangitis 351  
   male breast 296–297, 396  
 cardiovascular disease 11  
 case presentations, mammographic  
 110, 111–126  
 causes of breast cancer 7–19  
 cerebral metastases 340, 405,  
 409–410, 410  
 cheese cysts 283, 392, 392  
 chemotherapy

- locally advanced breast cancer  
325–326, 403, 403–404
- chemotherapy*  
metastatic breast cancer  
340, 342–344, 409  
refusal of 278–279, 391
- chest radiographs 337
- chronic lymphocytic leukemia 194, 371
- clavicular recess, tumor located in  
146–147, 365
- CNB *see* core-needle biopsy
- collodion, liquid 251, 252
- comedocarcinoma 67, 67  
male breast 296
- complications, treatment-related  
313–314, 314–328
- compression bandaging, post-biopsy  
231, 233, 234, 238, 249
- computed tomography (CT)  
guided biopsy 254–256  
guided localization 304–305, 398  
lymph node metastases 407, 407
- computer-aided detection (CAD), in digital  
mammography 40, 69, 100
- computer regulation thermography 78
- core-needle biopsy (CNB) 3, 231  
calcifications 69  
complications 231, 234, 234–235  
cost saving potential 239  
digital stereotactic (ST-CNB) 104,  
104–105, 232–234, 249–250, 250, 382  
follow-up 336, 409  
indications 230  
magnetic resonance imaging (MRI)-  
guided 254–256  
possibilities, limitations and risks  
258–259, 383–384, 384  
ultrasound-guided 237–238  
versus other biopsy methods  
251–254, 254
- coronary heart disease 90
- cost comparisons  
biopsy methods 239, 251, 253, 254  
follow-up regimens 338
- cribriform ductal carcinoma 67
- CT *see* computed tomography
- cylindrical cell lesions of breast 35
- cysts, breast 31, 63, 247–248, 382  
“cheese” 283, 392, 392  
ductal carcinomas near to 66  
ductography 245, 380–381  
fine-needle aspiration biopsy 236  
malignant transformation 274, 389, 389  
management 69  
papillomas within *see* intracystic  
papillomas
- cytology 3, 235
- D**
- DCIS *see* ductal carcinoma in situ
- decorin 33
- density, mammographic breast 98–99  
ACR grades 8, 33, 98–99  
BIRADS classification 99  
cancer risk and 8, 33–34, 98  
factors influencing 8–9, 33–34, 192  
hormone replacement therapy and  
12, 33–34  
screening pitfalls 145, 365  
Wolfe classification 98
- dermal appendages 237
- detective quantum efficiency (DQE) 101
- diagnostic tests/procedures  
options available 78–256  
possibilities and limitations  
261, 262–274
- dietary factors 8, 9
- diffuse carcinomas 63, 65, 65, 72–74
- digital mammography 1–3, 4, 100–105  
computer-aided detection (CAD) in  
40, 69, 100  
full-field online 2, 101  
model of a diagnostic service 101–104,  
102, 103  
screening unit 130–132, 131, 132  
storage plate system 100–101
- digital photography 90
- digital stereotactic biopsy 249–251,  
250, 382  
comparative evaluation 251–254, 254  
complications 234–235  
systems 104, 104–105, 105  
technique 231–235, 232–234
- digital stereotactic localization  
300, 301–305
- digital tomosynthesis 4, 109
- diuretics 293–294, 396
- double reading, mammograms 109–110
- ductal carcinoma (invasive) 31, 65–69, 74  
calcifying 65, 67, 67–69, 68  
clinical presentation 66  
with enlarged axillary lymph nodes  
200, 372  
hormone replacement therapy and 13  
locally advanced, treatment regi-  
men 325–326, 403, 403–404  
missed diagnoses 150–153, 366–370,  
366–370  
noncalcifying 65, 65–66, 66  
postoperative problems 319, 400  
screening pitfalls 137, 139–140, 142–143,  
361, 361, 362, 362, 363–364, 364  
stroma-rich (scirrhous) 71  
training mammograms 111–112, 114,  
117, 119, 124–126, 355, 358, 358  
treatment considerations 56–57, 350
- younger women 161–162, 281–282,  
392, 392
- ductal carcinoma in situ (DCIS) 34, 37–58  
cribriform 40, 40  
diagnosis 35–37, 38–39, 40–44, 345  
differential diagnosis 44–45, 51–52, 54,  
346, 347  
follow-up 62  
local recurrences 46, 62  
magnetic resonance imaging 40, 43–44,  
207, 373  
mammographic screening 139–140,  
362, 362  
monomorphic 40  
multicentric 45  
multifocal 45  
natural history 40–43, 41, 42–43,  
345, 345  
numbers of women affected 34, 35  
papillary 40  
pleomorphic, usually large-cell 40  
preoperative localization 301–303, 397  
prognosis 58  
specimen radiography 306  
training mammograms 123, 357, 357  
treatment considerations 40, 45–51,  
48–57, 346, 346–349, 347–349  
Van Nuys grading system 58  
younger women 275, 275–278, 390–391
- ductal growth pattern, predominantly  
65–69
- ductal hyperplasia (DH) 35  
atypical *see* atypical ductal hyperplasia  
differential diagnosis 51–52  
fine-needle aspiration biopsy 237
- ductal papillomas *see* papillomas, ductal
- ductectasia 28–29  
circumscribed focal, with associated  
inflammation 266, 385  
ductography 246, 381, 381–382  
fibrocystic change 187, 188  
hormone-related 159, 174, 175, 179, 191  
with plasma cell mastitis 262, 384–385  
with retained secretions 263, 385
- ductography 241–246, 243–247, 380–382  
ductal carcinoma 66, 349  
technique 241, 242, 380  
terminal duct lobular units 27, 29
- E**
- edema *see* arm edema; lymphedema
- Elston–Ellis grading system 74, 75
- endocrine influences *see* hormone-induced  
changes
- endogenous agents 9
- environmental carcinogens 9

- errors, treatment-related 313–314, 314–328
- estrogen-only therapy 3, 11, 12
- estrogen–progestin therapy, combined 3, 11–12, 13
- estrogens 9, 31
- European Federation of Neurological Societies (EFNS) 340
- European Protocol for the Quality Control of the Physical and Technical Aspects of Mammographic Screening (EPQC) 96, 97
- EUSOBI 230, 231
- EUSOMA 230
- examination, physical *see* physical examination
- exocrine influences 8–9
- extensive intraductal component (EIC) 48, 48–50, 63, 75
- F**
- familial breast cancer 14
- diagnostic investigations 275–276, 390, 390
- males 295, 394
- see also* high-risk women
- family history, positive 14
- fat allograft, breast augmentation 224
- fat content, breast 8
- fat necrosis
- after reduction mammoplasty 317–318, 400
- diagnostic evaluation 79–80, 265, 350, 385
- distinction from local recurrence 338
- on follow-up 337
- positron emission tomography 229–230, 380
- ferritin, elevated 140–141
- fibroadenoma
- differential diagnosis 44–45, 70, 346
- fine-needle aspiration biopsy 237
- mistaken diagnosis 361, 361
- sonographic appearance 160, 163–164
- training mammograms 122–123, 356, 356–357, 357
- vacuum biopsy removal 238, 239, 240–241, 380
- younger women 277–278, 391, 391
- fibrocystic changes
- breast ultrasound 175–176, 187–190
- with cysts and papillomas 245, 380, 380–381
- fine-needle aspiration biopsy (FNA)
- 3, 231
- complications 231, 234–235
- cost saving potential 239
- digital stereotactic (ST-FNA) 104, 105, 233, 249
- false-negatives 236, 237
- false-positives 237
- indications 230, 231, 235
- limitations and risks 257, 260–261, 383, 384
- palpable nodules 91, 236, 237
- pregnant women 237, 283
- supra- and infraclavicular nodes 198
- ultrasound-guided 235–237, 236
- versus other biopsy methods 251–254, 254
- flat epithelial atypia (FEA) 35
- FNA *see* fine-needle aspiration biopsy
- folliculitis 81, 350
- follow-up
- carcinoma in situ 62
- invasive carcinoma 328–341, 329–336, 405–409
- frostbite 86, 351, 352
- frozen section examination 300
- G**
- galactocele 283–284, 392, 392
- galactorrhea, recurrent 52–54
- gamma camera 308–309, 309
- gamma probe 308, 309
- gel bleed, silicone 212, 220–221, 222–224, 378
- gene activity profiles 21
- General Electric (GE) Senograph 2000 D system 101
- General Electric (GE) Senovision system 104, 104, 105, 105, 250
- genetic factors, predisposing 13–17
- genetic testing 14–15
- Giotto Image MD digital full-field mammography system 101–102, 102
- gonadotropin agonists 34
- gonadotropins 159
- grade, tumor 22, 74–77
- granulation tissue, postoperative 319, 400
- growth factors 8–9
- gynecomastia 291–294, 291–295, 298, 394–396, 395, 397
- H**
- hemangioma, congenital 79–80
- hematoma, post biopsy 234, 234–235, 239, 251, 252, 383, 383
- sentinel lymph node biopsy and 311
- hemorrhage, spontaneous 70–71
- hepatic ultrasound 337, 340
- Herceptin *see* trastuzumab
- heterotopic breast tissue 198, 199
- high-risk women 14, 15–17
- diagnostic investigations 275–276, 390, 390
- magnetic resonance imaging 206, 373
- screening 14, 15–16, 109
- histological classification, staging and grading 74–77
- histology
- apocrine carcinoma 362
- atypical ductal hyperplasia 35–37, 52, 53
- breast implants 223, 224, 379
- ductal carcinoma 52, 57
- ductal carcinoma in situ 38, 39, 40
- ductal papilloma 241
- fat necrosis 230
- gynecomastia 395
- hemangiosarcoma 402
- hormone-related changes 34, 170, 172
- intracystic papilloma 53
- lactating adenoma 272, 287
- lactation nodule 286
- lobular carcinoma 209
- lobular carcinoma in situ 39, 61
- mastitis 270, 273
- pure adenoma 164
- sclerosing adenosis 281
- seborrheic keratosis/warts 79
- terminal duct lobular units 23, 25, 27, 30
- see also* biopsy
- hookwires, X-shaped 300
- hormonal therapy, adjuvant, ductal carcinoma in situ 303, 397
- hormone-induced changes 8–9, 31, 156–157, 159–192
- hormone replacement therapy (HRT)
- 11–13, 18, 18
- breast ultrasound 157, 174, 176–177, 182–185, 187–188
- effects on breast density 12, 33–34
- magnetic resonance imaging and 202
- Horner syndrome 87, 352–354, 352–354
- HRT *see* hormone replacement therapy
- human chorionic gonadotropin (HCG) 9
- I**
- implants, breast 212–213, 217–226, 219
- fibrous encapsulation 218–219, 223–224, 378
- folds and wrinkles 218, 377
- follow-up and 337
- inflammatory exudate 226, 378, 379
- leaks 221, 225, 378
- ruptures 212–213, 218–224, 378
- trophic skin changes 221, 378
- imprint specimen 3
- IMS Giotto system 104, 104–105

- incidence, breast cancer 1, 1, 13
- inflammatory carcinoma 72–74, 73  
 biopsy 237  
 diagnostic options 82–84, 350–351, 351  
 diagnostic pitfalls 327–328, 405  
 male breast 296–297, 396, 396  
 postpartum 283, 289–290, 394, 394
- inflammatory epithelial reactions 237
- inflammatory exudate 226, 378, 379
- infraclavicular fossa 90
- infraclavicular lymph node metastases 198, 335, 407
- infraclavicular lymph nodes 408
- inhomogeneities, breast 46–47, 346
- inoculation metastasis 231, 238, 300
- inspection, visual 78–91, 79–89, 350–355, 351, 352–354  
 follow-up 329–335, 406–407, 408  
 possibilities and limitations 261, 262–274  
*see also* physical examination
- insulin metabolism 8
- interlobular stroma 2, 23, 25  
 adolescent girls 160  
 imaging appearances 26, 30  
 pregnancy and lactation 168–169
- interval cancers 2, 12, 108, 127  
 author's protocol 2, 108  
 detection by inspection and palpation 91  
 previous mammograms 147, 148–153, 365–370, 366, 367, 368–369  
 radiodense breasts 69, 127  
 training mammogram 115–116, 355  
*see also* missed cancers
- interventional procedures 230–256
- intracystic carcinoma 69
- intracystic papillary carcinoma 37
- intracystic papillomas 247–248, 381, 382  
 with focal ADH 52–53, 347
- intraductal and intracystic proliferation 237
- intraductal component, extensive  
*see* extensive intraductal component
- intraductal debris 29, 243–244, 380
- intraductal papillomas  
*see* papillomas, ductal
- intralobular stroma 2, 23, 25  
 imaging appearances 27, 30  
 proliferation 192
- intrauterine device (IUD), hormone-releasing 173
- invasive carcinoma 62–77  
 diffuse spread *see* diffuse carcinomas  
 gross morphology 63–65, 64  
 histological classification, staging and grading 74–77  
 mixed (lobulated-stellate-ductal) tumors 72  
 not otherwise specified (NOS) 63, 74  
 predominantly ductal growth 65–69  
 predominantly round to lobulated growth 63, 64, 69–71, 70  
 predominantly stellate or spiculated growth 71–72  
*see also specific types of carcinoma*
- J**
- Japan 9
- K**
- Kaposi sarcoma 71, 325, 329, 402, 405
- keloids 210, 374
- Klinefelter syndrome 394
- L**
- lactating adenomas 237  
 diagnostic challenges 283, 286–287, 393  
 diagnostic evaluation 271–272, 388
- lactation  
 breast ultrasound 157, 168–171  
 diagnostic challenges 283, 283–290, 392, 392–394, 393, 394  
 fine-needle aspiration biopsy 237  
*see also* breastfeeding
- lactation nodule 285–286, 393
- lactiferous ducts 23, 24, 28–29
- latissimus dorsi flap, breast reconstruction 213
- LCIS *see* lobular carcinoma in situ
- leukemia, chronic lymphocytic 194, 371
- linguine sign, ruptured implants 212, 218, 378
- lipomas 341, 409  
 axillary 279, 391  
 subcutaneous 335, 337, 407
- lipomatosis, lymph node 372
- lobes, mammary 23, 24, 155
- lobular carcinoma (invasive) 31, 74  
 biopsy 237, 258, 260–261, 383, 384, 384  
 diffuse 72, 73, 74  
 fine-needle aspiration biopsy 237  
 hormone replacement therapy and 13  
 magnetic resonance imaging 202, 204, 208–209, 372, 372–373, 374, 374–375  
 single-view mammography plus ultrasound 107  
 stellate 71  
 training mammograms 120–122, 356, 356–357
- lobular carcinoma in situ (LCIS) 34, 58–62  
 diagnosis 59, 60, 60–61, 350  
 local recurrence and follow-up 62  
 with microcalcifications 39  
 treatment implications 62
- lobular hyperplasia (LH) 58  
 atypical (ALH) 58  
 lactating, with inflammation 285–286, 393
- lobular intraepithelial neoplasia (LIN) 58–62  
 diagnosis 59, 60, 60–61, 350  
 treatment implications 62
- lobular neoplasia 58–62
- lobulated tumors 63, 64, 69–71, 70
- lobules, mammary 23, 24, 25, 155
- localization *see* preoperative localization
- locally advanced breast cancer 325–326, 403, 403–404
- local recurrence 299, 338  
 after breast reconstruction 214, 376  
 DCIS and LCIS 62  
 distinction from scarring 336, 409  
 magnetic resonance imaging 202  
 positron emission tomography 227–230, 379, 379  
 scarring mistaken for 332–333, 406, 406
- lumican 33
- Lumisys scanner 4
- lumps, breast *see* palpable breast nodules
- lymphadenopathy 194–196, 198, 371, 371
- lymphatic enlargement 193
- lymph drainage, manual 400
- lymphedema  
 arm *see* arm edema  
 breast 320, 400, 400–401, 404
- lymph node biopsy, sentinel *see* sentinel lymph node biopsy
- lymph node metastases 20, 21–22  
 follow-up examination for 335, 337, 407  
 imaging 193–198, 194–200, 371, 372  
 positron emission tomography 379, 379  
 tumor staging 76
- lymph nodes, regional 407, 408
- lymphography 311
- M**
- maceration specimen 29
- macromastia 188–190
- magnetic resonance imaging (MRI) 2, 16, 202–219, 204–211  
 aesthetic breast reconstruction and implants 212–213, 217, 218, 219, 220–222, 225–226  
 axilla 193, 211  
 cerebral metastases 409, 410  
 diffuse tumors 72, 74  
 ductal carcinoma 57, 66, 66, 69

- ductal carcinoma in situ 40, 43–44, 207, 349, 373
- follow-up 62, 328, 329, 332, 336, 337, 405
- guided breast interventions 202–203, 254–256, 255
- indications 109, 201–202
- inflammatory carcinoma 73–74
- integration into digital systems 102, 103
- lobulated tumors 70, 71
- local recurrence 338
- possibilities and limitations 261, 262–274
- postoperative use 202
- related overtreatment 275–276, 390
- sensitivity and specificity 106, 201–202
- stellate or spiculated tumors 71–72
- magnetic resonance mammography (MRM) *see* magnetic resonance imaging
- magnification mammography 40, 41, 50, 55, 59
- male breast 291–295  
*see also* gynecomastia
- male breast cancer 295, 296–298, 396, 396–397
- MammaCare 78
- mammography 91–147  
author's policy 2, 109  
axillary 193–198, 194–200  
BIRADS classification 99  
breast density  
*see* density, mammographic breast  
breast implants 212–213  
case presentations and interpretation 110, 111–126  
compression trauma 17  
conventional film-screen 100  
craniocaudal view 93–94, 94, 106  
diffuse lobular carcinoma 74  
digital *see* digital mammography  
discomfort 92  
double reading 109–110  
ductal carcinoma 66, 66, 68, 69  
ductal carcinoma in situ 38, 39, 40, 43  
follow-up 62, 328, 330–334, 406, 406  
future trends 105–109  
history of development 107–108  
hormone-induced changes and 31  
inflammatory carcinoma 73, 73–74  
lobular carcinoma in situ 39, 60, 60  
lobulated tumors 69, 71  
magnification 40, 41, 50, 55, 59  
male breast 291–292, 293–294, 296–298, 396, 396  
mediolateral (oblique) view 95, 95–96, 106  
palpable nodules 91, 117  
physician training 4  
possibilities and limitations 261, 262–274
- pregnant women 285–286, 393
- preoperative localization 300, 301–305
- procedure and organization 92–93
- quality control 93–97
- screening *see* screening, breast cancer
- sensitivity and specificity 91
- single-view 1, 2, 4–5, 92, 105–107, 109  
high-risk patients 16, 109  
plus sonography 1, 2, 5–6, 105–107, 107, 193  
versus two-view 105–107, 107
- standard protocol 91–92
- stellate or spiculated tumors 71–72
- terminal duct lobular units 23, 28
- two-view  
recommended use 109  
versus single-view 105–107, 107  
versus ultrasound 106, 156, 157–158  
younger women 275
- mastectomy  
morbidity related to 5  
scarring after subcutaneous 293–294, 396
- mastitis 211, 375, 375  
acute 264, 385  
granulomatous 267–270, 385–386, 386–388  
lymphocytoid 272–273, 388–389  
plasma cell 262, 384–385
- mastodynia 90–91
- medullary carcinoma 69, 70  
differentiation from LCIS 59, 350
- menopause  
age at 9  
breast ultrasound 157, 174–176, 179–180  
hormone replacement therapy  
*see* hormone replacement therapy  
symptom relief 11, 13  
TDLU changes 31
- menstrual cycle  
breast ultrasound 157, 163–167  
magnetic resonance imaging and 203  
numbers during lifetime 9  
TDLU changes 31, 32  
timing of breast examination 8, 91
- metastases  
cutaneous 351  
secondary breast 71
- metastatic breast carcinoma 338, 340–341, 342–344, 409–410, 410
- microcalcifications *see* calcifications
- microradiography, terminal duct lobular units 23, 26, 27–28, 30
- milk, inspissated or caseated 283–284, 392, 392
- Million Women Study (MWS) 3, 11, 12
- Mirena 173
- missed cancers 12, 108, 128  
cases 147, 148–153, 365–370, 366, 367, 368–369  
over numerous biopsies 339, 409  
training mammogram 115–116, 355  
*see also* interval cancers
- mixed (lobulated-stellate-ductal) tumors 64, 72, 72
- Model Project on Quality Assurance in Breast Diagnosis and Treatment 109
- modulation transfer function 101
- mortality, breast cancer 1, 1, 7, 43
- MRI *see* magnetic resonance imaging
- mucinous carcinoma 69  
biopsy 259, 384  
invading nipple 89, 355  
treatment-related errors 314–315, 399, 399
- mucocele of nipple 89, 355
- multifocal carcinomas 63  
breast reconstruction after 216–217, 376  
screening pitfalls 138, 142–143, 361, 361, 363–364, 364  
sentinel lymph node biopsy and 311
- ## N
- National Cancer Institute, US 340
- neurinoma, axillary 198, 371
- neurodermatitis 81, 350
- neurological disorder 271–272, 388
- nevi  
papillomatous nevus cell 150, 366  
pigmented 141–142
- nipple  
absent 134, 360, 360  
deviation 88, 354, 354–355  
mucocele of 89, 355  
retraction 66, 296
- nipple discharge 90, 172  
comedocarcinoma 67  
diagnostic tests 262–263, 384–385  
ductal carcinoma 54, 66  
ductography 245, 246, 246–247, 380–382  
male breast 294, 296  
papilloma removal 252–253  
postoperative 323, 401, 401
- nipple-pectoral line (NPL) 93, 94
- nodules, palpable breast  
*see* palpable breast nodules
- not otherwise specified (NOS), invasive carcinoma 63, 74
- Nottingham Prognostic Index 74, 75
- nutritional supplements 90

## O

obesity 8, 33  
 oil cysts, postoperative 278–279, 391  
   breast surgery for benign lesion  
     316–317, 400  
   reduction mammoplasty 317–318, 400  
 oral contraceptives 7–8, 9, 10, 18, 18  
   breast ultrasound 165, 178–180  
 orange-peel skin 72–73, 73  
   male breast 296–297, 396  
   postoperative lymphedema 320, 400  
 osteoporosis 11  
 ovarian cancer 14, 15  
 ovulation inhibitors 7–8

## P

PACS (picture archiving and communication system) 100, 105  
 Paget carcinoma 37  
   screening pitfalls 144, 364, 364  
 Paget disease 350, 355  
   male breast 295  
 pain, breast 90–91  
   diagnostic evaluation 271–272, 388  
 palpable breast nodules 69–70, 90, 91  
   atypical ductal hyperplasia 36–37  
   diagnostic evaluation 262–264, 266,  
     268–270, 384–385, 386, 386–388  
   ductography 247–248  
   fibrocystic change 175–176  
   fine-needle aspiration biopsy 91, 236,  
     237, 257, 383  
   follow-up 332–333, 406, 406  
   hormone-related 168–169, 173  
   magnetic resonance imaging  
     205, 208–209, 373  
   male breast 291–292, 294, 296  
   mammography 91, 117  
   postpartum 283–284, 392, 392  
   vacuum biopsy 238–239  
   younger women 277–279, 281–282,  
     391, 391, 392, 392  
 palpation, breast 78–91  
   follow-up 335, 407, 408  
   possibilities and limitations  
     261, 262–274  
   *see also* physical examination  
 papillary ductal carcinoma 67  
 papillomas  
   digital imaging 243–244, 251  
   ductal 243–244, 246–247, 380, 381–382,  
     381–382  
   ductography 243–245, 246, 246–248,  
     380–381  
   fine-needle aspiration 237  
   intracystic *see* intracystic papillomas  
   macro- and microanatomy 241  
   vacuum biopsy removal 238, 246, 251,  
     252–253, 380, 383  
 papillomatous carcinoma 69  
 papillomatous nevus cell nevus, benign  
   150, 366  
 paraffin-block radiography 51, 307  
 parasternal lymph nodes 408  
 patent blue dye 308, 311  
 peau d'orange *see* orange-peel skin  
 pectoral lymph nodes 408  
 perioperative management 299–314  
 personalized medicine 21  
 PET *see* positron emission tomography  
 PGMI quality rating system 93–95  
 photographs, digital 90  
 physical examination 78–91, 79–89,  
   350–355, 351, 352–354  
   optimal timing 8, 91  
   possibilities and limitations  
     261, 262–274  
   single-view mammography/ultrasound  
     with 1, 106–107, 107  
 picture archiving and communication  
   system (PACS) 100, 105  
 pigmented nevi 141–142  
 plasma cell mastitis 262, 384–385  
 plasminogen activator inhibitor (PAI) 74  
 pN classification 76  
 polymastia completa 199  
 polythelia 199  
 positron emission tomography (PET)  
   227, 227–230, 379, 379–380  
   follow-up 337  
   lymph node metastases 193, 407, 407  
   postpartum and postoperative  
     changes 288, 393, 393  
   preoperative staging 73  
 postirradiation changes 351  
 postmenopausal women  
   breast ultrasound 157, 174–188  
   mammographic density and cancer risk  
     33  
 postoperative changes 328–341  
 precancerous lesions 34–35  
 pregnancy  
   after breast surgery 277–278, 391, 391  
   age at first 9  
   breast changes 157, 168–170  
   diagnostic challenges 283, 283–290,  
     392, 392–394, 393, 394  
   fine-needle aspiration biopsy 237, 283  
   tumor removal during 288, 393, 393  
 premenopausal women 275  
   breast ultrasound 156–157, 161–173  
   diagnosis of breast cancer 16  
   magnetic resonance imaging 203  
   mammographic density and cancer risk  
     33

screening 6

*see also* younger women  
 premenstrual syndrome, breast ultrasound  
   157, 163–164, 166–167, 191–192  
 preoperative localization 299–305  
   computed tomography (CT)-guided  
     304–305, 398  
   mammography-guided 300, 301–305  
   problems 314–315, 399, 399  
   ultrasound-guided 304–305, 305, 398  
 progesterone 31, 159  
 progestins 9, 11–12, 173  
 prognostic factors 20–22  
 prolactin 9, 34  
 proliferation of breast parenchyma,  
   grading 192  
 protective factors, breast cancer 9  
 psoriasis 81, 350

## Q

quality assurance, breast cancer follow-up  
   337–338  
 quality control, mammography 93–97  
 questions, from patients 3

## R

radiation dose  
   mammography 101, 102–103, 129  
   pregnant woman 285–286, 393  
   sentinel lymph node biopsy 311  
 radiation-induced breast cancer 16, 16  
 radiation-induced telangiectasia  
   with fibrosis 330–331, 405  
 radiodermatitis 325, 402, 403  
 radiography  
   ductal carcinoma in situ 38, 39, 40  
   invasive carcinoma types 62–65, 64  
   lobular carcinoma in situ 39  
   *see also* mammography  
 radiolabeled colloid 308, 311  
 radionuclide bone scans 337, 340  
 radiotherapy  
   cerebral metastases 410, 410  
   ductal carcinoma in situ 45, 397  
   high risk gene carriers 17  
   Kaposi sarcoma after 329, 405  
   lymph node metastases 312–313,  
     398–399, 399  
   morbidity related to 5  
 raloxifene 34  
 reconstruction, breast 212–213, 214,  
   216–217, 219, 376, 377  
   follow-up after 337  
   *see also* implants, breast  
 recurrence, local *see* local recurrence

- reduction mammoplasty 87, 352–354, 352–354  
 postoperative problems 317–318, 321–322, 400, 401  
 sentinel lymph node biopsy after 311
- REM (reticular erythematous mucinosis) syndrome 87, 352
- residual tumor, after incomplete excision 319, 324, 400, 402
- retroareolar region  
 lobar anatomy 155  
 palpation 90
- risk assessment, breast cancer 15
- risk factors for breast cancer 7–19
- S**
- sarcoidosis 196, 371
- sarcoma 71
- scalloped margins 63, 65
- scarring  
 after subcutaneous mastectomy 293–294, 396  
 after tumor excision surgery 314–315, 332–333, 337, 399, 399, 406, 406  
 distinction from local recurrence 336, 409
- scintigraphy, sentinel lymph node 308–310, 309, 310, 312–313
- scleroderma, circumscribed 82, 350
- sclerosing adenosis 118, 355  
 biopsy 260–261, 384  
 younger women 280–281, 392
- screening, breast cancer 127–147  
 combined sonographic/mammographic 193  
 digital mammography unit 130–132, 131, 132  
 follow-up investigations 265, 272–273, 385, 388–389  
 intervals 92  
 missed cases 147, 148–153, 365–370, 366, 367, 368–369  
 new approach 1–2, 4–5, 129–130  
 pitfalls 132–133, 133–147  
 quality issues 3–4  
 recommendations 109, 130  
 risks and benefits 127–129  
 women at high risk 14, 15–16, 109
- seborrheic keratosis/warts 79, 350
- self-examination, breast 15–16, 16, 78
- Senograph 2000 D system, General Electric 101
- senology 108
- Senovision system, General Electric 104, 104, 105, 105, 250
- sentinel lymph node biopsy (SLNB) 4, 22, 307–313, 398–399, 399
- contraindications 311  
 errors 310, 324, 402  
 follow-up 337  
 lobular carcinoma 383, 384  
 results 311–313  
 safety and complications 311  
 technique 308–310, 309, 310, 312–313
- seroma, postoperative 319, 323, 401, 401
- shingles 85, 350, 351, 351
- silicone, free intramammary injections 212, 215, 376
- silicone breast implants 212  
 follow-up and 337  
 gel bleed 212, 220–221, 222–224, 378  
 inflammatory exudate 226, 378, 379  
 leaks 221, 225, 378  
 ruptures 212–213, 218–224, 378
- skeletal examinations 337, 340
- skeletal metastasis 341, 409
- skin lesions 136, 360, 360
- smoking 10–11, 18
- snowstorm pattern, ruptured implants 212, 219, 225, 378
- soybean oil breast implants 212, 218, 224, 377
- soy products 9
- specimen radiography 305–307, 306  
 core biopsies 232, 249  
 ductal carcinoma in situ 38, 39, 51, 52, 55, 57, 62  
 lobular carcinoma in situ 39, 60, 62
- specimen sonography 305
- spiculated tumors 63, 65, 70, 71–72
- sports activities 14, 17, 17–18, 33
- stellate tumors 63, 64, 65, 71–72
- stereotactic biopsy *see* digital stereotactic biopsy
- stereotactic localization, digital 300, 301–305
- stress, emotional 18
- supraclavicular fossa 90
- supraclavicular lymph node metastases 198, 335, 407
- supraclavicular lymph nodes 408
- Sure Touch System 1
- survival rates 22
- syncope, during interventional procedures 234, 249–250
- T**
- tamoxifen 14, 34
- TDLUs *see* terminal duct lobular units
- terminal duct lobular units (TDLUs) 3, 23  
 adolescents 156, 159–161  
 anatomy 23, 24–25, 155  
 grading of proliferation 192  
 histology 23, 25, 27, 30
- hormone-induced changes 31, 32, 157, 159, 163–192
- imaging appearances 23, 26–30
- maturation 9, 10
- sonographic examination 155, 156, 157–158
- thermoablation probes 238
- thyroid disease 90
- tibolone 11, 12, 34, 187–188
- tick bite 135, 360, 360
- TNM classification 75–76
- tomosynthesis, digital 4, 109
- TRAM flap breast reconstruction 213, 214, 376, 377
- tranquilizers 90
- transverse rectus abdominis myocutaneous flap *see* TRAM flap
- trastuzumab 6, 342–344, 409–410, 410
- trauma, breast  
 as cause of breast cancer 17, 17–18  
 granulomatous mastitis after 267–268, 385–386
- treatment, breast cancer 5, 5–6, 299–314  
 metastatic disease 340–341  
 preoperative localization 299–305  
 reactions, complications and errors 313–314, 314–328
- triple-test protocol 235, 236
- trophic skin changes 221, 378
- tubular carcinomas 71, 237
- tubulolobular carcinoma, multifocal 216–217, 376
- tumor  
 biology 7–19  
 doubling time 20–21  
 growth rates 20–21, 69  
 size 20–21, 22
- tumor markers  
 elevated levels 227–228, 335, 379  
 measurement on follow-up 337
- U**
- UICC staging system 76
- ultrasound, breast 153–193  
 automated examination 1  
 axillary 193–198, 194–200  
 basic breast structures and variants 156–193  
 BIRADS score 156  
 breast density and 33, 192  
 breast implants 212, 213  
 diffuse tumors 72, 74  
 ductal carcinoma 66, 66, 68, 69  
 ductal carcinoma in situ 40  
 early detection/screening 1–3, 153–154  
 examination technique 154–156, 155  
 follow-up 62, 328, 331, 336, 337

**ultrasound**

- future outlook 193
- hepatic 337, 340
- hormone-induced changes 31, 32, 156–157
- indications for 154
- inflammatory carcinoma 73, 73–74
- integration into digital systems 102, 103
- lobular carcinoma in situ 60, 61
- lobulated tumors 69–70, 71
- local recurrence 338
- male breast 292
- palpable nodules 91
- physiological parenchymal changes 2
- possibilities and limitations 261, 262–274
- sensitivity and specificity 106
- single-view mammography plus 1, 2, 4–5, 105–107, 107, 193
- specimen 305
- stellate or spiculated tumors 71–72
- terminal duct lobular units 23, 25–26, 27–28, 30, 155, 156
- versus mammography 106, 156, 157–158
- ultrasound-guided interventional procedures 235–246
  - comparative evaluation 251–254, 254
  - core needle biopsy 237–238
  - fine-needle aspiration 235–237, 236
  - vacuum biopsy 238–239, 240–241
- ultrasound-guided localization 304–305, 305, 398

- undetected cancers *see* missed cancers
- urokinase plasminogen activator (uPA) 74

**V**

- vacuum biopsy (VB) 3, 231
  - calcifications 69
  - complications 231, 234, 234–235
  - cost saving potential 239
  - digital stereotactic (D-VB) 104, 105, 105, 233, 250–251
  - failures 230–231
  - follow-up 336, 409
  - indications 230, 238
  - magnetic resonance imaging (MRI)-guided 254–256
  - papilloma removal 238, 246, 251, 252–253, 380, 383
  - ultrasound-guided (SO-VB) 238–239, 240–241
  - versus other biopsy methods 251–254, 254
- Van Nuys index 58
- vasovagal reactions, during interventional procedures 234, 249–250
- VB *see* vacuum biopsy
- venous stenosis, arm swelling 193, 197, 371
- visual inspection *see* inspection, visual
- vitamin A 8
- vitiligo 141–142, 363, 363

**W**

- warts, skin 136, 360, 360
- Willebrand–von Jürgens syndrome 235
- wires, localization 299–300
- Women's Health Initiative (WHI) study 3, 11, 12

**X**

- xenoestrogens 9
- X-shaped hookwires 300

**Y**

- younger women
  - breast cancer 16, 161–162
  - breast ultrasound 156–157, 159–167
  - diagnostic investigations 275, 275–282, 390–392, 391, 392
  - magnetic resonance imaging 201, 203
  - mammography 275
  - see also* adolescent girls; premenopausal women