

Index

- α -thalassemia/mental retardation syndrome
 X-linked (ATRX)
 mutation, 30
 1p/19q deletion, 33
 three-dimensional volumetric reconstruction, 5
 abscesses
 cerebellopontine angle, 373
 cerebral, 189, 275
 rupture, 275
 epidural, 398–9
 multiple, 156
 pituitary gland, 106
 acid-fast organisms, stains for, 25
 acute calcific tendonitis, 420–1
 acute disseminated encephalomyelitis (ADEM), 298, 389
 acute hemorrhagic (necrotizing) leukoencephalopathy (AHLE), 298
 acute inflammatory demyelinating polyradiculoneuropathy (AIDP), 391
 acute motor axonal neuropathy (AMAN), 391
 acute motor-sensory axonal neuropathy (AMSAN), 391
 acute transverse myelitis, 386–7
 adenohypophysis, 82
 adenoleukodystrophy (ALD), 285
 adrenomyeloneuropathy, 285
 AE1/AE3 (pancytokeratin), 33
 age at presentation, 20
 aging, 223–4
 ventricular system, 251
 Albers-Schönberg disease, 435
 alcian blue stain, 26
 Alzheimer disease, 224–8
 cerebral microbleeds, 225
 diagnosis, 228
 amelanotic melanomas, 54
 ameloblastomas, 214
 amyloid deposits, 227
 amyloid stains, 26
 amyloidosis, 26
 amyotrophic lateral sclerosis, 246
 anaplastic meningiomas, 48
 anencephaly, 339
 aneurysmal bone cysts, 402–3
 aneurysms, 106
 cerebellopontine angle, 373
 coil embolization, 13
 angiography
 applications, 13
 catheter angiography, 13
 CT angiogram, 5
 digital subtraction angiography (DSA), 13
 magnetic resonance angiogram (MRA), 9
 angiosarcomas, hemorrhagic, 219
 Apert syndrome, 438
 aprosencephaly, 343
 aqueductal stenosis, 261
 arachnoid, 40, 377
 arachnoid cysts, 40, 99, 371
 arachnoiditis, 57
 arteriovenous malformation (AVM), intraventricular, 278
 aspergillosis, orbital, 467
 astrocytomas, 169
 anaplastic, 178
 cerebellopontine angle, 367
 diffuse, 83, 165, 379
 low-grade, 165, 167
 necrosis prognostic significance, 169
 pilocytic, 84, 151, 199, 206, 214, 378–9
 juvenile, 312–14
 pilomyxoid, 83, 157, 214
 spinal cord, 377, 378–80
 subependymal giant cells (SEGAs), 211, 267
 atelencephaly, 343
 atlanto-axial dislocation, 423
 atrophy. *See* cerebral atrophy
 atypical teratoid/rhabdoid tumors (ATRT), 322–4
 Aunt Minnie diagnoses, 21
 autoimmune pachymeningitis, 74
 autosomal dominant osteopetrosis (ADOP), 435
 autosomal recessive osteopetrosis (AROP), 435
 Baastrop disease, 433
 bacterial meningitis, 64–6
 syphilitic, 68
 tuberculous, 67–8
 balloon cells, 211
 Balo's concentric sclerosis, 293
 basal ganglia, calcification, 242
 basket-brain, 257
 Bielschowsky stain, 24
 Binswanger disease, 232
 bone tumors. *See also* specific tumors
 benign, 402–11
 malignant, 411–20
 bone tumors, sellar region, 103
 bony changes, 402 *See also* bone tumors
 bovine spongiform encephalopathy, 236
 BRAF oncogene, 35
 brain metastases, 33
 brainstem
 development, 351
 gliomas, 329–30
 Brown-Sequard syndrome, 383
 butterfly lesion, 16
 butterfly sign, 342
 CADASIL, 232–4
 calcifications
 basal ganglia, 242
 choroid plexus, 251
 dural, 75
 fourth ventricle, 251
 pineal gland, 115
 CAM 5.2, 33
 capillary hemangioblastomas, 54
 carcinomas
 choroid plexus (CPCs), 270, 326, 327
 embryonal, 128
 metastatic, 33, 417
 pituitary, 88, 94
 catheter angiography, 13
 caudal agenesis, 357
 caudal regression syndrome, 357
 cavernomas, intraventricular, 277
 cavernous malformations, 106
 cavernous sinus thrombosis, 106
 cavum septi pellucidi, 251
 cavum velum interpositum, 251
 cavum vergae, 251
 CD163 stain, 31
 CD31 stain, 31
 CD34 stain, 31
 CD68 stain, 30
 cell migration and localization defects, 344–50
 cellular edema, 134–6
 central herniation, 146
 central pontine myelinolysis (CPM), 301–2
 cerebellar gangliocytoma, 332
 cerebellar hypoplasia, 354
 cerebellopontine angle (CPA), 361
 cysts, 371–3
 neoplasms, 361–71
 cerebellum, 311
 development, 351
 cerebral amyloid angiopathy (CAA), 226
 cerebral atrophy, 223–39
 Alzheimer disease, 224–8
 chronic traumatic encephalopathy, 228–9
 corticobasal degeneration, 238–9
 Creutzfeldt-Jakob disease, 235–6
 dementia with Lewy bodies, 229–31
 frontotemporal atrophy, 236–8
 normal aging, 223–4
 prion diseases, 236
 vascular dementia, 231
 cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL), 232–4

Index

- cerebral autosomal recessive arteriopathy with subcortical infarcts and leukoencephalopathy (CARASIL), 307
 cerebral edema. *See* edema
 cerebrospinal fluid (CSF)
 flow studies, 10
 overproduction, 262
 production, 249
 cerebrovasculum, 340
 Chiari malformations, 351
 CSF flow studies, 10
 type I, 351
 type II, 351
 type III, 353
 cholesteatomas, orbital, 469
 cholesterol granulomas, 373
 chondrosarcomas, 51, 103, 412–14
 mesenchymal, 51
 chordoid meningiomas, 47
 chordomas, 103, 411–12
 chordosarcomas, 420
 choriocarcinomas, 128, 129
 hemorrhagic, 219
 choristomas, neuromuscular, 442
 choroid plexus, 249, 250
 calcifications, 251
 carcinomas (CPCs), 270, 326, 327
 cysts, 251
 hemorrhage, 277
 neoplasms, 270, 324–9
 papillomas (CPPs), 270, 324
 xanthogranulomas, 251
 chromogranin, 28
 cingulate gyrus herniation, 143
 clear cell meningiomas, 47
 Coats disease, 463
 cobblestone malformation, 345
 coccidiomycosis-related hydrocephalus, 277
 colloid cysts, 157, 262
 color Doppler technique, 15
 compression fracture
 metastatic, 417, 434
 osteoporotic, 417, 434
 Paget's disease, 428
 spinal cord contusion, 383
 computed tomography (CT), 3–7
 applications, 5–7
 patients with MRI
 contraindications, 7
 preoperative planning, 5
 reconstruction procedures, 5
 rule out metallic foreign body, 5
 stroke, 5
 trauma, 5
 CT perfusion imaging, 3
 angiographic studies, 5
 densities, 3
 disadvantages, 7
 maximum intensity projection, 5
 minimum intensity projection, 5
 post-contrast dynamic imaging, 4
 special techniques, 3–5
 three-dimensional volumetric reconstructions, 5
 terminology, 2
 congenital intra-uterine infections, 274
 congenital muscular dystrophies (CMD), 460
 Congo red stain, 26
 contrast enhancement, 16, 156
 MRI, 12–13
 cord sign, 65
 corpus callosum, 249, 283
 agenesis, 283–5
 cortical dysplasia, 347
 corticobasal degeneration, 238, 238–9
 craniopharyngiomas, 84–6
 adamantinomatous, 84, 85, 214
 papillary, 85
 squamous papillary, 216
 craniorachischisis, 339
 craniosynostosis, 436–7
 secondary, 437
 Creutzfeldt–Jakob disease, 235–6
 Creutzfeldt–Peters cells, 288
 Crouzon syndrome, 438
 cryptococcal meningitis, 69
 CT. *See* computed tomography (CT)
 cysticercosis. *See* neurocysticercosis
 cytokeratins 7 and 20, 33
 metastatic carcinomas, 33
 cytomegalovirus (CMV)
 infection, 274
 cytotoxic edema, 134–6
 Dandy–Walker malformation (DWM), 262, 353
 deep gray-matter diseases, 239–42
 delta sign, 65
 dementia
 Alzheimer disease, 224–8
 CADASIL, 232
 vascular, 231
 with Lewy bodies, 229–31
 demyelinating disorders, 287–98
 osmotic demyelination syndrome, 301–2
 pseudotumors (DPs), 291
 spinal cord, 386–91
 dense artery sign, 137
 dermatomyositis, 455, 456
 dermoid cysts, 42, 97, 99, 101, 395
 cerebellopontine angle, 371
 orbital, 468
 spinal cord, 395
 desmin, 31
 Devic's disease, 293–8
 spinal cord, 388–9
 diastematomyelia, 356
 diencephalon herniation, 146
 differential diagnoses, 21
 diffuse axonal injury, 302–3
 diffuse idiopathic skeletal hyperostosis (DISH), 434
 diffuse large B-cell lymphomas, 54
 diffuse rhabdomyolysis, 458
 diffusion imaging, 8
 diffusion tensor imaging (DTI), 9
 digital subtraction angiography (DSA), 13
 diplomyelia, 356
 disc herniation, 417, 430
 discitis, 421–3
 tuberculosis, 423
 dolichoectasia, 373
 dumbbell sign, 447
 dura, 40, 377
 anatomy, 64
 calcification, 75
 lymphomas, 56, 56
 metastatic tumors, 58
 dural tail, 17
 Duret hemorrhages, 146
 Dutcher bodies, 471
 dysembryoplastic neuroepithelial tumors (DNTs), 203
 dysmyelinating disorders, 285–7
 edema, 131
 brain, 131
 classification, 131
 cytotoxic edema, 134–6
 inflammatory and infectious conditions, 141
 interstitial edema, 136
 intracranial hemorrhage-associated, 141
 neoplasm-associated, 138–41
 peritumoral, 20
 spinal cord, 383
 vasogenic edema, 131–4
 elastic van Gieson stain, 25
 electron microscopy, 35–6
 embryonal carcinomas, 128
 empty sella syndrome, 108–9
 empyemas, subdural, 77
 encephalitis
 herpes simplex, 189
 toxoplasma, 189
 encephaloceles, 141, 339, 340
 encephalopathy
 chronic traumatic, 228–9
 hypertensive, 303
 spongiform, 236
 endodermal cysts, 41
 endolymphatic sac tumors, 368
 endometriosis, 442
 ependymal cysts, 372
 ependymomas, 265, 318–21
 clear cell, 265
 myxopapillary, 381
 papillary, 265
 spinal cord, 377, 380–1
 epidermal growth factor receptor (EGFR), 35
 amplification, 35
 epidermoid cysts, 41, 97, 98, 101, 395
 cerebellopontine angle, 371
 epidural hematomas, 430–1
 epithelial membrane antigen (EMA), 30
 Erlenmeyer flask deformity, 436
 Ewing sarcomas, 414–15
 exencephaly, 339
 extramedullary hematopoiesis, 424–6
 extra-pontine myelinolysis (EPM), 301–2
 eye
 globe, 462
 intraocular tumors, 463–5
 optic nerve lesions, 472–3
 orbital benign and cystic lesions, 468–9
 orbital inflammatory lesions, 465–7
 orbital malignant tumors, 469–71
 vascular lesions, 471–2
 eye-of-the-tiger sign, 241
 facet joint degeneration, 433
 facial nerve schwannomas, 362
 falx cerebri, 141
 fasciitis, 460–1
 fatal familial insomnia, 241
 fetal studies
 MRI scan, 12
 ultrasonography, 15
 fibromas, leptomeningeal, 52
 fibromatosis, 426–8
 fibrous dysplasia, 403–4
 Fite staining method, 25
 Flexner–Wintersteiner rosettes, 463
 fluorescence *in situ* hybridization (FISH), 33
 fluoroscopy, 13–14
 applications, 13
 disadvantages, 14
 focal cortical dysplasia, 211, 347
 foramen magnum, herniation through, 146–7
 foramina of Monroe, 249
 fourth ventricle, 249
 calcifications, 251
 neoplastic lesions, 265–7
 frontal horns, 249
 frontotemporal lobar degenerations (FTLDs), 236–8

Index

- functional MRI, 10. *See also* magnetic resonance imaging (MRI)
- fungal meningitis, 68
- fungi, stains for, 26
- Gallyas silver stain, 24
- gangliocytomas, cerebellar, 332
- gangliogliomas, 202
- gemistocytes, 380
- germ cell tumors, 86, 121
- histologic features, 124
- mixed, 128–9
- germinomas, 86, 125–8
- Gerstmann–Sträussler–Scheinker disease, 236
- giant cell tumors, 404–5
- giant Homer Wright rosettes, 211
- glial fibrillary acidic protein (GFAP), 27, 169
- glioblastomas, 169, 178
- cerebellopontine angle, 367
- differential diagnosis, 60, 175
- epithelioid, 214
- hemorrhagic, 219
- spinal cord, 380
- with oligodendrogliomas, 178
- gliofibromas, 210
- gliomas, 151
- anaplastic, 169, 179
- angiocentric, 204
- brainstem, 329–30
- cerebellopontine angle, 367
- chordoid, 157, 265
- diffuse, 159–73
- high-grade, 175–9
- hypothalamic/chiasmatic, 83–4
- low-grade, 162, 199–211
- mixed, 173, 179
- necrosis, 178
- optic nerve, 472–3
- pilomyxoid, 379
- pineal region, 129
- proliferative activity, 173
- spinal cord, 377
- ventricular extension, 272
- versus radiation necrosis, 192–7
- gliomatosis cerebri, 155
- gliosarcomas, 51, 179
- differential diagnosis, 52
- globe, 462. *See also* eye
- glomus jugulare, 369
- glutaraldehyde fixative, 23
- granular cell tumors, 96, 97
- granulomas, 189
- cholesterol, 373
- eosinophilic, 408
- plasma cell (PCG), 70–2
- tuberculosis, 189
- gray matter
- brain, 131
- deep gray-matter diseases, 239–42
- heterotopia, 348
- spinal cord, 131
- Grocott's methenamine silver (GMS) stain, 26
- Guillain–Barré syndrome (GBS), 390–1
- Hallervorden–Spatz disease, 241
- hamartoblastomas, 213
- hamartomas, hypothalamic, 108, 200, 213
- Hand–Schuller–Christian disease, 408
- helminthic meningitis, 69
- hemangioblastomas, 54, 216, 321–2
- differential diagnosis, 54
- spinal cord, 381–3
- hemangiomas, 411, 417
- differential diagnosis, 406
- infantile capillary, 471–2
- intra-osseous, 405–8
- hemangiopericytomas, 48–50
- differential diagnosis, 49
- hematolymphoid markers, 31
- hematomas, 219
- acute, 75
- chronic, 75–7
- epidural, 430–1
- orbital, 469
- subdural, 58, 75–7
- subacute, 75
- hematopoiesis, extramedullary, 424–6
- hematopoietic tumors, 54–8
- hematoxylin and eosin (H&E) stain, 23
- hemimegalencephaly, 350
- hemorrhage
- choroid plexus, 277
- intraventricular, 277
- MRI scan, 11
- perinatal, 277
- spinal cord, 383
- hereditary cranio-facial syndromes, 438
- herniation, 141
- central/diencephalon
- herniation, 146
- cingulate gyrus, 143
- intervertebral discs, 417, 430
- spinal canal, 149
- subfalcine, 141, 143–4
- through foramen magnum, 146–7
- tonsillar, 141, 146
- transcalvarial, 147
- transtentorial, 141, 144–6
- uncal/parahippocampal, 144–6
- herpes simplex virus (HSV), 275
- encephalitis, 189
- meningitis, 69
- hippocampal atrophy, Alzheimer disease, 224
- histochemical stains, 23. *See also* immunohistochemical stains
- acid-fast organisms, 25
- amyloid, 26
- Bielschowsky, 24
- elastic, 25
- fungi, 26
- Gallyas silver, 24
- hematoxylin and eosin (H&E), 23
- Luxol Fast Blue (LFB), 24
- mucin, 26
- periodic acid–Schiff (PAS), 24
- reticulin, 24
- stains for microorganisms, 25–6
- trichrome, 25
- HIV infection, congenital, 275
- Hodgkin lymphomas, 56, 416
- differential diagnosis, 56
- holoacrania, 339
- holoprosencephaly, 257, 340–4
- alobar, 258, 342
- genetic basis, 341
- lobar, 259, 343
- middle interhemispheric variant, 259
- semilobar, 258, 343
- Homer Wright rosettes, 463
- hot-cross-bun sign, 244
- hummingbird sign, 239
- Huntington disease, 240–1
- Hurst disease, 298
- hydrocephalus, 259
- classification, 261
- coccidiomycosis-related, 277
- Dandy–Walker malformation, 262
- extraventricular, 261
- intraventricular, 261
- non-obstructive, 262
- normal pressure (NPH), 262
- obstructive, 136
- primary, 260
- secondary, 261
- treatment, 262
- tuberculous meningitis, 67
- hydromyelia, 356, 383
- hypertension
- chronic, 303
- white-matter changes, 303
- hypertensive encephalopathy, 303
- hypertrophic pachymeningitis, 73
- hypophysitis, 103
- granulomatous, 103
- lymphocytic, 103
- xanthomatous, 103
- hypothalamic hamartomas, 108, 200, 213
- IgG4-related disease, 466
- meningeal, 71
- pituitary, 103
- immune-mediated necrotizing myopathy, 455, 456
- immunofluorescence, 36
- immunohistochemical stains, 26–7
- ancillary markers, 34
- chromogranin, 28
- epithelial membrane antigen (EMA), 30
- glial fibrillary acidic protein (GFAP), 27
- hematolymphoid markers, 31
- inhibin, 31
- integrator interactor 1 (INI1), 32
- isocitrate dehydrogenase (IDH), 29
- Ki-67, 30
- macrophage markers, 30
- melanocytic markers, 33
- metastatic work-up, 32–3
- microglia markers, 30
- muscle markers, 31
- neurofilaments, 28
- neuron-specific enolase (NSE), 28
- neuronal markers, 28–9
- neuronal nuclei (NeuN), 28
- oligodendrocyte transcription factor 2 (Olig2), 27
- p53, 29
- phosphohistone H3 (PHH3), 30
- pituitary adenoma markers, 32
- S100 proteins, 27
- synaptophysin, 28
- transthyretin, 32
- type IV collagen, 32
- vascular markers, 31
- inclusion-body myositis, 455, 456
- infantile capillary hemangiomas, 471–2
- infarction, 137, 173
- CT findings, 137
- ischemic, non-hemorrhagic, 137
- MRI findings, 137
- spinal cord, 384–6
- vascular dementia and, 231
- infections. *See also* specific infections
- acquired, 275
- cerebellopontine angle, 373
- congenital intra-uterine, 274
- intraventricular, 273–7
- white-matter, 298–301
- inflammatory myofibroblastic tumors (IMTs), 69–70
- inflammatory pseudotumors, 70, 442
- inhibin stain, 31
- insular ribbon sign, 137
- integrator interactor 1 (INI1), 32
- interstitial edema, 136

Index

- intervertebral discs, 377
 desiccation, 432
 herniation, 417, 430
 intracerebral lesions. *See also*
 specific lesions
 appearances, 151–6
 classification, 151
 differential diagnosis, 218
 enhancing discrete lesions,
 214–18
 enhancing infiltrative lesions,
 175–97
 hemorrhagic lesions, 218
 locations, 156–8
 non-enhancing discrete
 lesions, 197–214
 non-enhancing infiltrative
 lesions, 159–75
 intracranial hemorrhage, edema
 and, 141
 intracranial hypotension, 79
 intracranial pressure, raised, 311
 intraneural perineuriomas, 447
 intraocular tumors, 463–5
 retinoblastomas, 463–4
 uveal malignant melanomas,
 464–5
 intraoperative consultation, 23
 intratumoral cysts, 138
 isocitrate dehydrogenase (IDH),
 29

 Joubert syndrome and related
 disorders, 353
 juvenile pilocytic astrocytomas,
 312–14

 Kasabach–Merritt syndrome, 471
 Ki-67 stain, 30
 kissing spines, 433
 Klinefelter syndrome, 121
 Kummel disease, 435
 kuru, 236

 Langerhans cell histiocytosis,
 87–8
 lateral ventricles, 249
 neoplastic lesions, 267–73
 Leigh syndrome, 242
 leiomyomas, 50
 leiomyosarcomas, 50
 lemon sign, 339
 leprosy, 442
 leptomeningeal cysts, 40–2
 differential diagnosis, 42
 leptomeningeal neuroglial
 heterotopia, 350
 leptomeningeal tumors
 grade IV, 54
 metastatic tumors, 58, 59
 lesion description, 16–21
 age at presentation, 20
 bony changes, 17
 contrast enhancement, 16
 location, 16

 margins, 16
 number, 16
 peritumoral edema and
 midline shift, 20
 pre-contrast T1 hyperintense
 lesions, 17
 size, 16
 Letterer–Siwe disease, 408
 leukemia, 57–8
 leukoariosis, 231
 leukocyte common antigen
 (LCA), 31
 Lewy bodies, 230
 dementia with, 229–31
 Parkinson disease, 242
 Lhermitte–Duclos disease
 (LDD), 332–5
 ligamentum flavum hypertrophy,
 434
 limb-girdle muscular
 dystrophies, 460
 lipochoristomas, 373
 lipomas, 373, 442
 lipomyelomeningoceles, 142,
 149, 359
 lipomyeloschisis, 359
 lissencephaly, 345
 Luxol Fast Blue (LFB) stain, 24
 lymph nodes, neck, 16
 lymphomas, 54–7
 bony involvement, 415–16
 differential diagnosis, 56
 diffuse large B-cell, 54
 dural, 56
 Hodgkin, 56, 416
 leptomeningeal, 56
 marginal zone, 56
 non-Hodgkin, 54, 183, 415
 orbital, 469–1
 sellar region, 101
 T-cell, 56

 macroadenomas, 89, 91
 cavernous sinus invasion
 (CSI), 93
 chiasmal compression, 93
 macrophages, staining, 30
 magnetic resonance angiogram
 (MRA), 9
 magnetic resonance imaging
 (MRI), 7–13
 applications, 10–12
 contraindications, CT scan as
 alternative, 7
 contrast administration, 12–13
 CSF flow studies, 10
 diffusion imaging, 8
 diffusion tensor imaging
 (DTI), 9
 evaluation of non-neoplastic
 conditions, 10
 fetal studies, 12
 follow-up in neoplasms, 10
 functional MRI, 10
 muscle, 454

 physiologic examinations, 12
 preoperative planning, 10
 sequences, 7
 skeletal muscle, protocol, 454
 special techniques, 8–10
 stroke, 10
 subtle hemorrhage, 11
 vascular structure evaluation,
 11
 magnetic resonance perfusion
 imaging, 8
 magnetic resonance spectroscopy
 (MRS), 9
 magnetic resonance terminology,
 2
 malformations, 338
 of cortical development
 (MCD), 344–50
 posterior fossa, 350–6
 spinal cord, 356–60
 malignant peripheral nerve
 sheath tumors
 (MPNSTs), 451
 mass effect, 141
 maximum intensity projection,
 5
 McCune–Albright syndrome,
 403
 Meckel–Gruber syndrome, 339
 medulla oblongata, 311
 medulloblastomas, 157, 179,
 315–18
 medulloepitheliomas, 464
 megalencephaly, 350
 melanin, 54
 melanocytic markers, 33
 melanocytomas, 52, 210
 differential diagnosis, 52
 melanomas, 53–4
 amelanotic, 54
 pineal region, 129
 uveal malignant, 464–5
 melatonin, 114
 meninges, 40
 leptomeningeal cysts, 40–2
 melanocytic tumors, 52–4
 meningioangiomatosis, 211
 meningiomas, 42–8
 anaplastic, 48
 blood supply, 44
 calcified, 43
 cerebellopontine angle, 362–6
 chordoid, 47
 clear cell, 47
 differential diagnosis, 48, 364
 dural-tail, 17
 grade I, 47
 grade II, 47
 grade III, 48
 intraventricular, 270
 microcystic, 44
 optic nerve, 472
 papillary, 44, 48
 pineal region, 129
 rhabdoid, 44, 48

 sellar and suprasellar regions,
 101
 spinal cord, 393–5
 variants, 46
 meningitis, 64–9. *See also*
 pachymeningitis
 bacterial, 64–6
 causative organisms, 70
 complications, 65
 edema, 141
 fungal, 68
 helminthic, 69
 suprasellar region, 106
 syphilitic, 68
 tuberculous, 67–8
 viral, 69
 meningoceles, 141, 149, 339, 435
 meningomyeloceles, 339
 meroacrania, 339
 mesencephalon, 351
 mesenchymal tumors, 42–52
 chondrosarcomas, 51
 metachromatic leukodystrophy
 (MLD), 285
 metastatic tumors, 58–60,
 183–9
 immunohistochemical
 markers, 34
 bone, 416–18
 brain, 33
 cerebellopontine angle, 367
 differential diagnosis, 59
 edema, 138
 intraventricular, 273
 pituitary gland, 102
 spinal cord, 397–8
 work-up, 32–3
 metencephalon, 311
 methyltransferase (MGMT)
 mismatch repair errors,
 35
 microadenomas, 89, 91
 microcephaly, 350
 microcystic meningiomas, 44
 microglia staining, 30
 midbrain, 311
 gliomas, 329
 midline shift, 20, 141, 143
 Miller–Fisher syndrome, 391
 mini-brain sign, 420
 minigemistocytes, 169
 minimum intensity projection, 5
 molar tooth sign, 353
 molecular testing, 33–5
 motor neuron disease, 246
 MRS. *See* magnetic resonance
 spectroscopy (MRS)
 MRI. *See* magnetic resonance
 imaging (MRI)
 mucicarmine stain, 26
 mucin stains, 26
 mucocoeles, orbital, 468
 mucormycosis, 467
 multiple myelomas, 58
 multiple sclerosis (MS), 287–91

Index

- management, 291
 spinal cord, 387–8
 variants, 291–3
 multiple system atrophy, 243–5
 muscle
 biopsy, 455
 denervation, 456–58
 drug-induced myopathy, 458
 fasciitis, 460–1
 idiopathic, 456
 imaging, 454–5
 inflammatory myopathies, 455–6
 MRI, 454
 muscular dystrophy, 458–60
 protocol, 454
 pathologic analysis, 455
 structure, 453–4
 muscle fiber, 453
 muscle markers, 31
 MYC protein overexpression, 35
 mycobacteria. *See also*
 tuberculosis
 leprosy, 442
 stains for, 25
 tuberculous meningitis, 67
 myelencephalon, 311
 myelin, 283
 stains, 283
 myelination, 283
 myelinoclastic diffuse sclerosis, 293
 myelomeningoceles, 142, 149, 339, 340
 myeloschisis, 339
 myofibrils, 453
 myopathy
 drug-induced, 458
 inflammatory, 455–6
 idiopathic, 456
 myotonic dystrophy, 460

 necrotizing fasciitis, 460
 neonatal ultrasonography, 15
 nerve sheath tumors, 391–3
 neural tube defects (NTDs), 338–40
 neurenteric cysts, 395
 neuritic plaques, 227, 228
 neurocysticercosis, 69, 189, 263, 275
 neurocytic rosettes, 211
 neurocytomas, 167, 169
 central, 211, 267
 intraventricular, 156
 parenchymal, 162
 neurodegeneration with brain iron accumulation, type 1 (NBIA-1), 241
 neurodegenerative disorders
 cerebral atrophy, 223–39
 initial work-up, 222
 neuroimaging studies, 222
 neurofibrillary tangles, 227
 neurofibromas, 392
 peripheral nervous system, 446–7
 plexiform, 447, 451
 neurofibromatosis type 1 (NF1), 200, 392
 neurofibromatosis type 2 (NF2), 392, 444
 and meningiomas, 45
 neurofilament proteins, 169
 neurofilaments, 28
 neuroglial heterotopia, 348
 neurohypophysis, 82
 neuromas, 442
 neuromuscular choristomas, 442
 neuromyelitis optica (NMO), 293–8
 treatment, 296
 neuron-specific enolase (NSE), 28
 neuronal markers, 28–9
 neuronal nuclei (NeuN), 28
 neuroradiology
 divisions of, 1
 modalities, 1
 terminology, 1–2
 neurosarcoidosis, 72–3, 104–5
 neurosyphilis, 275
 neutral buffered formalin
 fixative, 23
 nodular subependymal gray-matter heterotopia, 255
 non-Hodgkin lymphomas, 54, 183, 415
 normal pressure hydrocephalus (NPH), 262
 nuclear medicine, 15–16
 applications, 15

 obstructive hydrocephalus, 136
 occipital horns, 249
 oligoastrocytomas, 173
 oligodendrocyte transcription factor 2 (Olig2), 27
 oligodendrogliomas, 162, 167, 169
 anaplastic, 169, 178
 with glioblastomas, 178
 olivopontocerebellar atrophy, 244
 olivopontocerebellar degeneration, 245
 open-ring sign, 189
 optic chiasm, 82
 optic nerve lesions, 472–3
 gliomas, 472–3
 meningiomas, 472
 orbit, 462
 benign and cystic lesions, 468–9
 fungal infections, 467
 inflammatory lesions, 465–7
 lymphomas, 469–1
 malignant tumors, 469–71
 pathology, ultrasonography, 15

 rhabdomyosarcomas, 469
 thyroid-related orbitopathy, 466–7
 vascular malformations, 471
 orbital inflammatory
 pseudotumors, 466
 osmotic demyelination syndrome, 301–2
 ossification of the posterior longitudinal ligament (OPLL), 434
 osteitis deformans, 428
 osteoblastomas, 408–9
 osteochondromas, 410–11
 osteoid osteomas, 409–10
 osteomalacia, 434
 osteomyelitis, 424
 tuberculosis, 423
 vertebral, 421–3
 osteopenia, 434
 osteoporosis, 434
 osteosarcomas, 418–19

 p53 stain, 29
 pachymeningitis, 73–4
 autoimmune, 74
 pacinomas, 360
 Paget's disease, 428–9
 Pallister–Hall syndrome, 108, 213
 pancytokeratin (AE1/AE3), 33
 panthothenate kinase-associated neurodegeneration (PKAN), 241
 papillary meningiomas, 44, 48
 papillary tumors of the pineal region (PTPR), 117–18
 papillomas, choroid plexus (CPP), 270, 324
 paragangliomas, 16
 cerebellopontine angle, 369
 parahippocampal herniation, 144–6
 parenchymal neurocytic tumors, 162
 Parinaud syndrome, 115
 Parkinson disease, 242–3
 perfusion imaging, 8
 periodic acid-Schiff (PAS) stain, 24, 26
 peripheral nervous system, 442
 benign nerve sheath tumors, 443–51
 malignant neoplasms with secondary nerve involvement, 451
 malignant nerve sheath tumors, 451
 non-neoplastic lesions of nerve, 442
 peritumoral cysts, 138
 periventricular/subependymal nodular heterotopia (PNH), 348

 persistent fetal vasculature, 463
 Pfeiffer syndrome, 438
 phosphohistone H3 (PHH3), 30
 pia mater, 377
 Pick disease, 236, 237
 pineal gland, 114
 calcification, 115
 cysts, 115–17
 pineal region tumors, 114, 129
 germ cell tumors, 121
 germinomas, 125–8
 mixed germ cell tumors, 128–9
 papillary tumors, 117–18
 parenchymal tumors
 of intermediate differentiation (PPTIDs), 119–20
 parenchymal tumors, 118
 pineoblastomas, 118, 121, 179, 183
 pineocytes, 115
 pineocytomas, 118
 pituicytomas, 95, 97, 216
 pituitary adenomas, 88, 89–94
 apoplexy, 94
 atypical, 88
 cavernous sinus invasion (CSI), 93
 chiasmal compression, 93
 classification, 90
 functioning, 89
 macroadenomas, 89, 91
 markers, 32
 microadenomas, 89, 91
 non-functioning, 89
 typical, 88
 pituitary carcinomas, 88, 94
 pituitary gland, 82. *See also*
 hypophysitis, pituitary adenomas, pituitary carcinomas
 abscesses, 106
 classification of adenomas, 88
 duplication, 110
 granular cell tumors of the stalk, 216
 inflammatory disorders, 103
 metastatic tumors, 102
 neuroendocrine tumors, 88–94
 non-neuroendocrine tumors, 94
 stalk effect, 89
 Wegener's granulomatosis, 105
 pituitary stalk interruption syndrome, 109
 plain radiography, 2–3
 advantages, 2
 applications, 2
 densities, 2
 disadvantages, 3
 terminology, 2
 plasma cell granulomas (PCGs), 70–2

Index

- plasma cell neoplasms, 58
 differential diagnosis, 58
 plasmacytomas, 58, 103, 419–20
 differential diagnosis, 58
 pleomorphic
 xanthoastrocytomas (PXAs), 203
 polymicrogyria, 346
 polymyositis, 455, 456
 pons, 311
 pontine gliomas, 329
 pontocerebellar hypoplasia, 354
 porencephalic cysts, 255
 post-contrast dynamic imaging, 4
 posterior fossa
 evaluation, 311
 malformations, 350–6
 tumors, 311
 prealbumin, 32
 pre-contrast T1 hyperintense lesions, 17
 preoperative planning
 CT scan, 5
 MRI scan, 10
 PRES syndrome, 303
 primary central nervous system (CNS) lymphomas. *See* lymphomas
 primary central nervous system (CNS) melanomas, 53
 primitive neuroectodermal tumors (PNETs), 179–83
 necrosis, 181
 pineal, 183
 supratentorial, 179, 183
 ventricular extension, 272
 prion diseases, 236
 Creutzfeldt–Jakob disease, 235–6
 progressive multifocal leukoencephalopathy (PML), 298–301
 progressive supranuclear palsy, 238, 239
 pseudomeningoceles, 141, 149
 pseudopalisades, 178

 radiation necrosis, 192–7
 radiotracers, 15
 Rathke's cleft cysts, 91, 98, 100, 216
 reconstruction procedures, CT scan, 5
 reticulin stain, 24
 retina, 462
 retinoblastomas, 463–4
 rhabdoid meningioma, 44, 48
 rhabdomyolysis, 458
 rhabdomyosarcomas, 469
 variants, 469
 rheumatoid arthritis, 423–4
 rhombencephalon, 311, 351
 rhombencephalosynapsis, 354
 rubella, 275

 S100 proteins, 27
 sarcoidosis, 72–3, 104–5
 sarcomas
 Ewing, 414–15
 granulocytic, 58
 Schilder's disease, 293
 Schiller–Duval bodies, 128
 schizencephaly, 255
 Schmorl's nodes, 417, 433
 schwannomas, 361–2
 cellular, 443
 differential diagnosis, 364
 melanotic, 392, 444
 peripheral nervous system, 443–4
 plexiform, 444
 schwannomatosis, 444
 SCIWORA (spinal cord injury without radiographic abnormalities), 383
 secondary craniosynostosis, 437
 sellar region
 anatomy, 82
 congenital lesions, 108
 inflammatory disorders, 103–6
 tumors, 83, 88–103
 vascular lesions, 106
 septo-optic dysplasia, 110, 344
 septum pellucidum, 251
 Shy–Drager syndrome, 244, 245
 sickle cell disease, 422
 skeletal muscle. *See* muscle
 smooth muscle actin (SMA), 31
 solitary fibrous tumor (SFT), 48–50
 differential diagnosis, 49
 specimen processing, 23
 spinal arteries, 384
 spinal canal, 142
 herniations, 149
 spinal cord, 377
 astrocytomas, 378–80
 benign intramedullary lesions, 383
 contusion, 383–4
 demyelinating disorders, 386–91
 epidural abscesses, 398–9
 gray matter, 131
 herniations, 142
 infarction, 384–6
 intradural extramedullary lesions, 391–8
 intramedullary tumors, 377
 lesion classification, 377
 malformations, 356–60
 mass effect, 141
 metastatic, 397–8
 study approach, 377
 tumors, 377–83
 white matter, 131
 spinal dysraphism, 339
 spindle cell oncocytomas, 96
 spine, 377
 compression fractures, 417
 degenerative disease, 432–4
 epidural space, 377
 imaging modalities, 377
 metastatic disease, 416–18
 spinocerebellar ataxias, 246
 spongiform encephalopathies, 236
 stains. *See* histochemical stains
 stellate reticulum, 214
 striatal necrosis, 242
 striatonigral degeneration, 244, 245
 stroke
 CT scan, 5
 MRI scan, 10
 vascular dementia and, 231
 subacute combined degeneration, 390
 subacute sclerosing panencephalitis (SSPE), 301
 subcortical band heterotopia, 350
 subdural empyemas, 77
 subdural hematomas, 58, 75–7
 acute, 75
 chronic, 75–7
 subacute, 75
 subependymal giant cell astrocytomas (SEGAs), 211, 267
 subependymal giant cell tumors, 156
 subependymomas, 266, 319
 subfalcine herniation, 141, 143–4
 complications, 143
 suprasellar region
 anatomy, 82
 congenital lesions, 108
 inflammatory disorders, 103–6
 tumors, 82–8
 vascular lesions, 106
 supratentorium, 141
 Susac syndrome, 306
 swelling. *See* edema
 synaptophysin, 28, 32, 169
 synostosis, types of, 437
 synovial cysts, 432
 syntelencephaly, 259
 syphilis
 congenital, 275
 meningitis, 68
 syringohydromelia, 383
 syringomyelia, 356, 383
 syrinx, 383

Taenia solium, 275. *See also* neurocysticercosis
 tegmentum, 311
 temporal horns, 249
 tendonitis, acute calcific, 420–1
 teratomas, 122
 immature, 124
 mature, 124
 with malignant transformation, 124
 terminology, 1–2
 tethered cord, 360
 thalamic degeneration, 242
 third ventricle, 249
 neoplastic lesions, 262–5
 thrombosis, cavernous sinus, 106
 thyroid-related orbitopathy, 466–7
 Tolosa–Hunt syndrome, 466
 tonsillar herniation, 141, 146
 TORCH infections, 274
 toxocariasis, 463
 toxoplasma encephalitis, 189
 toxoplasmosis, congenital, 275
 TP53 tumor suppressor gene, 29
 tractography, 9
 tram tracking sign, 472
 transcalvarial herniation, 147
 transmission electron microscopy (TEM), 35
 transtentorial herniation, 141, 144–6
 central/diencephalon herniation, 146
 complications, 145
 uncal/parahippocampal herniation, 144–6
 transthyretin, 32
 transverse myelitis, 386–7
 trauma, CT scan, 5
 traumatic brain injury, 228
 chronic traumatic encephalopathy, 228–9
 trephine syndrome, 147
Treponema pallidum meningitis, 68
 trichrome stains, 25
 tuberculomas, 67
 tuberculosis
 cerebral, 151, 189
 discitis, 423
 osteomyelitis, 423
 sellar and parasellar region, 106
 tuberculous meningitis, 67–8
 tuberous sclerosis, 251, 267
 tumefactive demyelinating disease, 189, 291
 type IV collagen stain, 32

 ultrasonography, 14–15
 applications, 15
 color Doppler, 15
 fetal and neonatal evaluation, 15

Index

- intraoperative examination, 15

orbital pathologies, 15

terminology, 2

uncal herniation, 144–6

uveal malignant melanomas, 464–5

vascular dementia, 231

vascular malformations

intraventricular, 277

orbital, 471

vascular markers, 31

vascular tumors, 54

vasogenic edema, 131–4

ventricular horns, 249
- ventricular system, 249

age-related changes, 251

congenital/developmental disorders, 251–62

hemorrhagic/vascular conditions, 277–8

infectious conditions, 273–7

neoplasia, 262–73

ventriculitis, 65

Verhoeff–van Gieson stain, 25.

See elastic van Gieson stain

vermian syndrome, 311

vertebral osteomyelitis, 421–3

vertebral osteonecrosis, 435
- vimentin, 169

viral meningitis, 69

vitamin B12 deficiency, 390

Wegener’s granulomatosis, 390

white matter

acquired lesions, 301–3

brain, 131

changes in systemic disease, 303–7

demyelinating disorders, 287–98

developmental disorders, 283–5
- dysmyelinating disorders, 285–7

infectious diseases, 298–301

myelination, 283

radiologic considerations, 283

spinal cord, 131

Wilson disease, 242

xanthoastrocytoma, pleomorphic, 203

xanthogranulomas, 251

xanthoma disseminatum, 251

X-ray. *See* plain radiography

yolk sac tumors, 128