

Index

- A**
- AAC. *See* Augmentative/alternative communication
- AANEM. *See* American Association of Neuromuscular and Electrodiagnostic Medicine
- AAPM&R. *See* American Academy of Physical Medicine and Rehabilitation
- Abandonment, 385
- Abatacept (Orencia), 613t
- ABC. *See* Activities-Specific Balance Confidence
- Abdominal massage, 428
- Abdominal muscle-strengthening exercise, 701
- Abdominal musculature, 654, 655f
- lower, anatomic pattern of, 860t
- Abdominal pain/discomfort, 412
- Abducens nerve (cranial nerve VI), examination of, 9
- Abductor pads, 274
- ABI. *See* Ankle-brachial index
- Abnormal movements, 972–974
- Above-elbow stimulation, 131
- ABPMR. *See* American Board of Physical Medicine and Rehabilitation
- Abrupt knee flexion in loading response, 205
- Abrupt sound side loading, transtibial gait deviations, 206
- Absent knee flexion in loading response, 205
- Abstract thinking, 8
- Abstraction, as cortical function, 8
- Academic achievement tests, 51t, 52
- Acai, 370t–372t
- Accent 800, 377f
- Accessory deep peroneal nerve, 131
- Accessory nerve (cranial nerve XI), examination of, 11
- Accuracy, 111
- ACE. *See* Antegrade continence enema
- Acetabular dysplasia, 1019
- Acetabular labral tears, 730–731
- Acetaminophen, 798–799
- Acetylcholine receptor antibodies, elevated, 148–149
- Achalasia, of esophagus, dysphagia and, 56
- Achilles enthesitis, 232
- Achilles muscle stretch reflex, 118
- Achilles tendinopathy, 738–740
- Achilles tendon rupture, 738–740
- tests for, 18t–26t
- Acid maltase deficiency (glycogen storage disease type II), 905–906
- ACL. *See* Anterior cruciate ligament
- Acoustic immittance, 1105
- Acquired amputation, classification and etiology of, 200
- Acquired metabolic myopathies, 909
- Acquired myopathies, 907–909, 908t
- Acquired pediatric lower limb deficiencies, amputation level/energy expenditure in, 201
- ACR. *See* Acute cellular rejection
- Acromioclavicular (AC) joint
- evaluation, O'Brien test, 715
- radiographic evaluation of, 717
- sprains, 717, 717f
- tests for, 18t–26t
- Actin filaments, 297–298
- components of, 298
- Action potential generation, 152.e1
- Action potential propagation, physiologic factors affecting, 152.e2
- “Active” muscle stiffness, 447
- “Active rest”, 791
- Active terminal devices, 166–167, 167b
- Activities of daily living (ADL), 1–2, 4–5, 4b
- aids, 379
- cardiopulmonary deficits and, 5
- clinician identification and documentation of, 4
- mastery, 161–162
- for personal care, 4
- Activities-Specific Balance Confidence (ABC), 1112
- Activity, 2t
- interventions, for pressure redistribution, 477
- limitations, 376, 450
- required to recertify, 112t
- task execution, 376
- Acupressure, 335
- Acupuncture, 313, 358–360, 361b, 368
- evidence-based research of, 360
- history and theory of, 358
- indications, precautions, and contraindications of, 359–360
- mechanism of, 358–359
- model with meridians, 358f
- needles and insertion techniques of, 359
- pain management and, 360
- Acute arterial occlusion, 485
- Acute brachial neuritis, 846
- Acute care setting, assessment in, 69–70
- Acute cellular rejection (ACR), in cardiac transplantation, 555
- Acute demyelinating polyradiculoneuropathy, variants of, 865t
- Acute inflammatory demyelinating polyneuropathy (AIDP), 144–146
- Acute lumbosacral radiculopathy, algorithmic approach to, 679f
- Acute mountain sickness, in wheelchair athletes, 817
- Acute postamputation, 160–162, 162b
- Acute spinal cord injury
- chemical and cellular treatment of, 1072
- pathophysiology of, 1055
- Acute spinal injury, operative treatment of, 1071
- Acute stage, rheumatoid arthritis and, 624–625
- Acute stress disorder (ASD) symptoms, 509
- Acute UMN-predominant SCI, 1053–1054
- ADA. *See* Americans with Disabilities Act
- Adalimumab (Humira), 613t
- Adaptive equipment, for myopathy, 913
- Adaptive skills, 52t
- Adaptive use splint, 214f–217f, 214t–217t
- Addiction, definition of, 750t
- Additional componentry considerations, 192
- Adductor pads, 274
- ADED. *See* Association of Driver Educators for the Disabled
- Adenosine triphosphate (ATP), breakdown of, 291
- ADH. *See* Antidiuretic hormone
- Adhesive capsulitis (“frozen shoulder”), 720–721
- stages of, 720t
- treatment of, 720–721
- Adjustable compression wraps, 496
- Adjuvant analgesics, for bone pain, 572
- Adjuvant chemotherapy, 581
- ADL. *See* Activities of daily living
- Adolescent, idiopathic scoliosis in, 256
- Adolescent athlete, 810–812
- Adult diapers, 397
- Adults
- with cystic fibrosis, lung function of, 543
- myelomeningocele in, 1044–1047
- voiding function in, 389
- Advanced prosthetic training, phase, 171
- Adverse effects, 111
- Aerobic activity, 669
- Aerobic capacity (VO_{2max}), 514
- aerobic training and, 514, 516
- Aerobic conditioning, 583–584
- Aerobic exercise
- cerebral palsy and, 1014
- contraindications to, 309b
- fibromyalgia and, 313
- prescription, guidelines for, 310t
- purpose of, 622
- Aerobic oxidation system, 292
- Aerobic training
- for cardiopulmonary disease, 514–516
- for myopathies, 912
- Aesthetics, in wheelchair and seating system assessment, 263–264
- Affect, 8
- Afferent auditory pathway, 1103f
- AFO. *See* Ankle-foot orthosis
- Age-based pitch count, 796, 797t
- Aggravation, causation and, 82, 83f
- Aging
- in action potential propagation, 152.e2
- effects of, 302
- Agitated behavior scale, 940b
- Agitation, 939
- measures of, 939–940, 940b
- treatment of, 940

- Agonist-antagonist myoneural interface (AMI), 177
- AI. *See* Anal incontinence
- AICD. *See* Automatic implantable cardiac defibrillator
- AIDP. *See* Acute inflammatory demyelinating polyneuropathy
- AIF. *See* Apoptosis inducing factor
- Air bags, 952
- Air conduction tests, 1102–1103
- Air stacking, 544–545
- Airway clearance
- in pulmonary rehabilitation, 522
 - strategies, indication for, 539
- Airway hyperreactivity, reduction of, bronchodilators in, 1079
- Airway management, TBI and, 932–933
- Airway protection, swallowing and, 63–64
- AKA. *See* Artery of Adamkiewicz
- Albuterol, 799
- Alcohol
- as cause of polyneuropathy, 115
 - for essential tremor, 973
- Alcohol abuse, 713
- Alcohol-related myopathy, 909
- Alcoholic polyneuropathy, peripheral nerve disease and, 147
- Alemtuzumab (Lemtrada), for multiple sclerosis, 993
- Alendronate sodium, 709
- Alexander, F.M., 334
- Alexander technique, 334, 670
- Alginates, 481t, 482
- Alimentary neuromotor system, 410–412
- All-or-none phenomenon, 152.e1
- All-terrain power wheelchairs, 280
- Allergic angitis, 486
- Allodynia, definition of, 750t
- Allograft, 156
- Allowed conditions, workers' compensation systems, 82–83
- Aloe vera, 370t–372t
- Alpha motor neurons, 320
- ALS. *See* Amyotrophic lateral sclerosis
- Alternate suspension designs, 186
- Alternative socket designs, hip disarticulation and hemipelvectomy of, 196–197, 196f–197f
- “Altitude tents”, 791
- Altitude training, 791–792
- Alvimopan, for constipation, 426
- AMA Guides to the Evaluation of Permanent Impairment (AMA Guides), 79
- Amantadine, 977
- for cognition and attention enhancement, 937
 - daily treatment with, 923
 - for fatigue treatment, 997t
- Ambulation
- assessment of, 4
 - neurologic recovery and, 1064, 1064f, 1065t
- Ambulation aids, 243–244, 243f
- Ambulatory devices, early mobilization and, 528
- Amenorrhea, 809
- American Academy of Pediatrics Committee on Sports Medicine, 810–811
- American Academy of Physical Medicine and Rehabilitation (AAPM&R), 107
- practice improvement project, 112–113
- American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM)
- guidelines from, 129
 - Occupational Safety and Health Administration rule support of, 120–122
 - performance in practice, 113
 - standards of, 131–132
- American Board of Physical Medicine and Rehabilitation (ABPMR), 111
- MOC program, 111, 111b
- American Burn Association, 499
- American College of Sports Medicine
- guidelines for exercise prescription, 541t
 - pulmonary rehabilitation exercise recommendations of, 540
- American Diabetes Association, guidelines for DM diagnosis, 562
- American Heart Association, 803
- American Medical Association, *Guides to the Evaluation of Permanent Impairment*, 27
- American Society of Hand Therapists (ASHT), *Splint Classification System*, 209
- American Spinal Injury Association (ASIA)
- Impairment Scale, 1058
 - online e-learning modules of, 1057
- Americans with Disabilities Act (ADA), 94, 375, 1074
- and implications, 75–76, 76t
- α -Amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA), 753–754
- γ -Aminobutyric acid (GABA), 754
- 4-Aminopyridine, for spasticity, 458–459
- AMPA. *See* α -Amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid
- Amphetamine, for fatigue treatment, 997t
- Amplification, understanding of, 152.e9
- Amplifier, 152.e9
- Amplitude ratios (ARs), 946
- Amputation(s), 158–160
- acquired, classification and etiology of, 200
 - demographics, incidence, and prevalence of, 153–154
 - disarticulation level, 176
 - functional levels of, 154–155
 - nomenclature of, 154–155
 - in older adults, 601
 - sexual dysfunction and, 438
 - surgery, principles, 155–160
 - survival rates after, 175
 - terminology, 175–176
 - transhumeral, 155
 - transradial, 158–159
 - types of upper extremity, 154f
 - ultimate level of, 176
- Amputees
- axle, 272
 - rehabilitation, team approach, 160
- Amyotrophic lateral sclerosis (ALS), 58, 820
- aerobic exercise for, 835–836
 - cognition in, 839
 - cognitive disorders and, 838
 - communication and, 836
 - cramps and, 839
 - criteria for, 830–831, 831b
 - diagnosis of, 830–831, 831b
 - El Escorial criteria for, 150
 - dysphagia and, 836
 - familial, 822
 - fatigue in, 839
 - general approach to, 831–833
 - identification of, accurate, 150
 - insomnia in, 839
 - medical complications in, 839
 - mood disorders and, 838
 - motor neuron disease and, 150
 - nutrition and, 836–837
 - pain and, 839
 - prognosis and end-of-life care for, 839–840, 840b
 - pseudobulbar affect in, 839
 - regional, 822
 - resistance training for, 835–836
 - respiratory insufficiency in, 837–838
 - sialorrhea in, 837
 - spasticity and, 836
 - spectrum of, 821f
- Amyotrophic lateral sclerosis-plus syndromes, 823
- Anabolic agents, for osteoporosis, 703–704
- Anabolic androgenic steroids, 709
- Anabolic Steroid Control Act of 1990, 800
- Anabolic steroids, 799–800, 800t
- Anaerobic oxidation, 292
- Anaerobic threshold, 293–294
- Anal incontinence (AI), 780
- Anal stretch voiding, 396–397
- Analgesia, definition of, 750t
- Analgesics, 798–799
- Andersen-Tawil syndrome (ATS), 905
- Andry, Nicolas, 248
- Anejaculation, in men, 444–445
- Anemia, 809
- iron deficiency, 809
 - physiologic, 809
- Anencephaly, 1028
- Anger, 755
- Angitis, 485
- allergic, 486
- Angina pectoris, cardiac rehabilitation for, 520
- Angiotensin-converting enzyme (ACE) inhibitor, 490, 799
- Angle of gait, 796
- Animated intelligent agent, 385f
- Ankle
- disorders of, 738–746
 - dorsiflexion, 31f
 - weakness of, 909
 - dorsiflexors, 204
 - hinged, 235
 - joint, types of, 239, 239f
 - mediolateral stability, 233
 - plantar flexors, 204
 - prosthetic prescription for, disarticulation (Syme) amputations, 193
 - solid, 235
 - sprains, 743–744, 745f–746f
 - stability of, tests for, 18t–26t
 - valgus deformities of, 1042
- Ankle-brachial index (ABI), 487, 487t
- Ankle-foot orthosis (AFOs), 229, 232–237, 233f–234f, 473
- case report on, 236–237
 - electrical stimulation devices for, 236, 236f
 - metal, 233–235, 234f
 - as mobility assistive device, 3t
 - other types, 235–237, 235f
 - patellar tendon bearing, 235
 - plastic, 235, 235f
 - posterior leaf spring, 235
- Ankle inversion, 451t–453t
- Ankle plantar flexion, 451t–453t
- Ankylosing spondylitis, 613–615, 613t, 614f–616f, 614b, 677
- criteria for, 615b
 - main symptoms of, 625
 - rehabilitation intervention for, 625
 - treatment for, 677
- Anma massage, 335
- Annual National Healthcare Quality Report (NHQR), 108–109
- Annulus fibrosus, 249
- Anoctamin-5, 896
- Anodal block, 152.e11
- Anorectum, sympathetic, parasympathetic, and somatic nervous system innervation of, 409f
- Anorexia, 809
- Anorgasmia, 444–445
- Antegrade continence enema (ACE), 428, 1038, 1085
- Anterior and middle column fractures, 675
- Anterior apprehension and relocation tests, 715

- Anterior cervical disectomy and fusion, Smith-Robinson technique, 642f
- Anterior column fractures, 675
- Anterior compartment injuries, 742–743, 744f
- Anterior cord syndrome, 1055f
- Anterior cruciate ligament (ACL)
- injuries, 737
 - tears, 737, 737f–738f
 - tests for, 18t–26t
 - treatment of, 738
- Anterior glenohumeral joint instability, tests for, 715
- Anterior horn cell, 152.e5
- Anterior interosseous syndrome, 849, 850f
- Anterior knee pain, differential diagnosis of, 734, 734f–735f
- Anterior lobe, 11
- Anterior stop, 234
- Anterior support strap, 163
- Anterior tibialis overload, 742–743
- Anterograde ejaculation, spinal cord injury (men percentage), 435f
- Anthropometrics, 267
- Antiarrhythmics, 439t
- Antibiotic therapy, for lymphedema, 496
- Anticholesterolemics, 439t
- Anticoagulation, 960
- cardiac rehabilitation and, 521
- Anticonvulsants, 439t
- Antidepressants, 768–771
- Antidiuretic hormone (ADH), 935
- Antidromic, term, 152.e3
- Antidromic bipolar SNAP waveform recordings, 152.e3, 152.e3f
- Antidromic median sensory nerve action potential, 152.e9f, 152.e10f
- Antiglutamatergics, for pseudobulbar affect, 1003t
- Anti-Hu syndrome, 827
- Antihypertensives, 799
- Antiinflammatories, 799
- Anti-monosialotetrahexosylganglioside antibodies (anti-GM1 antibodies), 829
- Antineoplastic drugs, 581, 582t
- Antiplatelet agents, 960
- Antiplatelet therapy, 490
- Antipsychotic drugs, dysphagia and, 58
- Antiresorptive agents, for osteoporosis, 703–704
- Antisynthetase syndrome, 907
- Antitipper, 272, 272f, 278
- Anus, motility, 410
- Anxiety, 71
- Parkinson disease and, 975
- Aortic sclerosis, 513
- Aortic stenosis, 513
- AOSpine fracture classification, 675
- Aphasia, 8–9
- Aphonia, 589–590
- Apolipoprotein E (APOE), study on, 947
- Apoptosis, 920
- Apoptosis inducing factor (AIF), 920
- Apparent leg length, measurement of, 232
- Apraxia, 13
- Aquatherapy, 621
- Aquatic therapy, 309, 761
- Arachidonic acid residue receptors, 752
- Arachnoiditis, 403
- Arch system, 211
- Areflexic lower motor neurogenic bowel, management of, 425–426
- Areflexic lower motor neuron, 414
- Arm exercises, leg exercises and, effects of, 293
- Armmodafinil, for fatigue treatment, 997t
- Armrests, 274–275
- Arms, attitude of, 16
- Arnold-Chiari II (A-C II) malformations, 1035–1036, 1036f
- Arousal, cognitive function and, 936
- Arrhythmias, 517
- cardiac rehabilitation for, 521
- ARs. *See* Amplitude ratios
- Arterial diseases, 485–487
- Arterial insufficiency, 679
- lower extremity, 485
- Arterial ischemic ulcers, 469, 471f
- Arterial occlusion, acute, 485
- Arterial thromboemboli, 485
- Arteries, variation of, 513
- Arteriosclerosis obliterans, 485
- Arteritis, 632
- Artery of Adamkiewicz (AKA), 681, 681f
- Arthritis, 213–219
- exercise for, 309
- Articulatory technique, 323–324, 324f
- Artificial hands, 166–167
- Artificial urinary sphincter, 401
- “Artificially induced hypoxic conditions”, WADA consideration, 791
- Aseptic bursitis, 721
- ASHT. *See* American Society of Hand Therapists
- Ashtanga, 367
- Ashworth Scale, 453, 933, 933t
- ASIA. *See* American Spinal Injury Association
- Asian ginseng, 370t–372t
- Ask Legitimize Limitations Open Work together (ALLOW) models, 440b
- Aspen collar, 252
- Aspen Neurobehavioral Conference, 7
- Aspiration
- definition of, 56–57
 - pneumonia, prevention of, dysphagia and, 66
- Aspirin, 490
- Assist-control, 1080
- Assistive devices, 583
- Assistive technology, 288, 374–388
- abandonment, 385
 - assessment, phase, 386
 - clinical assessment, principles of, 385–387
 - for communication disorders, 377–379
 - defining, 374
 - devices, overview, 376–377
 - direct selection, 376
 - displays, 376–377
 - funding, 388
 - future directions of, 388
 - health care record, documentation, 387
 - history and legislation of, 374–376
 - human-technology interface, 376
 - International Classification of Functioning and, 375–376
 - physician responsibilities, 387–388
 - prescription, 387
 - report, writing, 387
 - requirements of, 375b
 - scanning or indirect selection, 376
 - selecting appropriate, 385
 - trial use, unexpected benefits of, 386–387
- Association of Driver Educators for the Disabled (ADED), 1075
- Asterixis, 973
- Asthma
- drugs for, sports and, 799
 - exercise in, 542
 - mouse model of, 542
- Astrocystic swelling, 919
- Asymmetric tonic neck reflex, 1011t
- Asymmetrical faces, 133–134
- Asymmetrical step lengths, transfemoral gait deviations, 206
- Asymptomatic bacteriuria, 403
- Ataxic CP, 1008
- Ataxic gait, 17t
- Atelectasis, spinal cord injury and, 1079–1080
- Athetosis, 13
- Athletes
- adolescent, 810–812
 - basic life support (BLS), need for, assessment of, 804
 - cardiovascular screening and, 803, 803b
 - classification of, 814
 - clearance to play and, 803
 - emergency assessment and care in, 803–806
 - facemask of, removal of, 804
 - female, landing of, 798
 - with impairments, 813
 - classification of, 814
 - injured, evaluation of, 792
 - limb-deficient, 817–818
 - low bone mineral density, diagnosis of, 810t
 - management of, 806
 - medicolegal aspects of PPE and, 803
 - mild TBI and, 923–924
 - older, 812–813
 - pediatric, 810–812
 - physical examination of, 792
 - with repeated concussions, 807
 - and return to play, phases of, 794t
 - ROM, achievement of, 794
 - shoulder injury, rehabilitation program for, 794
 - sudden cardiac arrest in, 804
 - taco method (cooling method), 805–806
 - therapeutic use exemption, 798
 - wheelchair, 815–817
- Athletic performance, 304
- Athletic pubalgia, 731
- Athletic training, flexibility and, 303
- Atkins Prosthetic Functional Adaption Rating Scale, 173b
- Atlas, 628f
- burst fracture of, 649f
- At-level spinal cord injury (neuropathic) pain, 1091–1092
- Atomoxetine, for fatigue treatment, 997t
- ATP. *See* Adenosine triphosphate
- Atrial fibrillation, 513
- ATS. *See* Andersen-Tawil syndrome
- Attention, 7
- cognitive function, 936
 - enhancement, amantadine use and, 937
- Atypical antipsychotics, 940
- Atypical segments, of cervical spine, 318–319
- Auditory brainstem response, 1105, 1106f
- Auditory evaluation, in newborn, 47–48
- Auditory habilitation, 1108
- Auditory impairments, 1101, 1110b
- Auditory processing disorder, 1106–1107
- Auditory rehabilitation, 1108–1110
- bone-anchored hearing aids for, 1109
 - cochlear implants for, 1109
 - hearing aids for, 1108–1109, 1108f–1109f
 - hearing assistance technology for, 1108–1109
 - middle ear implantable hearing aids for, 1109–1110
 - surgical management with implantable devices, 1109–1110
- Auditory system
- anatomy and physiology of, 1101–1102
 - assessment of, 1102–1105
 - auditory brainstem response and, 1105, 1106f
 - case history on, 1102, 1104b
 - examination of, 1102–1105, 1103t
 - otoacoustic emissions and, 1105
 - otoscopic examination of, 1102–1105, 1104b
 - pure-tone audiometry for, 1103–1104
 - speech audiometry and, 1104
- Augmentation cystoplasty, 400f

Augmentative/alternative communication (AAC), 377
 devices, usefulness, 377
 nonelectronic systems, 377–378
 Autolytic debridement, 480t
 Automated external defibrillators, 790
 Automatic collision notification technology, 952
 Automatic implantable cardiac defibrillator (AICD), 521
 Autonomic dysfunction, 862
 Autonomic dysreflexia, 404, 1083
 occurrence of, 429
 in wheelchair athletes, 816
 Autonomic neuropathy, 471, 865
 Autosomal centronuclear (myotubular) myopathy, 903
 Autosomal dominant disorders, 883
 Avascular necrosis, 727–728, 728f
 Avascular necrosis of the femoral head (AVNFH), 727, 728f
 AVNFH. *See* Avascular necrosis of the femoral head
 Avulsion injury, 731
 Axilla loop, 163
 Axillary web syndrome, 587, 587f
 Axis, anterior view of, 628f
 Axonal loss, SNAPs/CMAPs and, 144
 Axonal neuropathies, electrodiagnostic changes in, 143–144
 Axonotmesis, 117, 117t
 Axons, proportion estimate of, CMAP in, 126
 Ayurveda, 364

B

Babies, limbs (missing), 153–154
 Babinski reflex, 1011t
 Babinski sign, 14
 Back
 defect, 1034
 examination of, 45
 extensor musculature, weakness of, 694
 schools, 668
 supports, 712f
 for wheelchair, 271t, 274
 Back extensor
 resistance training, 694, 694f–695f
 strength
 exercise for, performed, 709f
 in healthy women *versus* women with osteoporosis, 707f
 progressive resistive back exercise and, 704f
 thoracic kyphosis and, 694f
 Back pain, 666
 disability, 92
 Back to Sleep program, 44
 Baclofen, 439t
 for cerebral palsy, 1017t
 for spasticity, 455–458, 933–934
 Bacterial colonization *versus* infection, 478–479
 Bacteriuria, 403–404
 BAD. *See* Brachial amyotrophic diplegia
 Bad-conduct discharges, 78–79
 BAHA. *See* Bone-anchored hearing aids
 Bail lock, 240
 Bal shoes, 229, 230f
 Balance, observation of, 15
 Balanced forearm orthosis, 222
 Ball antispasticity orthosis, 221–222, 222f
 Ball splint orthosis, 226f
 Ballistic stretching, 305
 Ball-valve effect, 414
 Bankart lesion, 719
 Barefoot running, 796
 Barnes, John, 334
 Barrier concept, of manual medicine, 317–318, 318f

Barthel index, 967t
 Basal ganglion, in Parkinson disease, 975
 Baseball pitch
 acceleration phase, 796
 age-based pitch count, 796, 797t
 deceleration phase, 796, 796b
 common injuries in, 796b
 early cocking, 795
 follow-through phase, 796
 late cocking, 795–796, 796b
 six phases of, 795, 795f
 velocity of, 795
 Baseline functional assessment tests, 591b
 Basic life support (BLS), need for, assessment of, 804
 Basson's circular model, 431
 Battery, for hearing aids, 1108
 Battlefield acupuncture (BFA), 360
 Bauhin, Caspar, 1027
 Bayley Scales of Infant Development, 49–50
 BDCSE. *See* Blue dye clinical swallow examination
 BDI. *See* Beck Depression Inventory
 BDI-FS. *See* Beck Depression Inventory-Fast Screen
 BDNF. *See* Brain-derived neurotrophic factor
 “Beating”, involvement of, 333
 Beck Depression Inventory (BDI), 997
 Beck Depression Inventory-Fast Screen (BDI-FS), 997
 Becker disease, 903–904
 Becker muscular dystrophies, 875, 888–892
 diagnostic evaluation of, 889–890, 890f
 disease-related comorbidities and management of, 890–892
 cardiomyopathy evaluation and management, 890
 cognition and behavioral phenotype, 892
 dysphagia, 891
 endocrine, growth, and bone health, 891
 failure-to-thrive screening and nutrition management, 891
 orthopedic management of contractures and spine deformity, 891–892
 pulmonary impairment, evaluation, and management, 890–891
 incidence of, 888–889
 pathophysiology and epidemiology of, 888–889, 888t
 progression of, 889
 Bed mobility, 3
 Bed rest, 527
 therapeutic, 528
 Bedside swallow evaluation, 59–62
 Bedsore, 474
 Beery-Buktenica Developmental Test of Visual Motor Integration, 51, 51t
 Behavior
 problems in, psychological assessment of, 70
 psychologists role in, 68
 Behavioral auditory tests, 1102–1104
 Behind-the-ear (BTE) hearing aids, 1109f
 Beliefs, low back pain and, 658
 Bell palsy, 134
 Below-elbow stimulation, 131
 Below-level spinal cord injury (neuropathic) pain, 1092–1093, 1094f
 Bender Visual Motor Gestalt Test, 51, 51t
 “Benediction sign”, 219–221
 Benign paroxysmal positional vertigo (BPPV), 943, 1110
 canalith repositioning treatment for, 1114, 1114f
 Benik-type orthosis, 225f
 Benzodiazepines, 439t
 mechanism, 671
 for spasticity, 455–457

Beyond Surviving: Tools for Thriving after Burn Injury, 508–509
 BFA. *See* Battlefield acupuncture
 Biceps, long head of, 718–719
 Biceps tendinopathy, test for, 715
 Biceps tendon, tests for, 18t–26t
 BIGmack Communicator, 378, 378f
 Bikram, 367
 Bilateral abductor pollicis brevis CMAP amplitudes, oscilloscope screen waveform, 639f
 Bilateral amputee considerations, 198
 Bilateral diaphragmatic pacemaker, 546f
 Bilateral metatarsus adductus, 47f
 Bilateral spastic CP, 1008
 Bilateral upper limb amputee, 165, 168–169, 169f
 Bilevel ventilation, 522
 Bio surgical/larval debridement, 480t
 Biochemical cascades, 918
 Biofeedback, 369, 427–428, 761
 Biofilm, in treatment of chronic wounds, 479
 Biological component, of disability, 74
 Biological processes, energy for, 291
 Biological signals, 152.e9
 Biomarkers, in TBI, 926, 946
 Biomechanical diagnosis, 792t
 Biomechanical therapies, 368–369
 Bionic hand, 171, 171f
 Biopsychosocial model, 95–96, 95f
 BioScanner BioSculptor, 258, 258f
 BIP. *See* Bleomycin-induced acute pneumonitis
 Biphasic fibrillation potentials, 125
 Birth history, of pediatric patient, 42
 Bisphosphonates
 for bone metastases, 573
 for heterotopic ossification in burns, 504
 for osteoporosis, 709
 treatment with, 599
 Bitter orange, 370t–372t
 Bivalved body jacket, 712f
 Bizarre high-frequency discharges, 126
 “Black hole” lesions, 986
 Bladder
 afferent pathways of, 390t
 augmentation, 399, 400f
 with continent catheterizable stoma, 399–400
 central connections of, 390f
 injection therapy, 401
 management, 1034
 options, 397t
 neurogenic, 1036–1037
 parasympathetic, sympathetic, somatic nerve supply to, 390f
 stimulation of, 395
 stones, 404
 urgency, neurologic complaints and, 115
 Valsalva and Credé maneuvers for, 396
 Bladder dysfunction, TBI and, 932
 “Blast plus”, 918
 Blasts
 effects of, 921b
 injuries related to, 918
 Bleomycin-induced acute pneumonitis (BIP), 581
 Blepharospasm, dystonia and, 973
 Blindness
 definition of, 1115
 resources for, 383b
 Blisters, 501
 Bloating, 412, 422–423
 α -Blockers, 439t
 β -Blockers, 439t, 799, 940
 Blood doping, 800
 Blood flow, 293
 Blood pressure, 293
 BLS. *See* Basic life support
 Blucher shoe, 229, 230f

- Blue dye clinical swallow examination (BDCSE), 60
 BlueRocker noncustom ankle-foot orthosis, 235, 235f
 BMD. *See* Bone mineral density
 Bobath techniques, 306–307
 Body
 cardinal planes of motion of, 27, 27f
 changes in, aging, 594–596
 functions, 376
 measurements, 270f
 structures, 376
 Body image, in burn survivors, 508
 Body-powered prostheses, 163–164
 Body-powered upper limb prosthetic system, 162, 162b
 Body practices, 365–369
 Body weight support (BWS)
 ambulation training, 1077
 facilitation of, 1073
 Bolus, 53
 modification, for dysphagia, 63t
 Bone
 changes in, 595
 formation of, 691
 function and structure of, 690
 hormones and physiology and, 691–692
 metastases, 573–574
 rehabilitation of, 583
 pain, 572
 remodeling, 690–691, 862
 stimulation of, 258, 258f
 strains, rates and magnitude of, 701
 Bone-anchored hearing aids (BAHA), 1109
 Bone-conduction threshold, 1104
 Bone mass, 691
 effect of aging on, 692
 improvement of, 700–701
 other factors affecting, 692
 Bone mineral density (BMD), 690, 1013
 absorptiometry and, 697
 assessment of, 810, 810t
 fracture risk and, correlation of, 1084
 job-related physical activity score (PAS) and, 703f
 reports on, 699f
 T scores, suggested rehabilitation guidelines based on, 700b
 Bone remodeling, 931
 BoNT type A (BoNT-A), 999–1000
 “Boosting”, in autonomic dysreflexia, 816
 Boston brace, 256–258, 257f
 biomechanics of, 257
 contraindications to, 257
 design and fabrication of, 257
 indications for, 257
 special considerations for, 257–258
 Botulinum toxin (BTX), 221–222, 222f, 1017–1018
 Botulinum toxin chemodenervation, 459, 459t
 clinical issues related to, 460–467
 dilution, 460
 dosing, 460
 early treatment of, 461
 immunoresistance, 461
 reasons for poor response to, 460, 460t
 recovery of function, 461, 462b
 repeated injections, 461
 techniques of, 460
 “therapeutic weakness”, 461–462, 463b
 Botulism, 149
 Boutonnière deformity, 213, 218f, 610
 Bowel
 care, 423–424
 habituation program protocol, progressive steps in, 425b
 management, 1037–1038, 1084–1085
 Bowel (*Continued*)
 nervous systems, 408f
 parasympathetic innervation of, 1085
 procedure, 399–400
 Bowel dysfunction, TBI and, 932
 Bowel irrigation, 426–427
 Bowel program, 423–424
 goals of, 424, 424b
 as treatment plan, 1084
 Bowlegged (genu varus position), 49f
 BPPV. *See* Benign paroxysmal positional vertigo
 Brace, 209
 Brachial amyotrophic diplegia (BAD), 820, 821f
 Brachial plexopathy, 134, 221, 221f, 575–576
 Brachial plexus, 846f
 peripheral neuroanatomy of, 134
 Brachydactyly, pectoral muscle absence in, 46f
 Bracing, for myopathy, 913
 Braden Headings, 476, 477t
 Bradycardia, 1082–1083
 “Braille Trails”, 382–383
 Brain
 concussed, 806
 diseases of, 402–403
 Parkinson disease, 402
 stroke, 402
 trauma, 402
 tumors, 402
 disorders, 414
 enteric nervous system relationship to, 408–410
 lesion, 1013
 stroke, 221–222
 tumors, 574–575
 Brain-derived neurotrophic factor (BDNF), 921
 Brain injury, 221–222
 vision loss from, 1117
 Brain Injury Association, 951
 Brain swelling, 919
 Brainstem, 955–956
 Brainstem reflexes, 928
 Breast cancer, 587–588
 hormone replacement therapy and, 707–709
 Breast cancer-associated lymphedema, 495
 Breath-holding maneuvers, for dysphagia, 63t
 Breathing, normal, 514
 Breathing/physical activity, metabolic requirements of, obesity and, 548
 Bring up Explain Tell Time Educate Record (BETTER) models, 440b
 Bristol Stool Scale, 417f
 Bromelain, 370t–372t
 Bromocriptine, 928–929
 Bronchoscopic LVRS, 547
 Brown-Séquard syndrome, 1052, 1054f
 Brown-Vialetto-Van Laere syndrome 1 (BVLS1), 828
 Brunnstrom stages, of motor recovery after stroke, 449f
 Brunnstrom techniques, 306
 BTX. *See* Botulinum toxin
 “Bucket socket”, 195–196
 Buerger disease (thromboangiitis obliterans), 486
 Bulimia, 809
 Bundle of His, 513
Burkholderia cepacia, transmission of, 543
 Burn center, other acute conditions treated in, 502
 Burn Model Systems project, 499
 Burns, 499–510
 acute pain management in, 501
 acute physiatriac assessment of, 499–501
 acute surgical procedures in, 501–502
 acute wound care in, 501
 age, impact of, 500f
 catabolism and metabolic abnormalities in, 503
 community reintegration in, 508–509
 Burns (*Continued*)
 contractures for, 506, 506f
 depression in, 507–508, 508b
 heterotopic ossification and, 504–505, 504f
 hypertrophic scarring in, 505–506, 505f
 immersion hydrotherapy for, 501
 inhalation injury in, 502
 injury, epidemiology of, 499
 inpatient rehabilitation admission for, 507
 Lund and Browder chart for, 499, 500f
 nutrition and swallowing in, 503–504
 orthoses for, 224–225
 peripheral neuropathies and, 504
 polytrauma and, 502–503
 poor body image in, 508
 positioning for, 506, 506f
 psychosocial adjustment in, 507–508
 PTSD in, 508, 508b
 risk factors and barriers to return to work after, 509b
 scar measurement in, 507
 scar pruritus, 506–507
 Butterbur, 370t–372t
 “Buttonhole” deformity, 610
 BVLS1. *See* Brown-Vialetto-Van Laere syndrome 1
 BWS. *See* Body weight support
C
 C2–C3 facet joints, pain referral, 631f
 C5–C6 intervertebral disk extrusion, 637f
 C6–C7 facet joints, pain referral, 631f
 C7 selective nerve root block, 641f
 C7–T1 intervertebral disk, axial view, 638f
 C6/7T7 polymorphism, 1030
 CA. *See* Cervical auscultation
 CABG. *See* Coronary artery bypass grafting
 Cachexia, 594–595
 Cadexomer iodine dressing, 481t
 Café-au-lait spots, 44, 46f
 Caffeine, 800
 Calcaneus deformities, 1041
 Calcitonin, 178–179, 691
 as antiresorptive agent, 709
 Calcitonin gene-related peptide (CGRP), 752
 Calcium
 parathyroid hormone and, 691
 supplementation of, 711
 Calcium channel blockers, 799
 Calcium metabolism, osteoporosis and, 1083–1084
 Calf pseudohypertrophy, 46f, 884, 884f
 Calf strain, 738–740
 Calluses, on foot, 229
 Caloric testing, of vestibular system, 1113f
 Calpainopathy, 895
 CAM. *See* Complementary and alternative medicine
 Camber
 advantages and disadvantages of, 272b
 angle, 271–272
 Canadian Study of Health and Aging Measurement Tools, 526, 526t
 Canal pressure, determination of, 412
 Canalith repositioning treatment, for benign paroxysmal positional vertigo, 1114, 1114f
 Cancer, 601–602
 acute pain and, 571–572, 572t
 augmentative and compensatory strategies for, 587
 chronic pain and, 572
 constitutional symptoms of, 570–573
 cranial and peripheral nerves, involving, 575
 demographic disparities in, 568
 disease considerations for, 568–570
 epidemiology of, 568
 fatigue and, 570–571, 571b
 impairments in, 573–583

Cancer (*Continued*)

- inpatient rehabilitation for, 584–585
 - and low back pain, 676
 - opioid conversion for, 572, 573t
 - pain and, 571–572, 571b
 - phases of, 569–570, 570b
 - prognosis and metastatic spread of, 569
 - rehabilitation, 568–593, 583–591
 - precautions in, 591–592
 - of specific populations, 587–591
 - strategies for, 583–587
 - staging of, 568–569
 - survival statistics of, 569t
 - survivorship, 568
 - treatment of, impairments caused by, 578–583
- Cancer-related fatigue, 570, 571b
- Canes, 243–244
 - fitting and use considerations, 244
 - indications for, 243
 - as mobility assistive device, 3t
 - types of, 243–244, 243f
- Capacitor electrodes, 346, 347f
- Capital femoral epiphysis, slipped, 728–729, 729f, 729t
- Capsular patterns, 16–17
- Capsule, integrity of, assessment of, 16–17
- Carbon fiber AFOs, prefabricated, 235
- Cardiac auscultation, 513
- Cardiac conduction system, 513
- Cardiac disease, sexual dysfunction and, 438
- Cardiac dyspnea, 511–512
- Cardiac function, 292–293
- Cardiac myocytes, 513
- Cardiac output, 293, 514
 - aerobic training and, 516
- Cardiac rehabilitation, 517–523
 - after cardiac transplant, 520–522
 - after myocardial infarction, 517–520, 520t
 - acute phase (phase I) of, 519, 520t
 - inpatient rehabilitation phase (phase I B), 519
 - maintenance phase (phase 3) of, 520
 - training phase (phase 2) of, 519–520
 - after revascularization procedures, 520
 - cardiopulmonary function, assessment of,
 - physical examination in, 512–513
 - graded exercise tolerance test before, 521
 - and heart, abnormal physiology of, 517
 - importance of, 313
 - as primary prevention, 517
 - in specific conditions, 520
 - for stroke, 521
- Cardiac risk, reduction of, 516
- Cardiac syncope, 512
- Cardiac transplantation
 - cardiac rehabilitation for patients after, 520–522
 - complications after, 553–554
 - contraindications to, 553b
 - effect of, 554t
 - indications for, 553b
 - rehabilitation in, 552
 - therapeutic exercise after, 555
- Cardiac valves, 513
- Cardiomyopathy
 - cardiac rehabilitation for, 521
 - evaluation and management of, 890
- Cardiopulmonary deficits, 5
- Cardiopulmonary disease
 - interventions for, 514–516
 - signs or symptoms of, 297b
- Cardiopulmonary dysfunction, rehabilitation of, 584
- Cardiopulmonary exercise test (CPET), 514
 - American Thoracic Society/American College of Chest Physicians indications for, 540b
 - effects of physiological conditions on, 515t

- Cardiopulmonary metastases, 577
- Cardiopulmonary rehabilitation, 511–513
 - cardiopulmonary function, assessment of, 511–513
 - history in, 511–512
 - physical examination in, 512–513
 - conclusion for, 523
 - for the physically disabled, 523
- Cardiopulmonary resuscitation (CPR), primary goal of, 804
- Cardiorespiratory endurance, 295
 - training for, ACSM recommendations for, 295–296
- Cardiorespiratory physiology, 292
- Cardiovascular activity, exercise on, effects of, 294b
- Cardiovascular disease
 - HDL-C level in, 1082
 - renal transplantation and, 550–551
- Cardiovascular events, risk of, 762
- Cardiovascular exercise, 292–297
- Cardiovascular fitness, 1076
- Cardiovascular preparation, 792–793
- Cardiovascular screening, 803, 803b
- Cardiovascular system
 - changes in, 595
 - exercise training in, effects of, 294
- Carlyle formula, 169b
- Carnitine deficiency, 906
- Carnitine palmitoyltransferase II deficiency, 906
- Carpal canal, 849f
- Carpal ligament, tests for, 18t–26t
- Carpal tunnel, 816
- Carpal tunnel syndrome, 848–850, 850f
 - prefabricated wrist splints for, 221, 221f
- Cartilaginous joints, 606
- CASPAR. *See* Classification of Psoriatic Arthritis
- Caster wheels, sizes and configurations of, 277
- Casting, 453
- CAT. *See* Computerized adaptive testing
- Catabolism/metabolic abnormalities, 503
- Cataract, 1117
- Catastrophizing, chronic pain and, 755
- “Catch-up”, 792
- Catecholamines, 503
- Catechol-*O*-methyl transferase (COMT) inhibitors, 977
- Catheter angiography, 489, 489f
- Catheter-associated UTIs, 403
- Cathode ray tube (CRT), 152.e9
- Cauda equina, 138, 1051
 - diseases of, 403
- Cauda equina syndrome, 1054f
- Caudate nucleus, 955
- Caveats
 - in musculoskeletal examination, 16, 18t–26t
- Caveolinopathy, 895
- CBC. *See* Complete blood count
- CBTs. *See* Cognitive-behavioral therapies
- CDP-choline, 923, 938
- CDT. *See* Complete decongestive therapy
- cEEG. *See* Continuous electroencephalography
- Cellular-based products, 483
- Cellular dysfunction, propagation of, 918
- Center for Neurologic Study-Lability Scale (CNS-LS), 1001
- Center of mass (COM), 180–181
- Centers for Disease Control and Prevention, 95–96
- Centers for Medicare and Medicaid Services (CMS), 100, 101f, 181–182
- Central amputation, 154
- Central core myopathy, 902
- Central nervous system (CNS)
 - degenerative movement disorders of, 972–982
 - summary of, 980
 - glutamate levels, elevation of, 947

Central nervous system (CNS) (*Continued*)

- multiple sclerosis and, 983
 - tissues, cell death, 920
 - UMN lesions on, 6–7
- Central pain, 963
 - definition of, 750t
- Central pattern generator, 55
- Central sensitization, 754
- Central sleep apnea, 996
- Central somatosensory conduction time (CCT), 946
- Central spinal stenosis, sagittal MRI scan of, 647f
- Central ventilatory dysfunction, 1035–1036
- Centralization, pain and, 657
- Centrally acting sympatholytics, 439t
- Centronuclear myopathy, 902
- Cerebellum, 11, 956
- Cerebral arteries, territories of, 956f
- Cerebral atrophy, from radiation, 580–581
- Cerebral lesions, swallowing and, 57
- Cerebral palsy, 1006–1026
 - approaches, neuromotor therapy, 1015t
 - childhood disabilities and education, 1013–1014
 - classification of, 1007–1008, 1008b
 - clinical findings of, 1010
 - complementary and alternative medicine, 1023, 1025t
 - deep brain stimulation, 1018
 - diagnosis of, 1010
 - diagnostic algorithm and, 1012f
 - durable medical equipment, 1016
 - epidemiology of, 1006
 - etiology of, 1006–1007
 - feeding, growth, and nutrition, 1012
 - functional prognosis of, 1011
 - gastrointestinal, 1013
 - genitourinary, 1013
 - history of, 1010
 - lower limb, 1019–1020
 - management of hypertonia, 1016–1018
 - medical management of, 1011–1013
 - motor abnormalities, 1008
 - musculoskeletal pain and osteopenia, 1013
 - neurologic issues of, 1012–1013
 - neuromotor therapy, similarities/differences, 1015t
 - oral medications for, 1016–1017, 1017t
 - orthopedic management, 1019–1023
 - patterns, 1010
 - pulmonary, 1012
 - risk factors of, 1006–1007
 - summary of revised elements of consensus
 - statement on hip surveillance for children with, 1021t–1023t
 - therapeutic management of, 1013–1019
 - therapy interventions of, 1014–1016
 - transition to adulthood and aging with, 1026
 - upper limb in, 1024t
- Cerebral peduncles, 955
- Cerebral perfusion pressure (CPP), 924
 - decrease in, 919
- Cerebral vasospasm, 962
- Cerebrospinal fluid (CSF)
 - arachnoid impact of, 1051
 - cortisol levels, elevation of, 925
 - oligoclonal bands, 985
 - TBI and, 926
- Certified orthotist, 248
- Certolizumab pegol (Cimzia), 613t
- Cervical auscultation (CA), for swallow evaluation, 60–62
- Cervical axial pain, 627
- Cervical contracture, 589, 589f
- Cervical extension, 638
- Cervical facet, injections, 644f

- Cervical facet joint-mediated pain, prevalence of, 642
- Cervical internal disk disruption (CIDD), 644–646
 diagnosis of, 644–645
 epidemiology of, 644
 history and physical examination of, 644–645
 imaging studies and, 645
 interventional spine care and, 645–646
 physical medicine and rehabilitation and, 645
 physical modalities, prescription, 645
 provocation diskography and, 645
 surgery of, 646
 transforaminal epidural steroid injections and, 645–646
 treatment of, 645–646
- Cervical intervertebral disk herniation (CIDH), 634f, 636
 -related radiculopathy, antiinflammatory medications, 640
- Cervical intervertebral disks
 injury, 632
 mechanical stimulation of, 631–632
 nerve supply of, 629f
- Cervical joint pain, 642–644
 diagnostic zygapophyseal joint blocks and, 643
 epidemiology of, 642
 history and physical examination of, 643
 imaging studies and, 643
 interventional spine care and, 643
 percutaneous radiofrequency ablation medial branch neurotomy and, 643–644
 physical medicine and rehabilitation and, 643
 superficial cryotherapy of, 643
 therapeutic zygapophyseal joint injections and, 643
 treatment of, 643–644
- Cervical medial branch block, target zones, 628f
- Cervical muscles, importance of, 139
- Cervical myelopathy/myeloradiculopathy, 646–647
 diagnosis of, 646–647
 epidemiology of, 646
 history and physical examination of, 646
 imaging studies and, 646–647
 nonoperative care and, 647
 surgery of, 647
 treatment of, 647
- Cervical nerve roots, dermatomal distribution of, 632f
- Cervical orthoses, 250, 251t, 252, 640f
 function of, 639
- Cervical osteophytes, 56
- Cervical radicular pain, 632
 dynatomal mapping of, 633f
- Cervical radiculopathy, 138, 636–642
 diagnosis of, 638–639
 diagnostic selective nerve root block and, 641
 electrodiagnostic evaluation and, 639
 epidemiology of, 636
 history and physical examination and, 638, 638t
 imaging studies and, 638–639
 interventional spine care, 641
 medications and, 640
 modalities and, 639–640
 pathophysiology of, 636–638
 percutaneous discectomy/disk decompression and, 642
 physical medicine and rehabilitation and, 639
 screens, 141
 six-muscle screen identifications of, 140, 140t–141t
 stabilization and functional restoration and, 640–641
 surgery of, 642
 therapeutic selective nerve root injection, 641–642
 treatment of, 639–642
- Cervical range of motion, decreased, 635
- Cervical SNRIs, safety of, 642
- Cervical spinal cord, injuries to, 804
- Cervical spine, 804
 anatomic interrelationships of, 627–628
 C2–C7, treatment of, 325f
 common lesions affecting, 634f
 fractures/dislocations of, 1056
 lateral plain radiographs of, 636f
 ligaments, anatomic relationship of, 628f
 manipulation, 328
 neuroanatomy of, 627–632, 630f
 open mouth view of, 649f
 physiologic forces in, 634–635
 plain radiographs, 808
 sequential radiographs, appearance of, 635f
 test for, 18t–26t
- Cervical spondylitic myelopathy, 646
- Cervical spondylosis, 636–638
- Cervical strain/sprains, 633–635
 diagnosis of, 635
 epidemiology of, 633
 pathophysiology of, 633–635
 treatment of, 635
- Cervical strengthening, with isometric exercises, 640–641
- Cervical traction, 329
 distractive force, 639–640
- Cervical vertebrae, 249
- Cervical vestibular evoked myogenic potential (VEMP), 1112
- Cervical zygapophyseal joints, 627–628, 631
- Cervicogenic headaches, 647–649
 epidemiology and pathophysiology of, 647
 functional diagnostic tests and treatment of, 649
 history and physical examination of, 648
 imaging studies of, 648–649
 symptoms, duration of, 648
- Cervicothoracic orthoses, 252–253
 head, 250–252
- Cervicothoracic stabilization, 640
 exercises, 637t
- Cervicothoracolumbosacral orthoses, 253
- CGRP. *See* Calcitonin gene-related peptide
- Chaddock sign, 14
- Chaining, 71
- Chamomile, 370t–372t
- Chance fractures, 675, 1057f
- Changing Faces*, 508–509
- Charcot joints, development, 1046
- Charcot neuroarthropathy, 862
- Charcot neuropathy, 863f
- Charcot restraint orthotic walker (CROW), 235–236, 235f
- Charcot-Marie-Tooth disease, 824, 824f, 872–874
 nerve conduction tests for, 873
- CHART. *See* Craig Handicap Assessment and Reporting Technique
- “Chart lore”, 2–3
- Checkout, orthotic, 241–242
- Chemical debridement, 480t
- Chemobrain, 582–583
- Chemodervation, 1017
 with botulinum toxin injections, in multiple sclerosis, 998
- Chemofog, 582–583
- Chemotherapy, 581–583
- Chest harnesses, 275–276
- Chest pain, 512
- Chest percussion, 1079–1080
- Chest physical therapy, 538–539
 in pulmonary rehabilitation, 522
- Chest wall, function disorders of, exercise in, 543
- Chiari II malformation, 1036
- Chief complaint, 2b, 3
- Child Behavior Checklist, 944
- Children
 abuse of traumatic brain injury and, 918
 with cerebral palsy, 1007
 with cystic fibrosis, 542–543
 disabilities and education, 1013–1014, 1014t
 exercise for, 311
 with midlumbar-level lesions, 1041
 myelomeningocele, management, 1035–1044
 obesity in, rise in, 311
 orthotic management of, 225
 physical examination of, 44
 in prone position, evaluation of, 48f
 pure equinus deformities in, 1041
 rapport with, 44
 with spastic diplegia, 1007f
 strength training guidelines for, 311t
 voiding function in, 389
- Chin tuck posture, for dysphagia, 63t
- Chiropractic, 368
- Chloride channel 1 (CLCN1)* gene, 903–904
- Chloride channel disorders, 903–904
- Cholinergic systems, importance of, 922
- Chondroitin sulfate, dietary supplements, 369
- Chorea, 13, 973–974
- Choreoathetoid CP, 1008
- Chromatin, 948
- Chromosome 9 open reading frame 72 (C9ORF72)* gene, 822
- Chronic bronchitis, 535–536
- Chronic diseases, 78–79
 sexual dysfunction in, 434–438
- Chronic hypoxemia, 514
- Chronic inflammatory demyelinating polyneuropathy (CIDP), 866–867
 clinical criteria for, 867b
 diagnosis of, 867
 electrodiagnostic criteria for, 868b
 electrodiagnostic studies of, 867
 identification of, 144
 IVIG/plasma exchange response for, 867
 representation of, 146
 treatment of, 867
 variants of, 867b
- Chronic intestinal pseudo-obstruction, surgery for, 428
- Chronic limb ischemia, 485
- Chronic liver failure, 560
- Chronic medical conditions, 535–567
- Chronic neuropathic pain
 gabapentin for, 766–767
 states, anticonvulsants, 762
- Chronic obstructive pulmonary disease (COPD), 535, 536b
 diet counseling and self-management for, 543
 exercise in, 541–542, 541b
 nutritional issues in, 543
 severity of, classification scheme for, 541t
- Chronic pain, 748–773
 affective factors of, 754–755
 anger and, 755
 antidepressants and, 768–771
 anxiety and, 755
 aquatic therapy, 761
 assessment of, 757
 behavioral medicine and, 760–761
 behavioral treatment approaches of, 756
 biofeedback, 761
 Centers for Disease Control and Prevention guidelines for, 767t
 cerebral plasticity and, 751
 cognitive behavioral techniques, 756
 cognitive factors of, 755
 cyclooxygenase-2 inhibitors for, 762
 depression and, 754–755

Chronic pain (*Continued*)

- diagnostic categories common in patients with, 756–757
- disability and cost of, 749–750
- Feldenkrais Method and, 761
- first-generation anticonvulsants, 766
- historical overview of, 748–751
- history of, 750–751
- interdisciplinary and multidisciplinary approaches for, 759–761
- learning factors, 755–756
- management of, 759b
- measurement, McGill Pain Questionnaire Short Form, 757
- medications for, 762–766
- microfractures and, 694
- mind-body medicine and, 761
- movement, fear, 756
- movement-based therapies and, 761
- nonsteroidal antiinflammatory drugs for, 762, 763t–764t
- nurse facilitator and, 761
- occupational therapy, 759–760
- operant behavioral techniques, 756
- operant learning, 755–756
- opioid analgesics for, 764, 765t–766t
- pharmacotherapy and, 762
- physical therapy, 759–760
- Pilates and, 761
- prevalence of, 748
- processes of, 749f
- psychological issues related to, 754
- psychology and, 760–761
- psychometric assessment tools, 758t
- psychometric measures, 757
- relaxation training, 761
- secondary problem, reviews of, 748
- selective serotonin reuptake inhibitors for, 768
- sexual dysfunction and, 437
- sleep and, 757
- tai chi and, 761
- topical analgesics for, 771
- treatment of, 757–766
 - goals of, 759b
 - interdisciplinary, 759–761
 - modalities, 760t
 - multidisciplinary team in, 759–761
- tricyclic antidepressants for, 768
- vocational rehabilitation, 761
- yoga and, 761

Chronic pelvic pain (CPP)

- overlap of pelvic floor disorders and, 787–788
- subtypes of, 787–788

Chronic persistent asthma, 799

Chronic spinal pain, causes of, 694

Chronic stages, rheumatoid arthritis and, 625

Chronic traumatic encephalopathy (CTE), 807

Chronic venous hypertension, 492

Chronic venous insufficiency, 492–493

- compression for, 493–494
- elevation for, 494
- evaluation for, 493
- exercise for, 494
- intermittent pneumatic compression for, 494
- management of, 493–494

Chronic wounds, 469–484

- abnormal healing of, 469, 470f
- ischemic ulcers, 469–474
 - arterial, 469, 471f
 - dressings for, 474
 - management of, 469
 - neuropathic wounds, 470–472, 471f
 - protective footwear for, 473–474
 - small vessel, 469
 - venous ulcers, 469

Chronic wounds (*Continued*)

- pressure injury, 474–478
 - documentation of, 475
 - prevention of, 476
 - risk assessment of, 476–477, 477t
 - risk factors for, 477
 - staging of, 475–476, 475f–476f
- treatment of, 478–484
 - bacterial colonization *versus* infection, 478–479
 - biofilm, 479
 - care products, 479–483, 481t
 - cleansing, 479
 - debridement, 479, 480t
 - dressings selection consideration, 479
 - electrical stimulation, 483–484
 - hyperbaric oxygen therapy, 483
 - management, 478
 - negative pressure wound therapy, 484
 - noncontact low-frequency ultrasound, 483
- Churg-Strauss syndrome, 486
- CIDD. *See* Cervical internal disk disruption
- CIDH. *See* Cervical intervertebral disk herniation
- CIDP. *See* Chronic inflammatory demyelinating polyneuropathy
- Cigarette smoking
 - multiple sclerosis and, 984–985
 - vascular disease and, 490
- Cilostazol, 490
- CIM. *See* Community Integration Measure
- CIM, economics of, 372–373
- CIMT. *See* Constraint-induced movement therapy
- CIQ. *See* Community Integration Questionnaire
- Circle of Willis, 956–959, 956f
- Circumduction, transfemoral gait deviations, 207
- Circumlocutions, 8–9
- CIS. *See* Clinically isolated syndrome
- Cisplatin, 581
- Classification of Psoriatic Arthritis (CASPAR), 615–616, 616b
- Claudication, intermittent, 485
- Cleansing, of wound, 479
- Clearance to play, 803
- Clinical Care Practice Improvement Project (Clinical Care PIP), 112
- Clinical Frailty Index, 526
- Clinical measure, Tardieu Scale and, 14
- Clinical outcome, 101
- Clinical practice guidelines (CPG), 107–108, 108f
- Clinical swallow evaluation (CSE), 59–62
- Clinically isolated syndrome (CIS), 987
- Clock face diagram, 776–777, 777f
- Clock-drawing test, 8, 976
- Clonidine, for cerebral palsy, 1017t
- Clonus, 14, 449
- Closed-chain activities, 794
- Clostridium botulinum*, 149
- CMAP. *See* Compound muscle action potential
- CMG. *See* Cystometrogram
- CMS. *See* Centers for Medicare and Medicaid Services
- CNS. *See* Central nervous system
- CNS-LS. *See* Center for Neurologic Study-Lability Scale
- Co: Writer, literacy technologies, 384–385
- Cochlea, 1101
- Cochlear implants, 382, 1109
- Cochrane Review, 672
- Cognition, 4
 - ALS and, 839
 - enhancement, amantadine use and, 937
 - as mental process, 4
- Cognitive-behavioral therapies (CBTs), 756
 - interventions, assumptions, 756b

Cognitive deficits, after TBI, 936–937

- clinical neuropharmacology for, 937–938, 937f
- practical interventions for, 938–939
- Cognitive disabilities, assistive technology for, 384–385
- Cognitive disorders, ALS and, 838
- Cognitive function, 936
 - scale, Ranchos level, 929
- Cognitive impairments, 582–583, 911
 - in multiple sclerosis, 1000–1002, 1000f
- Cognitive linguistic deficits, 9
- Cognitive rehabilitation, 71–72
- Cold
 - analgesic effect of, 338
 - application of, 338
 - contraindications of, 338
 - effect of, 338
 - packs, 339
 - precautions of, 338
 - rheumatic diseases and, 624
- Cold paresis, 827
- Cold spray, 339–340
- Cold water immersions, 340
- Cold whirlpool, 342
- Collaboration, 71
- Collagen matrix dressing, 481t
- Collagen VI-deficient congenital muscular dystrophy, 900
- Collateral sprouting, 152.e5, 152.e6f
- Colles fracture, 223
- Colon, sympathetic, parasympathetic, and somatic nervous system innervation of, 409f
- Colonic compliance, 413
- Colonic intestinal pseudo-obstruction, surgery for, 428
- Colonic motility, 413
- Colorectal function, 415t
- Colostomy, 428–429, 1085
- COM. *See* Center of mass
- Coma, 7, 928
 - duration of, 946
 - emergence from, 929
- Combination indoor-outdoor power wheelchairs, 279–280, 281f
- “Combine rule”, exceptions to, 82
- Combined technique, 327
- Combining impairments, to whole person
 - impairment ratings, 81–82
- Comfort, in orthoses, 226
- Comfort Cool orthosis, 218f
- Commercial cold pack, 340f
- Commercial hot pack, 341f
- Commercial hydrocollator pack, 341
- Common law, principle of, 86
- Common mode rejection, 152.e9
- Common signals, 152.e9
- Communication, 4–5, 8–9
 - ALS and, 834b, 836
 - disorders, assistive technology for, 377–379
 - pragmatics and context of, 9
 - skills, 4–5
- Community Integration Measure (CIM), 950
- Community Integration Questionnaire (CIQ), 950
- Community mobilization, 530–531
 - Healthy People 2020 and, 530, 530t
 - wellness centers and, 530–531
- Community reintegration, of burn survivors, 508–509
- Community services, 951
- Community Transformation Grant Program, 530
- Compensation formulas, 76–77
- Compensatory strategies, 72
 - for dysphagia, 61–64, 63t
- Competitive athletes, cardiovascular screening (AHA recommendations), 803b

- Competitive season macrocycle, 791
- Complementary and alternative medicine (CAM), 1023, 1025t
- Complementary movement therapies, for low back pain, 670
- Complete blood count (CBC), 809
- Complete decongestive therapy (CDT), 585
- Complete enclosure shoulder socket, 166
- Complete paraplegia, transfer training for, 1073, 1074f
- Complete tetraplegia, neurologic recovery in, 1064
- Completely-in-the-canal (CIC) hearing aids, 1109f
- Complex motor tic, 974
- Complex regional pain syndrome (CRPS), 178
- Complex repetitive discharge (CRD), 126, 126t
- Complicated mild injury, 916
- Composite dressing, 481t
- Composite tissue allograft (CTA), 156–157
- Compound muscle action potential (CMAP)
amplitude assessment of, 861
amplitudes of, 134
reduction of, 131, 144–146
temperature and, 152.e2
- Comprehensive treatment regimens, for lymphedema, 496
- Compression
intermittent pneumatic, 494
for lymphedema, 496
for venous disease, 493–494
- Compression garments, 585
- Computed tomography (CT), 495
of kidneys, ureter, and bladder, 393, 405f
for venous disease, 493
- Computed tomography angiography (CTA), for peripheral arterial disease, 488, 489f
- Computer-aided design (CAD system), 162–163, 258
- Computer-aided manufacturing, 258
- Computerized adaptive testing (CAT), 105
- Concentric contractions, 299–300
- Concentric needle electrodes, 122, 150, 152.e8
- Concussion
care for, 806
exercise and, 943
grading scales for, 924t
management of, 806, 923–924
prognosis after, 806–807
sports, 806–807
symptoms reported after, 806b
- Conditioning, principles of, 790–792
- Conduction, 338
- Conduction block, 861
SNAPs/CMAPs and, 144
- Conductive hearing loss, 1104
- Conference Mate, 382
- Confusion Assessment Method (CAM), 529
- Congenital amputations, 44
- Congenital fiber type disproportion, 903
- Congenital glenoid hypoplasia, 719
- Congenital lower limb deficiencies, prevalence, classification, and epidemiology of, 199–200, 199t
- Congenital lymphedema, 495
- Congenital muscular dystrophy, 887–888, 896–900
defects in proteins of the endoplasmic reticulum, 900
due to defects in glycosylation, 900
due to defects of structural proteins, 900
- Congenital myopathies, 147–148, 902–903
- Congenital myotonic muscular dystrophy, 902
- Congenital pediatric lower limb deficiencies, amputation level and energy expenditure in, 201
- Congenital scoliosis, 256–257
- Congenital skeletal lower leg deficiencies, Frantz and O’Rahilly traditional classification system of, 199t
- Congenital upper limb reductions
classification scheme for, 154b
ISPO classification system for, 154b
- Connective tissue disease neuropathies, 870–874, 873b
- Consciousness
disorders of, management of, 928–929
level of, 7
- Conservative pedorthic management, of diabetic foot, 474
- Conservative sharp debridement, 480t
- Constant current stimulator, 152.e10
- Constant voltage stimulator, 152.e10
- Constipation, 413
acting agents for, 427t
management of, 423–424, 423f
medications for, 426
TBI and, 932
- Constraint-induced movement therapy (CIMT), 1014
- Continuous electroencephalography (cEEG), for TBI, 926
- Continuous passive motion splint, 214f–217f, 214t–217t
- Continuous positive airway pressure (CPAP)
devices, 1079–1080
- Continuous Quality Improvement (CQI), 112
- Continuous shortwave diathermy, 347
- Continuous traction, 329
- Continuous wave Doppler
for peripheral arterial disease, 488, 488t
for venous disease, 493
- Contractile filaments, molecular characteristics of, 298
- Contraction, duration of, energy sources for, 292f
- Contractures, 225, 506, 1096–1097
development of, 933
myopathic disorders and, 912
prevention of, 161
suggested positioning for, 506f
TBI and, 933–934
visual inspection of, 27
wheelchair prescription and, 264
- Contrast baths, 340
- Contrast venography, for venous disease, 493, 494f
- Control attachment strap, 163
- Control cables, transhumeral prosthesis, 166
- Control system, types of, 164
- Conus, diseases of, 403
- Conus medullaris syndrome, 1054f
- Conventional beams, for breast irradiation, 584f
- Conventional position-sensing joystick, 282f
- Coordination, 11–13
- COPD. *See* Chronic obstructive pulmonary disease
- Core muscle work, 792
- Core myopathies, 902, 903f, 904t
- Corns, on foot, 229
- Coronal knee instability, transtibial gait deviations, 205–206
- Coronary artery bypass grafting (CABG), cardiac rehabilitation after, 520
- Coronary artery disease, risk factor for, 299t
- Cortex, bone mass and, 691
- Cortical contusions, 919
- Corticobasal ganglionic degeneration, 980
clinical presentation of, 980
diagnosis of, 980
epidemiology of, 980
genetics of, 980
pathophysiology of, 980
- Corticospinal neuron, 1052–1053
- Corticosteroid-induced myopathy, 909
- Corticosteroids, 439t, 799
for acute TBI, 925
for brain tumors, 574
- Corticostriatal DA signaling system, 936
- Cosmesis, 155, 226, 578f
- Costochondral joints, inflammation of, 625
- Costovertebral joint, inflammation of, 625
- Cough, cardiopulmonary disease and, 512
- CoughAssist Mechanical In-Exsufflator cough machine, 539, 540f
- Counterstrain, 326, 327f
- Coupled movement, of spine, 318–319
- Coupling, 690
- COX-2 protein, isolation of, 762
- Coxa saltans* externa/interna, 730
- Coxa valga, 229, 1019
- Coxa vara, 229
- Cozen test, 716
positive, 721
- CPET. *See* Cardiopulmonary exercise test
- CPG. *See* Clinical practice guidelines
- CPP. *See* Cerebral perfusion pressure
- CPR. *See* Cardiopulmonary resuscitation
- CQI. *See* Continuous Quality Improvement
- Craig Handicap Assessment and Reporting Technique (CHART), 105, 950
- Cramp potentials, 128, 128f, 128t
- Cramps, ALS and, 839
- Cranberry, 370t–372t
- Cranial nerve I (olfactory nerve), examination of, 9
- Cranial nerve II (optic nerve), examination of, 9
- Cranial nerve III (oculomotor nerve), examination of, 9–10
- Cranial nerve IV (trochlear nerve), examination of, 9–10
- Cranial nerve V (trigeminal nerve), examination of, 10
- Cranial nerve VI (abducens nerve), examination of, 9–10
- Cranial nerve VII (facial nerve), examination of, 10
- Cranial nerve VIII (vestibulocochlear nerve), examination of, 10
- Cranial nerve IX (glossopharyngeal nerve), examination of, 10–11
- Cranial nerve X (vagus nerve), examination of, 10–11
- Cranial nerve XI (accessory nerve), examination of, 11
- Cranial nerve XII (hypoglossal nerve), examination of, 11
- Cranial nerve examination, 9–11, 115
- Cranial nerves, cancer involving, 575
- Craniorachischisis, 1028
- Craniosacral technique, application of, 327
- Craniovertebral junction injuries, 1056
- CRD. *See* Complex repetitive discharge
- Creatine, 801
- Creatine kinase (CK) levels
dermatomyositis and, 907
myopathy and, 885
polymyositis and, 907
- Creatine phosphate system, 291
- Creatinine clearance time, 394
- Creative arts therapies, 366
- Crédé maneuvers, 396
- Creep, 325–326
- Cricopharyngeal myotomy, 65
- Cricopharyngeus muscle, in swallowing, 55
- Critical illness myopathy, 910
- Cromolyn, 799
- Crossed extensor reflex, 1011t
- Crosspoint, 163, 163f
- CROW. *See* Charcot restraint orthotic walker
- CRPS. *See* Complex regional pain syndrome
- CRT. *See* Cathode ray tube

- Cruciform anterior-spinal hyperextension thoracolumbosacral orthosis, 254, 254f
 biomechanics of, 254
 contraindications to, 254
 design and fabrication of, 254
 indications for, 254
 special considerations for, 254
- Crutches, 244
 as mobility assistive device, 3t
- Cryoglobulinemia, 486
- Cryoglobulins, 486
- Cryotherapy, 338–340
 contraindications and precautions of, 338, 339t
 indications and evidence basis of, 338
 physiology of, 338
 types of devices and techniques of, 338–340
- Crystal-related arthropathies, 616–618, 617f
- CSE. *See* Clinical swallow evaluation
- CSF. *See* Cerebrospinal fluid
- CT. *See* Computed tomography
- CTA. *See* Composite tissue allograft
- CTE. *See* Chronic traumatic encephalopathy
- Cubital tunnel syndrome, 212f, 221
- Cuboid subluxation, 744–746
- “Cupping” (tapotement), 333
- Curb-drop tester, 285–287
- Custom foot orthosis, making, 230
- Custom orthoses, prefabricated orthoses and, 248
- Customary walking speed (CWS), 197
- Custom-fabricated body jacket thoracolumbosacral orthosis, 254, 254f
 biomechanics of, 254
 contraindications to, 254
 design and fabrication of, 254
 indications for, 254
 special considerations for, 254
- Custom-fitting techniques, advances, 163
- Cutaneous pain, cortical and subcortical networks, 754
- Cutis aplasia, 45f
- Cutometer, 507
- CWS. *See* Customary walking speed
- Cyanoacrylate-based monomer dressing, 481t
- Cyclists, external iliac syndrome in, 487
- Cyclooxygenase (COX) nonselective inhibitors, for bone pain, 572
- Cyproheptadine, for spasticity, 458–459
- Cyriax, James, 332
- Cystic fibrosis, exercise in, 542–543
- Cystography, 394
- Cystometrogram (CMG), 395
- Cystoscopy, 395
- Cytokines, TBI and, 920
- Cytomegalovirus (CMV) infection, after cardiac transplantation, 553–554
- Cytomegalovirus-related progressive polyradiculomyelopathy, 869
- Cytopenias, 591–592
- D**
- DAI. *See* Diffuse axonal injury
- Daily adjusted progressive resistance exercise (DAPRE), 302
- Daily living, electronic aids to, 288–290
- Dalfampridine, 995
- Dantrolene, for spasticity, 455–458, 933–934
- Dantrolene sodium, for cerebral palsy, 1017t
- DAPRE. *See* Daily adjusted progressive resistance exercise
- Davidenkow syndrome, 824, 825f
- DBA. *See* Defense Based Act
- DBP. *See* Diastolic blood pressure
- DBS. *See* Deep brain stimulation
- D-dimer, 493
- DDS. *See* Disability Determination Service
- De Quervain syndrome, 723
- Death, classification of causes of, 74–75
- Debility, renal failure and, 532
- Debridement, in treatment of chronic wounds, 479, 480t
- Declarative memory retrieval, 936
- Decompressive craniectomy, 925
- Deconditioning, 527
- Decreased insertional activity, 122f, 123
- Deep brain stimulation (DBS), 1018
 for Parkinson disease, 978
- Deep heat, 343–349
 for cancer, 591
- Deep massage, effect of, 332
- Deep partial-thickness burns, 499–500, 501f
- Deep posterior compartment injuries, 739f–740f, 740–741
- Deep tendon reflexes, 15
- Deep tissue pressure injury, 476
- Deep vein thrombosis (DVT), 525, 1081
 TBI and, 931
- Defecation, 410–412
 dysfunction, 423–424, 423f
 prevention of, 411f
- Defective articulation, 9
- Defense and Veterans Brain Injury Center (DVBIC), 951
- Defense Based Act (DBA), 78
- Degeneration, of intervertebral disk, 634f
- Degenerative cascade, 655–657, 656f
- Degenerative facet joint, delineation, 666
- Degenerative intervertebral disk space, MRI depiction, 645f
- Degenerative movement disorders, 972–982
- Degenerative osteoarthritic changes, 636–638
- Dejerine-Sottas (HSMN type 3), 147
- Delayed ejaculation, 433, 444–445
- Delirium, 601
 in intensive care unit, 529
- DELIVER. *See* Disability evaluation, livelihood, and employment rehabilitation model
- Delivery process, of wheelchair and seating system, 261–262
- DeLorme method, 301
- Deltpectoral groove, inclusion, 165
- Dementia, 402, 600–601
 Parkinson disease and, 976
- Demyelinating neuropathies, electrodiagnostic changes in, 143–144
- Demyelinating polyneuropathy, 146
- Denervation, rate of, 150
- Denver Developmental Screening Test (DDST-II), 49–50, 50t
- Department of Health and Human Services (HHS), 100
- Dependence, definition of, 750t
- Dependent lift transfer, 1073
- Depression, 71
 in burn survivors, 507–508, 508b
 Parkinson disease and, 975
 predictors of, 754–755
 sexual dysfunction and, 438
 spinal cord injury and, 1078
 TBI and, 941–942
- Dermal metastases, 576–577
- Dermatomes, distribution of, 12f–13f
- Dermatomyositis, 147–148, 907
- Descartes, René, 750
- Descending inhibition, 754
 definition of, 321
- Desensitization techniques, 161
- Desipramine, 938
- Desminopathies, 895
- Detraining, effects of, 294
- Detrusor bladder neck dyssynergia, 402
- Detrusor sphincter dyssynergia (DSD), 389, 999
- Developmental delay, 911
- Developmental history, of pediatric patient, 42–43
- Developmental milestones, 42–43, 43t
- Developmental skills, assessment of, 49–50
- DEXA. *See* Dual-energy x-ray absorptiometry
- Dextroamphetamine, for fatigue treatment, 997t
- Dextromethorphan, 1001–1002
- DHI. *See* Dizziness Handicap Inventory
- Diabetes insipidus, 935
- Diabetes mellitus, 535–567
 as cause of polyneuropathy, 115
 complications of, 565t
 diagnosis of, 562
 drugs for, sports and, 799
 electrodiagnostic testing and, 131
 epidemiology of, 562
 exercise and, 312, 313t, 563
 exercise prescription guidelines for, 313t
 gangrene in, 486f
 increasing incidence of, 147
 inpatient rehabilitation for, 565–566
 insulin treatment for, 565
 lifestyle modifications for, 563
 neuropathy in, 471
 oral pharmacologic treatment of, 565
 pathophysiology of, 562
 peripheral arterial disease and, 490
 physical activity assessment for, 563
 preexercise assessment for, 564
 prevention guidelines for, 563
 rehabilitation management of, 562–566
 sexual dysfunction and, 438
 treatment guidelines for, 563
 type 1, 562
 type 2, 562
 exercise prescription in, 564, 564t
 physiologic effects of exercise in, 563–564
- Diabetic amyotrophy (proximal neuropathy), 864
- Diabetic autonomic neuropathy, 865
- Diabetic foot care program, 472
- Diabetic gastroparesis, treatment of, 566
- Diabetic neuropathies, 472, 864–865
- Diabetic peripheral neuropathy, treatment of, 566
- Diabetic polyneuropathy, identification of, 144
- Diabetic retinopathy, 1117
- Diagnosis-based impairment (DBI) method, 80–81, 81f
- Diagnostic and Statistical Manual, 5th ed (DSM-5), 432
 sexual dysfunction in, 433t
 subtypes, application, 432–433
- Diagnostic selective nerve root block, 641
- Diagnostic zygapophyseal joint blocks, 643
- Dial lock, 240
- Dialysis, 532
 issues of, 532
- Diaphragm paralysis, long-term outcomes of, 547
- Diaphragmatic pacing, 545–546, 546f
- Diarrhea, 412–413, 423
- Diarthrodial joint, 606
- Diaschisis, 919
 reversal of, 922
- Diastematomyelia, 1028
- Diastolic blood pressure (DBP), 293
- Diastolic murmurs, 513
- Diazepam, for cerebral palsy, 1017t
- Diet, musculoskeletal health and, 713
- Dietary supplements, 369–372
- Differential amplification, 152.e9
- Difficulty with evacuation (DWE), 407, 414, 421
- Diffuse axonal injury (DAI), 919
 CT scan of, 928f
- Diffusion of the lung for carbon monoxide (D_{lCO}), 514

- Diffusion tensor imaging (DTI), 948, 949f
 - Diffusion-weighted imaging (DWI), 948
 - Digit circumference, in action potential propagation, 152.e2
 - Digital evacuation, of rectum, 1084–1085
 - Digital speech, 378
 - Digital sprains, orthosis for, 213
 - Digital stimulation, of rectum, 1084–1085
 - Dimethyl fumarate (BG-12; Tecfidera), for multiple sclerosis, 991, 994t
 - Diplegia *versus* hemiplegia, 1008f
 - Diplomyelia, 1028
 - Diplopia, 943
 - Direct costs, 90
 - Direct diaphragm pacing, 1080
 - Direct myofascial release, 325–326, 326f
 - Direct passive motion testing, 322
 - Direct selection, 376
 - Directed history, 115
 - Disabilities
 - adaptations for people with, 90–94
 - employees with preexisting impairments, 94
 - ergonomics, 91, 91f, 92b
 - prevention strategies, 91, 92f
 - returning to work, 93–94, 93t
 - safety regulation, 90–91
 - treating worker disability, 91–92
 - workplace environment, 90–91
 - biopsychosocial model approach to, 74, 95–96, 95f
 - comprehensive vocational rehabilitation, 94–95
 - defined, 75–76
 - determination, practical aspects of, 74–88, 88b
 - disease, sexual dysfunction in, 434–438
 - ethical considerations, 87
 - evaluation, livelihood, and employment rehabilitation model, 96–97, 96f
 - legal and ethical considerations, 86–87, 86b
 - relating impairment to, 76–77
 - as return-to-work restrictions, 83, 84f–85f
 - “social model” of, 74
 - Disability Determination Service (DDS), 77
 - Disability evaluation, livelihood, and employment rehabilitation model (DELIVER), 96–97, 96f
 - Disability Rating Scale (DRS), 949–950
 - Disablement, ICF classification system, 75
 - Disease, pathologic features of, 75
 - Disease consequences, 375–376
 - Disease-modifying antirheumatic drugs (DMARDs), 612, 613t
 - Disease-modifying therapies
 - first-generation, 988–990
 - for multiple sclerosis, 983, 988–993, 994t
 - in pipeline, 993
 - Dishonorable discharges, 78–79
 - Disk bulge, 667
 - Disk decompression, 642
 - Disk disease, 403
 - Disk herniation, 632, 667–668, 667f
 - inflammatory response, 667–668
 - Diskogenic back pain, treatment for, 667–668
 - Diskogenic pain, 629f
 - Diskography, provocation, 645
 - Displays, 376–377
 - Distal clavicle, 171f
 - Distal hamstring injuries, 735
 - Distal inherited muscular dystrophies, 900–901
 - Distal interphalangeal (DIP) joints, 211, 609
 - Distal sensory polyneuropathy, 869
 - Distal symmetric sensorimotor polyneuropathy, 471, 864
 - Distal symmetric weakness, 882
 - Distal symmetrical polyneuropathy, 147
 - Distance vision activities, 1118
 - Distortion product otoacoustic emissions (DPOAEs), 1105, 1106f
 - Disturbed sleep, medications for, 769t–770t
 - Diuretics, 439t, 799
 - for lymphedema, 496
 - Dix-Hallpike maneuver, 10, 10f, 1112, 1112f
 - Dizziness, causes of, 943
 - Dizziness Handicap Inventory (DHI), 1111–1112
 - DJ-1* gene, 974–975
 - DMARDs. *See* Disease-modifying antirheumatic drugs
 - DME. *See* Durable medical equipment
 - Docking system, 285, 288f
 - Doctor-patient-family relationship, 2
 - Doll’s eyes, 928
 - Domperidone (Motilium), for gastroparesis, 566
 - Donor site morbidity, 578–579
 - Donor skin, removal of, 502, 502f
 - Donor tissue, microvasculature, 155–156
 - Dopamine (DA)
 - attention and, 937
 - systems, importance of, 922
 - Dopamine (DA) agonists, 977
 - Dopamine transporter (DAT), expression, decrease in, 922
 - Doping
 - definition of, 798
 - history of, 799b
 - Dorsal root ganglion, location of, 138
 - Dorsiflexion, knee flexion moment and, 233
 - Dorsiflexion assist, stirrup, 234f
 - Dorsiflexion stop, 233
 - Double-action metal ankle joint, 234f
 - Double-action stirrup, 235f
 - Double-drum tester, 285–287
 - DPOAEs. *See* Distortion product otoacoustic emissions
 - Dressings
 - for ischemic ulcers, 474
 - selection of, considerations in, 479
 - Driving, 4, 950–951
 - Driving skills, tetraplegia and, 1075
 - Drop arm test, 716
 - Drop lock, 239–240
 - “Dropped” elbows, 796
 - DRS. *See* Disability Rating Scale
 - Drug monitoring, history of, 799b
 - DRX9000 (decompression device), 329
 - Dry swallow, for dysphagia, 63t
 - DSD. *See* Detrusor sphincter dyssynergia
 - DTI. *See* Diffusion tensor imaging
 - Dual-energy x-ray absorptiometry (DEXA), 697, 699f, 810
 - Dual sensory impairment, 1119
 - Dual-site system, 164
 - Duchenne muscular dystrophy, 225, 875, 888–892
 - calf hypertrophy and, 44, 46f
 - diagnostic evaluation of, 889–890, 890f
 - disease-related comorbidities and management of, 890–892
 - cardiomyopathy evaluation and management, 890
 - cognition and behavioral phenotype, 892
 - dysphagia, 891
 - endocrine, growth, and bone health, 891
 - failure-to-thrive screening and nutrition management, 891
 - orthopedic management of contractures and spine deformity, 891–892
 - pulmonary impairment, evaluation, and management, 890–891
 - incidence of, 888–889
 - pathophysiology and epidemiology of, 888–889, 888t
 - progression of, 889
 - Duplex scanning, 488
 - Duplex ultrasound, 493
 - Dura, sagittal schematic of, 1053f
 - Durable medical equipment (DME), 1016
 - Duran splint, 223, 224f
 - Duration, 295–296
 - of aerobic training, 514–516
 - DVBIC. *See* Defense and Veterans Brain Injury Center
 - DVT. *See* Deep vein thrombosis
 - DWE. *See* Difficulty with evacuation
 - DWI. *See* Diffusion-weighted imaging
 - Dynamic motion-blocking splint, 214f–216f, 214t–217t
 - Dynamic postures, 706f
 - Dynamic splint, 214f–216f, 214t–217t
 - Dynamic splinting device, 933–934
 - Dynamic traction splint, 214f–216f, 214t–217t
 - Dynamin 2, 903
 - Dynatome mapping, 633f
 - Dysarthria, 9
 - Dysautonomia, 931
 - Dysdiadochokinesis, 11–13
 - Dysesthesia, definition of, 750t
 - Dysferlinopathy, 895
 - Dyspareunia, 433, 446
 - Dysphagia, 883, 891, 1012
 - ALS and, 836
 - burns and, 504
 - evaluation of, 58–59
 - neurologic complaints and, 115
 - postoperative, 58
 - rehabilitation for, 56–59
 - screenings, 59
 - surgery for, 65–66
 - treatment of, 62–66
 - Dysphonia, 9, 115, 589–590
 - Dyspnea, 511–512
 - cardiac, 511–512
 - causes of, 512t
 - neurologic complaints and, 115
 - pulmonary, 511–512
 - Dysraphic defect, 1028
 - Dystonia, 13, 973, 1010
 - Dystonic cerebral palsy, 632
 - Dystonic CP, 1008
 - Dystroglycanopathies, 895
 - Dystrophin, 889
 - Dystrophinopathies, 888–892
- E**
- EAA. *See* Excitatory amino acids
 - EAC. *See* Exercise-associated collapse
 - EADLs. *See* Electronic aids to daily living
 - EAH. *See* Exercise-associated hyponatremia
 - Ear, anatomy of, 1102f
 - Ear disease, red flags as warnings of, 1107, 1107b
 - Early bladder management, 1034
 - Early/late heel rise, transtibial gait deviations, 206
 - Early mobilization, 527–528
 - after renal transplantation, 532–533
 - ambulatory devices and, 528
 - application of, to patients not in the intensive care unit, 529–531
 - culture of immobility and, 528
 - culture of mobility and, 528
 - psychiatric involvement and, 528
 - psychology of patient in intensive care unit and, 529
 - rationale for, 527–528
 - training and, 528
 - treatment considerations in the critical care setting and, 528–529
 - Early recruitment, 129
 - Early satiety, 412
 - management of, 422–423

- EARN. *See* Employer Assistance and Resource Network
- EAS. *See* External anal sphincter
- Eating disorders, 809
- Eccentric contractions, 299–300
- Echinacea, 370t–372t
- ECUs. *See* Environmental control units
- ED. *See* Erectile disorder/dysfunction
- Edema, 722
cardiopulmonary disease and, 512
lymphedema and, 495
- Edema control, 161
in venous ulcers, 470
- EDHs. *See* Epidural hematomas
- EDL. *See* Extensor digitorum longus
- EDSS. *See* Expanded Disability Status Scale
- Education, for dysphagia, 66
- Education of All Handicapped Children Act of 1975 (PL 94-142), 1014t
- Educational history, of pediatric patient, 43–44
- Edwin Smith Surgical Papyrus, 1049
- EDX. *See* Electrodiagnostic testing
- EEG. *See* Electroencephalography
- EEJ. *See* Electroejaculation
- EEOC. *See* Equal Employment Opportunity Committee
- Efficiency, 300
- Effleurage, 332–333, 333f
- Effortful swallow, for dysphagia, 63t
- EHL. *See* Extensor hallucis longus
- Ehlers-Danlos syndromes, 719
- EIB. *See* Exercise-induced bronchospasm
- Ejaculatory dysfunction, 1087
SSRIs and, 439t
- Elbow(s)
conditions of, 721–723
disarticulation, 155
extension, 451t–453t
flexion, 29f, 451t–453t
flexion angle, differences in, 273f
hard end feel in, 16–17
injuries to, in wheelchair athletes, 816
radiographs of, 722
range of motion, loss, 155
special tests of, 716
stability of, tests for, 18t–26t
ulnar neuropathy at, 851–852
- Elbow neoprene sleeves, 213
- “Elbowing”, motion of, 166
- Elderly
ambulatory assistive devices, 603
amputation in, 601
cancer in, 601–602
cardiovascular changes in, 595
conditions and diseases in, 597–602
delirium in, 601
dementia in, 600–601
disuse and immobilization, 598
endocrine changes in, 596
evaluation of, 596–597
falls in, 596–599, 598b–599b
gait changes in, 596
gastrointestinal changes in, 595
genitourinary changes in, 596
hip fracture in, 599–600
hip pads for, 696
history taking, 596–597
management issues in, 602–604
medication management of, 602
medication metabolism in, 596
medication review in, 597
modifying the environment for, 603–604
neurologic changes in, 595
normal pressure hydrocephalus in, 601
nutrition in, 602
- Elderly (*Continued*)
orthoses and footwear of, 603
osteoarthritis, 599
pain management in, 602
Parkinson disease in, 601
physical examination in, 597
physical exercise in, 602–603, 603b
polypharmacy in, 602
psychosocial support of, 603
pulmonary changes in, 595
sexual activity, medical factors, 431–432
skin changes in, 596
spinal cord injury in, 600
stroke in, 600
traumatic brain injury in, 600
- Electric therapy, rheumatic diseases and, 624
- Electrical injuries, burns and, 501
- Electrical injury, 828
- Electrical potentials, 122
- Electrical stimulation, 453
swallowing and, 65
- Electrical twitch-obtaining intramuscular stimulation (ETO-IMS), 355
- Electrocardiogram stress testing, for diabetes mellitus, 564
- Electrodes, 152.e8
- Electrodiagnosis, 141
limitations of, 131, 131t
- Electrodiagnostic assessment, 140
- Electrodiagnostic conclusions, 150–151
- Electrodiagnostic medicine, 115–152
for clinical assessment, 115
consultation and, 131–132
false-positive results of, possibility of, 131
history and, 115–116
instrumentation for, 152.e7f, 152.e8
physical examination and, 115–116, 116f
standards of practice for, 131–132
- Electrodiagnostic report, 150–151
writing, 113
- Electrodiagnostic testing (EDX), 808
extent of, 129–131, 130t
for motor neuron disease, 829–830
physiologic basis for, 152.e1
purpose of, 116
- Electroejaculation (EEJ), 444–445, 445f
- Electroencephalography (EEG), 959
for TBI, 926, 946
- Electrogoniometer, 304
- Electromagnetic shock wave generator, 349
- Electromyography (EMG)
for dysphagia, 57
examination, of cervical and lumbar paraspinal muscles, 139
for myopathic disorder, 885
radiculopathy on, 116
- Electronic aids to daily living (EADLs), 288–290, 380
- Electronic hands, types of, 168
- Electronic medical records (EMRs), 103
emergence of, 1
- Electronic voice output systems, 378–379
- Electronystagmography, of vestibular system, 1112
- Electroprosthesis, 428
- Electrotherapy, 349–355, 355b
history of, 349–350
other modalities of, 356–361
physiology and mechanism of action of, 350, 351f, 351t
precautions and complications of, 355
types of, 350–354
- Elevated vacuum suspension, 184
- Elevation, 288, 289t
for lymphedema, 496
for venous disease, 494
- Eligibility, for SSDI, 77
- Emergency action plan, 803–804
rehearsal of, 790
- Emerin* gene, 893
- Emery-Dreifuss muscular dystrophy, 875, 893
- Emery-Dreifuss muscular dystrophy 1, 893
- Emery-Dreifuss muscular dystrophy 2, 893
- EMG. *See* Electromyography
- “EMG disease”, 123
- Emphysema, 513, 535–536
pulmonary rehabilitation for, 522
- Employer Assistance and Resource Network (EARN), 94
- Employment, after spinal cord injury, 1075
- “Empty” feel, 16–17
- EMRs. *See* Electronic medical records
- Encephalocele, 1028
- Encephalopathy, delayed radiation therapy, 580
- Endocannabinoid system, 931
- Endocrine disorders, 1038
- Endocrine dysfunction, associated with TBI, 935
- Endocrine myopathies, 909
- Endocrine system, changes in, 596
- Endocrinopathy, bone health management and, 911
- Endometriosis, 787
- Endoprosthesis implant, 156
- Endoskeletal construction, 187
- End-plate noise, 123, 123t
- End-plate potentials, 123
- End-plate spikes, 123
characteristics of, 124f, 124t
- End-stage liver disease (ESLD), 560
- End-stage renal disease (ESRD), 550
- Endurance exercise training, 311
- Energy consumption, 197–198
prosthetic limb fitting and replacement considerations, 197–198
- Energy flow (qi), 335
- Energy storing/dynamic response feet, 188–189, 189f
- Energy systems, 291–292, 292f
- Engel, George, 751
- Enneking Outcome Measurement Scale, 156
- ENS. *See* Enteric nervous system
- Enteral feeding, for burns, 503–504
- Enteric nervous system (ENS), 408
automatic feedback control, 408
excitatory or inhibitory messages, transmission, 410
intrinsic loss of, 426
modulation, sympathetic and parasympathetic nervous systems, 410
sensory neurons, 408
- Enteropathic spondyloarthropathies, 677
- Enterostomies, 428
- Entheses, inflammation of, 625
- Enthesopathy, 213
- Entrapment neuropathies, 134, 135t–138t
- Environmental adaptations, 382, 384
- Environmental control units (ECUs), 380
- Environmental controls, 374–388
- Environmental factors, 376
- Environmental stimulation, for TBI, 943
- Environmental variables, in wheelchair and seating system assessment, 263
- Enzymatic debridement, 480t
- Ephedra, 800
- Epicondylitis
lateral, 213, 218f
tests for, 18t–26t
- Epidermoid inclusion cysts, 178
- Epidural hematomas (EDHs), 919, 926
- Epidural space
anatomy of, 680–681
sagittal schematic of, 1053f

- Epidural spinal cord
compression, brain metastases and, 575
stimulation of, 1077–1078
- Epidural steroid injections (ESIs)
approaches for, 682
indications for, 681
- Epigenetics, 948
- Epiphysis, 811
pressure, 812
- Epstein-Barr virus (EBV) infection, multiple
sclerosis and, 984, 984f
- Equal Employment Opportunity Committee
(EEOC), 375
- Equinovarus deformity, 176
control of, 235
three-point system for, 229, 230f
- Erectile disorder/dysfunction (ED), 442–443
intraurethral therapy for, 443f
intraurethral treatment, alprostadil for, 442
male sexual dysfunction, 433
PDE-5 inhibitors, usage, 442
penile injection for, 442f
penile prostheses for, 444f
prevalence of, 435
spinal cord injury, men percentage, 435f
third-line treatments for, 443
vacuum-assisted device, usage of, 443f
vacuum constriction for, 443
- Ergonomics, 91, 91f, 92b
assistive technology for, 379–382
Internet-based resources for, 381t
- Error, definition of, 100
- Erythromycin, for diabetic gastroparesis, 566
- Erythropoietin, 800
- Escharotomy, 501–502
- ESIs. *See* Epidural steroid injections
- ESLD. *See* End-stage liver disease
- Esophageal dysfunction, dysphagia and, 56
- Esophageal stage, of swallowing, 55
- Esophagus, in swallowing, 55
- ESRD. *See* End-stage renal disease
- Essential oils, 372
- Essential tremor, 973, 981t
- Estrogen, 810
as antiresorptive agent, 707
minimal effective doses of, 707
for neurogenic lower urinary tract dysfunction, 399
- Estrogen replacement therapy, contraindications
to, 707
- Etanercept, 613t
- ETO-IMS. *See* Electrical twitch-obtaining
intramuscular stimulation
- Euler theory of elastic buckling of a slender column, 257
- European Stroke Prevention Study 2 (ESPS-2), 960
- Eustachian tube, 1101
- Evening primrose oil, 370t–372t
- Event administration, 790
- Eversion, 230–231, 233
- Evidence-based medicine
assessing, evaluating, and applying evidence, 106–107, 107f–108f
definitions of, 105–106
guideline, 108f
- Ewing amputation procedure, 177
- Exacerbation, causation and, 82, 83f
- Examiner, physician, workers' compensation claims, 78
- Excessive heel rise, transfemoral gait deviations, 206–207
- Excessive lumbar lordosis, transfemoral gait
deviations, 206
- Excessive terminal impact, transfemoral gait
deviations, 207
- Excisional debulking, for lymphedema, 497
- Excitatory amino acids (EAAs), presence of, 919
- Excitotoxic insult, reduction of, 925
- Excretory urography, 393–394
- Executive function, 936
- Exercise, 366
ACOG recommendations for, 308
basic terminology for, 514
for burn individual, 503
for cancer rehabilitation, 583–584
in cold air, 542
conditioning, considerations for, 540
coronary physiology and, 513
low back pain, 668–669
aquatic, 669
traditional, 670
for lymphedema, 496
for motor neuron disease, 834b, 835–836
for myopathies, 912
in older adults, benefits of, 813t
for PAD, 491
physiology of, 789
prescriptions for, 294–295, 301
American College of Sports Medicine's
guidelines for, 541t
components of, 295
guidelines for, 540
program, physiologic changes after, 295b
rehabilitation program, 540–541
rheumatic diseases and, 621–622, 623f
for special populations, 307–313
stress test, users of, identification of, 297
TBI and, 943–944
testing
ACSM recommendations for, 298t
contraindications to, 299b
tests, 298t
training, effects of, 294, 301
for venous disease, 494
- Exercise-associated collapse (EAC), 790, 804–806
differential diagnosis of, 805b
heat-related illness, impact of, 805–806
- Exercise-associated hyponatremia (EAH), 804–805
prevention of, 805
- Exercise-induced bronchospasm (EIB), 799, 808–809
diagnostic testing for, 808–809, 809b
symptoms of, 808
- Exercise training, for dysphagia, 64–65
- Exhalation, normal, 514
- Exhaustion, Fried Frailty Phenotype and, 525
- Existential distress, 573
- Exoskeletal ambulation training, 1077
- Expanded Disability Status Scale (EDSS), 988, 992f
- Expert witnesses, 79, 87
testimony, 86–87
- Explosions, effects of, 921b
- Explosives, categories of, 921
- Expondys51 (Eteplirsen), for myopathic disorders, 892
- Extensor digitorum brevis (EDB) test, 461
- Extensor digitorum longus (EDL), 742
- Extensor hallucis longus (EHL), 742
- Extensor pollicis brevis tenosynovitis (de Quervain
tenosynovitis), detection of, 716
- Extensor tendon orthosis, 224f
- External anal sphincter (EAS), contraction of, 411
- External (“condom” or “Texas”) catheters, 397
- External foot rotation, transfemoral gait deviations, 206
- External iliac syndrome in cyclists, 487
- External sphincter electromyography (EMG),
diagrams of, 391f
- External strategies, compensatory, for impaired
memory, 72
- External ventricular drain, 924
- Externally powered prostheses, 164
muscle contractions, 164
- Externally powered upper limb prosthetic system, 162, 162b
- Extracorporeal shock wave therapy, 348–349, 467
contraindications and precautions of, 349, 350b
history of, 348
indications and evidence basis of, 349, 350f
physics of, 348–349, 349f
techniques of, 349
ultrasound diathermy and, 357b
- Extraocular muscles, examination of, 10
- Extremities, as regional units, 81
- Extrinsic extensor stretching orthosis, 223f
- Eye gaze switch, 376
- Eyeball, structures of, 1116f
- “Eyeball” measurements, 305
- Ezeform, 226–227
- ## F
- Facemask, removal of, 804
- Facet joint corticosteroid injections, 666
- Facet joints, 653, 654f, 655
- Facet-mediated back pain, procedures for, 666–668
- Facial nerve (CN VII), 56
- Facial nerve (cranial nerve VII), examination of, 10
- Facilitated positional release, 327, 327f
- Facioscapulohumeral muscular dystrophy, 882, 893–894, 893f
- Fall Prevention Tool Kit, 528
- Falls, risk factors for, 694b
- False-positive EMG testing, risk of, lowering of, 139
- False-positive results, possibility of, 131
- Familial amyotrophic lateral sclerosis, 822
- Family Caregiver Alliance, 950
- Family/friends support, 5
- Family history, 2b, 6
of pediatric patient, 43
- Fascia, assessment of, 322–323
- Fasciculation potentials, 127, 127t
- Fast-twitch fibers, 27–31
- Fat reduction, exercise for, 307
- Fatality, epidemiology of, 90
- Fatigue, 911–912
ALS and, 839
cancer and, 570–571, 571b
cardiopulmonary disease and, 512
in multiple sclerosis, 996, 996b, 997t
testing, 285–287
- Fazio-Londe syndrome, 828
- FCE. *See* Functional capacity evaluation
- FDL. *See* Flexor digitorum longus
- Fear avoidance, low back pain and, 658
- Fecal incontinence (FI), 407, 413, 780–781
cause of, 421
definitions and etiology of, 780
diagnosis and physical examination of, 780
epidemiology of, 780
impact of, 407–408
management of, 423–424, 423f
treatment of, 780–781
- Federal Black Lung Program, 78
- Federal Workers' Compensation Systems, 78
- Feeding, history of, 42
- Feeding tubes, for dysphagia, 65
- FEES. *See* Fiberoptic endoscopic evaluation of
swallowing
- Feet
contact, running and, 796
deformities, presence of, 1041–1042
musculoskeletal considerations, 1041–1042
valgus deformities of, 1042
- Feldenkrais, Moshe, 334
- Feldenkrais method, 367–368, 670, 761

- Feldenkrais pattern, 334
- Female arousal disorder, 445
pharmacologic interventions for, 445
- Female athlete triad, management of, 811f
- Female fertility, decreased, SCI and, 1087
- Female hypoactive sexual desire, 445
- Female orgasmic disorder, 434
- Female orgasmic dysfunction, 446
- Female sexual arousal disorder, 434
- Female sexual dysfunction, 434
common, 434
- Female sexual interest, 434, 445
- Female sexual response
Basson's circular model, 431
cycle, 432f
- Females, TBI outcomes and, 945
- Femoral anteversion, 46–47
- Femoral bone stress injury, 735
- Femoral heads, avascular necrosis of, 727, 728f
- Femoral neck fracture, 695
- Femoral nerve, 855f
- Femoral neuropathy, 854–855
- Femoroacetabular impingement, 730
- Femur
longitudinal deficiency of, 201
with medial displacement, 696f
- Fenugreek, 370t–372t
- Fertility, spinal cord injury and, 1087
- FES. *See* Functional electrical stimulation
- Feverfew, 370t–372t
- FHL. *See* Flexor hallucis longus
- FI. *See* Fecal incontinence
- Fiber, 424
- Fiberoptic endoscopic evaluation of swallowing (FEES), 61–62
procedure of, 61
versus VFSS, 62
- Fibrillation potentials, 123, 125, 125f
amplitude studies of, 143
characteristics of, 124t
grading of, 126
positive sharp waves and, 125–126, 125f
spike form, 125
study of, 143
- Fibrillation score, 139
- Fibromyalgia (FM)
exercise for, 313
suspicion for, 115–116
- Fibrosis, dysphagia and, 58
- Fibular deficiencies, 200
- Fibular mononeuropathies, 856–857
- Figure-of-eight harness, 163, 163f, 166
- Filaria, 495
- Filters, 152.e9, 152.e10f
- FIM. *See* Functional Independence Measure
- Finances, 6
- Finger extension splints, 213
- Finger flexion, 451t–453t
- Finger pressing insertion, 359, 359f
- Fingers
amputation of, 153
MCP and, 212
- Fingertip amputation, 154
- Finger-to-nose test, 11
- Fingolimod (Gilenya), for multiple sclerosis, 990–991, 994t
- Finkelstein test, 716
- First-generation anticonvulsants, 766
- First-generation disease-modifying therapies, for multiple sclerosis, 988–990
- First metacarpophalangeal joint ulnar collateral ligament sprain, 724
- “Fishtailing”, 281
- Flanagan Quality of Life Scale, 950
- Flat (pes planus), 47
- Flat foot (pes planus), 49f
- Flexed elbow posture, 450
- Flexed spine, axial loading of, 1056
- Flexibility, 303–306
assessment of, 304–305
determinants of, 304
dynamic factors of, 304
exercises, 584
importance of, 303–304
static factors of, 304
training
for older adults, 309–311
recommended guidelines for, 305t
- Flexion teardrop fracture, 1056, 1057f
- Flexor carpi radialis, degenerative changes of, 721
- Flexor digitorum longus (FDL), 740–741
- Flexor hallucis longus (FHL), 740–741
- Flexor hallucis overload, 740–741
- “Flexor reflex afferents”, 448
- Flexor spasms, 448
- Flow-mediated vasodilation (FMD), 810
- Fluid-attenuated inversion recovery (T2 FLAIR), 926–927
- Fluid volume, cardiac disease and, 513
- Fluoride, for osteoporosis, 703–704
- Fluori-Methane, spray-and-stretch technique with, 339–340, 340f
- Flutter kick, 798
- FM. *See* Fibromyalgia
- FM system, 1108–1109
- Foam dressings, 481t, 482
- Focal brachial plexus lesions, localization of, 847t
- Focal chemodenervation, for spasticity, 934
- Focal contusions, 919
- Focal demyelination, 861
- Focal dystonia, 973
- Focal mononeuropathies, 843, 864
- Focal neuropathies
of lower extremities, 853–860
of upper extremity, 845–853
- Focused shock waves, 348
- Folding wheelchairs, 279
- Folic acid consumption, 1029
- Folstein Mini-Mental Status Examination, 8
- Foot
complications of, neuropathy and, 862
conditions of, 230–232
disorders of, 738–746
orthoses, 230, 230f–231f
pain in, 744–746
pronation of, 231
ulceration, 862
- Foot drop, electromyographic evaluation of, 857t
- Foot strike hemolysis, 809
- Footplates, 276–277
- Footrests, 276–277
- Force-sensing method, 282
- Forced expiratory volume in 1 second (FEV₁), 514
- Forced expired vital capacity (FVC), 514
- Fordey, Wilbert, 751
- Forearm, conditions of, 723–724
- Forearm-based thumb spica orthosis, 213, 218f
- Forearm exercise test, for myopathic disorders, 886
- Forearm pronation, 451t–453t
- Forearm pronation-supination orthosis, 223, 223f
- Forefoot pain (metatarsalgia), 231
metatarsal pad for, 231
- Forequarter level amputation, 155
challenge, 166
- “Foreseeability”, legal causation and, 82
- Four-poster brace, 250, 253
- Four-stage sequential model, for swallowing, 53, 54f
- Four-wheeled scooter, 284f
- Fovea, 1115–1116
- Fractures, 213, 693
hip, 599–600
musculoskeletal considerations of, 1042
prophylaxis of, hip pads for, 696
risk, calculation of, 574t
spinal, 673–677
spinal cord injury and, 1097
splint for, 219f
total immobilization of, 213
- Fragile X syndrome, 384
- Frailty, 511, 523–531, 597–598
community mobilization and, 530–531
as a complex syndrome, 526–528
deep vein thrombosis and, 525
early mobilization and, 527–528
function and, 523–524
insulin and, 525
metabolic syndrome and, 524–525
movement and, 523–524
obesity and, 525
physiology and consequences of inactivity and, 524–525
syndrome, 525
Canadian Study of Health and Aging Measurement Tools, 526, 526t
Fried Frailty Phenotype and, 525–526
tools used for measurement of, comparison of, 527t
zero physical activity, hospital immobility and, 527
- Frequency, 295–296
of aerobic training, 516
- Frequency Intensity Type Time (FITT), training
program design variable, 790b
- Freud, Sigmund, 751, 1006
- Friction, in pressure injury, 477
reduction of, 478
- Friction massage, 333, 334f
- Fried Frailty Phenotype, 525–526
exhaustion and, 525
low physical activity and, 525
reduced grip strength and, 525–526
slow walking speed and, 525
weight loss and, 525
- Front rigging, 276, 276t
- Front-wheel drive power wheelchair, 281, 281f
- Frontal lobe, 954–955
- Frontal plane evaluation, 793f
- Frostbite, 501
- “Frozen shoulder” (adhesive capsulitis), 720
- Fukuda stepping test, 1112
- Full-thickness burns, 500
- Full-thickness skin loss, 475
and tissue loss, 475–476, 475f
obscure, 476, 476f
- Function, frailty and, 523–524
- Function Classification Scales, 1009t
- Functional Assessment Measure, 949
- Functional capacity evaluation (FCE), 83, 98
- Functional constipation, 781–782
definitions and etiology of, 781
diagnosis and physical examination of, 781
epidemiology of, 781
treatment of, 781–782
- Functional electrical stimulation (FES), 428, 1015
for therapeutic exercise, 1076–1077
- Functional gain/deterioration, assessment of
potential, 3
- Functional history, 2b
- Functional impairment, 863
- Functional Independence Measure (FIM), 104–105, 507, 949
for children, 48–49
instrument, 104b
scores, for multiple sclerosis, 995–996
- Functional knee braces, 238

- Functional level one (K-1)
 - transfemoral amputees, 194
 - transtibial amputees, 193
- Functional level two (K-2)
 - transfemoral amputees, 194
 - transtibial amputees, 193
- Functional level three (K-3)
 - transfemoral amputees, 194–195
 - transtibial amputees, 193
- Functional level four (K-4)
 - transfemoral amputees, 193f, 195, 195f
 - transtibial amputees, 193–194
- Functional limitation, 450
- Functional magnetic stimulation, 428
- Functional medicine, 365
- Functional Mobility Scale, 1043f
- Functional MRI (fMRI), 948
 - differences, 949f
- Functional Restoration Programs, 98
- Functional status, 3–4
- Functional technique, 327
- Functional use splint, 214f–217f
- Functional variables, in wheelchair and seating
 - system assessment, 263
- Funding, for wheelchairs, 265
- F-waves, 118–143
- G**
- GABA. *See* Gamma-aminobutyric acid
- Gabapentin, 439t
 - for spasticity, 458
- Gacyclidine, 1072
- Gadolinium, nephrogenic systemic fibrosis and, 488–489
- Gag reflex, testing of, 10–11
- Gain, amplifier, 152.e9
- Gait, 15–16, 174–208
 - abnormalities, 50t
 - in family history, 43
 - assessment of, 48
 - changes in, 596
 - determinants of, 203–204
 - disturbances in, 17t
 - evaluation of, importance of, 15
 - examination for, 15
 - factors, 598b
 - impairment of, in multiple sclerosis, 994–995
 - muscle activity during, 204, 205f
 - myopathic diseases and, 902
 - normal human, 201–207
 - phases of, 202f
 - terminology, 202–203
- Gait deviations, 1024t
- Galant reflex, 1011t
- Galeazzi sign, 47
- Galen, 248
- Gallbladder disease, increased incidence of, 1084
- Galveston Orientation and Amnesia Test (GOAT), 929
- Gamma-aminobutyric acid (GABA), 933–934
- Gamma glutamyl transpeptidase (GGT), myopathy and, 885
- Gamma motor neurons, 320
- Gamma system, 320
- Gangrene, in diabetes and peripheral arterial disease, 486f
- Garlic, 370t–372t
- Garth view, 719–720
- Gastric motility, 410
- Gastrocnemius muscle, 738
- “Gastrocolic reflex”, 412
- “Gastrocolonic response”, 412
- Gastroenterologist, on esophageal dysphagia, 56
- Gastroesophageal reflux disease (GERD), 1013
 - swallowing and, 56
- Gastrointestinal bleeds, 963
- Gastrointestinal complications, 1084
- Gastrointestinal dysfunction, 407, 414–422
 - diagnostic testing for, 421–422, 421t, 421b, 422f
 - evaluation of, 416–422
 - history of, 416–417, 416b, 417f–420f
 - nausea, vomiting, bloating, 412
 - pathophysiology of, 412–413
 - physical examination of, 417, 421b
- Gastrointestinal neuromotor system, 410–412
- Gastrointestinal system
 - autonomic dysfunction of, 865
 - cerebral palsy and, 1013
 - changes in, 595
 - physical examination of, 417
 - spinal cord injury and, 1084–1085
- Gastrointestinal tract
 - muscles, responses, 410
 - neuroanatomy and physiology of, 408
- Gastroparesis, 865
 - diabetic, treatment of, 566
- Gastrostomies, 428
- Gastrostomy, for traumatic brain injury, 932
- Gastrostomy tube feeding, for dysphagia, 65
- Gate control theory, 750–751
- Gauze, 480–482, 481t
- Gaze testing, 1112
- GBS. *See* Guillain-Barré syndrome
- GCS. *See* Glasgow Coma Scale
- Geared wheelchairs, 278–279
- Gel shell orthosis, 214t–217t
- Gel shell splint, 214f
- Gender, in action potential propagation, 152.e2
- Gene therapy, for PAD, 491
- General discharges, 78–79
- General Health Questionnaire, 950
- General medical physical examination, 2b
- Generalized disorders, 143–150
- Generalized dystonia, 973
- Generalized peripheral neuropathies, 860–862
 - assessment of, 860–862
 - electrodiagnostic studies for, 861–862, 862b
- Genetic disorder, in family history, 43
- Genetic myopathic disorders, 875
- Genito-pelvic pain, 434, 446
- Genitourinary system
 - cerebral palsy and, 1013
 - changes in, 596
 - spinal cord injury and, 1085–1086
- Genomics, 947–948
- Genu recurvatum, 233
- Genu varum, 229
- GERD. *See* Gastroesophageal reflux disease
- Geriatric patient, 594–605
- Geriatric rehabilitation, 594
- Gesell Developmental Schedule, 49–50, 50t
- GFR. *See* Glomerular filtration rate
- GGT. *See* Gamma glutamyl transpeptidase
- Ginger, 370t–372t
- Glasgow Coma Scale (GCS), 7, 7t, 916, 917t, 946
- Glasgow Outcome Scale (GOS), 949–950, 968t
- Glasgow Outcome Scale Extended (GOS-E), 968t
- Glatiramer acetate (Copaxone), 988–990, 994t, 998
- Glaucoma, 1117
- Glenohumeral joint
 - amputation of, 166
 - dynamic stabilizers of, 718–719
 - instability, 718–720
 - classification of, 719
 - etiology of, 719
 - frequency of, 719
 - physical examination of, 719
 - radiographic views of, 719–720
 - sling immobilization, 720
 - unidirectional or multidirectional, 719
 - static stabilizers of, 718–719
- Glenoid retroversion, excess, 719
- Globus pallidus, 955
- Glomerular filtration rate (GFR), approximation, 394
- Glomerulonephritis, 531
- Glossopharyngeal breathing (GPB), 539, 548–549
 - tracing, 549f
- Glossopharyngeal nerve (cranial nerve IX), 56
 - examination of, 10–11
- Glucocerebrosidase (GBA)* gene, Parkinson disease and, 975
- Glucocorticoids, 612
 - for Duchenne muscular dystrophy, 892
- Glucosamine, dietary supplements, 369
- Glycogen metabolism disorders, 905–906
- Glycogen storage disease type II. *See* Acid maltase deficiency
- Glycogen storage disease type V (McArdle disease), 905
- Glycolysis, end product of, 919–920
- GM-1 ganglioside, 1072
- GMFCS. *See* Gross Motor Function Classification System
- GOAT. *See* Galveston Orientation and Amnesia Test
- Goldman Consensus Group, 997
- Golgi tendon organs, 320, 320f
- Golgi tendon reflex, 320
- Golimumab (Simponi), 613t
- Good Samaritan laws, 789, 803
- GOS. *See* Glasgow Outcome Scale
- GOS-E. *See* Glasgow Outcome Scale Extended
- GoTalk, 378, 378f
- Gout, 616–618, 617f
- Gower sign, 883, 884f
- GPB. *See* Glossopharyngeal breathing
- Grade aids, 277
- Graded exercise tolerance test, for patients with heart failure, 521
- Gradient recalled echo (GRE), 926–927
- Graphesthesia, 11
- Grasp reflex, 14–15, 15t
- “Gravity position”, 264
- Gray matter, 1051–1052
- Gray matter density, decrease, 751f
- GRE. *See* Gradient recalled echo
- Great toe hyperextension, 451t–453t
- Greater trochanteric pain syndrome (GTPS), 687, 729–730
- Green tea, 370t–372t
- Greenman's modified 10-step screening exam, 319t
- Grip, five types of, 168b
- Grip strength, reduced, Fried Frailty phenotype and, 525–526
- Groin, disorders of, 727–732
- Gross Motor Function Classification System (GMFCS), 1008
 - levels, 1013
- Gross Motor Function Measure (GMFM-66), 52
- Ground reaction AFO, 233, 233f
- Growing Right Onto Wellness (GROW) program, 530
- Growth, physical examination for, 44–52
- Growth hormone, 692
- Growth hormone/insulin-like growth factor 1 (GH/IGF-1) axis, changes in, frailty and, 526
- Growth plate injuries, 812f
- Growth spurts, idiopathic scoliosis and, 257
- GTPS. *See* Greater trochanteric pain syndrome
- Guided imagery, 366
- Guides to the Evaluation of Permanent Impairment*, 27
- Guillain-Barré syndrome (GBS), 144–146, 865–866
 - clinical features of, 865–866
 - diagnosis of, 865–866

Guillain-Barré syndrome (GBS) (*Continued*)

- electrodiagnostic testing for, 866
- features not consistent with, 866b
- immunotherapy for, 866
- lumbar puncture, performing of, 866
- management of, 866
- prognosis of, 866
- rehabilitation for, 866

Gut

- mechanoreceptors in, 412
- transverse section of, 411f

Gutter orthosis, 219f

Gutter splint, 213

Guttman, Ludwig, 1049

Gymnasts, BMD of, 701

HH₂-blockers, 439t

Habituation, 1114

“Hacking” (tapotement), 333, 334f

Hair cells, 1101

Hallucination, Parkinson disease and, 975

Halo orthosis, 250–252, 251f

- biomechanics of, 250
- contraindications for, 251
- design and fabrication of, 250–251
- indication for, 251
- special considerations in, 251–252

Hammer syndrome, hypothenar, 487

Hamstring muscle group, injury, 734–735

Hamstring strains, 734–735

Hand

- amputations, 155f
- conditions of, 723–724
- replantation, 156
- special tests of, 716
- transplantation, 156–157, 157t

Hand-based orthosis, 223, 223f

Hand-based thumb splint, 214f–215f

Hand bike, 380f

Hand osteoarthritis, 609

Handicapped Children's Early Education Assistance Act of 1968, 1014t

Hangman's fracture, 1056

“Hard disk” formation, 636–638

Hard end feel, 16–17

Harnesses, 275–276

HAT. *See* Hearing assistance technology

Hatha, 367

Hawkins-Kennedy impingement test, 716, 718

HCM. *See* Hypertrophic cardiomyopathyHCV. *See* Hepatitis C virusHDL-C. *See* High-density lipoprotein cholesterol

Head

- cancer of, 588, 588f
- cervicothoracic orthoses, 250–252
- CT scan of, for TBI, 926
- injury, 916, 951
- movement of, translational acceleration, inertial forces, 919
- switch, 377f

Head array, 283

Head circumference, in infant evaluation, 44

Head-forward posture, 589f

Head rotation, for dysphagia, 63t

Head tilt posture, for dysphagia, 63t

Head turn posture, for dysphagia, 63t

Healing, abnormal, of wounds, 469, 470f

Health care, dimensions of, 103f

Health care quality

- with performance measurement, 109–110
- perspectives, 102f

Health care record, documentation in, 387

Health-related QOL (HRQOL), 950

Health Risk Appraisal, needs assessment via, 530

Healthcare, dimensions of, 101–102

Healthcare Effectiveness Data and Information Set (HEDIS), 110

Healthcare quality

- concept in, 100
- measure of performance, 100
- perspectives, 101

Healthy People 2020, community mobilization and, 530, 530t

Hearing, stroke and, 965

Hearing aids, 382, 1108–1109, 1109f

bone-anchored, 1109

middle ear implantable, 1109–1110

styles of, 1109f

Hearing assistance technology (HAT), 1108

Hearing impairments

- assistive technology for, 382
- complaints with, 1108b
- possible, signs of, 1108b
- risk factors for, 1105–1107

Hearing loss, 1101

acquired, 1106–1107

age-related, 1106, 1107f

conductive, 1104

degree of, 1104, 1104f

mixed, 1104–1105

noise-induced, 1106

sensorineural, 1104–1105

symptoms of, 1107–1108

types of, 1104–1105

Hearing technologies, 382

Hearing thresholds, 1104

Heart

- anatomy of, 513
- variation of arteries in, 513
- physiology of, 513
- transplanted, 520–521

Heart Outcomes Prevention Evaluation (HOPE) study, 490

Heart rate (HR), 292, 514

aerobic training and, 516

methods, 296

reserve method, 296

Heart rate reserve (HRR) method, 296

Heart transplantation

- contraindications to, 553b
- epidemiology of, 552
- physiology in, 554–555
- rehabilitation before, 553

Heat, 340

rheumatic diseases and, 623–624

Heat exhaustion, 805–806

Heat intolerance, in multiple sclerosis, 997–998

Heat-related illness, 805–806

Heat stroke, 805–806

Heating modalities, in cancer, 591

Heavy-duty indoor-outdoor power wheelchair, 281f

HEDIS. *See* Healthcare Effectiveness Data and Information Set

Heel

- lifts, 232
- pain, 231–232
- spurs, 232
- wedges, 232

Heel reflex, 1011t

Heel-to-shin test, 11

Height, in action potential propagation, 152.e2

Helmets, 951

Hematologic malignancies, cancer involving, 585

Hematopoietic stem cell transplantation (HSCT), 590–591

Hemiarthroplasty, 695

Hemiballismus, 13

Hemidystonia, 973

Hemi-inattention, stroke and, 965

Hemineglect, stroke and, 965

Hemiparetic clinical presentation, 1012–1013

Hemipelvectomy, 195–197, 195f

Hemiplegia, 933

Hemiplegic gait, 17t

Hemodynamic instability, frailty and, 528–529

Hemorrhagic contusions, CT scan of, 927f

Hemorrhagic conversion, 960–961, 962t

Hemorrhagic shock, treatment of, 1065–1071

Henoch-Schönlein purpura, 486

Hepatitis C virus (HCV), 869

Hereditary bulbar syndromes, 828

Hereditary inclusion body myositis (h-IBM), 900–901

Hereditary myopathies, 884

Hereditary sensory and motor neuropathies (HSMNs), 147

Herniated disk, 667

Herniated nucleus pulposus, 667

Heterotopic bone, formation of, 161

Heterotopic ossification, 504–505, 504f, 931, 1097–1098, 1097f

TBI and, 932f

pathophysiology of, 931

prophylactic methods for, 931

in wheelchair athletes, 816–817

HGH. *See* Human growth hormone

High-density lipoprotein cholesterol (HDL-C), 1082

High-flow oxygen with exercise, 522

High-intensity interval training, 521–522

High-intensity training, focus on, 791

High-order explosives (HE), 921

High-resolution manometry, for swallow evaluation, 62

High-strength lightweight wheelchair, 268

High-tech aids, note takers, 383

High-tech visual aids, 383–384

High-temperature thermoplastics, 226–227

High-velocity manipulation techniques,

- contraindications for, 328b

High-voltage injuries, 501

Hill-Sachs defects, Stryker Notch view, 719–720

Hindbrain decompression, 1036

Hip(s)

- abduction, 30f
- adduction, 30f, 451t–453t
- congenital dislocations of, 1041
- deformities of, in children, 1098
- dislocation of, 49f
- disorders of, 727–732
- evaluation of, 47, 48f
- examination of, 48f
- extension, 451t–453t
- flexion, 30f, 451t–453t
- fracture of, 693–696
- heterotopic ossification of, 1097f
- internal and external rotation, 31f
- musculoskeletal considerations, 1038–1041
- orthopedic management, 1019
- osteoarthritis, 609, 731–732, 732f
- subluxation, 1041
- tests for, 18t–26t

Hip arthroplasties, 695

Hip disarticulation, 195–197, 195f

Hip dislocation, 730–731

in children with MMC, 1041

physical examination of, 730

surgery for, 730–731

Hip extensors, 204

Hip flexion contracture, 180

Hip flexors, 204

Hip impingement, 730–731

Hip joint, prosthetic, 192

- Hip-knee-ankle-foot orthoses, 241, 241f–242f, 241b
- Hip orthoses, 241–243, 241f
- Hip osteoarthritis, 609
- rehabilitation intervention for, 624–625
- Hip pads, 696
- Hippocampal BDNF, 922
- Hippocampus, damage to, 936
- Hirayama disease, 827, 827f
- History of present illness (HPI), 2b, 3
- History-taking skills, 1–2
- HMG-CoA (3-hydroxy-3-methylglutaryl-coenzyme A), 490
- Hoffer Ambulation Criteria, 1042b
- Hoffman reflex, 15t
- Home assessment, for wheelchair and seating system, 263
- Home automation systems, 380–382
- Home-based rehabilitation, 522
- Home cervical traction, 330f
- Home environment, 5
- Home traction device, alternative, 330f
- Homeopathy, 364
- Honey dressings, 483
- Honorable discharges, 78–79
- Hooks, 166–167, 167f, 167b
- Horizontal adduction test, 715
- Horizontal axle position, 272
- Horner's syndrome, brachial plexopathy and, 576
- Horny goat weed, 370t–372t
- “Horse's tail”, 138
- Hospital immobility, 527
- deconditioning in, 527
- iatrogenic immobilization in, 527
- traditional hospital practices and, 527
- Hostility, 755
- “Hot Bath Test”, 997–998
- “Hot foot”, 860
- HPI. *See* History of present illness
- HR. *See* Heart rate
- H-reflex, 118
- HSCt. *See* Hematopoietic stem cell transplantation
- HSMNs. *See* Hereditary sensory and motor neuropathies
- Hubbard tank, 342
- Huff coughing, 539
- Human arm, capability, 170–171
- Human elbow flexor muscles, maximal force of, relationship of, 302f
- Human growth hormone (HGH), 503
- Human Hand Prehensile Patterns, 168b
- Human immunodeficiency virus (HIV) infection, 1060
- HIV-1, neuropathies, 869b
- HIV-associated neuropathies and, 868–869
- myopathy and, 910
- Human sexual response, 431
- Masters and Johnson model, 431
- Human tissues, attenuation of, 344t
- Human T-lymphotropic virus infection, 1060
- Human T-lymphotropic virus type 1 (HTLV-1) infection, 827–828, 1060
- Human-technology interface, 376
- Humeral fracture brace, 213
- Humeral retroversion, excess, 719
- Humerus, proximal third (amputation), 166
- Huntington disease, 981t
- Hyaluronan, 447
- Hyaluronidase injections, for spasticity, 467
- Hybrid, upper limb prosthetic system, 162
- Hydraulic ankle feet, 188–189
- Hydraulic knees, 191, 191f
- Hydrocephalus, 44, 962, 1034
- TBI and, 934
- Hydrocollator pack, 341
- Hydrocolloid dressings, 481t, 482
- Hydroconductive dressings, 483
- Hydrofiber dressings, 481t, 482
- Hydrogels, 481t, 482
- Hydromyelia, 1036, 1036f
- Hydrotherapy, 342–343
- Hyperalgesia, definition of, 750t
- Hyperbaric oxygen therapy, 483
- Hypercalcemia, 1083
- Hypercalciuria, 404
- Hypercholesterolemia, 436
- HyperCKemia, 875
- Hyperesthesia, definition of, 750t
- Hyperglycemia, 960
- Hyperhidrosis, 178
- Hyperhomocysteinemia, PAD and, 490
- Hyperkalemia, renal failure and, 531
- Hyperkeratosis pilaris, 900
- Hyperkinetic disorders, 972
- Hyperparathyroidism, bone remodeling and, 691
- Hyperprolactinemia, 935
- bone mass and, 692
- Hyperreflexia, 447
- Hypersensitivity vasculitis, 486
- Hypersomnolence, 911–912
- Hypertension, 959
- exercise and, 311–312
- prescription guidelines for, 312t
- Hypertonia, 48
- botulinum toxin treatment for, 1017–1018
- management of, 1016–1018
- oral medications of, 1016–1017
- orthopedic surgical intervention, 1019
- phenol, usage, 1016
- Hypertonicity, wheelchair and, 264–265
- Hypertrophic cardiomyopathy (HCM), 803
- Hypertrophic scarring, 505–506, 505f
- Hypnosis, 366
- Hypoactive sexual desire disorder, male, 433, 442
- Hypoarousal, 940–941
- Hypocalcemia, renal failure and, 531
- Hypoglossal nerve (cranial nerve XII), 56
- examination of, 11
- Hypoglycemia, occurrence of, exercise and, 312
- Hypogonadism, 935
- Hypokinetic disorders, 974–979
- Hyponatremia, 925
- renal failure and, 531
- Hypophosphatemia, renal failure and, 531–532
- Hypothalamic hypogonadism, amenorrhea and, 692
- Hypothalamus, oxytocin/vasopressin synthesis and, 935
- Hypothenar hammer syndrome, 487
- Hypothermia, TBI, 925, 944
- Hypothyroid myopathy, 884
- Hypotonia, 48, 466
- Hypotonic infant, diagnostic challenges with, 133
- Hypoventilation, myopathy and, 913
- Hypoxemia
- chronic, 514
- pulmonary hypertension and, 522–523
- I**
- I-ADL. *See* Instrumental activities of daily living
- IASP. *See* International Association for the Study of Pain
- Iatrogenic immobilization, 527
- Ibandronate sodium, for osteoporosis, 709
- IBM. *See* Inclusion body myositis
- IBW. *See* Ideal body weight
- Ice massage, 338–339, 339f
- Ice packs, 339
- ICIDH. *See* International Classification of Impairments, Disabilities, and Handicaps
- IC/PBS. *See* Interstitial cystitis/painful bladder syndrome
- ICSHT. *See* International Classification for Surgery of the Hand in Tetraplegia
- IDEA. *See* Individuals with Disabilities Education Act
- Ideal body weight (IBW), 1079–1080
- Ideomotor apraxia, 13
- Idiopathic hypertrophic subaortic stenosis, 513
- Idiopathic inflammatory myopathies (IIMs), 907
- Idiopathic scoliosis, 256, 689
- growth spurts and, 257
- pain and, 689
- IFC. *See* Interferential current therapy
- IFN- β _{1a}, 994t
- IFN- β _{1b}, 988, 994t
- IGF-1 levels, frailty and, 526
- IGHL. *See* Inferior glenohumeral ligament
- IIMs. *See* Idiopathic inflammatory myopathies
- IL-1 β , 920
- Iliacus tender point, counterstrain for, 327f
- Iliotibial band syndrome, 732–733, 732f
- L4 or L5 radiculopathy, confusion, 687
- Illness
- disabling consequences of, 77f
- epidemiology of, 90
- World Health Organization International Classification of, 75f
- Immediate postoperative rigid dressing (IPORD), 161
- Immersion hydrotherapy, 501
- Immobility
- culture of, 528
- dangers of, 527
- effects of, 528t
- Impaired movement, 450
- Impairment(s), 376
- definition of, 2t
- identification and treatment of, 1
- psychosocial impact of, recognition of, 6
- rating, practical aspects of, 74–88
- Implicit learning, 936
- Impregnated dressings, 481t
- Impregnated gauze, 482
- Inactivity, physiology and consequences of, 524–525
- Inclusion body myositis (IBM), 908–909
- Income maintenance, 6
- Incomplete nerve injuries, 221
- Increased insertional activity, 123
- Independent medical examination
- causation and allowable conditions, 82–83
- diagnosis and medical necessity, 82
- elements and reporting requirements, 82–83
- physicians, 87
- Indiana Protocol splint, 223, 224f
- Indirect balancing, 318
- Indirect costs, 90
- Indirect selection, 376
- Individualized worker rehabilitation plan, development and implementation of, 375
- Individuals with Disabilities Education Act (IDEA), 374–375
- of 1990, 1014t
- assistive technology requirements, 375b
- Part C, 375
- reauthorization of, 374
- revisions of 2004, 1014t
- Indoor-outdoor power wheelchair, 281f
- Induction chemotherapy, 581
- Inductive electrodes, 346–347, 347f
- Indwelling catheters, 397
- Infantile reflex, redevelopment of, 14–15
- Infants
- growth of, 44–52
- hypotonic, diagnostic challenges with, 133

- Infants (*Continued*)
 needle EMG examination in, 133
 physical examination of, 44
 proximal peripheral nervous system of, late responses of, 133
 voiding function in, 389
- Infection, bacterial colonization *versus*, 478–479
- Infectious myopathy, 910
- Infectious neuropathies, 868–869
- Inferior glenohumeral joint instability, evaluation of, 715
- Inferior glenohumeral ligament (IGHL), 719
- Inferior vena cava (IVC) filters, 1081
- Infertility, in men, 1087
- Inflammation, after TBI, 920
- Inflammatory cascades, activation of, 752
- Inflammatory myopathies, 887
- Inflammatory response, excessive, 794
- Inflicted childhood neurotrauma, 918
- Infliximab, 613t
- Infrared, 342, 342f
- Infrared heating lamp, 342, 342f
- Infraspinatus, test for, 18t–26t
- Inhalation injury, 502
- Injury
 brain, 72
 by cause of disability, 815–818
 disabling consequences of, 77f
 patterns of, in adaptive sports medicine, 815
 phases of, 793–794
 prevention and rehabilitation of, 792–795
 scores, 155
- Injury severity score (ISS), 946
- Inner ear, 1101, 1102f
- Innervation ratio, 126
- Inpatient rehabilitation
 diabetes consult team, 565–566
 for multiple sclerosis, 995–996
 neurologic examination for, 6
 plan, 39b
 goals of, 39b
 setting, assessment in, 69–70
- Inpatient rehabilitation facility (IRF), 507
- Inrolling, 230–231
- Insertional activity, 122–123, 122f
 study of, 133
- Insight, 8
- Insomnia
 ALS and, 839
 benzodiazepines, long-term use of, 770
 medication for, 770–771
- Inspection, 44
 of musculoskeletal system, 16
- Inspiratory stridor, 513
- Institute for Work and Health, 97
- Instrumental activities of daily living (I-ADL), 3–5, 4b
 cardiopulmonary deficits and, 5
- Instrumental swallow assessment, 60–62
- Instrumentation, electrodiagnostic, 152.e7f, 152.e8
- Insufficient velopharyngeal closure, 56
- Insular cortex, 955
- Insulin, 525
 for diabetes mellitus treatment, 565
 dysfunction in, 503
 intramuscular injections of, 799
- Integrated controls, 283, 283f
- Integrative medicine, 364
 in rehabilitation, 364–373, 365f
- Intellectual evaluations, 51t
- Intelligence, 8
- IntelliKeys, expanded keyboards, 379, 380f
- Intensity, 295–296
 of aerobic training, 514
 calculation of, 296
- Intensive care unit
 patient in, psychology of, 529
 secondary complications in, 925
 weakness acquired from, 529
- Interferential current therapy (IFC), 352–353, 352f
- Interferon β (IFN- β), 988, 994t
- Intermittent catheterization (IC), of bladder, 1086
- Intermittent claudication, 485
 agents for, 490
- Intermittent pneumatic compression, 491, 494
- Intermittent positive-pressure ventilation (IPPV), 544–545
- Intermittent traction, 329, 343
- Intermodal Surface Transportation Efficiency Act (ISTEA), 951
- Internal capsule, 955
- Internal disk disruption, 656, 667
- Internal fixation, 695–696, 696f
- Internal strategies, compensatory, for impaired memory, 72
- International Association for the Study of Pain (IASP), 748–749
- International Classification for Surgery of the Hand in Tetraplegia (ICSHT), 1076, 1077t
- International Classification of Functioning, Disability and Health (ICF), 75, 75f, 94, 95f, 103–104, 375–376, 1045f
 classification of causes of death to, 74–75
- International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY), 1008, 1009f, 1009t–1010t
- International Classification of Impairments, Disabilities, and Handicaps (ICIDH), 74–75
- International Continence Society pressure-flow nomogram, 395f
- International Mission on Prognosis and Analysis of Randomized Controlled Trials in TBI, 926
- International Organization for Standardization (ISO), 175–176
- International Paralympic Committee (IPC), 813
- International Spinal Cord Injury Pain (ISCIP) Classification, 1091t
- International Standards for Neurologic Classification of Spinal Cord Injury (ISNCSCI), 1057
 ASIA Impairment Scale inclusion of, 1057
 motor levels, 1076
- Interphalangeal flexion, 30f
- Interphalangeal joint, 211
 extension of, 212f
- Interstitial cystitis/painful bladder syndrome (IC/PBS), 787
- Interstitial lung disease, 513
 pulmonary rehabilitation for, 522
- Interval throwing program, 722b
- Interventional spine care, 641
- Intervertebral disk, 249, 652–653, 652f–653f, 655
 location, 628–629
- Intervertebral foramen
 anatomy of, 680–681, 680f–681f
 dorsal root ganglion in, 138
 nerve vulnerability within, 632
- Interview, for wheelchair and seating system assessment, 262
- Intestinal motility, 410
- Intra-articular areas, of knee, 736
- Intracavernosal penile injections, usage of, 442
- Intracerebral hemorrhage, 970
- Intracranial abnormality, evaluation for, 806
- Intracranial pressure (ICP)
 elevated, 919
 and adults and children, poor outcomes in, 946
 monitoring of, 924
- Intralesional corticosteroid injection, for hypertrophic burn scars, 506
- Intramuscular diaphragm electrodes, implantation of, 546–547
- Intramuscular myenteric (Auerbach) plexus, 408
- Intrathecal baclofen (ITB), 464–465
 therapy, 1018
 complications of, 1018
 for multiple sclerosis, 998
 withdrawal of, 465b, 466f
- Intrathecal space (subarachnoid space), 1051
- Intrathecal system, 465
- Intrathecal therapies, 464–466
- Intrauterine surgical procedures, 1032–1034
- Intravenous therapies, for multiple sclerosis, 991–993
- Intrinsic foot muscles, with monopolar EMG, 140
- Intrinsic minus feet, 1041
- “Intrinsic plus” position, 211–212
- Intrinsic restrictive lung diseases, primary limitations of, 516
- Inversion, 233
- Inverting amplifier, 152.e9
- Involuntary contraction, 775
- Involuntary movements, 13
- Involuntary relaxation, 775
- Iodine dressings, 483
- Iontophoresis, 353, 353f
- IPC. *See* International Paralympic Committee
- IPORD. *See* Immediate postoperative rigid dressing
- IPPV. *See* Intermittent positive-pressure ventilation
- Ipsilateral axial rotation, 638
- IRF. *See* Inpatient rehabilitation facility
- Iron deficiency anemia, 809
- Irritable bowel syndrome, 787
- Ischemic forearm testing, for myopathic disorders, 886
- Ischemic ulcers, 469–474
 arterial, 469, 471f
 dressings for, 474
 management of, 469
 neuropathic wounds, 470–472, 471f
 protective footwear for, 473–474
 small vessel, 469
 venous ulcers, 469
- Ischial avulsion fractures, 731, 731f
- Ischial containment socket, 183–184
- ISNCSCI. *See* International Standards for Neurologic Classification of Spinal Cord Injury
- ISO. *See* International Organization for Standardization
- Isokinetic contraction, 621–622
- Isolectin B₄ P2X3 receptor expression, 752
- Isometric contractions, 299–300
- Isotonic contractions, 299–300
- Isotope studies, 394
- ISS. *See* Injury severity score
- ISTEA. *See* Intermodal Surface Transportation Efficiency Act
- Isthmic spondylolisthesis, treatment of, 674
- ITB. *See* Intrathecal baclofen
- Iyengar, 367
- J**
 Jaws, 384
- Jefferson, Geoffrey, 1056
- Jefferson fracture, 649f, 1056, 1057f
- Jejunostomy, for traumatic brain injury, 932
- Jejunostomy feeding tubes, for dysphagia, 65
- Jendrassik maneuver, 15
- Jet flow, whirlpool with, 343f
- Jewett hyperextension thoracolumbosacral orthosis, 254–255, 255f
 biomechanics of, 254
 contraindications to, 255

Jewett hyperextension thoracolumbosacral orthosis
(*Continued*)
design and fabrication of, 254–255
indications for, 255
special considerations for, 255
JFK Coma Recovery Scale-Revised (CRS-R), 928
Job description, 83
Job-related physical activity score (PAS), bone
mineral density and, 703f
Job site evaluation (JSE), 83
Joint
disorders, 687
dysfunction, 319–320
play, decrease of, 319–320
position sense, 11
protection, 620, 620b
range of motion (ROM), increase, 212
stability, assessment of, 16–17
tests for, 18t–26t
Joint Jack, 223, 223f
Joint play, 16–17
Jones, Lawrence, 326
JSE. *See* Job site evaluation
Judgment, 8
“Jumper’s knee”, 734
Jumping/landing, 798
Juvenile idiopathic scoliosis, 256

K

KAFOs. *See* Knee-ankle-foot orthoses
Keefe, Frances, 751
Keloid, 505
Kennedy disease, 825–826, 826f
Kidney, damage to, chronic, 531
Kidneys, ureter, and bladder (KUB) study, 393
Kinematics, 203
Kinesiotape (KT), 623, 624f
Kinesophobia, 756
Kinetic chain, 16
assessment of, 792
preexisting issues in, 794
weak link in, 795
Kinetics, 203–204
Klumpke palsy, 133–134
“Kneading massage”, 333
Knee
disarticulation, 194
tibial deficiencies, 200
disorders of, 732–738
evaluation of, 47, 49f
extension, 30f
extensors, 204
flexion, 30f
flexors, 204
intra-articular areas of, 736
ligament issues at, 736
locks for, 239–240, 240f
meniscal injury, tests for, 18t–26t
microprocessor, 191, 192f
musculoskeletal considerations, 1041
noncontact ACL injuries of, 798
orthoses, 237–241
brace design features, 237, 237f
clinical indications for, 237b
design feature considerations, 237b
prescription considerations, 237–239, 238f, 238b
osteoarthritis of, 232
pneumatic, 191, 191f
safety, 191
Knee-ankle-foot orthoses (KAFOs), 229, 239
additional component and material
considerations of, 240, 240b
clinical indications of, 240–241
design feature considerations, 239–241
Knee-ankle-foot orthoses (KAFOs) (*Continued*)
purpose of, 239
wheelchairs and, 239
Knee bracing
functional, 238
prophylactic, 237–238
Knee disarticulation amputation, 200
Knee extension, 451t–453t
Knee flexion, 451t–453t
Knee flexion contracture, 180
Knee instability during loading response, 206
Knee joint
offset, instability from, 239
types of, 239, 239f
Knee osteoarthritis, 607
rehabilitation intervention for, 624–625
Knight-Taylor orthosis, 255
Knowledge, general fundamentals of, 8
Krukenberg amputation, 160f
Krukenberg prosthesis, 168
Kyphoplasty, 676, 694, 695f
Kyphoscoliotic ventilatory insufficiency (thoracic
restriction), long-term NIPPV in, 547
Kyphosis
computerized dynamic posturography, composite
score of, 696f
osteoporosis and, 693
severe, 709f

L

L4/L5 radiculopathy, ITB syndrome (confusion),
687
Laboratory studies, of motor neuron disease, 829
Labral disorder, tests for, 18t–26t
Labyrinthine concussion, and TBI, 943
Lactate, 919–920
usage of, by brain, 920
Lactate/pyruvate (L/P) ratios, 919–920
Lactic acid system, 292
LAD. *See* Leg amyotrophic diplegia
Lambert-Eaton myasthenic syndrome (LEMS), 131
characterization of, 149
presynaptic disorders and, 149
Laminectomy, 648f
Laminopathy, 895
Laminoplasty, 648f
Lap belt injuries, 1056
Laryngeal nerve, recurrent, 56
Laryngeal penetration, definition of, 56–57
LASER. *See* Light amplification of stimulated
emissions of radiation
Late neurologic decline, 1078–1079
Late-onset Tay-Sachs disease, 824
Lateral ankle sprains, 743–744
Lateral collateral ligament (LCL), 738
Lateral compartment injuries, 742, 743f
Lateral epicondylitis, 213, 218f
pathologic changes of, 721
treatment of, 721
Lateral epicondylitis, tests for, 18t–26t
Lateral epicondylopathy, 721
Lateral femoral cutaneous nerve, sensory territory
of, 855f
Lateral femoral cutaneous neuropathy, 855–856
Lateral flexion, 638
Lateral hemisphere lesions, 11
Lateral key pinch, 212, 213f
Lateral T strap, 234
Lateral trunk bending
transfemoral gait deviations, 206
transtibial gait deviations, 206
Laterals, 275–276
Latex allergy, 1038
Lavender, 370t–372t
“Laying on of hands”, 316
LCL. *See* Lateral collateral ligament
LCPD. *See* Legg-Calvé-Perthes disease
Leapfrog Group, 110–111
Learning disabilities, assistive technology for,
384–385
Lee Silverman Voice Treatment (LSVT), 65
Left pubic bone, insufficiency fractures in, 697f
Left ventricular assist device (LVAD), cardiac
rehabilitation after, 521
Left ventricular gallop, 513
Leg amyotrophic diplegia (LAD), 820, 821f
Leg exercises, arm exercises and, effects of, 293
Leg length discrepancy, 232
Leg pain, 666
back pain greater than, 666
Leg rests, 276–277
“Legal blindness”, 1115
Legal causation, 82
Legg-Calvé-Perthes disease (LCPD), 728–729
Legs, attitude of, 16
Leighton flexometer, 304
LEMS. *See* Lambert-Eaton myasthenic syndrome
Length-tension relationship, 300
Lentiform nucleus, 955
Leprosy (Hansen disease), 868
Leptin, 931
LES. *See* Lower esophageal sphincter
Lethal dosage (LD₅₀), changes in, 500f
Lethargy, 7
“Letter of medical necessity”, 387
funding, 387–388
Levator ani, 775
Level-specific upper limb amputation prostheses,
164–166, 166b
Lever drives, 278, 278f
Levetiracetam, for PTE, 930–931
Levodopa, for Parkinson disease, 977
Levodopa-induced dyskinesias, 977–979
Lewy bodies, in Parkinson disease, 975
Lhermitte sign, 999
Liang distal myopathy, 900
Lifts, for wheelchair, 285, 286f–287f
Ligamentous injury, 736–738, 737f–738f
Ligamentous injury grading scale, 724t
Ligamentous instability test, 716
Ligaments, 653
Ligamentum flavum, 653
Light amplification of stimulated emissions of
radiation (LASER), 355
Light touch, assessment of, 11
Limb-deficient athletes, 817–818
neuroma in, 818
skin disorders in, 817–818
Limb girdle muscular dystrophies, 882, 895–896,
896t
autosomal dominant, 895, 896t
autosomal recessive, 895–896, 897t–899t
calf pseudohypertrophy in, 884f
scapular winging in, 893f
Limb loss, 153
Limbs
deficiency, 153
pain, cluster, 627
positioning, three-point system, 229, 230f
salvage, 155–158
complication rate, 156
principles of, 155–160
vibration testing in, 11
Linacotide, for constipation, 426
Ling, Per Henking, 332
Lipid-lowering therapy, 490
Lipid management, in PAD, 490
Lipid metabolism disorders, 906
Lipomeningocele, 1028
Lipomyelomeningocele, 1028

- LIPUS. *See* Low-intensity pulsed ultrasound
- Liquid wash, for dysphagia, 63t
- Lisdexamfetamine dimesylate, for fatigue treatment, 997t
- Literacy technologies, 384–385
- Litigation, 6
- Little, William, 1006
- “Live high-train low” method, 791–792
- Liver transplantation
- clinical presentation of, 560
 - complications of, 561
 - contraindications of, 560
 - epidemiology of, 559
 - etiology of, 560
 - future of, 562
 - management for
 - patient classification, 560–561
 - preoperative, 561
 - patient selection for, 560
 - postoperative
 - fatigue, 561
 - medical complication of, 561
 - nutrition in, 561–562
 - outcomes of, 562
 - rehabilitation management for, 561
 - rehabilitation in, 559–560
- Living situation, understanding of, 5
- LLRDs. *See* Lower limb reduction deficiencies
- LMN. *See* Lower motor neuron
- LMNB. *See* Lower motor neurogenic bowel
- Locomotion assistance systems, 944
- Long arm orthosis, 212f
- Long muscles, 882
- Long-term oxygen therapy, 538
- Long-term socket use, 155
- Long transhumeral amputation, 155
- Long transhumeral socket, usage, 165
- Long transradial amputation, 155
- Longitudinal ligaments, 653
- Lou Gehrig disease, 820
- Lovett, Robert, 27–31
- Low back
- history of, 658–659, 659b
 - neurologic examination, 660–661
 - physical examination of, 659–664, 660t
 - illness behavior and nonorganic signs seen on, 663–664
 - strength and flexibility assessment, orthopedic special tests for, 661, 663f–664f
- Low back pain, 366, 651–689
- acupuncture for, 672
 - Alexander technique for, 670
 - anger, accompaniment with, 657–658
 - antidepressants for, 671
 - antiseizure medications for, 672
 - antispasticity medication for, 671
 - anxiety, accompaniment with, 657–658
 - beliefs and fear avoidance in, 658
 - biomechanics, 651–655
 - cancer and, 676
 - comorbidities, treatment of, 672–673
 - complementary movement therapies for, 670
 - depression, accompaniment with, 657–658
 - differentiation of inflammatory *versus* mechanical, 613t
 - epidemiology of, 651
 - etiology of, 688, 688b
 - Feldenkrais method for, 670
 - herbal medicines for, 672
 - injections and needle therapy for, 672
 - lumbar supports for, 670
 - manual mobilization or manipulation for, 670
 - massage for, 670
 - medications for, 671–672
 - multidisciplinary pain programs for, 658
- Low back pain (*Continued*)
- multidisciplinary rehabilitation for, 672
 - muscle relaxants for, 671
 - nonbenzodiazepine antispasmodics for, 671
 - nonsteroidal antiinflammatory drugs for, 671
 - observation of, 659, 661f
 - opioids for, 671–672
 - palpation of, 659
 - Pilates for, 670
 - prognosis of, 673
 - psychosocial factors of, 657–658
 - public health perspective of, 651
 - range of motion in, 659–660
 - reassurance and patient education in, 668
 - in special populations, 687–689
 - as symptom, 651
 - systemic steroids for, 672
 - Tai chi for, 670
 - topical treatments for, 672
 - traction for, 670
 - Tramadol for, 672
 - transcutaneous electrical nerve stimulation for, 670–671
 - treatment of, 668–670
 - yoga for, 670
- Low-frequency ultrasound, 345
- Low-intensity pulsed ultrasound (LIPUS), 345, 345f
- Low-level laser therapy, 355–356
- contraindications and precautions of, 356
 - history of, 355
 - indications and evidence basis of, 356
 - physics and bioeffects of, 355–356
 - rheumatic diseases and, 624
 - techniques of, 356, 356f
- Low-order explosives (LE), 921
- Low-power laser therapy, rheumatic diseases and, 624
- Low-tech assistive devices, availability of, 379
- Low-tech visual aids, 382–383
- Low-temperature thermoplastics, 226–227
- Low vision, resources for, 383b
- Lower abdominal neuropathies, 859–860
- Lower body mobility devices, 379
- Lower esophageal sphincter (LES), in swallowing, 55
- Lower extremity, 80–81
- acquired amputation, classification terminology and description, 175t
 - arterial insufficiency, 485
 - Ashworth scores for, improvement of, 933–934
 - lymphedema, 586f
 - orthotic bracing, for myopathic disorders, 912
 - prosthesis, prescription of, 182
- Lower limb
- BMD, fracture risk correlated with, 1084
 - disorders of, 738–746
 - hip and groin, 727–732
 - thigh and knee, 732–738
 - examination of, 45–46
 - lymphedema, lymphatic drainage of, 586f
 - mononeuropathies, 135t–138t
 - muscle testing, 36t–38t
 - NCS on, 118
 - orthopedic management, 1019–1020
 - pain and dysfunction, 727–747
- Lower limb amputation, 174–208
- epidemiology of, 174–175
 - functional classification, 181–182
- Lower limb deficiencies, acquired pediatric, amputation level and energy expenditure in, 201
- Lower limb orthoses
- devices, 229–247
 - specialty, 241, 242f–243f
- Lower limb reduction deficiencies (LLRDs), 199
- Lower motor neurogenic bowel (LMNB)
- delineation, 425
 - dysfunction, 414
- Lower motor neuron (LMN)
- diseases, 820
 - weakness and, 6–7
 - dysfunction of, 831
 - lesions, 6–7
 - spinal cord injury, 435
- Lower plexus palsy, 133–134
- Lower tetraplegia, transfer training for, 1073
- Lower tract, tests, 394–395
- Lower urinary tract
- changes of, 404
 - function, 389
 - innervation, 389
 - management of, 398
 - physiology of, 1085
- LRRK2* gene, 974
- LSVT. *See* Lee Silverman Voice Treatment
- Lubiprostone, for constipation, 426
- Lumbar disk
- disease, 667
 - herniation of, tests for, 18t–26t
- Lumbar epidural steroid injections, for lumbar radicular pain, 680
- Lumbar extension, 679
- Lumbar interlaminar epidural steroid injections, 684–686
- complications of, 685–686, 686b
 - for radicular pain
 - due to disk herniation, 685
 - due to lumbar spinal stenosis, 685
 - technique for, 684–685, 685f
- Lumbar paraspinal muscles
- examination of, 139
 - importance of, 139
- Lumbar root syndromes, 662t
- Lumbar soft tissue technique, 324f
- Lumbar somatic dysfunction, treatment of, 325f
- Lumbar spinal stenosis, 679–680
- management, goals of, 680
 - natural history of, 679–680
- Lumbar spine, 651–655
- anatomy and biomechanics of, 651–655
 - clinical evaluation of (diagnostics), 664–666
 - computed tomography of, 665
 - differential diagnosis/treatment, 666
 - electromyography, 666
 - examining area above and below, 661
 - fractures/dislocations in, 1056
 - imaging studies of, 664–666
 - laboratory studies of, 666
 - ligaments, 653
 - magnetic resonance imaging, usage, 665, 665f
 - motion of, tests for, 18t–26t
 - muscles with, 653–654, 654f
 - myelography, 665, 666f
 - nonbenzodiazepine antispasmodics for, 671
 - opioids for, 671–672
 - pain generators of, 655–658, 656b
 - plain radiography of, 664
 - usage, 665f
 - scintigraphy, 665
- Lumbar spondylosis, 666
- Lumbar stabilization, 669
- Lumbar stenosis, 403
- grading of, MRI, 680t
 - surgical consideration for, 680
- Lumbar strain, 666
- Lumbar supports, usage, 670
- Lumbar traction, 329, 330f

- Lumbar transforaminal epidural steroid injections, 682–684
 explanatory studies of, 682–683
 outcome studies of, 683–684
 pragmatic studies of, 683
 for radicular pain
 due to disk herniation, 682
 due to lumbar spinal stenosis, 684
 due to miscellaneous conditions, 684
 technique for, 682, 682f–683f
- Lumbar vertebrae, 249
- Lumbosacral chairback orthoses, 256, 256f
 biomechanics of, 256
 contraindications to, 256
 design and fabrication of, 256
 indications for, 256
 special considerations for, 256
- Lumbosacral corset, 255–256, 255f
 biomechanics of, 255
 contraindications for, 256
 design and fabrication of, 255
 indications for, 255
 special considerations for, 256
- Lumbosacral orthoses, 255–256
- Lumbosacral paraspinal muscles, monopolar EMG and, 140
- Lumbosacral plexopathies, 575–576, 853–854
- Lumbosacral plexus, 854f
 peripheral neuroanatomy of, 134
- Lumbosacral radiculopathy, 138, 677–679
 in patients with sciatica, 662t
 screens, 141
 six-muscle screen identifications of, 140, 140t–141t
 surgical management of, 678
- “Lumbrical bar”, 219–221, 220f
- Lund and Browder chart, for burns, 499, 500f
- Lung
 abnormal physiology of, 516–517, 517t
 anatomy of, 513
 physical examination of, 513
 physiology of, 514
- Lung cancer, brain metastases and, 574
- Lung disease
 epidemiology of, 536
 severe, management options for, 544–548
- Lung parenchyma, emphysematous changes in, 547
- Lung transplantation, 548
 diagnoses in, 556b
 indications and contraindications for, 556b
 long-term results in, 548
 medical complications of, 557–559
 patient outcomes and, 555
 postoperative exercise considerations for, 559
 pretransplant rehabilitation for, 555–557
 rehabilitation in, 517, 555–559
- Lung volume reduction surgery (LVRS), 547
 long-term results for, 547–548
- Lung volumes, in health and disease, 539f
- Luschka (uncovertebral) joints, 629f
- LVAD. *See* Left ventricular assist device
- LVRS. *See* Lung volume reduction surgery
- Lyme disease, 868
- Lymphangiography, 496
- Lymphatic disease, 494–495
- Lymphatic system, 494–495
 reconstruction of, 497
- Lymphedema, 494–495
 classification of, 495
 evaluation for, 495–496
 imaging techniques for, 495–496
 management of, 585–586
 treatment of, 496–497
- Lymphedema tarda, 495
- Lymphoscintigraphy, 495
- M**
- Ma huang, 800
- Macrocephaly, 44
 conditions associated with, 45t
- Macular degeneration, age-related, 1116–1117
- Maddocks questions, 806
- Mag wheel, 277f
- MAGic, usage, 383–384
- Magnetic resonance angiography (MRA), 488–489
- Magnetic resonance imaging (MRI), 495
 false-positive rates for, 138–139
 for spinal cord compression, 575
 for sports concussion, 806
- Magnetic resonance venography, for venous disease, 493
- Maintain functional mobility, 620–621, 621f–622f
- Maintenance of Certification (MOC), 111–112
- Mal de débarquement (MdDS), 1114
- Maladaptive plasticity, spasticity result from, 449, 449f
- Male erectile dysfunction, treatment of, 1087
- Male hypoactive sexual desire disorder, 442
- Male orgasmic disorder, 433
- Male sexual dysfunction, 433
- Malignant hyperthermia, 883
- Malignant tumors, limb salvage treatment, 156
- Management plan, 39, 39b–40b
- Mangled extremity scoring systems, 155
- Mangled extremity syndrome, 155
- Manipulable lesion, 319–320
- Manipulation, 316–317
 contraindications for, 328, 328b
 for coupled movement, of spine, 318–319
 definition of, 316
 direct techniques of, 318
 examination and diagnosis for, 322
 goals of, 316
 historical perspective of, 317
 indirect techniques of, 318
 nomenclature for, 332
 side effects of, 328
- Manometry, high-resolution, for swallow evaluation, 62
- Mantra meditation, 365
- Manual Abilities Classification Scale, 52
- Manual Ability Classification System, 1008
- Manual locking knees, 189–190, 190f
- Manual lymphatic drainage (MLD), 334, 496, 585–586, 586f
- Manual medicine, 317
 articular treatment in, 323–324
 clinical use of, 327
 direct isometric types and, 325
 direct techniques in, 323–326
 examination and diagnosis for, 322
 goals of, 316, 321–322
 indications of, 321–322
 indirect techniques in, 326–327
 mobilization with impulse in, 324–325
 muscle energy and, 325
 nomenclature for, 332
 popularity of, 317
 soft tissue technique in, 323
 strain-counterstrain for, 326–327
 techniques of, 317
 types of, 323–327
 types of, 317–318
- Manual muscle testing, 27–31, 31t
 of lower limb, 36t–38t
 of upper limb, 32t–35t
- Manual therapies
 evidence-based use of, 328
 gamma system for, 320
 physiologic rationale for, 320–321
 usage, 365
- Manual wheelchairs, 262b, 268
 accessories of, 274–278
 antitippers for, 278
 armrests for, 274–275
 back supports for, 274
 components of, 269f, 274–278
 footplates for, 276–277
 footrests for, 276–277
 grade aids for, 277
 headrests for, 276
 laterals and chest harnesses for, 275–276
 leg rests for, 276–277
 lever drives for, 278, 278f
 mag and spoke wheels of, 277f
 myopathy and, 913
 performance of, 287
 pushrims for, 277, 278f
 seating for, 274
 setup of, 270–272
 transfers, in automobiles, 274
 types of, 268t
 users of, propulsion techniques of, 273–274, 273f
 wheel locks of, 277
 wheels and tires of, 277
- Manual wheeled mobility device, 262b
- Manuka honey, 483
- Marathon, 790
 fluid replacement guidelines in, 805b
 popularity of, 805
 runner, cause of collapse in, 805
- Marathon-related deaths, increase in, 805
- Marfan syndromes, 719
- Markesbery-Griggs/Udd, 900
- Martin-Gruber anastomosis, 131
- Masako maneuver, for dysphagia, 63t
- Mass effect, 925
- Mass exercise testing, 311
- Mass participation endurance event, care administration in, 790
- Massage, 331–336, 369
 contraindications to, 336
 definition of, 331
 Eastern forms of, 335–336
 evidence-based use of, 336
 goals of, 332
 history of, 331–332
 for hypertrophic scars, 506
 indications for, 332
 mechanical effects of, 332
 physiologic effects of, 332
 types of, 332
 Western forms of, 332–333
 Western techniques of, 333–335
- Mastication, 53
- Mat activities, spinal cord injury and, 1073
- Maximal inspiratory pressure (MIP), 837
- Maximal oxygen consumption ($\dot{V}O_{2max}$), 292, 294, 309
- Maximal voluntary ventilation (MVV), 514
- Maximum heart rate method, 296
- Maximum medical improvement, determination of, 83
- May-Thurner syndrome, 492
- MBP. *See* Myelin basic protein
- McArdle disease (glycogen storage disease type V), 905
- McDonald criteria, for multiple sclerosis, 986, 987t
- McGill Pain Questionnaire Short Form, 757
- MCLs. *See* Medial collateral ligaments
- MCS. *See* Minimally conscious state
- Measure development, 108–109
 agencies and, 109
 attributes of, 109
 challenges in, 109
 extensive costs, 109

- Measure development (*Continued*)
 measure testing, 109
 privacy, security, and databases, 109
 risk adjustment, 109
- Mechanical cervical traction, 329
- Mechanical compression devices, for deep venous thrombosis, 931
- Mechanical cough assisting device, 838
- Mechanical debridement, 480t
- Mechanical lift transfer, 1073
- Mechanical low back pain, 666
 myofascial pain, 672
 trigger point injections, 672
- Mechanical ventilation, 544–547
 long-term outcomes of, 547
 mode of, 1080
 undersedation during, 527
- Medial branch blocks, 666–667
- Medial collateral ligaments (MCLs), 736–737
- Medial epicondylitis
 nonoperative treatment of, 721
 oblique radiographs of, 721
 tests for, 18t–26t
- Medial epicondylopathy, 721
- Medial rectus, primary action of, 9
- Medial tibial stress syndrome (MTSS), 740–741
- Medial T-strap, 234
- Median mononeuropathies, 848–850
- Median nerve, 849f
 CMAP reduction in, 144–146
 at wrist, tests for, 18t–26t
- Median neuropathies, 135t–138t
- Median sensory neuropathies, burns and, 504
- Medical causation, 82
- Medical clearance, 296–297
- Medical device-related pressure injury, 476
- Medical examination, ACSM recommendations for, 298t
- Medical history, 2b
- Medical malpractice, 87
- Medical needs, future of, 83
- Medical Outcomes Study 36-Item Short-Form Health Survey, 950
- Medical problem list, 39b–40b
- Medical rehabilitation
 Certification to Continuous Certification
 Program, moving from maintenance of, 113
 evidence and guidelines, 105–108
 maintenance of certification and quality improvement, 111–112
 outcome measures, 101–105
 quality and outcome measures for, 100–114
 quality improvement and practice improvement projects, 112–113, 112t
 safety and accreditation, 110–111
- Medical Research Council Scale, use of, 31
- Medical treatment, chief complaint and, 3
- Medical variables, in wheelchair and seating system assessment, 262–263
- Medicare, in multiple sclerosis, 995–996
- Medicare Functional Classification Levels (MFCLs), 181–182, 182t
- Medication, 5
 metabolism, changes in, 596
 for motor neuron disease, 833, 834b
- Medication-induced myopathy, 909–910
- Meditation, 365–366
- Medium length transhumeral socket, usage, 165
- Medium transradial amputation, 155
- Medulla, 955–956
- MELAS. *See* Mitochondrial encephalomyopathy lactic acidosis and stroke-like episodes
- Memory, 8
 anatomy, 936
 testing of, 8
- Men, treatment of osteoporosis in, 711
- Mendelsohn maneuver, for dysphagia, 63t
- Meniere disease, 1104–1105
- Meningocele, 1028
- Meniscal injuries, 738
- Mennell, John M., 332
- Menopausal hormone therapy (MHT), 599
 “Mental break”, 791
- Mental status, general assessment of, 8
- Mental status examination (MSE), 7–8
 abstract thinking in, 8
 attention in, 7
 consciousness level in, 7
 general mental status assessment in, 8
 insight and judgment in, 8
 knowledge in, fundamentals of, 8
 memory in, 8
 mood and affect in, 8
 orientation in, 7–8
 performing, 7
- “Mentastics”, 335
- MEPPs. *See* Miniature end-plate potentials
- MERiT static progressive component, 214t–217t
- Merosin-deficient congenital muscular dystrophy, 900
- MERRF. *See* Myoclonic epilepsy with ragged red fibers
- Meshing, of donor skin, 502
- Mesocycle, 790–791
- MET. *See* Metabolic equivalent
- Metabolic abnormalities, 503
- Metabolic bone disease, biochemical indices for, 697
- Metabolic equivalent (MET), 293
- Metabolic myopathies, 147–148, 905
- Metabolic syndrome, 490, 524–525
- Metacarpophalangeal flexion, 30f, 451t–453t
- Metacarpophalangeal joints
 finger function and, 211–212
 flexion of, 212f
 hyperextension of, 211
- Metacognitive strategies, 72
- Metal ankle-foot orthosis, 233–235, 234f
 components of, 234f
- Metastatic disease, 574
- Metatarsal bar, 231
- Metatarsal bones, medial deviation of, 47f
- Metatarsal pad, 231
- Metatarsal stress fracture, 744–746
- Metatarsalgia, 231, 744–746
 metatarsal pad for, 231
- Metatarsus adductus, 45–46, 47f
- Methotrexate, 439t
- Methylenetetrahydrofolate reductase (*MTHFR*), 1030
- Methylnaltrexone, for constipation, 426
- Methylphenidate (MPH), 922–923
 daily treatment with, 923
 for fatigue treatment, 997t
- Methyl-prednisolone sodium succinate, administration of, 1072
- Metoclopramide, 439t
 for gastroparesis, 566
- Mexameter, 507
- MF SpinaLogic bone stimulator, 258f
- MFCLs. *See* Medicare Functional Classification Levels
- MHT. *See* Menopausal hormone therapy
- Miami J orthosis, 252, 252f
- Miami orthosis, 257–258
- Microcephaly, 44
 conditions associated with, 45t
- Microclimate, in pressure injury, 477
- Microcurrent, 353–354, 354f
- Microcycles, 790–791
- Microfractures, chronic pain and, 694
- Microprocessor feet, 189, 189f–190f
- Microprocessor knee, 191, 192f
 with internal power, 191, 192f
- Microvascular free flaps, 155
- Microwave diathermy (MWD), 348
 contraindications and precautions of, 348, 348b
 indications and evidence basis of, 348
 physics of, 348
 techniques of, 348
- Micturition reflex, 389
- Midbrain, 955–956
- Middle ear, 1101, 1102f
- Middle ear implantable hearing aids, 1109–1110
- Midline, of cerebellum, 11
- Midlumbar-level lesions, 1041
- Midwheel drive, 281–282
- Migraine, vestibular, 1113
- Mild TBI, management of, 923–924
- Military traumatic brain injury, epidemiology of, 918
- Milwaukee orthosis, 253
 biomechanics of, 253
 contraindications to, 253
 design and fabrication of, 253
 indications for, 253
- Mind and body practice, 365–369
- Mind-body medicine, 761
- Mindful movement, 366
- Mindfulness, 365–366
- Mindfulness-based stress reduction, 366
- Minerva body jacket, 250
- Miniature end-plate potentials (MEPPs), 123, 123f
- Minimalist shoes, 796
- Minimally conscious state (MCS), 7
 functional MRI/PET, usage for, 928
- Mini-Mental State Examination, 976
- Minimum effective strain stimulus, 701
- Miniparaspinal mapping screen, 139
- Minivan modification, with powered ramp system, 287f
- Minute ventilation, aerobic training and, 516
- 6-minute walk test (6MWT), 105
- MIP. *See* Maximal inspiratory pressure
- Misoprostol, 999
- Mitchell, Fred, Sr., 325
- Mitchell, Silas Weir, 748
- Mitochondrial dysfunction, 920
- Mitochondrial encephalomyopathy lactic acidosis and stroke-like episodes (MELAS), 906
- Mitochondrial myopathies, 147–148, 906
- Mitochondrial neurogastrointestinal encephalomyopathy (MNGIE), 907
- Mitoxantrone (Novantrone), for multiple sclerosis, 993, 994t
- Mixed hearing loss, 1104–1105
- Mixed urinary incontinence (MUI), 777–778
- Miyoshi myopathy type I, 895
- MLD. *See* Manual lymphatic drainage
- MMC. *See* Myelomeningocele
- MMN. *See* Multifocal motor neuropathy
- MND. *See* Motor neuron disease
- MNGIE. *See* Mitochondrial neurogastrointestinal encephalomyopathy
- Mobile arm support, usage of, 222, 222f
- Mobility, 3–4
 cardiopulmonary deficits and, 5
 impairments, assistive technology for, 379
- Mobility assistive devices, 3, 3t
- Mobility interventions, for pressure redistribution, 477
- Mobility-related activities of daily living (MRADLs), 265
- Mobilization
 for burn individual, 503
 with impulse, 324–325

- MOC. *See* Maintenance of Certification
- Modafinil, for fatigue treatment, 997t
- Modality
of cancer rehabilitation, 591
therapy, combined, 578
- Mode, 295
- Moderate TBI, acute medical management of, 924–925
- Modified Ashworth Scale, 14, 467, 933, 933t
- Modified minivan, with powered ramp system, 287f
- Modified Oxford scale, of pelvic floor muscles, 777, 777t
- Modified ranking scale, 967t
- Modified Vancouver Scar Scale, 507
- Moisture management, in pressure injury, 478
- Momentum, transfer of, 795
- Monoamine oxidase B (MAO-B) inhibitors, 977
- Mononeuropathies, 134, 504, 843–845
assessment of, approach to, 134
electrodiagnostic testing of, 843–845
fibular, 856–857
focal, 843, 864
median, 848–850
onset, history, 843
peroneal, 856–857
plantar, 857–859
radial, 852–853
sciatic, 859
sural, 859
suspected, 134
tibial, 857–859
ulnar, 850–852
- Monopolar needles, 122, 152.e8
- Montreal Cognitive Assessment, 8
- Mood, 8
myopathy and, 911
- Mood disorders
ALS and, 834b, 838
in multiple sclerosis, 997
- Moro reflex, 1011t
- Morphine, for neuropathic pain, 999
- Morphology, motor unit, 129
- Morton neuroma, 744–746
- Motion, loss of, 322
- Motion testing, 322, 323f
- Motor abnormalities, 1008
- Motor conduction studies, 132t
- Motor control, 11–14
coordination and, 11–13
involuntary movements and, 13
strength and, 11
tone and, 14
- Motor-eliminated tests, 51t
- Motor innervation, 1038
- Motor NCSs, performing, 118
- Motor nerve conduction studies, 861
- Motor nerve damage, 471
- Motor nerves, clinical testing of, 118, 119t–121t
- Motor neuron disease (MND), 115–116, 150, 820–841
amyotrophic lateral sclerosis and, 820–823
classification of, 820–828, 821b
definition of, 820
diagnosis of, 828–833
electrodiagnostic testing for, 829–830
etiologies of, 827–828
history of, 828
laboratory studies of, 829
physical exam of, 828–829
primary lateral sclerosis and, 821–822
progressive muscular atrophy and, 822
specific disease-related impact, 836–840
spinal muscular atrophy and, 823–825, 823f–824f
treatment for, 833–840, 834b
- Motor neuron disease (MND) (*Continued*)
exercise in, 835–836
medication in, 833
rehabilitation in, 834–835, 835f
- Motor point, 152.e3f, 152.e4
- Motor recovery, after stroke, 449, 449f
- Motor response oscillations, 977
- Motor responses, physiology of, 152.e3
- Motor unit action potentials (MUAPs), 129, 152.e4f, 152.e5, 152.e5f
- Motor unit morphology, 129, 129t
assessing phases of, 152.e5
assessment of, 133
- Motor unit recruitment, assessing phases of, 152.e5
- Motor weakness, physical examination for, 115
- Motorized lumbar traction, 330f
- Mouth intermittent positive-pressure ventilation, 546f
with angulated mouthpiece, 546f
- Movement
cerebellum control of, 11
fear, 756
frailty and, 523–524
therapies, 366–368
- Movement-based therapies, 761
- Movement Disorder Society Unified Parkinson's Disease Rating Scale (UPDRS), 976
- Movement disorders, 972
- Moxibustion, 360–361
history and mechanism of, 360, 361f
indications and contraindications of, 361
techniques and evidence-based effects of, 361
- MRA. *See* Magnetic resonance angiography
- MRADLs. *See* Mobility-related activities of daily living
- MRI. *See* Magnetic resonance imaging
- MS. *See* Multiple sclerosis
- "MS hug", 999
- MSE. *See* Mental status examination
- MTSS. *See* Medial tibial stress syndrome
- MUAPs. *See* Motor unit action potentials
- Mucosal membrane pressure injury, 476
- Muenster orthosis, 226f
- Muenster socket, 164–165
- MUI. *See* Mixed urinary incontinence
- Multiaxial feet, 188
- Multiaxial prosthetic feet, 188f
- Multidisciplinary clinics, amyotrophic lateral sclerosis and, 834b
- Multidisciplinary rehabilitation, for low back pain, 672
- Multidisciplinary team, in wound healing, 473
- Multifocal dystonia, 973
- Multifocal motor neuropathy (MMN), 115–116, 822
motor neuron disease and, confusion with, 147
- Multiminicore myopathy, 902
- Multiple cranial nerves, 55
- Multiple electrical stimulation techniques, 179
- Multiple sclerosis (MS), 415, 983–1005
clinical decision-making for, 986–988, 989f–992f
cognitive impairment in, 1000–1002, 1000f
costs of, 983
definition of, 983
diagnosis of, 985–986, 987t, 988b
differential diagnosis of, 986b
disease-modifying therapies for, 988–993, 994t
environmental factors of, 984–985
epidemiology of, 983, 984f
evidence for rehabilitation in, 1002
exercise for, 994–999
genetic linkage of, 983, 984t
immunology of, 985
intravenous therapies for, 991–993
neurogenic bladder in, 999–1000
- Multiple sclerosis (MS) (*Continued*)
neurogenic bowel in, 1000
oral therapies for, 990–991
pain of, 998–999
pathogenesis of, 983–988
pediatric, 1002–1004
pharmacologic management of, 988–993
in pregnancy, 1004
pseudobulbar affect in, 1001–1002, 1002f, 1003t
rehabilitation for, 994–999
sexual dysfunction in, 436–437, 1000
sodium intake and, 985
subtypes of, 985
swallowing in, 1001
symptom management for, 994–999
symptoms of, 986b
thermoregulation in, 997–998
- Multiple swallows, for dysphagia, 63t
- Multiple system atrophy, 979–980, 981t
autonomic manifestations of, 979–980
clinical presentation of, 979
diagnosis of, 980
epidemiology of, 979
genetics of, 979
management of, 980
motor manifestations of, 979
pathophysiology of, 979
- Muscle(s), 653–655
aging on, effects of, 302, 309
anatomic variations in, 131
changes in, 594–595
energy, 325, 325f
guarding, 669
hypertrophy, 301
length-tension relationship of, 300
performance, factors affecting, 300
physiology of, 297–303
repetitions or rate in, increasing number of, 302
skeletal, structure of, 300f
spasms, 672
spindle, stretching of, 320
stretch reflex of, 320
study of, 140–142, 140t, 142f
wasting, 864
- Muscle biopsy, 129
for myopathy, 886
- Muscle contraction
molecular basis of, 301f
physiology of, 298–300
types of, 299–300
usage, 164
- Muscle fibers, 882
degeneration of, 152.e5, 152.e6f
orientation of, 299
types of, 299
- Muscle function, physiology and anatomy of, 875–882
"Muscle memory", 792
- Muscle resistance, tone as, 14
- Muscle stiffness
active, 447
passive, 448
- Muscle strength
assessment of, 27–31
principles of, 27–31
techniques in, 31
factors affecting, 300
- Muscle stretch reflexes, 15, 15t
- Muscle-tendon unit, flexibility and, 304
- Muscle tone, of child, evaluation of, 48
- Muscle weakness, myopathy and, 875
- Muscular dystrophies, 147–148, 887–888, 889f
- Musculoskeletal assessment, of pediatric patient, 44–47
- Musculoskeletal conditions, 213–219

- Musculoskeletal disorders, 5
 range of, 5
 suspicion for, 115–116
- Musculoskeletal examination, 16–31
 caveats in, 16, 18t–26t
- Musculoskeletal flexibility, exercise prescription for, ACSM guidelines for, 305
- Musculoskeletal impairments, AMA guides, sixth edition, application of, 80–82
- Musculoskeletal pain, cerebral palsy and, 1013
- Musculoskeletal physical examination, 2b
- Musculoskeletal provocative maneuvers, 18t–26t
- Musculoskeletal system
 changes in, 594–595
 inspection of, 16
 palpation of, 16–27
- MVV. *See* Maximal voluntary ventilation
- MWD. *See* Microwave diathermy
- Myasthenia gravis, as autoimmune disorder, 148–149
- Myelin basic protein (MBP), 946–947
- Myelinated axon, Schwann cell investment, 844f
- Myelomalacia, sagittal MRI scan, 647f
- Myelomeningocele (MMC), 1027–1048
 adult health care, transition to, 1044
 back defect, 1034
 behavior and, 1044
 childhood management and, 1035–1044
 cognitive function of, 1044
 early bladder management, 1034
 educational issues, vocational issues, and independent living, 1047
 embryology of, 1031, 1032f–1033f
 endocrine disorders, 1038
 epidemiology of, 1028–1029
 etiology of, 1029
 fertility, sexuality, and reproductive issues, 1046–1047
 general issues, health, and participation, 1044–1046
 genetic factors of, 1030–1031
 historical background of, 1027–1028
 hydrocephalus and, 1034
 incidence of, 1028–1029
 intrauterine surgical procedures, 1032–1034
 late musculoskeletal considerations, 1046
 late neurologic changes, 1046
 latex allergy, 1038
 mobility, 1042–1043
 motor innervation, 1038
 musculoskeletal considerations, 1038–1043
 neonatal management, 1034–1035
 neurogenic bladder, 1034, 1036–1037
 neurogenic bowel, 1037–1038
 neurologic level, assessment of, 1034
 nomenclature of, 1027–1028
 obesity and, 1044
 orthoses, 1043
 palliative care and neural tube defects, 1047
 prenatal detection of, 1032
 prenatal diagnosis and management, 1032–1034
 prevalence of, 1028–1029
 prognostication, 1039t–1040t
 psychological and social issues and, 1044
 renal and urologic damage, 1046
 risk factors of, 1029
 shunts, 1035
 skin breakdown and, 1043–1044
 terminology of, 1027–1028
 tethered cord syndrome, 1036
 therapy, 1034–1035
 toileting independence, 1037
- Myeloradiculopathy, 646–647
- Myocardial infarction, cardiac rehabilitation of
 patient after, 517–520
 cardiac mobilization program for, 520t
- Myocardial oxygen capacity, aerobic training and, 516
- Myocardial oxygen consumption (M_{VO_2}), 514
- Myoclonic epilepsy with ragged red fibers (MERRF), 906
- Myoclonus, 13, 973
 asterixis, 973
 negative, 973
 palatal, 973
 spinal, 973
- Myocytes, cardiac, 513
- Myoelectric devices, advantages/disadvantages, 167t
- Myoelectric prostheses, 166
- Myoelectrical control systems, types, 164
- Myoelectrically controlled prosthesis, muscle contraction (usage), 164
- Myofascial pain, 672
- Myofascial pain syndrome
 exercise for, 313
 suspicion for, 115–116
- Myofascial release, 334
- Myofiber, 882
- Myofilament, 882
- Myokymia, 127–128
- Myokymic discharge, 127–128, 128t
- Myopathic disorders, 147–148, 875–914, 876t–881t
 acquired metabolic myopathies, 909
 acquired myopathies, 907–909, 908t
 congenital muscular dystrophy, 896–900
 congenital myopathies, 902–903, 903f, 904t
 diagnostic workup for, 885–887, 886t
 disease history of, 882–883
 disease-modifying treatments for, 892–893
 distal inherited muscular dystrophies, 900–901
 dystrophic myotonias, 901–902
 electrodiagnostic studies on, 885
 Emery-Dreifuss muscular dystrophy, 893
 evaluation of patient with, 882–887
 facioscapulohumeral muscular dystrophy, 893–894, 893f
 family history of, 883
 forearm exercise test for, 886
 genetics of, 883
 glycogen metabolism disorders, 905–906
 histology and histochemistry of, 887
 immunohistochemical staining and, 886t
 interdisciplinary team for, 910–911
 secretion management, 910–911
 limb girdle muscular dystrophies, 895–896
 lipid metabolism disorders, 906
 metabolic myopathies, 905
 mitochondrial myopathies, 906
 molecular genetics and, 886
 muscle biopsy for, 886
 neuropsychiatric conditions and, 911
 nondystrophic myotonias, 903–905
 nutritional management for, 911–912
 oculopharyngeal muscular dystrophy, 894, 894f
 physical examination for, 883–884, 884f–885f
 progressive external ophthalmoplegia, 906–907
 radiographic evaluation for, 887
 rehabilitation of individuals with, 910
 respiratory management for, 913, 914f
 serum laboratory studies for, 885
 surgical history of, 883
 swallowing disorders, 911
 toxic myopathies, 909–910
- Myopathic gait, 17t
- Myopathic recruitment, 129
- Myopathy, 115–116, 147–148
 congenital, 902–903
 Duchenne and Becker muscular dystrophy (dystrophinopathies), 888–892
- Myopathy (*Continued*)
 electrodiagnostic findings in, 148t
 exercise for, 912
 inflammatory, 887
 metabolic, 905
 mitochondrial, 906
 muscular dystrophies, 887–888, 889f
 toxic, 909–910
- Myophosphorylase deficiency (McArdle disease), 905
- Myoplasty, 156
- Myosin filaments, 297–298, 300f
- Myosin molecules, tails of, 298
- Myotilinopathy, 895
- Myotonia, 126
- Myotonia congenita, 903–904
- Myotonic discharges, 126–127, 127t
- Myotonic dystrophy type 2 (DM2), 901–902
- Myotonic muscular dystrophy, 875, 901, 901f
- Myotonic muscular dystrophy type 1 (DM1), 901
- N**
- Naloxegol, for constipation, 426
- NAM. *See* Necrotizing autoimmune myositis
- Narcolepsy, 996–997
- Nasal intermittent positive-pressure ventilation, 546f
- Nasogastric feeding tubes, for dysphagia, 65
- Natalizumab (Tysabri), for multiple sclerosis, 991–993, 994t
- National Alliance for Caregiving, 950
- National Collegiate Athletic Association (NCAA), drugs/supplements ban, 798
- National Committee for Quality Assurance (NCQA), 100
- National Dysphagia Diet*, 64
- National Family Caregivers Association, 950
- National Governing Bodies (NGBs), 813
- National Health and Nutrition Examination Survey* (NHANES) database, 524
- National Institute on Deafness and Other Communication Disorders (NIDCD), 1110
- National Institute on Disability and Rehabilitation Research (NIDRR), 499
- National Pressure Ulcer Advisory Panel (NPUAP), 474, 1088t
- National Quality Forum, 109
- National Quality Strategy (NQS), 100
- National Safety Council (NSC), 90
- National SCI Model System Database, 1050
- Natural products, 369–372
- Naturopathy, 365
- Nausea, 412
 management of, 422–423
- NCAA. *See* National Collegiate Athletic Association
- NCQA. *See* National Committee for Quality Assurance
- NCSs. *See* Nerve conduction studies
- NCV. *See* Nerve conduction velocity
- Near-term infants, hemiparetic/quadruparetic CP, 1007
- Near vision activities, 1118
- Neck
 cancer of, 588, 588f
 common problems, 627–650
 diagnosis, 635
 disorders affecting, 634b
 pathophysiology of, 633–635
 physical modalities, 635
 treatment of, 635
- Neck pain, 657–658
 cluster, 627
- Neck region pain, brachial plexopathies and, 134
- Necrotizing autoimmune myositis (NAM), 907–908
- Needle biopsy, for myopathic disorder, 887

- Needle electromyography, 120–123
 one-handed technique of, 122
 specificity of, 139
- Needle examination, aspects of, 122
- Needle insertional activity, 122–123, 122f
- Needle recording electrodes, 152.e8, 152.e8f
- Needlestick injuries, 122
- Needs assessment, via health risk appraisal, 530
- Neer-Walsh impingement test, 715–716, 718
- Negative pressure wound therapy, 484
- Nelson, Lord, 1049
- Nemaline myopathy, 902
- Neoadjuvant therapy, 581
- Neonatal management, 1034–1035
- Neoplastic-induced plexopathy, 848, 848t
- Neospinothalamic system, 754
- Nephrogenic systemic fibrosis, 488–489
- Nephrosclerosis, 531
- Nerve(s), 655, 655f–656f
 anatomy of, 844f
 pathways, anatomic variations in, 131
 plexuses, 575–576
- Nerve biopsy, 129–131
- Nerve block (neurolysis), 463–464, 464t
- Nerve conduction studies (NCSs), 118, 639
 interpretations of, 131–132
 latency/amplitude of, 118
 protocol for, recommended, 147
 safety of, 118
- Nerve conduction velocity (NCV)
 temperature in, 152.e2
 in women, 152.e2
- Nerve fiber, classification of, 752t
- Nerve injuries, 219–221, 220f
 algorithm for, 144f
 classification of, 116–118, 117t, 844t
 Seddon, 116–117
 Sunderland, 117–118
 electrodiagnostic assessment of, 143
 incomplete, 221
 proximal median, 850
- Nerve roots
 impingement, 656
 mechanism of mechanical compression of, 677–678
- Nerve stimulation, for neurogenic bladder, 1000
- Neural adaptations, 301
- Neural tube defects (NTDs), 1027
 palliative care and, 1047
 prevalence of, 1030f
 risk factors for, 1031t
- Neurapraxia, 116–117, 117t
- Neurapraxic injury, 143
- Neurectomy, 786–787
- Neuritis, vestibular, 1113
- Neuroanatomy, 954–956, 955f–956f, 957t–958t
- Neurobehavioral Rating Scale, 929, 939–940
- Neurodegenerative disorders, dysphagia from, 58
- Neurofacilitation techniques, 306–307
- Neuroforaminal closure, root tension and, 638
- Neurogenic bladder, 1034, 1036–1037
 in multiple sclerosis, 999–1000
- Neurogenic bowel, 1037–1038
 complications of, 429
 dietary considerations of, 424–425
 dysfunction and rehabilitation, 407–430
 results, 424
 epidemiology of, 407
 impact of, 407–408
 management of, 422–425
 in multiple sclerosis, 1000
 physical interventions of, 426–428
 rationale, 425–429
 surgical options for, 428–429
 treatment for, 425–429
 outcomes of, 429
- Neurogenic bowel dysfunction score, 420f
- Neurogenic lower urinary tract dysfunction (NLUTD), 389–406
 adrenergic agonists for, 399
 adrenergic antagonists for, 398–399
 adult diapers and, 397
 anal stretch voiding and, 396–397
 anatomic classification of, 392f
 antimuscarinic agents for, 398
 bethanechol for, 398
 capacity, increase, 399–400
 cholinergic agonists for, 398
 classification of, 391
 complications of, 403–404
 computed tomography of, 393
 computed tomography urogram of, 393–394
 contractility, increase, 400–401
 creatinine clearance time of, 394
 cystography of, 394
 cystometrogram of, 395
 cystoscopy of, 395
 denervation procedures for, 400
 diagnostic testing for, 392, 393t
 indications for, 392
 differential diagnosis of, 402–403
 electrical stimulation of, 400–401
 estrogens for, 399
 evaluation of, 391–395
 external (“condom”/“Texas”) catheters and, 397
 external compressive procedures for, 401
 functional classification of, 392t
 history of, 391–392
 indwelling catheters and, 397
 intermittent catheterization and, 397–398
 intravesical therapy for, 399
 isotope studies of, 394
 lower tract tests for, 394–395
 management of, 1085–1086
 micturition reflex and, 389
 muscle relaxants for, 399
 neuroanatomy and physiology of, 389–391
 nonpharmacologic treatment of, 395–398
 behavioral management of, 395–397
 principles of, 395
 outflow resistance, decrease, 402
 outlet resistance
 decrease, 401–402
 increase, 401
 pelvic floor exercises and, 397
 peripheral innervation and, 389
 pharmacologic treatment of, 398–399
 principles of, 398
 physical examination of, 391–392
 postvoid residual of, 394
 sensitivity testing of, 394
 sphincter electromyography of, 395
 sphincterotomy of, 401
 timed voiding and, 395
 ultrasonography of, 392–393
 upper tract tests for, 392–394
 urethral stents for, 401–402
 urinalysis and culture of, 394
 urinary diversion for, 400
 urodynamics of, 394–395
 definitions, 393t
 videourodynamic study of, 395
- Neurogenic pain, definition of, 750t
- Neurogenic shock, treatment of, 1065–1071
- Neurologic claudication, 679
- Neurologic complaints, inquiry about, 115
- Neurologic complications, of stroke, 960–962
 cerebral vasospasm, 962
 hemorrhagic conversion, 960–961, 962t
 hydrocephalus, 962
- Neurologic complications, of stroke (*Continued*)
 repeat stroke, 961–962
 seizures, 962
- Neurologic disorders, 5
 gastrointestinal dysfunction in, 414–422
 sexual dysfunction and, 437
- Neurologic examination, 6–7
- Neurologic level of injury (NLI), 1051
 definition of, 1057
- Neurologic physical examination, 2b
- Neurologic recovery, ambulation and, 1064, 1064f, 1065t
- Neurologic system
 changes in, 595
 testing of, 7
- Neuroma(s)
 development of, 178
 formation of, 156
 in limb-deficient athletes, 818
- Neuromatrix theory, 751
- Neuromuscular conditions, 219–223
- Neuromuscular control (NMC), 794
 importance of, 792
- Neuromuscular electrical stimulation (NMES), 1015
 swallowing and, 65
- Neuromuscular facilitation, 305
- Neuromuscular junction
 disorders, 115–116, 148–150, 149t, 830
 failure at, 143
 transmission disorders, electrodiagnostic findings in, 148t
- Neuromyelitis optica, 1063
- Neuromyelitis optica spectrum disorders (NMOSD), 985–986
- Neuromyotonic discharges, 128–129, 128t
- Neuron-specific enolase (NSE), 946–947
- Neuronal disconnection, 919
- Neuropathic pain, 762, 764–766, 862
 conditions, anticonvulsant medications, 766–771
 in multiple sclerosis, 998–999
 treatment for, 762, 764–766
 challenge, 862–863
- Neuropathic pain, definition of, 750t
- Neuropathic wounds, 470–472, 471f
 evaluation of, 472
 management of, 472–473
- Neuropathies, 842
 anatomy and physiology of, 842
 autonomic, 865
 chemotherapeutic, 581
 classification of, 844t, 845b
 complications of, 862–863
 in foot, 862
 functional impairment, 863
 pain as, 862–863
 connective tissue disease, 870–874
 diabetic, 864–865
 femoral, 854–855
 infectious, 868–869
 lateral femoral cutaneous, 855–856
 lower abdominal, 859–860
 mechanism and classification of, 842–843
 oburator, 856
 posterior interosseous, 853
 proximal, 864
 specific, 864–874
 toxic, 869–870
- Neurophysiology, of swallowing, 55
- Neuropsychologic (NP) testing, 806
- Neuropsychological assessment, 70
 purpose of, 938
- Neuro-QOL, 950
- Neurostimulants, 439t
- Neurotmesis, 117, 117t

- Neurotrophins, 921
administration of, 922
- Newborns
conduction velocities in, 132–133
peripheral nerve entities in, occurrence of, 133–134
- NGBs. *See* National Governing Bodies
- NIDCD. *See* National Institute on Deafness and Other Communication Disorders
- NIDRR. *See* National Institute on Disability and Rehabilitation Research
- NIPPV. *See* Noninvasive intermittent positive-pressure ventilation
- Nitric oxide, 810
- NLI. *See* Neurologic level of injury
- NLUTD. *See* Neurogenic lower urinary tract dysfunction
- NMC. *See* Neuromuscular control
- NMES. *See* Neuromuscular electrical stimulation
- N*-methyl-D-aspartate (NMDA), 753–754
- N*-methyl-D-aspartate (NMDA) receptor antagonist, 178–179
- NMOSD. *See* Neuromyelitis optica spectrum disorders
- No Child Left Behind Act of 2002, 1014t
- Nociception, 750t, 751
- Nociceptive impulses, brain center modulation, 409–410
- Nociceptive information, conveyance, 753–754
- Nodes of Ranvier, in myelinated nerves, 152.e1
- Nonaka distal myopathy/h-IBM, 900
- Nonarticular splint, 214f, 214t–217t
- Nonblanchable erythema, of intact skin, 475, 475f
- Noncontact, low-frequency ultrasound, 480t
- Noncontact anterior cruciate ligament (ACL) injuries, 798
- Noncontact low-frequency ultrasound, 483
- Non dystrophic myotonias, 903–905
- Nonelectronic AAC systems, 377–378
- Nonfunctioning pelvic floor muscles, 775
- Noninvasive arterial studies, 487–488
- Noninvasive intermittent positive-pressure ventilation (NIPPV), 539
long-term outcomes of, 547
- Noninverting amplifier, 152.e9
- Nonnecrotizing vasculitides, 486
- Non-neural structures, biomechanical/biochemical insults, 631
- Nonpoliomyelitis infections, 827–828
- Nonproportional drive control, 282–283
- Nonservice connected, disability and, 78–79
- Nonspecific low back pain, 666
- Nonsteroidal antiinflammatory drugs (NSAIDs), 439t, 762, 799
for bone pain, 572
for heterotopic ossification, 931
- Nontraumatic spinal cord injury, 1059–1063, 1061t–1063t
- Nonverbal tests, alternative, 51t
- Noradrenergic systems, 922
- Norepinephrine transporter (NET) inhibitor, 923
- Normal human gait, 201–207
- Normal pelvic floor muscles, 775
- Normal pressure hydrocephalus, 601
TBI and, 934
- Normal Shape Normal Alignment (NSNA) design, 183–184
- Normal transit constipation, 781
- Northwestern socket, 164–165
- Noxious stimulus, definition of, 750t
- NPUAP. *See* National Pressure Ulcer Advisory Panel
- NQS. *See* National Quality Strategy
- NSAIDs. *See* Nonsteroidal antiinflammatory drugs
- NSC. *See* National Safety Council
- NSE. *See* Neuron-specific enolase
- NTDs. *See* Neural tube defects
- NTS. *See* Nucleus tractus solitarius
- Nucleoplasty, 642
- Nucleus tractus solitarius (NTS), 408
connections with, 409
- “Nudge”, operation, 164
- Number of phases, definition of, 152.e5
- Nutrition, 369
ALS and, 834b, 836–837
- Nutritional support, in pressure injury, 478
- O**
- O’Brien test, 715
- OA. *See* Osteoarthritis
- Obesity, 525
exercise for, 307
- Obesity-hypoventilation syndrome, 548
- Obesity-related pulmonary dysfunction, 548
- Objective auditory tests, 1105, 1105f
- Obligatory primitive reflexes, 48
- Obstructive lung disease, primary limitations of, 516
- Obstructive sleep apnea (OSA), 548, 996, 1080–1081
- Obtundation, 7
- Obturator neuropathy, 856
- Occipital lobe, 955
- Occlusion, acute arterial, 485
- Occupational medicine, 89–99
- Occupational Safety and Health Administration rule, AANEM support for, 120–122
- Occupational therapy, for myopathic disorders, 912
- Occupational Therapy Practice Framework, for ADL and I-ADL, 4, 4b
- OCD. *See* Osteochondritis dissecans
- Ocrelizumab, for multiple sclerosis, 993
- Oculomotor nerve (cranial nerve III), examination of, 9
- Oculopharyngeal muscular dystrophy, 894, 894f
- OECD. *See* Organization for Economic Cooperation and Development
- Off-season cross-training, 792–793
- Off-set knee joint, instability from, 239
- Off-the-shelf ankle/foot orthoses, as mobility assistive device, 3t
- Off-the-shelf shoe, 474
- Older adults
activity for, 308–311
aerobic exercise prescription guidelines for, 310t
physical activity counseling for, 310b
resistance exercise prescription guidelines for, 310t
TBI in, 945–946
voiding function in, 390
wheelchair for, 266–267
- Older athlete, 812–813
exercise in, benefits for, 813t
- Olecranon bursa, 721
- Olecranon bursitis, 721–722
- Olfactory nerve (cranial nerve I), examination of, 9
- OLT. *See* Osteochondral lesion of the talus
- Ondine curse, 545–546
- 180-degree system, 27, 28f
- One Step, 378
- One-arm lever drive system, 278f
- One-site/two-function (single-site) system, 164
- One-to-one sitters, 938–939
- On-site concussion, 923–924
- Onuf nucleus, 389
- Open-chain exercises, 794
- Open-packed position, 16–17
- Operant behavioral techniques, 756
- Operant behavioral therapy, goals of, 756
- Operant learning, 755–756
- Opioid analgesics, prescription of, 765t–766t
- Opioid dose conversion, 573t
- Opioids, 439t
for bone pain, 572, 573t
for burns, 501
- Optic nerve (cranial nerve II), examination of, 9
- Optic pathways, from retina to visual cortex, 1116f
- Optimal dose, 465
- Optimal healthcare quality, defined, 100
- Optimal wheelchair prescription, 262
- Oral bolus hold, for dysphagia, 63t
- Oral cavity cancer, dysphagia and, 58
- Oral contraceptive pills, 810
- Oral preparatory stage, of swallowing, 53
- Oral spasmolytics, for spasticity, 455–459
- Oral stage, of swallowing, 53
- Oral therapies, for multiple sclerosis, 990–991
- Oral transport stage, of swallowing, 53
- Organ systems, review of, 6
- Organ transplantation, 535–567
exercise after, 313
- Organization for Economic Cooperation and Development (OECD), 96
- Orgasm, neurologic control of, 1087
- Orgasmic ability, preservation of, 436
- Orgasmic dysfunction, prevalence of, 435
- Orientation, 7–8
- Orientation and mobility (O&M), 1118
- Orientation Log (O-Log), 929
- Orogastric feeding tubes, for dysphagia, 65
- Oropharyngeal swallow process, bypass, 65
- Oropharyngeal swallowing, 60–61
- Orthodromic bipolar SNAP waveform recordings, 152.e3
- Orthopaedia, 248
- “Orthopedic disease”, somatic dysfunction coexisting with, 322
- Orthoses, 209, 248, 589f
acronyms, 248
description of, 250–256
MMC, 1043
osteoporotic spine and, 701–703
primary goal of, 248
rheumatic diseases and, 622–623, 623f–624f
- Orthostasis, 865
- Orthostatic hypotension, 1082
frailty and, 528–529
Parkinson disease and, 976
in wheelchair athletes, 817
- Orthostatic syncope, 512
- Orthotic devices, upper limbs, 209–228
classification of, 209, 210t–211t
design categories of, 214t–217t
diagnostic categories of, 212–225
materials for, 226–227
- Orthotic prescription, 248–249
- Orthotics, 248
- Orthotist, 248
- OSA. *See* Obstructive sleep apnea
- Osgood Schlatter syndrome, 734, 735f
- Osler, William, 1006
- Osseointegration, 169, 170f
- Osteoarthritis (OA), 218–219, 219f, 599, 607–609
hand, 609
hip, 609, 731–732, 732f
imaging of, 607–608, 608f
Kellgren-Lawrence Radiographic Grading Scale for, 607, 608t
knee, 232, 607
management of, 609–610
pharmacological, 609
prognosis of, 608
risk factors for, 607
signs and symptoms of, 607
surgical procedures for, 610
- Osteoblast stimulator agents, for osteoporosis, 703–704

- Osteoblastic activity, stimulation of, sodium fluoride and, 709
- Osteoblasts, derivation of, 690
- Osteochondral lesion of the talus (OLT), 744
- Osteochondritis dissecans (OCD), 736
- Osteoclasts
- calcitonin and, 691
 - localized, 690
- Osteolytic lesion, pathologic fractures and, 574
- Osteomyelitis, infection, 677
- Osteonecrosis, 727
- Osteopathic medicine, 368
- Osteopathy, 368
- Osteopenia, 599, 810
- cerebral palsy and, 1013
- Osteoporosis, 599, 690–714, 710f, 810, 810t
- acute pain in, management of, 693b
 - calcium metabolism and, 1083–1084
 - causes of, 691b
 - chronic back pain secondary to, 694
 - chronic pain in, management of, 695b
 - classification of, 691
 - clinical manifestations of, 692–693, 693f
 - computerized dynamic posturography, composite score for, 696f
 - diagnostic evaluations for, 698t
 - diagnostic studies in, 697
 - exercise for, 700–701, 700f
 - fractures and management of, 693
 - individuals at risk for, 697
 - insufficiency fractures with, 697f
 - nonstrenuous progressive exercises for, 705f–706f
 - pathogenesis, 691
 - pharmacologic interventions for, 703–713
 - postmenopausal, FDA approved medications for, 713t
 - radiographic findings of, 697, 698f
 - sex steroids, role of, 692
 - steroid-induced, management of, 711–713
 - suggested rehabilitation guidelines for, 700b
 - treatment for, 697–701
 - in wheelchair athletes, 817
 - World Health Organization definition, 690
- Osteoporotic compression fractures, 675–676
- Osteoporotic skeletal frame, posture training program for, 701–703, 711f
- Osteoporotic spine, orthoses and, 701–703
- Otoacoustic emissions, 1105
- Otoconia, 1110
- Otolith organ system, 1110
- Otolithic membrane, 1110
- Otoscope examination, of auditory system, 1102–1105, 1104b
- Ototoxic drug, hearing loss from, 1105
- Outcome, of health care, 101–102, 103f
- Outcome measures, 101–105, 265
- choosing, 104b–107b, 105, 106t
 - functional independence measure, 104b, 104–105
- International Classification of Functioning, Disability and Health, 103–104
- for medical rehabilitation, 100–114
 - patient-reported outcomes, 105
 - process measures and, 101–102
 - types of, 101–103
 - use of, 102
- Outcomes Following Traumatic Spinal Cord Injury*, 1064–1065
- Outer ear, 1102f
- Outlet constipation, 781
- Outpatient rehabilitation
- neurologic examination for, 6
 - plan, 40b
 - goals of, 40b
 - programs, after renal transplant, 533
- “Over the top” throwers, 796
- Overactive pelvic floor muscles, 775
- Overarching principle, 798
- Overhead strap lift, 285, 286f–287f
- Overload, principle of, 790
- Overt Agitation Severity Scale, 939–940
- Over-the-counter orthoses, treatment with, 230
- Overtraining, 294, 295b
- Overtraining syndrome, 791
- Oxandrolone, 503
- Oxford technique, 301
- Oxidative injury, F₂-isoprostane marker, 947
- Oximetry, transcutaneous, 488, 488t
- Oxygen
- concentrators, 538
 - therapy, 538
- Oxygen pulse, 294
- Oxytocin, 935
- P**
- Pacing system, external transmitter and antenna of, 546–547
- Packing strips, 480–482
- PAD. *See* Peripheral arterial disease
- Pain, 748–749
- adjustment to, factors, 761f
 - ALS and, 839
 - ascending and descending modulation, 754
 - cancer and, 571–572, 571b
 - central sensitization, 754
 - centralization and, 657
 - control, 161
 - definition of, 750t
 - descending inhibition, 754
 - discussion of, terminology, 750t
 - disorder criteria of, 757
 - experience, aspects of, 750–751
 - gate control theory and, 750–751
 - management of, in burns, 501
 - medicine, universal precautions, 767b
 - modulation, 753–754
 - of multiple sclerosis, 998–999
 - myopathic disorders and, 912
 - neuroimaging, advances in, 751
 - neuropathic, 862
 - pathophysiology of, 751–756
 - peripheral sensitization, 753
 - physiology of, 751–756
 - psychological aspects of, advancements in, 751
 - relaxation training and, 761
 - somatic, in residual limb, 178
 - specificity theory, 750
 - spinal cord compression, associated with, 575
 - theory, history of (peripheral perspective), 750–751
 - transduction, 752
 - transmission, 752–753
 - treatment of, 760t
 - treatment programs of, 759
- Pain management, 178–179
- Pain referral patterns, pathophysiology and significance of, 632f
- Pain-related disability, maintenance of, 755
- Pain-related insomnia, 770
- Palatal myoclonus, 973
- Paleospinothalamic system, 754
- Palliative care, amyotrophic lateral sclerosis and, 834b
- Palmar grasp reflex, 1011t
- Palmar hand burns, 225
- Palmer, Daniel David, 317
- Palmonental reflex, 15t
- Palpation, of musculoskeletal system, 16–27
- Palpitation, cardiopulmonary syncope, 512
- Pancreatic beta cells, dysfunction of, 562
- Pancreatitis, increased incidence of, 1084
- Paracelsus, 973–974
- Paraffin bath, 341, 342f
- Paralympic games, 813
- Paralysis
- TBI and, 933
 - of upper limbs, 221–222
 - wheelchair prescription and, 264
- Paralytic poliomyelitis, 826
- Paramyotonia congenita, 904
- Paraneoplastic degeneration, 827
- Paraneoplastic syndromes, 576, 577t
- Paraspinal hematomas, 122
- Parathyroid hormone, 691, 704–707
- Paré, Ambroise, 248
- Paresis, wheelchair prescription and, 264
- Paresthesia, definition of, 750t
- Parietal lobe, 955
- PARK2* gene, 974–975
- Parkinson disease, 402, 414, 601, 974–975, 981t
- autonomic nervous system symptoms of, 976
 - treatment for, 978, 978t
 - autosomal dominant forms of, 974
 - autosomal recessive forms of, 974–975
 - caregiver considerations for, 978–979
 - clinical presentation of, 975
 - cognitive symptoms of, 976
 - diagnosis of, 976
 - dysphagia and, 58
 - epidemiology of, 974
 - genetic risk factors for, 975
 - genetics of, 974
 - levodopa-induced dyskinesias in, 977–979
 - management of, 976, 977b
 - motor examination for, 976
 - motor response oscillations in, 977
 - motor symptoms of, 975
 - pharmacologic treatment of, 977
 - neuropsychiatric symptoms of, 975
 - nonmotor symptoms of, 975
 - treatment for, 978, 978t
 - nonpharmacologic treatment of, 978
 - pathophysiology of, 975
 - pharmacologic treatment options for, 977b
 - sleep disturbances and, 976–977
 - surgical treatment for, 978
 - top ten facts about, 975b
 - top ten warning signs of, 976b
- Parkinson plus diseases, 414
- Parkinson plus syndromes, 979–980
- Parkinsonian gait, 17t
- Parkinsonism, dystonia and, 973
- Paroxysmal sympathetic hyperactivity (PSH), 934–935
- PAR-Q. *See* Physical Activities Readiness Questionnaire
- Parsonage-Turner syndrome, 846
- Partial facial paralysis, 133–134
- Partial foot amputations, prosthetic prescription for, 192–193
- Partial hand prostheses, 164
- Partial-thickness burns, 499, 501f
- Partial-thickness skin loss, with exposed dermis, 475, 475f
- Participation
- definition of, 2t
 - involvement, 376
 - restrictions, 376
- Passionflower, 370t–372t
- Passive glenohumeral joint range-of-motion (ROM) exercises, 716
- “Passive” muscle stiffness, 448
- Passive range of motion (PROM), 14
- Passive stretching, 305
- resistance to, 453–454

- Passive terminal devices, 166–168, 167b
- Passy-Muir tracheostomy speaking valve, functioning of, 1081f
- Past medical/surgical history, 5
- Patellar tendinopathy, 734, 734f
- Patellar tendon bearing (PTB), 183
- Patellar tendon bearing ankle-foot orthoses, 235
- Patellofemoral pain, 733–734
- Patellofemoral tests, 18t–26t
- Pathologic barrier, 323–324
- Pathology, motor unit and, 152.e5
- Patient, history of, 297
- Patient education
- in foot care, 473
 - rheumatic diseases and, 619–620
- Patient Protection and Affordable Care Act of 2010, 100
- “Patient-oriented evidence that matters” (POEM), 107
- Patient-reported outcomes, 105
- Patient-Reported Outcomes Measurement Information System (PROMIS), 105
- Patients, dual disability, rehabilitation and, 511
- PBA. *See* Pseudobulbar affect
- PCL. *See* Posterior cruciate ligament
- PEA. *See* Pulseless electrical activity
- Peak bone mass, 809–810
- Pectoral muscle, absence of, 46f
- Pediatric adaptive stroller, 270f
- Pediatric athlete, 810–812
- training programs for, 811
- Pediatric electrodiagnosis, 132–134
- Pediatric Glasgow Coma Scale (PGCS), 916
- Pediatric low back pain, 688–689, 688b
- Pediatric lower limb loss, 198–201
- financial and vocational impacts of, 201
- Pediatric manual wheelchair, 268, 270f
- Pediatric orthoses, 244–246, 245f–246f
- Pediatric patient
- developmental evaluation and screening tests for, 50t
 - examination of, 42–52
 - functional assessment of, 48–52
 - history of, 42–44
 - birth, 42
 - developmental, 42–43
 - educational, 43–44
 - family, 43
 - presenting problem in, 42
 - social, 43–44
 - intellectual evaluations for, 51t
 - multiple sclerosis in, 1002–1004
 - musculoskeletal assessment of, 44–47
 - neurologic assessment of, 47–48
 - physical examination of, 44–52
- Pediatric power wheelchair, 266f
- Pediatric Quality of Life Inventory (PedsQL), 52, 52t
- Pediatric rehabilitation medicine, 108
- Pediatric shoes, 232
- Pediatric-specific performance measures, 110
- Pediatric spine, neoplastic disease of, 689
- Pediatric TBI, 944–945
- impact on health care needs, 945
 - neurobehavioral functioning and, 945
 - outcomes in, 944
- Pedicle flaps, 155
- Peer visitor, 160
- Pelvic floor
- exercises for, 397
 - innervation of, 777f
 - motility of, 410
 - muscles of, 776f
 - neuromusculoskeletal anatomy of, 774–775, 775f–776f, 776t
- Pelvic floor (*Continued*)
- parasympathetic, sympathetic, and somatic nerve supply to, 390f
 - physical examination of, 775–777
 - slings, 428
 - terminology of, 775
- Pelvic floor disorders, 774–788
- overlap of, and chronic pelvic pain, 787–788
- Pelvic floor dysfunction, types of, 777–787
- Pelvic floor muscles (PFMs), 774, 776f, 776t
- Pelvic floor myofascial pain, 782–783
- definitions and etiology of, 782
 - diagnosis and physical examination of, 782–783
 - epidemiology of, 782
 - treatment of, 783
- Pelvic floor pain/dysfunction, etiologies of, 774t
- Pelvic floor physical therapy, 427–428
- Pelvic floor rehabilitation, 780
- Pelvic girdle, 775f
- Pelvic girdle pain (PGP), 784
- Pelvic nerve injuries, 785–787
- definitions and etiology of, 785
 - diagnosis and physical examination of, 785–786, 786f
 - epidemiology of, 785
 - treatment of, 786–787
- Pelvic stabilizers, 654–655
- Pelvis
- anteroposterior x-ray of, 729f
 - fractures of, 574
- Pendulum test, 14
- Penetration disorder, 434, 446
- Penile implants, 1087
- Penile vibratory stimulation (PVS), vibrator disc
- position during, 444f
- Pentoxifylline, 490
- Peppermint oil, 370t–372t
- Perceived exertion
- Borg Scale of, 296t
 - rating of, 296
- Perceptual dysfunction, 943
- Perceptual evaluations, 51t
- Percussion massage, 333
- Percussion myotonia, 884, 885f
- Percutaneous disectomy/disk decompression, 642
- Percutaneous radiofrequency ablation medial branch neurotomy, 643–644
- Performance, maximization of, 1
- Performance-enhancing drugs, 799–800
- anabolic steroids, 799–800, 800t
 - creatine, 801
 - erythropoietin and blood doping, 800
 - stimulants, 800
 - supplements, 800–801
- Performance measures/metrics, 108–110
- health care quality with, 109–110
- Periodic limb movement disorder (PLMD), 996
- Periodization, 790–791
- Periodized training program, template for, 791f
- Peripheral arterial disease (PAD), 472, 485
- evaluation for, 487–489
 - exercise for, 491
 - gangrene in, 486f
 - gene therapy for, 491
 - imaging techniques for, 488–489
 - intermittent pneumatic compression for, 491
 - lipid management in, 490
 - management of, 489–491
 - rehabilitation for, 491
 - revascularization, 491
 - risk factor management for, 490
- Peripheral innervation, 389
- Peripheral joints, manipulation of, 316
- Peripheral nerve injury, ultrasound in diagnosis of, 845
- Peripheral nerves
- cancer involving, 576
 - diseases of, 403
 - distribution of, 12f–13f
 - injuries to, 144f
 - injury to, 219–221
- Peripheral nerves disorders, 687
- Peripheral neuroanatomy, understanding of, 134
- Peripheral neurogenic pain, 750t
- Peripheral neuropathic pain, 750t
- Peripheral neuropathies, 504, 863
- assessment of, 860–862
 - classification of, and common etiologies, 845b
 - electrodiagnostic criteria for, 862b
 - electrodiagnostic findings for, 146t
 - exam finding predictive of, 861b
 - generalized, 860–862
 - medications associated with, 861b
- Peripheral neuropathy, 416
- Peripheral resistance, aerobic training and, 516
- Peripheral sensitization, 753
- Peripheral tissue insulin resistance, 562
- Peripheral vascular disease, 312
- exercise prescription guidelines for, 312t
- Peritoneal dialysis, 532
- Periventricular leukomalacia (PVL), 1006
- Permission Limited Information Specific Suggestions Intensive Therapy (PLISSIT) model, 440b
- Peroneal mononeuropathies, 856–857
- Peroneal motor nerve conductions, 147
- Peroneal nerve, 856f
- Peroneal neuropathy, intrauterine onset of, 134
- Peroneal tendinitis, 742
- Persistent sinus node denervation, 313
- Personal injury claims, 79
- Pes anserine bursitis, 736
- Pes cavus, 47, 231, 873, 1041
- deformity, 873f
 - in neuromuscular disorders, 49f
- Pes planus, 47, 230–231
- ligamentous laxity in the foot and, 231
- PET. *See* Positron emission tomography
- Pétrissage, 333, 333f
- Peyronie disease, 440, 442
- PFC. *See* Prefrontal cortex
- PFMs. *See* Pelvic floor muscles
- PGCS. *See* Pediatric Glasgow Coma Scale
- PGP. *See* Pelvic girdle pain
- Phalangization, 158, 159f
- Phantom limb pain (PLP), 161, 178, 179b
- Phantom limb sensation (PLS), 178
- Phantom pain, 161
- Pharmacodynamics, changes in, 596
- Pharmacokinetics, changes in, 596
- Pharmacotherapy, 703–704
- Pharyngeal phase, of swallowing, 53–55
- Phenytoin
- long-term treatment with, 931
 - for PTE, 930–931
- Philadelphia orthosis, 252, 252f
- biomechanics of, 252
 - contraindications for, 252
 - design and fabrication of, 252
 - indications for, 252
- Phlegmasia cerulea dolens, 492
- Phonophoresis, 346
- Phrenic nerve pacing, 1080
- Physes, 812f
- Physiatric assessment, structure of, 1
- Physiatric history, 1–6
- patients, as source of information for, 2–3
 - rapport in, 2
 - time in, 2

- Physiatric history and physical examination (H&P), 1–41
 assessment of, 39–40
 emphasis on, 1
 essential elements of, 2b
 plan of, 39–40, 39b
 summary of, 39–40
- Physiatrists, 523
 evaluation of patients with TBI, 925
- Physical Activities Readiness Questionnaire (PAR-Q), 297, 297b
- Physical activity
 decrease in, 692
 low, Fried Frailty Phenotype and, 525
 for multiple sclerosis, 994, 995t
- Physical agent modalities, 338–363
 perspective of, 356–361
- Physical conditioning, heart rate and, 514
- Physical examination, 115–116, 802
 algorithmic approach to, 115, 116f
 clinical assessment and, 115
 of motor neuron disease, 828–829
 of pediatric patient, 44–52
 physiatric, 6–16
- Physical inactivity, 307
- Physical medicine and rehabilitation (PM&R), 74
- Physical modalities, rheumatic diseases and, 623–624
- Physical restraints, for TBI patients, 940
- Physical therapy
 for myopathic disorders, 912
 for Parkinson disease, 978
- Physical Treatment by Movements, Manipulation and Massage*, 332
- Physical variables, in wheelchair and seating system assessment, 263
- Physically disabled, cardiopulmonary rehabilitation in, 523
- Physician billing, H&P basis for, 1
- Physiologic anemia (pseudonemia), 809
- Physiologic tremor, 973
- Physis, 811, 812f
- Pia mater, 1051
- “Picking up”, involvement of, 333
- Piezoelectric shock wave generator, 349
- Pilates, 761
 usage, 670
- PIN. *See* Posterior interosseous neuropathy
- Pin lock suspension, 184–185, 187f
- Pinch, types of, 212, 213f
- Pinching needle insertion, 359
- Pinching skin needle insertion, 359
- PINK1* gene, 974–975
- Piriformis syndrome, 687
- Plaintiffs, 79
- Plank, 794f
- Planned prosthesis, orientation to, 162
- Plantar fasciitis, 231–232, 744–746
 night splint for, 232
- Plantar flexion, 31f
 knee extension moment and, 233
- Plantar grasp reflex, 1011t
- Plantar mononeuropathy, 857–859
- Plantar pressure gradient, 474
- Plantar reflex, 14, 15t
- Plantaris muscle, 738–739
- Plastic ankle-foot orthosis, 235, 235f
- Plastic rearrangement, 449
- Plasticity considerations, for dysphagia, 64–65
- Platform lift, 285, 286f–287f
- Plexopathies
 brachial, 845–848
 lumbosacral, 853–854
 neoplastic-induced, 848, 848t
 radiation-induced, 848, 848t
- PLMD. *See* Periodic limb movement disorder
- PLP. *See* Phantom limb pain
- PLS. *See* Phantom limb sensation
- Plyometrics, 305–306
- PM. *See* Polymyositis
- PM&R. *See* Physical medicine and rehabilitation
- Pneumatic knees, 191, 191f
- Pneumonia, aspiration, prevention of, dysphagia and, 66
- Pocket coach, prompting technology, 385f
- POEM. *See* “Patient-oriented evidence that matters”
- Poikilothermia, 1083
- Poliomyelitis, 826
- Pollicization, 158, 159f
 process, 158
- Polyarteritis, 486
- Polyarteritis nodosa, 486
- Polycentric knee joints, 239
 double-axis system in, 239
- Polycentric knees, 191, 191f
 prosthetic, 191f
- Polyform, 226–227
- Polymyalgia rheumatica, suspicion for, 115–116
- Polymyositis (PM), 147–148, 907
- Polyneuropathy, 143–144
 assessment of, accurate, 147
 causes of, 115
 chronic inflammatory demyelinating, 866–867
 classification of, by electrodiagnostic characteristics, 145b–146b
 distal sensory, 869
 distal symmetric sensorimotor, 864
 evaluation for, 143
- Polyphagia, 861–862
- Polypharmacy, 602
- Polyphasicity, increased, 139
- Polytrauma, burns and, 502–503
- Pompe disease, 905–906
- Pons, 955–956
- Popliteal dysfunction, 736
- Popover transfer, 1073
- Port wine stains, 44
- Portable amplification systems, 379
- Portable ventilators, 545
- Position-sensing joystick, 282f
- Position-sensing method, 282
- Positive expiratory pressure mask therapy, 539
- Positive sharp waves (PSW), 125–126, 125f
 grading of, 126
 increased insertional activity and, 123
- Positron emission tomography (PET), 928, 948
- Postacute setting, assessment in, 69–70
- Postamputation, 160b
 pain, 178
- Postcardiac transplantation, exercise after, 313
- Postconcussion syndrome, 923
- Postcoronary artery bypass grafting, 520
- Posterior apprehension test, 715
- Posterior axillary depression sign, 884, 885f
- Posterior column fractures, 675
- Posterior cruciate ligament (PCL), 736–737
 tests for, 18t–26t
- Posterior elbow, heterotopic ossification of, 504, 504f
- Posterior interosseous neuropathy (PIN), 853
- Posterior leaf spring AFO, 235
- Posterior offset knee joint, 239, 239f
- Posterior tibialis tendon dysfunction (PTTD), 740–741
- Postexercise ROM, focus on, 793
- Postherpetic neuralgia, pregabalin for, 766
- Postinjury orthoses, 223–224
- Postmenopausal osteoporosis
 FDA-approved medications, 713t
 low bone mineral density in, 810t
- Postoperative joint replacements, 224
- Postparalytic/intensive care unit-acquired weakness, frailty and, 529
- Postpartum pelvic floor dysfunction
 definitions and etiology of, 783–784
 diagnosis and physical examination of, 784
 epidemiology of, 784
 pregnancy and, 783–785
 treatment of, 784–785
- Postpolio syndrome, 826
- Postseason macrocycle, 791
- Postsurgical orthosis, 223–224, 225f
- Postsurgical residual limb pain, 161
- Postsynaptic neuromuscular disorders, evaluation of, repetitive nerve stimulation for, 133
- Postsynaptic neuromuscular junction, 148
- Posttraumatic amnesia (PTA), 916, 946
 evaluation of, 929
- Posttraumatic depression (PTD), 941
 development of, 941–942
 overlap of, with neurologic disease, 942
- Posttraumatic epilepsy (PTE), 930
- Posttraumatic seizures, and TBI, 930–931
 treatment for, 930–931
- Posttraumatic stress disorder
 in burn survivors, 508, 508b
 in intensive care unit, 529
 TBI and, 942
- Posttraumatic syringomyelia (PTS), 1078
- Postural abnormalities, 450, 451t–453t
- Postural alignment, types of, 661f
- Postural changes, for dysphagia, 63–64
- Postural considerations, 293
- Postural drainage, 1079–1080
 techniques, 496
- Postural reactions, 48, 50t
- Postural support device, 262b
- Postural techniques, for dysphagia, 63–64
- Postural tremor, 972–973
- Posture
 factors affecting, 661t
 kyphotic, 694–695, 708f
 training program, 701–703, 711f
- Postvoid residual (PVR), 394
- Potassium channel disorder, 905
- Potassium channels, passive, 152.e1
- Potassium ion channels, resting membrane potential and, 152.e1
- Power-assisted wheelchairs, 278–279, 279f
- Power drive wheel location, 280–282
- Power grip, 212, 212f
- Power operated vehicle, 262b
- Power seating options, 279–280
- Power wheelchairs, 262b, 279
 bases of, 281–282
 basic, 279, 279f
 front-wheel drive, 281, 281f
 maximum speed for, 283
 midwheel drive, 281–282
 pediatric, 266f
 performance of, 287–288
 programmability of, 283
 progressive disorders and, 266
 rear-wheel drive, 280–281
- Power wheeled mobility device, 262b
- Powered exoskeletons, 242–243, 243f
- PPEs. *See* Preparticipation examinations
- Practice improvement project
 options of, 112–113
- Prayer, 366
- Preamputation, 160
 acute management, 160–162
- Precision grip, 212, 213f
- Precision pinch, 212, 213f
- Precocious puberty, 44

- Preexercise evaluation, 297
- Preexisting congenital/acquired neurologic disorders, 5
- Prefabricated cam walkers, 473
- Prefabricated orthoses, custom orthoses and, 248
- Prefabricated thoracolumbosacral orthosis, 253–254, 253f
- biomechanics of, 253
 - contraindications to, 254
 - design and fabrication of, 253
 - indications for, 253
 - special considerations for, 254
- Prefrontal cortex (PFC), 936
- Pregabalin, 439t, 767–768
- Pregnancy
- aerobic exercise during, contraindications to, 309b
 - exercise and, 307–308
 - low back pain and, 687–688
 - multiple sclerosis in, 1004
 - and postpartum pelvic floor dysfunction, 783–785
- Prehabilitation, 792–793
- Prehensors, 166–167
- advantages and disadvantages of, 167b
- Premature brain, intraventricular hemorrhage (grades), 1008t
- Premature (early) ejaculation, 443–444
- cognitive-behavioral therapy and psychological counseling for, 443
 - disorder, 433
 - on-demand treatment for, 444
 - treatment, medications for, 443
- Premenopausal women, low bone mineral density in, 810t
- Premyoelectric testing/training, 162
- Prenatal diagnosis, and management, 1032–1034
- Preparticipation examinations (PPEs), 789, 801–803
- cardiovascular screening and, 803, 803b
 - clearance to play and, 803
 - form for, 802f
 - medicolegal aspects of, 803
 - primary goals of, 801–802
 - settings for, 802
- Preprosthetic training, 161
- Presbycusis, 1106
- Prescription
- criteria, 194
 - hip disarticulation and hemipelvectomy of, 195–196
 - orthotic, 248–249
- Preseason macrocycle, 791
- Presenting problem, history of, of pediatric patient, 42
- Pressure
- analysis, 267
 - mapping, as assessment tool, 267f
- Pressure epiphyses, 812, 812f
- Pressure garments, for hypertrophic scars, 505–506
- Pressure injury, 474–478, 1087–1090
- assessment of, 1088, 1089f
 - documentation of, 475
 - prevention of, 476
 - activity and mobility interventions for pressure redistribution, 477
 - moisture management, 478
 - nutritional support, 478
 - sensory perception deficit recognition, 477
 - shear and friction reduction, 478
 - support surfaces, 477–478
 - temperature reduction, 478
 - risk assessment of, 476–477, 477t
 - risk factors for, 477
 - staging of, 475–476, 475f–476f
 - treatment of, 1088–1090
- Presumptive service connection, 78–79
- Presynaptic neuromuscular disorders, evaluation of, repetitive nerve stimulation for, 133
- Presynaptic neuromuscular junction, 148
- Prevention and Public Health Fund, 530
- Priapism, 442–443
- PRICE (protection, rest, ice, compression, and elevation) approach, 794
- Primary auditory cortex, 955
- Primary deep venous reflux, 493
- Primary impairments, identification and treatment of, 1
- Primary lateral sclerosis (PLS), 821–822, 821f
- Primary lymphedema, 495
- Primary motor cortex, 954–955
- Primary osteoporosis, 691
- Primary prevention, 517
- Primary progressive MS (PPMS), 985
- Primary somatosensory cortex, 955
- Primary visual cortex, 955
- Primitive reflexes, 14–15, 15t
- eliciting, 1011t
 - evaluation of, 48, 50t
- Principle of overload, for dysphagia, 64
- Principle of specificity, for dysphagia, 64
- Process, of health care, 101–102, 103f
- Progesterone, 707, 925
- Programmability, of power wheelchair, 283
- Progression (overload), 295–296
- Progressive bulbar palsy, 820, 821f
- Progressive disorders, 266
- Progressive external ophthalmoplegia, 906–907
- Progressive muscular atrophy, 821f, 822
- Progressive resistance exercise, 301–302
- Progressive supranuclear palsy, 979, 981t
- clinical presentation of, 979
 - diagnosis of, 979
 - epidemiology of, 979
 - genetics of, 979
 - pathophysiology of, 979
- Progressive ventilator-free breathing (PVFB), 1080
- Prolapsed disk, 667
- PROM. *See* Passive range of motion
- PROMIS. *See* Patient-Reported Outcomes Measurement Information System
- Prompting technologies, 385, 385f
- Pronation, 230–231
- of foot, 231
 - reduction of, 231
- Pronator syndrome, 849
- Prone instability test, 660t
- Prophylactic knee bracing, 237–238
- Proportional control, *versus* switched control, 282
- Propranolol, 503
- Proprioception, 306
- control, importance of, 792
 - test for, 11
- Proprioceptive exercise regimens, 306
- Proprioceptive neuromuscular facilitation, 161–162, 306
- Propulsion analysis, 267
- Propulsion technique, 273–274, 273f
- Prostaglandins, 798–799
- Prosthesis, 171b
- Prosthetic construction options (endoskeletal or exoskeletal), 186–187
- Prosthetic feet, 187–188
- articulated, 188
 - categories and types of, 188b
 - nonarticulated, 187–188
 - single axis, 188f
- Prosthetic gait deviations, 205
- Prosthetic interface options, 186, 187b
- Prosthetic knees, 189–191
- design options, 190b
- Prosthetic limb fitting and replacement considerations, 197–198, 197t
- Prosthetic limb suspension, 184–186, 185f–186f
- Prosthetic prescription
- essential elements of, 182, 182b
 - for partial foot amputations, 192–193
- Prosthetic restoration, 182–198
- Prosthetic technology, advances in, 169–171, 170f, 170b
- Prosthetic training, 171–172, 172b
- phase considerations, 181
- Prosthetics, for sports, 814
- Protective footwear, for ischemic ulcers, 473–474
- Protective sensation, loss of, 472
- Proteomics, 946–947
- Proton pump inhibitors, 439t
- Provisional footwear, 473
- Provocation diskography, 645
- Proximal hamstring injuries, 735
- Proximal limb girdle weakness, 882
- Proximal neuropathy, 864
- Proximal peripheral nervous system, late responses of, 133
- Proximate cause, concept of, 82
- Proximity, 111
- Prucalopride, for constipation, 426
- Pruritus, in burn scar, 506–507
- Pseudoanemia, 809
- Pseudobulbar affect (PBA)
- ALS and, 839
 - in multiple sclerosis, 1001–1002, 1002f, 1003t
- Pseudoephedrine (Sudafed), 800
- Pseudohypertrophy, calf, 46f, 884, 884f
- Pseudomyotonic discharges, 126
- PSH. *See* Paroxysmal sympathetic hyperactivity
- Psoriatic arthritis, 615–616, 616f, 616b, 677
- treatment for, 616
- PSW. *See* Positive sharp waves
- Psychogenic pain, 750t
- Psychological assessment, 68–73, 69t
- core of, 70
- Psychological component, of disability, 74
- Psychological intervention, 70–72, 71t
- Psychological rehabilitation, following compromised brain functioning, 72
- Psychological support, 179–180
- Psychosocial history, 6
- Psychosocial support, for pulmonary rehabilitation, 543
- PTA. *See* Posttraumatic amnesia
- PTB. *See* Patellar tendon bearing
- PTB-Supra Condylar/Supra Patellar (SC/SP), 183
- PTD. *See* Posttraumatic depression
- PTE. *See* Posttraumatic epilepsy
- Ptoxis, in oculopharyngeal muscular dystrophy, 894, 894f
- PTS. *See* Posttraumatic syringomyelia
- PTTD. *See* Posterior tibialis tendon dysfunction
- Puborectalis muscle, contraction of, 411
- “Pull sock”, usage, 166
- Pulmonary disease, 535–567
- characteristic physiologic changes associated with, 538t
 - classification of, 535–536
 - chronic bronchitis, 535–536
 - emphysema, 535–536
 - epidemiology of lung disease, 536
 - impairments in, 516
 - symptoms of, 536–537
- Pulmonary dysfunction
- biopsychosocial considerations for, 543
 - future directions and areas of opportunity for, 549–550
 - obesity-related, 548
 - spinal cord injury and, 548–549

- Pulmonary dyspnea, 511–512
Pulmonary fibrosis, 513
Pulmonary hypertension
 primary, 512, 514
 pulmonary rehabilitation for, 522–523
Pulmonary impairment, 890–891
Pulmonary management, TBI and, 932–933
Pulmonary rehabilitation, 516–517, 535, 538, 549
 aerobic exercise for, 540
 definition of, 535
 evidence-based guidelines on, 544t
 exercise prescription for, 540–541
 goals and methods of, 518t–519t
 for lung, abnormal physiology of, 516–517, 517t
 medical management for, 537t, 537–538
 oxygen therapy for, 538
 programs, 517
 psychosocial support for, 543
 in specific conditions, 522–523
 treatment options in, 537–543
Pulmonary syncope, 512
Pulmonary system, 1079–1081, 1079f
 changes in, 595
Pulmonary vascular disease, 516
Pulmonary ventilation (Ve), 293
Pulsatile lavage, 480t
Pulsatile phenomenon, 977
Pulsed dye laser, for hypertrophic scars, 506
Pulsed shortwave diathermy, 347
Pulseless electrical activity (PEA), 804
Pump-related adverse events, 466
Pupillary light reflex, 10
Pupillary reflexes, 926
Pure equinus deformities, 1041
Pure-tone audiometry, 1103–1104
Pushrim-activated power-assist wheelchair, 279f
Pushrims, 277
 with angled projections, 278f
Putamen, 955
PVFB. *See* Progressive ventilator-free breathing
PVL. *See* Periventricular leukomalacia
PVR. *See* Postvoid residual
PVS. *See* Penile vibratory stimulation
- Q**
Qi (energy flow), 335
Qi gong, 367
Quadriceps femoris injury, 735
Quadrilateral socket (quad socket), 183, 183f
Quadriparetic CP, 1012–1013
Quadriplegic CP, 1007
Qualitative impairments, 80
Quality measures
 evidence-based, 101, 102f
 for medical rehabilitation, 100–114
 value equation, 111
Quality of life, 950
Quality-of-life measures, 52t
Quality of Upper Extremity Skills Test (QUEST), 52
Quantitative impairments, 80
QUEST. *See* Quality of Upper Extremity Skills Test
Quinidine, 1001–1002
QWERTY keyboard, 379, 383
- R**
RA. *See* Rheumatoid arthritis
Radial amputations, 154, 155f
Radial collateral ligaments, stability test of, 716
Radial deviation, 29f
Radial mononeuropathies, 852–853
Radial nerve, 853f
 injuries, 219–221
 palsy orthosis, 221f
 palsy splint, 219–221
Radial neuropathies, 135t–138t
Radiation
 to bone metastases, 573
 toxicity, 580t
Radiation fibrosis, pathogenesis of, 580f
Radiation-induced brachial plexopathy (RIBP), 580
Radiation-induced plexopathy, 848, 848t
Radiation therapy, dysphagia and, 58
Radiation therapy-related impairments, 579–581
“Radicular” leg symptoms, nonlumbar spine causes of, 686–687
Radicular pain, 636–642
 diagnosis of, 638–639
 diagnostic selective nerve root block and, 641
 electrodiagnostic evaluation and, 639
 epidemiology of, 636
 history and physical examination of, 638, 638t
 imaging studies and, 638–639
 interventional spine care and, 641
 modalities of, 639–640
 pathophysiology of, 636–638
 percutaneous disectomy/disk decompression and, 642
 physical medicine and rehabilitation and, 639
 stabilization and functional restoration and, 640–641
 surgery of, 642
 therapeutic selective nerve root injection, 641–642
 treatment of, 639–642
Radiculopathies, 138–140
 algorithm for, 142f
 presence of, confirmation of, 138–139
Radiofrequency neurotomy, 666–667
Radiologically isolated syndrome, 987
Radioulnar pronation, and supination, 29f
Raloxifene, 711
Ramps, for wheelchair, 285, 287f
Rancho Levels of Cognitive Functioning Scale, 929, 930t
Rancho Los Amigos Scale of Cognitive Levels, level IV, 939
Range of motion (ROM), 80
 assessment of
 principles of, 17–27
 techniques of, 27
 increase, 212
 loss, 155
 performing of, 17–27
 systems, comparison of, 28f
Rapid glycolysis, 292
Rashes, in limb-deficient athletes, 817–818
Ratchet lock, 240
Rating guide, example of, 172t
Rating of perceived exertion (RPE), 296
Raynaud phenomenon, 486
Raynaud syndrome, 486
REACH OUT (Reassurance, Effort, Assertiveness, Courage, Humor, Over There), 508–509
Reactive arthritis, 677
Reading rehabilitation, 1118
Rear wheel camber, 271–272
Rear-wheel drive power wheelchair, 282f
Reasonable accommodation, 75–76
 μ -Receptor antagonists, for constipation, 426
Reciprocating gait orthosis, 241, 242f
Recline, 288, 289t
Recombinant human erythropoietin (rhEPO), 800
Recovery stage, of rehabilitation, 794
Recreation, 6
Recreational exercise, 622
Recruitment, reduced, 129
Rectal medications, 426
Rectal probe electroejaculation, 444–445, 445f
Rectoanal inhibitory reflex, 410–411
Rectum
 evacuation of, mechanical methods for, 1084–1085
 motility of, 410
Rectus femoris avulsion, 731
Recurrent laryngeal nerve, 56
Recurrent urinary tract infection (UTI), 391–392
Red fibers, 875
Reductase inhibitor, 490
Referral party, 87
Referral question, psychological assessment and, 68, 69t, 70
Reflex stiffness, 447
Reflex voiding, 1086
Reflexes, 2b, 14–15
 testing of, physical examination for, 115
Reflexic upper motor neurogenic bowel, 413–414
Reflex-inhibiting posture, 221–222
Reflexive swallows, 56
Reflexology, 335
Refractive error, 1117
Regenerative medicine, 369
Regional amyotrophic lateral sclerosis, 822
Regional coupling patterns, 251f
Rehabilitation
 after hand replantation and transplantation, 157–158
 defined, 68
 follow-up, 172, 172t, 172b–173b
 goal for, 160
 implication of amputation level and surgical technique, 176–177
 integrative medicine in, 364–373, 365f
 intervention in, 68–73
 lower limb amputation, 174
 medical, quality and outcome measures for, 100–114
 for motor neuron disease, 834–835, 835f
 for multiple sclerosis, 994–999
 for PAD, 491
 pre-prosthetic phase considerations, 180–181
 problem list, 39b–40b
 psychological assessment in, 68–73
 stages of, 794–795, 794t
 of swallowing disorders, 53–67
 bedside/clinical swallow evaluation, 59–62
 compensatory strategies in, 61–64, 63t
 dysphagia, 56–59
 neurophysiology of, 55
 Rehabilitation Act, 375
 Rehabilitation Act of 1973, 94, 1076
 Title I of, 761
 Rehabilitation Engineering and Assistive Technology Society of North America (RESNA), 262
 Rehabilitation Institute of Chicago tenodesis splint, 222–223
 Rehabilitation Measures Database, 105
 Rehabilitative knee bracing, 237–238
 Rehabilomics, 946
 Reinnervation, rate of, 150
 Reiter syndrome, 677
 Relapsing-remitting MS (RRMS), 985
 Relative energy deficiency in sport (RED-S), 811t
 Relaxation training, 761
 Relaxin, 783–784
 Remedial lymphedema exercises, 586
 Remodeling, 809
 Renal failure, 531–533
 anatomic classification of, 532t
 physiology of, 531–532
 bone issues in, 531–532
 debility in, 532
 hyperkalemia in, 531
 hyponatremia in, 531
 metabolic issues in, 531

- Renal failure (*Continued*)
 residual syndrome and, 532
 sarcopenia/uremia in, 532
 uremia in, 531
 weakness in, 532
 transplantation for
 early mobilization after, 532–533
 rehabilitation before, 532
 Renal mass and blood flow, decrease of, 596
 Renal transplantation
 epidemiology of, 550
 etiology of, 550–551
 future of, 552
 outcomes of, 551–552
 postoperative medical issues of, 551
 postoperative rehabilitation management for, 551
 preoperative rehabilitation management for, 551
 rehabilitation after, 550–552
 REPAS Scale, 453
 Repeat stroke, 961–962
 Repetitive discharge characteristics, complex, 126t
 Repetitive nerve stimulation, 148–149
 use of, 133
 Repetitive strain injuries (RSIs), development of, 379–380
 Replantation surgery
 goals of, 158b
 steps in, 157b
 Repolarization, in myelinated nerves, 152.e1
 RER. *See* Respiratory exchange ratio
 RERC-ACT work, 384
 Research, 111
 “Residual functional capacity”, 77
 Residual limb, 177–178
 Residual limb pain (RLP), 178
 “Residual syndrome”, 532
 Residual volume (RV), 514
 Resistance exercise prescription, for older adults, 310t
 Resistance to Passive Movement Scale, 460
 Resistance training
 following liver transplantation, 561
 for older adults, 309
 Resistive exercise, 583–584
 RESNA. *See* Rehabilitation Engineering and Assistive Technology Society of North America
 Respiratory assistive devices, superimposed, 545f
 Respiratory exchange ratio (RER), 294
 Respiratory failure, TBI and, 932–933
 Respiratory insufficiency, ALS and, 837–838
 Respiratory measurements, amyotrophic lateral sclerosis and, 834b
 Respiratory quotient (RQ), 294
 Respiratory rate, aerobic training and, 516
 Response theory, 105
 Rest, ice, compression, and elevation (RICE), 716
 Resting anal canal pressure, determination of, 412
 Resting blood flow, SPECT for, 948
 Resting cardiac output, 293
 Resting hand orthosis, 221–222, 226
 Resting hand orthotic device, 222f
 Resting hand splint, edema and, 226
 Resting heart rate, 292
 Resting hypertension, 555
 Resting membrane potential, 152.e1, 152.e1f
 Resting oxygen consumption, 294
 Resting posture, of head and neck cancer patient, 588f
 Resting tremor, 972–973
 Restless leg syndrome (RLS), 972, 981t, 996
 diagnostic criteria for, 972
 Restorative interventions, 72
 Restorative strategies, for dysphagia, 62, 64–65
 Restraint system, 288f
 Restrictive barrier, 317
 Restrictive lung disease, 825
 primary limitations of, 516
 Restrictive pulmonary disease, 535
 Reticulospinal hyperexcitability, 447
 Reticulospinal tract (RST), 447
 Retina, 1115–1116
 Return to play
 phases of, 794t
 protocol of, 807t
 team physician responsibility, 789
 Returning to work (RTW), 93–94, 93t
 interventions, 97–98
 Return-to-work restrictions, disability as, 83, 84f–85f
 Revascularization, for PAD, 491
 “Reverse Hill-Sachs defect”, 719
 Review of systems, 2b, 6
 Review of Treatments (ROT), for Parkinson disease, 976
 Revised trauma scale score (RTS), 946
 Rey-Osterrieth Complex Figure Test, 51
 Rheumatoid arthritis (RA), 218, 610–613
 biologic agents for, 613t
 classification criteria for, 611–612, 611b, 612t
 deformities of hands and foot, 611f
 prevalence of, 610
 rehabilitation intervention for, 625
 sexual dysfunction and, 437
 Rheumatoid vasculitis, 485–486
 Rheumatologic diseases, 606–607
 principles of joint protection for, 620b
 rehabilitation evaluation of patients with, 619, 620b
 rehabilitation goals for, 619b
 rehabilitative management of, 619–625
 sexual dysfunction and, 437–438
 Rheumatologic rehabilitation, 606–626
 Rhodiola, 370t–372t
 RIBP. *See* Radiation-induced brachial plexopathy
 RICE. *See* Rest, ice, compression, and elevation
 Rickets, bowed legs and, 49f
 Rigid back support, 712f
 Rigid spine syndrome, 900
 Rigidity, 14
 Riluzole, for amyotrophic lateral sclerosis, 833, 834b
 Risedronate, 709
 Risk stratification, 103
 Rituximab (Rituxan), 613t
 Rivastigmine, 923
 RLP. *See* Residual limb pain
 RLS. *See* Restless leg syndrome
 “Rockwood Index”, 526
 Rolf, Ida, 335
 Roling, 369
 Roling structural integration, 335
 Rolled gauze, 480–482
 ROM. *See* Range of motion
 Romberg test, 13, 1112
 Rooting reflex, 14–15, 15t
 Rosalyn Carter Institute for Caregiving, 950
 Rossolimo reflex, 1011t
 ROT. *See* Review of Treatments
 Rotation, 230–231
 Rotational chair testing, 1112
 Rotator cuff
 impingement, 717–718
 types of, 717
 injuries, common, 717
 internal impingement, 718
 microtrauma, 717
 microvascular studies of, 717
 muscles
 distal insertion of, 719
 inclusion, 719
 Rotator cuff (*Continued*)
 nonoperative treatment of, 718
 physical examination of, 718
 tendinopathy, 717–718
 tendons, suture, 160
 test for, 18t–26t
 RPE. *See* Rating of perceived exertion
 RQ. *See* Respiratory quotient
 RSIs. *See* Repetitive strain injuries
 RST. *See* Reticulospinal tract
 RTS. *See* Revised trauma scale score
 RTW. *See* Returning to work
 Ruffled border, 690
 Running, 796–798
 barefoot, 796
 faster, foot contact and, 796
 float phase of, 796
 Running gait cycles, 796, 797f
 Ruptured disk, 667
 Rural populations, unhealthy lifestyle behaviors in, 917–918
 RV. *See* Residual volume
- S**
 S100b, 946–947
 in children with inflicted TBI, 947
 impending mortality and, 946–947
 limitations of, 947
 Saccades, 1117
 Sacral alae, insufficiency fractures in, 697f
 Sacral insufficiency fracture, 696–697, 697f
 Sacral nerve stimulation, for neurogenic bladder, 1000
 Sacral orthosis, 256
 biomechanics of, 256
 contraindications for, 256
 design and fabrication of, 256
 indications for, 256
 Sacral vertebrae, 249
 Sacroiliac joint disorder, tests for, 18t–26t
 Sacroiliac orthoses, 256
 Sacroiliitis, radiograph grading of, 614b
 SaebFlex, 222
 Safety, 100
 Safety regulation, 90–91
 Sagittal plane evaluation, 793f
 Sagittal plane kinematics, 203, 203f
 Sagittal plane kinetics, 203–204, 204f
 SAHs. *See* Subarachnoid hemorrhage
 SAID principle, 301
 SAR. *See* Specific absorption rate
 Sarcoglycanopathies, 895
 Sarcoidosis, 632
 Sarcoma, 590
 Sarcopenia, 882, 882f
 Sarcopenia, 594–595
 uremic, renal failure and, 532
 Satellite potentials, 152.e5
 Satiety, early, 412
 Satisfaction with Life Scale (SWLS), 950
 SBP. *See* Systolic blood pressure
 SCA. *See* Sudden cardiac arrest
 Scanning, indirect selection, 376
 Scaphoid, lunate gap, 724f
 Scapholunate angle, 723f
 Scapholunate injury, 723
 Scapholunate instability, 723
 Scapholunate stability, test of, 716
 Scapular tests, 18t–26t
 Scapular winging, 893, 893f
 Scapular Y view, 719–720
 Scar
 measurement of, 507
 pliability of, 507
 Scarpus triangle, 183

- SCD. *See* Sudden cardiac death
- SCFE. *See* Slipped capital femoral epiphysis
- Scheuermann disease, 688
etiology of, 688
- Schober test, 305
- School-age child, assessment of, 51
- SCI. *See* Spinal cord injury
- SCI Model Systems of Care, 1050
- Sciatic mononeuropathy, 859
- Scissoring, 1010
gait, 17t
- Scoliosis, 256–258, 892
children with, 45
curve progression in, 257
Euler theory of elastic buckling of a slender column and, 257
growth spurts and, 257
evaluation of, 46f
neuromuscular disease and, 257
in spinal muscular atrophy, 825
- Scooters, 262b, 283–284, 284f
myopathy and, 913
- SCORTEN (SCORE of Toxic Epidermal Necrosis), 502, 503t
- SCPE. *See* Surveillance of Cerebral Palsy in Europe
- Screening EMG study, involvement of, 140
- SDHs. *See* Subdural hematomas
- SDR. *See* Selective dorsal rhizotomy
- “Seashell murmur”, 123
- Seat belts, 952
- Seat functions, 288
- Seated position, ease of arising from, 15
- Seating principles, 264
- Seating support system, 262b
- Second-impact syndrome, 806
- Second injury fund, 78
- Secondary impairments, 578
- Secondary injury
prevention of, 379–382
to spinal cord, 1055
- Secondary lymphedema, 495
- Secondary risk factor modification, 517
- Secretagogues, for constipation, 426
- Securement, 285, 288f
- Seddon classification, of nerve injury, 116–117, 117t
- Segmental dysfunctions, 657
- Segmental dystonia, 973
- Segmental ligaments, 653
- Segmental motion testing, 322, 323f
- Segmental pressure measurements, 487
- Seizures, 962
- Selective dorsal rhizotomy (SDR), 1018
- Selective estrogen receptor modulators, 711
- Selective nerve root injections (SNRIs), 641–642
- Selective serotonin reuptake inhibitors (SSRIs), 439t, 768
for pseudobulbar affect, 1003t
- Selective serotonin-norepinephrine reuptake inhibitors (SNRIs), 768–770
- SELENON (SEPN1)-related congenital muscular dystrophy, 900
- Self-confidence, vocational activities and, 6
- Semen quality, deterioration of, 1087
- Semiocclusive dressings, 482
- Semmes-Weinstein 5.07 (10-g) monofilament, in neuropathic wounds, 472
- Sensation, testing of, physical examination for, 115
- Sensitivity, amplifier, 152.e9
- Sensorineural hearing loss (SNHL), 1104–1105
- Sensory conduction studies, 133t
- Sensory enrichment, 928–929
- Sensory examination, 11
- Sensory feedback, usage, 169–170
- Sensory gating, 936
- Sensory loss, wheelchairs and, 264
- Sensory motor responses, physiology of, 152.e3
- Sensory nerve action potentials (SNAPs), 134, 152.e3
antidromic amplitudes of, in females, 152.e2
- Sensory nerves
clinical testing of, 118, 119t–121t
conductions of, 118
- Sensory Organization Test (SOT), 1113f
- Sensory perception deficit recognition, in pressure injury, 477
- Sensory receptors, types of, 340
- Sensory substitution, 1114
- Septic arthritis, 618–619
- Septic bursitis, occurrence of, 721–722
- Serial casting, for spasticity, 934
- Serial static splint, 214f–215f, 214t–217t
- Seronegative spondyloarthropathy, 613
- Serotonin agonists, for constipation, 426
- Serotonin-norepinephrine reuptake inhibitors (SNRIs), 439t, 768–770
- Serum ferritin, 809
- Service connected, disability and, 78–79
- Seventh cervical vertebrae, axial view, 629f
- Severe TBI, acute medical management of, 924–925
- Sex steroids, role of, 692
- Sexual activity, frequency of, 431
- Sexual behavior, and aging, 431–432
- Sexual dysfunction
amputation and, 438
antidepressant medications and, 438
antihypertensives and, 438
antipsychotics and, 439t
in burn survivors, 508
cardiac disease and, 438
cardiovascular medications and, 438
chronic pain and, 437
classification of, 432–433
depression and, 438
diabetes and, 438
diagnostic evaluation of, 441–442
disability and chronic disease, 434–438
DSM-5
classification of, 433t
subtypes, application of, 432–433
evaluation of, 439–442
medication and, 438–439, 439t
men genital examination in, 440
multiple sclerosis and, 436–437, 1000
neurologic disorders and, 437
neurologic examination in, 440
penile injection for, 442f
physical examination of, 440–441
psychiatry practice, medication, 438–439
rheumatologic disease and, 437–438
spinal cord injury and, 435–436
stroke and, 436
traumatic brain injury and, 436
treatment of, 442–446
types of, 432–434
women genital examination in, 440
- Sexual history, 5–6
taking of, 439–440
- Sexual response
behavior and, 431–432
Kaplan model, 431
Masters and Johnson model of, 432b
- Sexual symptom checklist, 441f
- Sexuality
ALLOW, PLISSIT, and BETTER models, 440b
spinal cord injury and, 1087
- SGA. *See* Substantial gainful activity
- Shaken baby syndrome, 918
- Shaker head lift exercise, for dysphagia, 63t
- Shear, 476
in pressure injury, reduction of, 478
- “Shelf” orthosis, 589, 589f
- Shiatsu, 335–336
- Shock artifact, method of reducing, 152.e10
- Shoe fit, 474
- Shoes, 229
parts of, 229, 230f
pediatric, 232
- Short Musculoskeletal Function Assessment (SMFA) questionnaire, 176
- Short T1 inversion recovery (STIR) sequence, 986
- Short transhumeral amputation, 155
- Short transradial amputation, 155
- Shortwave diathermy (SWD), 346–348
contraindications and precautions of, 347–348, 348b
history of, 346
indications and evidence basis of, 347–348
physics of, 346
techniques of, 346–347, 347f
- Shoulder
abduction, 28f
adduction, 451t–453t
conditions of, 717–721
disarticulation, 160, 166f
flexion and extension of, 28f
girdle, 641
impingement, tests for, 18t–26t
injuries to, in wheelchair athletes, 815–817
internal/external rotation of, 29f, 451t–453t
mobilization, time line of, 587t
passive flexion, 715
range of motion, deficits in, 587t
special tests of, 715–716
stability of, tests for, 18t–26t
- Shoulder adduction deformity, after axillary burns, 225
- Shoulder pain, 963–964
brachial plexopathies and, 134
- “Shrinkers”, 161
- Shunts, 1035
isolated downstream infections, 1035
malfunction, symptoms of, 1035b
- SIADH. *See* Syndrome of inappropriate antidiuretic hormone
- Sialorrhea, ALS and, 837
- Sickness Impact Profile, 155
- Sickness Impact Profile-5, 950
- Side plank evaluation, 794f
- “Sidearm” throwers, 796
- Side-to-side pinch, 154
- Silent aspiration, 57
- Silent/sleeping nociceptors, 752–753
- Silicone gel sheeting, for hypertrophic scars, 506
- Silver dressings, 481t, 483
- Silver Ring custom-fit orthosis, 220f
- Silver sulfadiazine, 481t, 501
- Simian hand, 219–221, 220f
- Simple backache, 666
- Simple motor tic, 974
- Sine waves, 152.e10
- Single axis feet, 188
- Single axis knee, 190
- Single-fiber electrodes, 152.e9, 152.e9f
- Single-fiber electromyography, 126
concentric electrode and, 150
- Single leg squat, 793f
- Single muscle fiber, 123–124
action potential of, 123–124, 124f
discharges, 125
- Single photon emission computed tomography (SPECT), 948
bone scanning, 665
- Single-site system, usage, 164

- Sinoatrial node, 513
 SINS. *See* Spine Instability Neoplastic Score
 Sip-and-puff input device, 283f
 Six-Minute Walk Test, 994–995
 Skeletal demineralization, 809
 Skeletal muscle
 fiber characteristics, 302t
 structure of, 300f
 Skeletal muscle fiber, 875
 types of, 882t
 Skeletal system, pediatric, 811
 Skin, 501f
 breakdown of, 1043–1044
 in limb-deficient athletes, 817
 in wheelchair athletes, 816
 changes in, 596
 disorders of, in limb-deficient athletes, 817–818
 examination of, on pediatric patient, 44
 flaps, 156b
 metastases, 576–577, 577f
 preparation, for needle insertion, 122
 Skin care, 177–178
 Skull density, halo orthoses and, 251–252
 Skull flexure, 951–952
 SLE. *See* Systemic lupus erythematosus
 Sleep
 and chronic pain, 757
 determinants of, 757
 disorders, 1080–1081
 disturbance of
 Parkinson disease and, 976–977
 TBI and, 940–941
 disturbed, 769t–770t
 chronic pain, interrelationship, 757
 problems, pain and, 770
 Sleep disorders, in multiple sclerosis, 996–997
 Sliding filament
 mechanism, 298
 theory, 300f
 Slings, types of, 222
 Slipped capital femoral epiphysis (SCFE), 728–729, 729f, 729t
 Slow transit constipation, 781
 SLP. *See* Speech-language pathologist
 SMA. *See* Spinal muscular atrophy
 Small calf vein thrombi, 492
 Small toe flexion, 451t–453t
 Small vessel ischemic ulcers, 469
 SMART/SMARTER acronym, 450
 SmartWheel protocol, 267
 Smoking, history of, 5
 SNAPs. *See* Sensory nerve action potentials
 SNARE (soluble n-ethylmaleimide sensitive fusion attachment receptor) proteins, 459
 SNCA gene, 974
 Snellen Acuity Test, 943
 SNHL. *See* Sensorineural hearing loss
 Sniff nasal pressure (SNP), 837
 Snout reflex, 14–15, 15t
 SNP. *See* Sniff nasal pressure
 SNRIs. *See* Selective nerve root injections
 SOAR. *See* Survivors Offering Assistance Recovery
 Social component, of disability, 74
 Social environmental assessment, for wheelchair and seating system, 263
 Social functioning, 945
 Social history, 2b, 5–6
 of pediatric patient, 43–44
 Social Security Act of 1965, 265
 Social Security Disability Insurance (SSDI), 77–78, 94
 benefits of, 77
 Social skills, 52t
 Sociodemographic variables, 70
 Socioeconomic status, 917–918
 Socket, choices of, 162–163
 Socket designs, 182–184
 Sodium channel disorders, 904
 Sodium fluoride, for osteoporosis, 709
 Sodium imbalance, 925
 Soft cervical collar, 252
 Soft compressive dressing, 161
 Soft end feel, 16–17
 Soft tissue
 disorders, 687
 technique, 323
 Soleus muscle, 738–739
 Solid ankle, 235
 Solid ankle cushion heel (SACH) prosthetic foot, 187, 188f
 Solid ankle flexible endoskeletal foot, 188
 Solid stirrup, for metal AFOs, 233, 234f
 Somatic dysfunction, 317, 318f, 319–320
 Glossary of Osteopathic Terminology naming of, 318f
 International Classification of Diseases, Tenth Revision classification of, 319–320
 orthopedic disease, coexisting with, 322
 Somatic pain, in residual limb, 178
 Somatopause, 526
 Somatosensory-evoked potentials (SSEPs), 925–926, 946
 Sonophoresis, 346
 contraindications and precautions of, 346, 346b
 SOT. *See* Sensory Organization Test
 Sound, 1101
 electrodiagnostic instrument and, 152.e10
 production of, deficit in, 9
 Sound side vaulting, transtibial gait deviations, 206
 Soy, 370t–372t
 Spastic diplegia, 1007f–1008f, 1023f
 Spastic hemiplegia, 1007f
 Spastic quadriplegia, 1007f
 Spasticity, 14, 222, 447–468, 1094–1096
 ALS and, 834b, 836
 biomechanical assessment of, 450–453
 cause of, 447
 clinical assessment in, 450, 454b–455b, 456t
 drugs for, classification of, 458t
 emerging therapies of, 467
 goal setting in, 450, 454b
 hyaluronidase injections for, 467
 management of, 453–467
 measures of, 455t
 in multiple sclerosis, 998
 nonpharmacologic, 453–454
 pathophysiology of, 447–449, 448f
 pharmacologic, 454–459, 456f
 problem identification of, 449–450, 450b
 functional limitation, 450
 impaired movement, 450
 postural abnormalities, 450, 451t–453t
 radiographic parameters for, 1020f
 result from maladaptive plasticity, 449, 449f
 surgical intervention of, 466–467
 TBI and, 933–934
 treatment based on pathophysiology, 457f
 treatment for, 933–934, 1095–1096
 wheelchair and, 264–265
 in wheelchair athletes, 817
 Special populations, 687–689
 exercise for, 307–313
 Specially Adapted Housing Act of 1948, 1074
 Specialty feet, 189, 190f
 Specific absorption rate (SAR), 346
 Specific populations, sports and, 809–813
 Specificity
 of aerobic training, 516
 theories, 750
 SPECT. *See* Single photon emission computed tomography
 Speech, apraxia of, 9
 Speech audiometry, 1104
 Speech-generating devices, 290
 Speech-language pathologist (SLP), 53
 Speed test, 715
 Spherical grip, 212, 212f
 Sphincter electromyography (EMG), 395
 Sphincter tone, evaluation of, 413
 Sphincterotomy, 401
 Spina bifida, factors influencing psychosocial adjustment and disability in, 1045f
 Spina bifida aperta, 1028
 Spina bifida cystica, 1028
 Spina bifida occulta, 1028
 Spinal accessory nerve palsy, 588–589, 588f
 Spinal afferents, 409
 nerves, receptor expression, 412
 Spinal anatomy, 249, 1056f
 Spinal cord
 blood supply to, 1054–1055, 1055f
 cross-sectional view of, 1051–1052, 1053f
 diseases of, 402–403, 416
 dorsal horn of, 753f, 754
 enteric nervous system relationship to, 408–410
 facilitation, 320–321, 321f
 numbered segments/vertebral bodies of, relationship between, 1053f
 symptoms, onset and severity of, 402
 tethering of, 1078–1079
 Spinal cord injury (SCI), 222–223, 600, 1049–1100
 activities for, training in, 1072–1073
 acute phase of, 1065–1072
 age/gender/marital status and, 1050
 autonomic dysfunction and, 1082–1083
 autonomic dysreflexia and, 1083
 from bacterial infection, 1060
 bowel management and, 1084–1085
 bradycardia and, 1082–1083
 cardiometabolic system and, 1081–1082
 care for, model systems of, 1049–1050
 causes of, 1050–1051
 chronic phase of, 1078–1079
 classification of, 1057–1058
 contractures and, 1096–1097
 death from, causes of, 1051, 1052t
 disability, adjustment of, 1078
 driver training and, 1075
 education for, 1074
 epidemiology of, 1050–1051
 expected functional outcomes of, by neurologic level of injury, 1066t–1070t
 fertility in, decreased, 1087
 fitness/exercise and, 1082
 fractures and, 1097
 functional recovery from, 1064–1065
 gastrointestinal system and, 1084–1085
 genitourinary system and, 1085–1086
 heterotopic ossification and, 1097–1098
 historical perspective on, 1049
 home and environmental modifications for, 1074–1075
 in hospital setting, 1072
 incidence and prevalence of, 1050
 infectious/inflammatory causes of, 1060–1063
 inpatient rehabilitation setting for, 1072
 interdisciplinary team for, 1072
 late neurologic decline and, 1078–1079
 life expectancy for, 1051, 1052t
 medicine, subspecialty of, 1050
 men percentage of, 435f
 morbidity of, 1051
 musculoskeletal conditions and, 1096–1098
 musculoskeletal pain and, 1090–1091, 1092f–1093f
 neoplastic causes of, 1059–1063
 neurologic deficit in, extent of, 1051

- Spinal cord injury (SCI) (*Continued*)
 neurologic examination of, sensory portion of, 1057–1058
 neurologic level of, 1051
 neuropathic pain and, 1091–1094, 1095f
 nociceptive pain and, 1091
 orthostatic hypotension and, 1082
 other (neuropathic) pain and, 1094–1098
 pain and, 1090–1094
 patients, majority, 402
 physical skill training for, 1072–1073
 prehospital care for, 1065–1071
 pressure ulcers and, 1087–1090
 pulmonary complications of, 1079
 pulmonary dysfunction and, 548–549
 pulmonary system and, 1079–1081
 quality of life and, 1078
 rehabilitation phase of, 1072–1077
 secondary conditions of, 1079–1094
 semen quality in, deterioration of, 1087
 sexual dysfunction, 435–436
 sexuality/fertility and, 1087
 spasticity and, 1094–1096
 spinal mechanics and stability in, 1055–1057, 1056.e2f
 surgical management of, 1071
 therapeutic exercise for, functional electrical stimulation for, 1076–1077
 thermal regulation and, 1083
 UMN, 413
 urinary tract surveillance after, 403b
 vascular causes of, 1063
 vascular system and, 1082
 visceral pain and, 1091
 vocational training and, 1075–1076
- Spinal deformity, myopathic disorders and, 912
- Spinal degeneration, 666
- Spinal dysraphisms, 1027–1048
 cliniconoradiologic classification of, 1028b
 historical background of, 1027–1028
 nomenclature of, 1027–1028
- Spinal extension exercises, 701
- Spinal facet joints, manipulation of, 316
- Spinal facilitation, 320–321, 321f
- Spinal flexion exercises, avoidance of, 701
- Spinal fractures, traumatic, 674–676
- Spinal infections, 676–677
 plain films and, 676–677
 treatment for, 677
- Spinal ligaments, 655
- Spinal mechanics/stability, 318–319, 1055–1057
- Spinal muscular atrophy (SMA), 823–825, 823f–824f
- Spinal myoclonus, 973
- Spinal nerves, dermatomal innervation of, 843f
- Spinal orthoses, 248–260, 259t
 motion, classification of, 249, 250f
 terminology in, 248
- Spinal orthotic management, history of, 248, 249f
- Spinal orthotics, myopathic disorders and, 912
- Spinal problems, traction for, 328–329
- Spinal Proprioceptive Extension Exercise Dynamic (SPEED) program, 694–695, 700
- Spinal roots, 575
- Spinal stenosis
 arterial insufficiency theory of, 679
 classification of, 680b
 symptoms of, 679
- Spinal traction, 343
 indications and contraindications of, 344t
- Spinal tumors
 classification of, 1059, 1059f
 clinical presentation of, 1059
 management of spinal cord compression by, 1059–1060
- Spine
 abnormalities of, 46t
 biomechanics of, 249–250
 deformity of, 1042
 in children, 1098
 examination of, 45
 lateral radiograph of, 699f
 lateral view of thoracolumbar, 614f
Mycobacterium tuberculosis to, hematogenous spread of, 1060
 orthopedic management, 1020–1023
 osteoporotic, orthoses and, 701–703
 as regional units, 81
 surgical approach to, 1071
 tuberculosis of (Pott disease), 1060
- Spine Instability Neoplastic Score (SINS), 574
- Spiral groove, radial neuropathy at, 852–853
- Spirituality, importance of, 6
- Splint(s), 209
 on burn areas, 506
 design categories of, 214t–217t
 prescriptions for, 226
- Splinting, 453
- Split stirrup, for metal AFOs, 233–234, 234f
- Split-thickness skin grafting, 502
- Spoke wheel, 277f
- Spondyloarthropathies, 677
- Spondylolisthesis, 673f, 674, 674t
 natural history of, 674
- Spondylolysis, 673–674
 management of, 674
- Spontaneous activity, 122–123
 study of, 133
- Sporadic amyotrophic lateral sclerosis, 820
- Sport specificity, 790
- Sports, 789–819
 biomechanics of, 795–798
 catch-up, occurrence of, 792
 competitive season macrocycle, 791
 concussion, 806–807
 symptoms reported after, 806b
 conditioning and training, principles of
 altitude training, 791–792
 overtraining syndrome, 791
 periodization, 790–791
 doping/drug monitoring, history of, 799b
 emergency assessment and care in, 803–806
 FITT, 790b
 injury
 phases of, 793–794
 prevention and rehabilitation in, 792–795
 kinetic chain assessment and, 792
 microcycles, 790–791
 Paralympic, eligibility for, 814
 pharmacology in, 798–801, 801t
 performance-enhancing drugs in, 799–800
 therapeutic drugs in, 798–799
 postseason macrocycle, 791
 prehabilitation and, 792–793
 preparticipation examination in, 801–803
 preseason macrocycle, 791
 rehabilitation, stages of, 794–795
 return to play phases, 794t
 tissue diagnosis and biomechanical diagnosis, 792t
 training program design variables, 790b
 women in, 809–810
 year-long training program, 791
- Sports equipment, adaptive, 814–815
- Sports medicine
 adaptive, 813–818
 cause of disability, injuries and complications by, 815–817
 classifications of, 814
 injury patterns in, 815
 sports equipment in, 814–815
- Sports medicine (*Continued*)
 emergency action plan, rehearsal of, 790
 event administration, 790
 role of team physician in, 789–790
 specific diagnoses in, 806–809
 Sports/recreation wheelchairs, 268, 270f
 Sprain injuries, pathomechanisms in, 633–634
 Sprains, as momentary subluxations, 213
 Spray-and-stretch technique, with Fluori-Methane, 340f
 Sprengel deformity, 45, 47f
 Spurling maneuver, 648
 SSDI. *See* Social Security Disability Insurance
 SSEPs. *See* Somatosensory-evoked potentials
 SSI. *See* Supplemental Security Income
 SSRIs. *See* Selective serotonin reuptake inhibitors
 Stair mobility, 4
 Stance-control KAFOs, 240
 Standard nerve conduction studies (NCSs), 118
 Standard wheelchair, 268, 269f
 Standardized Assessment of Concussion, Pocket Sport Concussion Assessment Tool 3, 806
 Standing wheelchairs, 284, 284f
Staphylococcus aureus, in spinal cord injury, 1060
Staphylococcus epidermidis, 1035
 State Workers' Compensation Systems, 78
 Static motion-blocking splint, 214t–217t
 Static postures, 706f
 Static progressive orthosis, 226
 Static progressive pronation-supination splint, 223f
 Static progressive splint, 214f–216f, 214t–217t
 Static splint, 214f, 214t–217t
 Static splinting device, 933–934
 Static stretching, 305
 for older adults, 309
 Statin, 490
 Stax splint, 223–224, 224f
 Steele-Richardson-Olszewski syndrome, 979
 Steinert disease, 901
- Step
 and body rotation, 795
 length of, 16
- Step by Step, 378
- Steppage gait, 17t
- Sternal occipital mandibular immobilizer, 252–253, 253f
 biomechanics of, 252–253
 contraindications, 253
 design and fabrication of, 253
 indications for, 253
- Steroid-induced osteoporosis, management of, 711–713
- Steroid myopathy, 909
- Stevens-Johnson syndrome, 44, 502
- Still, Andrew Taylor, 317
- Still technique, 327
- Stimulants, 800
- Stimulator, 152.e10
- Stimulus artifact, 152.e10
- Stingers, 807–808
 episode of, duration of, 808
 evaluation of, 808
 pathophysiology of, 807–808
 presentation of, 808
 return to play and, 808
 treatment of, 808
- Stool propulsion, 413
- Straight leg raise, 116
- Strain-counterstrain, 326–327
- Stransky sign, 14
- Strength
 determinants of, 300
 examination for, 48
 testing of
 manual muscle, 11, 27–31
 physical examination for, 115

- Strength exercises, 794
 Strength training, 810–811
 guidelines for, 303t
 for myopathies, 912
 program, parameters of, 794
 Strength-training exercise, prescription of, ACSM
 guidelines for, 302–303
 Strengthening, cerebral palsy and, 1014
 Stress fractures, spondylolysis, 652
 Stress-induced pain disorders, 751
 Stress urinary incontinence (SUI), 777–778
 Stretch reflex, 448
 Stretching, methods of, 305
 Stride, length of, 16
 Stridor, 513
 Stroke, 221–222, 600
 complications of, 960–964, 961f, 962t
 cardiovascular, 963
 contractures, 964
 depression, 964
 falls, 964
 neurologic, 960–962
 pain, 963–964
 psychiatric issues, 964
 pulmonary, 963
 skin ulcers, 964
 urinary tract infection, 963
 venous thromboembolism, 963
 dysphagia and, 57
 initial workup/management of, 959–960
 physical effects of, 436
 prognosis of, 967–971
 hemorrhagic stroke, 970–971
 individual impairments, 968–970
 initial presentation prediction, 967–968, 969f
 outcome measures, 967, 967t–968t
 recovery thresholds, 968–970
 time frames for recovery, 968, 970f
 rehabilitation, 954–971
 return-to-home rates for patients with, 407–408
 sequelae, treatment of, 964–966
 activities of daily living, 966
 bladder/bowel, 966
 cognition/aphasia/speech, 964–965
 dysphagia/nutrition, 965
 functional assessment, 964
 mobility, 966
 motor impairment, 965
 sensory impairment, 965
 sexual dysfunction, 966
 spasticity, 966
 transition to home and community, 966
 sexual dysfunction and, 436
 types of, 954–959
 Stroke volume (SV), 293, 514
 aerobic training and, 516
 in transplanted heart, 554
 Structural abnormalities, dysphagia and, 56
 Structure, of health care, 101–102, 103f
 Stryker Notch view, usage of, 719–720
 Stupor, 7
 Sturge-Weber syndrome, 44
 Subacute stages, rheumatoid arthritis and, 625
 Subarachnoid hemorrhage (SAHs), 919, 970–971
 Subarachnoid space (intrathecal space), 1051
 sagittal schematic of, 1053f
 Subaxial cervical spine, hyperflexion/hyperextension
 of, 1056, 1056e1f
 Subdural hematomas (SDHs), 600, 919, 927f
 Sub-ischial socket design, 184
 Subluxation, 317
 Submucosal (Meissner) plexus, 408
 Substance abuse, 2
 history on, 5
 Substance P, 752
 Substantia nigra, 955
 Substantial gainful activity (SGA), 77
 Subtalar joint, placement of, 230
 Subtalar neutral position, 230
 Subthalamic nucleus, 955
 Sucking reflex, 14–15
 Suction suspension, 184
 Sudden cardiac arrest (SCA), 804
 incidence of, in high school-aged athletes, 804
 survival after, 804
 Sudden cardiac death (SCD), rarity, 803
 Sugar tong orthosis, 214f
 SUI. *See* Stress urinary incontinence
 Sulcus sign, 715
 Sunburn, 499
 Sunderland classification, of nerve injury, 117–118,
 117t
 Superficial burns, 499
 Superficial heat, 340–343
 indications and contraindications of,
 340, 341t
 physiology of, 340
 types of devices and techniques of, 341–343
 Superficial pelvic floor muscles, 775
 Superficial posterior compartment, 738–740,
 739f–740f
 Superficial reflexes, 14, 14t
 Superficial skin burns, 342
 SuperTalker Progressive, 378
 Supplemental oxygen, for pulmonary rehabilitation,
 522
 Supplemental Security Income (SSI), 77–78
 Supplements, 369–372, 800–801
 Support surfaces, in pressure injury, 477–478
 Suprapubic extensor reflex, 1011t
 Supraspinatus, tests for, 18t–26t
 Sural mononeuropathy, 859
 Sural nerve, 118
 Sural sensory nerve conduction, 147
 Surface electrodes, 152.e8
 Surgery
 for dysphagia, 65–66
 for lymphedema, 497
 Surgery-related impairments, 578
 Surgical history, 2b
 Surgical sharp debridement, 480t
 Surgical site infection, 160
 Surveillance of Cerebral Palsy in Europe (SCPE),
 1008
Survival motor neuron 1 (SMN1) gene, 823
 Survivors Offering Assistance Recovery (SOAR),
 508–509
 Suspension, choices of, 162–163
 Sustained traction, 329
 SV. *See* Stroke volume
 Swallow maneuvers, 63t
 Swallow screening, 59
 Swallowing, 55
 medications affecting, 59t
 in multiple sclerosis, 1001
 physiology of, 53–55, 54f
 Swallowing disorders, 911
 evaluation of, 59–62
 rehabilitation of, 53–67
 treatment of, 62–66
 aspiration pneumonia prevention in, 66
 compensatory strategies for, 61–64, 63t
 oropharyngeal bypass as, 65
 restorative, 64–65
 surgery as, 65–66
 Swan neck deformity, 214f–215f
 Swan neck orthosis, 214t–217t
 Swan neck splints, 214f–215f, 218
 SWD. *See* Shortwave diathermy
 Swedish knee cage, 238
 Swimming, 798
 competitive strokes of, 798
 kick patterns in, 798
 propulsive phase, 798
 recovery phase, 798
 rehabilitation and prehabilitation principles for,
 798
 Swing phase whips, transfemoral gait deviations,
 207
 Swing-through gait pattern, 1073, 1074f
 Switch-controlled externally powered prostheses,
 164
 Switch-controlled prostheses, 164
 Switched control, proportional *versus*, 282
 Switches, styles, 376
 SWLS. *See* Satisfaction with Life Scale
 Syme, 200
 Symmetrical polyneuropathies, 147
 Sympathetic postganglionic neurons, excitatory or
 inhibitory messages, 410
 Symptomatic A-C malformations, 1036
 Syncope, 512
 cardiac, 512
 orthostatic, 512
 pulmonary, 512
 Syndactyly, pectoral muscle absence in, 46f
 Syndesmosis tests, 18t–26t
 Syndrome of inappropriate antidiuretic hormone
 (SIADH), 935
 Synovial bursae, 178
 Synovial joint, 606
 Synthesized speech, creation of, 378
 Systemic lupus erythematosus (SLE), arthritis
 associated with, 618
 Systemic primary carnitine deficiency (CDSP), 906
 Systems review, 2b, 6
 Systolic blood pressure (SBP), 293
T
 T (Treg) cells, in multiple sclerosis, 988
 T strap, 234
 T2-weighted images, 926–927
 Taco method, 805–806
 Tager, Milton, 335
 Tager physiologic integration, 335
 Tai chi, 366–367, 622, 670, 761
 Tamoxifen, 711
 Tapotement, 333
 hacking, 334f
 “Tapping”, 333
 Tardieu Scale, 14, 933, 934t
 Target heart rates, in training phase of cardiac
 rehabilitation, 519–520
 Targeted muscle reinnervation (TMR), 169–170
 Taxanes, 581–582
 Taylor orthoses, 255
 biomechanics of, 255
 contraindications to, 255
 design and fabrication of, 255
 indications for, 255
 special considerations for, 255
 TBI. *See* Traumatic brain injury
 TBSA. *See* Total body surface area
 TCAs. *See* Tricyclic antidepressants
 Team physician
 medicolegal responsibility, 789
 role of, 789–790
 RTP decision from, 789
 Teeth, loss of, 56
 Tegaserod, for constipation, 426
 Telerehabilitation, 952
 Temperature
 in action potential propagation, 152.e2
 reduction of, in pressure injury, 478
 testing, 11

- Temporal dispersion, 144
 Temporal lobe, 955
 Temporal pain classifications, differentiation of, 749t
 10-visual pain scale, 105
 Tender points, 326
 Tendinosis, 742
 Tendon lengthening, 466–467
 Tendon sheaths, 606
 Tendonitis, 213
 “Tennis leg”, 738–739
 Tennis sport wheelchair, 270f
 Tenodesis, 1076
 Tenodesis splint, 214f–217f, 214t–217t
 Tenosynovitis, 213
 TENS. *See* Transcutaneous electrical nerve stimulation
 Tensile injuries, occurrence of, 807–808
 Teres minor, test for, 18t–26t
 Teriflunomide (Aubagio), for multiple sclerosis, 991, 994t
 Teriparatide, 704–707
 Term infants, hemiparetic/quadruparetic CP, 1007
 Terminal devices, 167b, 169f
 TERT. *See* Total end range time
 Testosterone, elevated, 935
 Testosterone therapy, for osteoporosis, 709
 Tethered cord syndrome, 1036
 Tetraplegia, 933
 Thai massage, 335
 Therapeutic drugs, 798–799
 analgesics, 798–799
 antihypertensives, 799
 antiinflammatories, 799
 asthma drugs, 799
 diabetes drugs, 799
 Therapeutic exercise, 291–315
 cardiovascular, 292–297
 flexibility and, 303–306
 general principles of, 291–292
 muscle physiology and, 297–303
 neurofacilitation techniques for, 306–307
 Therapeutic (prescription) footwear, 473–474
 Therapeutic ultrasound, 344
 Therapeutic use exemption (TUE), 798
 Therapeutic zygapophyseal joint injections, 643
 Thermal regulation, 1083
 Thermal tactile stimulation, for dysphagia, 64
 Thermoplastics, 226–227
 Thermoregulation
 in multiple sclerosis, 997–998
 in wheelchair athletes, 816
 Thermotherapy, 340
 Thiazide diuretics, 709
 Thigh, disorders of, 732–738
 Thigh-foot angle, 46–47, 48f
 Third occipital nerve (TON), 628f, 649
 “Third-spaced fluid”, 161
 Thomas heel extension, 231
 Thompson test, 739, 741f
 Thomsen disease, 903–904
 Thoracic esophagus, in swallowing, 55
 Thoracic kyphosis, 688
 back extensor strength and, 694f
 Thoracic outlet syndrome (TOS), 846–848, 847f
 Thoracic radiculopathies, 138
 Thoracic somatic dysfunction, treatment of, 324f
 Thoracic spine
 fractures/dislocations in, 1056
 motion testing or articular treatment of, 323f
 Thoracic vertebrae, 249
 Thoracic WKO, 701–703
 Thoracolumbar fascia, 654
 Thoracolumbar kyphoscoliosis, 698f
 Thoracolumbar orthoses, 701–703
 Thoracolumbar support (rigid stays), 712f
 Thoracolumbosacral low-profile scoliosis orthoses, 257–258
 Thoracolumbosacral orthosis, 253–255
 cruciform anterior-spinal hyperextension, 254, 254f
 custom fabricated body jacket, 254, 254f
 Jewett hyperextension, 254–255, 255f
 prefabricated, 253–254, 253f
 Three-column concept, of spine stability/instability, 249
 Three-dimensional clinical ultrasound, 258
 360-degree system, 27, 28f
 Three-jaw chuck, 212, 213f
 Three-point chuck action, 167
 Three-point pinch, 222–223
 Three-wheeled scooter, 284f
 Throat clear, for dysphagia, 63t
 Thromboangiitis obliterans (Buerger disease), 486
 Thromboemboli, arterial, 485
 Thromboembolism, venous, 491–492
 Throwing, 795–796
 Thrust, 324–325
 Thumb amputation, 154
 Thumb flexion, 451t–453t
 Thunder god vine, 370t–372t
 Thyrotoxic myopathies, 909
 Thyrotoxicosis, bone remodeling and, 691
 TIBC. *See* Total iron binding capacity
 Tibial deficiencies, 200
 Tibial mononeuropathy, 857–859
 Tibial nerve, 858f
 Tibial stress fracture, 741–746, 742f
 Tibial torsion, 46–47
 Tibial tubercle, 734
 Tibiofemoral joint, osteoarthritis (Kellgren-Lawrence Radiographic Grading Scale), 608t
 Ticket to Work, 94
 Tics, 974
 complex motor, 974
 simple motor, 974
 Tidal volume (TV), 514
 aerobic training and, 516
 increase in, 1079–1080
 Tie-downs, 285, 288f
 Tight skin needle insertion, 359
 Tilt, 288, 289t
 “Tilt-in-space”, 288
 Timed 25 (T25) Foot Walk Test, 994–995
 Timed voiding, 395
 Tinnitus, hearing loss and, 1107
 Tires, 277
 Tissue
 diagnosis of, 792t
 texture abnormality, palpation for, 322
 Tissue-based products, 483
Titan (TTN) gene, 895–896
 Titanopathy, 895–896
 Tizanidine
 for cerebral palsy, 1017t
 for spasticity, 455–458
 TLC. *See* Total lung capacity
 TMR. *See* Targeted muscle reinnervation
 TN. *See* Trigeminal neuralgia
 Tobacco, cessation of, 713
 Tocilizumab (Actemra), 613t
 Toe-brachial index (TBI), 487
 Toe pain, 232
 Tokushima Classification for Grading Pars Defects, 674b
 Tolerance, 750t
 TON. *See* Third occipital nerve
 Tone, as muscle resistance, 14
 Topical analgesics, 771
 Torque-velocity relationship, 300
 Tortfeasor, 86
 Torticollis, 13
 TOS. *See* Thoracic outlet syndrome
 Total body surface area (TBSA), 499
 Total-contact casting, 473
 Total end range time (TERT), 212
 Total iron binding capacity (TIBC), 809
 Total lung capacity (TLC), 514
 Total surface bearing (TSB), 183
 Toxic myopathies, 909–910
 Toxic neuropathies, 869–870
 electrodiagnostic classification of, 870, 872t
 features of, 871t–872t
 Trabecular bone
 active remodeling units in, 690–691
 bisphosphonates and, 709
 bone mass and, 691
 Tracheostomy, for TBI, 933
 Traction, 328–331
 contraindications for, 331
 definition of, 328
 delivery methods of, 329
 efficacy of, 329–331
 historical perspective on, 328–329
 indications for, 329–331
 physiologic effects of, 329–331
 spinal, 343
 types of, 329
 Traction-type orthosis, 213
 Traditional Chinese medicine, 364
 Training, principles of, 790–792
 altitude training, 791–792
 high-intensity training, focus on, 791
 and overtraining syndrome, 791
 Tramadol, 439t
 Transcutaneous electrical nerve stimulation (TENS), 350–351, 624, 635
 for arthritis, 624f
 Transcutaneous oximetry, 488, 488t
 Transfemoral amputees, 194–195, 194f
 Transfemoral gait deviations, 206–207
 Transfemoral socket design, 183–184, 184f
 Transfemoral suspension options, 187b
 Transforaminal epidural steroid injections, 631f, 645–646
 Transforming growth factor- β (TGF- β), scar development and, 505
 Transhumeral amputations, 159–160
 forearm muscles, myodesis (involvement), 159–160
 Transhumeral myoelectronic prosthesis, 165f
 Transhumeral prosthesis, control cables, 166
 Transition of care, in intensive care unit, 529
 Translational acceleration, inertial forces, 919
 Transparent film dressings, 481t, 482
 Transplant rehabilitation, 550
 goal of, 551
 patient-family education for, 556b
 Transplantation
 heart, 520
 for heart disease, 517
 renal
 early mobilization after, 532–533
 rehabilitation of patients before, 532
 Transport power wheelchairs, 279, 280f
 Transportation, wheelchair, 284–285
 Transportation variables, in wheelchair and seating system assessment, 264
 Transradial amputation, 155
 performing, 156
 Transradial Anatomically Contoured (TRAC) designs, 164–165
 Transradial prosthesis, 165f
 Transradial socket options, 164–165, 165f
 Transtibial amputations, 180, 200

- Transtibial amputees, prosthetic prescription algorithms for, 193–194, 193f
 Transtibial gait deviations, 205–206
 Transtibial level, amputation, 175
 Transtibial residual limb, 180
 Transtibial socket design, 183
 Transtibial suspension system, 187b
 Transverse deficiency, 153–154, 154b
 Transverse digit amputations, 154
 Transverse myelitis, 1060–1063
 Transverse rectus abdominis flap procedure, 578f–579f, 579
 Trapezius
 as high-yield muscle, 150
 weakness of, 588
 Trauma, 403
 neuropathic ulcers and, 472
 Traumatic anterior glenohumeral dislocation, 719
 Traumatic brain injury (TBI), 57, 600, 916–953
 acute care, physiologic measurements in, 925–926
 acute confusion in, 938
 age and gender and, 917
 agitation in, 939
 measures of, 939–940, 940b
 treatment of, 940
 airway/pulmonary management in, 932–933
 arousal and cognition, behavioral measures of, 929
 coma, emergence from, 929
 posttraumatic amnesia, evaluation of, 929
 β -blockers and, 940
 behavioral and cognitive issues in, 939
 behavioral management in, 940
 benzodiazepines and, 940
 biomarkers and, 946
 blast/explosions, effect on, 921b
 bowel and bladder dysfunction in, 932
 case study on, 1118b
 child abuse and, 918
 clinical variables and, 946–948
 closed, 916
 cognition after, 936–938
 cognitive-behavioral therapies for, 941
 cognitive deficits after, 936–937
 clinical neuropharmacology for, 937–938, 937f
 practical interventions for, 938–939
 community integration, 949–951
 computed tomography, 926
 concomitant injury, 921
 contractures in, 933–934
 costs associated with, 917
 deep venous thrombosis and, 931
 definition of, 916
 demographics and, 945–946
 depression and, 941–942
 diffusion tensor imaging in, 948, 949f
 diffusion-weighted imaging in, 948
 driving and, 950–951
 endocrine dysfunction associated with, 935
 environmental/cognitive interventions for, 939b
 epidemiology of, 917
 global demographic/risk factors for, 918
 injury cause, 917
 United States and Worldwide, 917
 evaluation and treatment of, 923–929
 exercise and, 943–944
 experimental neurotransmitter dysfunction, principles of, 922–923
 family education/caregiver burden, 950
 functional assessment measure, 949
 functional evaluation and treatment concepts, 942–944
 functional imaging, 948
 Traumatic brain injury (TBI) (*Continued*)
 functional independence measure, 949
 functional measurement of, 949–950
 GCS scores for, 916
 genomics and, 947–948
 global outcome, 949–950
 heterotopic ossification and, 931, 932f
 hypoarousal in, 940–941
 hypoxic-ischemic brain injury and, 921–922
 inflammation after, 920
 injury and repair continuation in, 918, 918f
 inpatient rehabilitation assessment and management, 929–944
 medical rehabilitation, evaluation, complications, and management in, 929–936
 role of neuropsychologist in, 929
 intentional or violent, 946
 locomotion assistance systems and, 944
 magnetic resonance imaging for, 926–927
 scanning, sequences of, 926–927
 medical management of, neuroimaging for, 926–927
 medical stability in, 930
 mild, management of, 923–924
 military, epidemiology of, 918
 military blast injury and, 921
 moderate to severe, acute medical management of, 924–925
 morbidity in, DVT source, 931
 mortality
 DVT and, 931
 rate of, 946
 neurodegenerative disorders and chronic traumatic encephalopathy, 942
 neuropsychological assessment in, purpose of, 938
 neurotransmission repair, regeneration, and recovery in, 922
 normal pressure hydrocephalus, 934
 nutrition, initiation of, 925
 outcomes, 949–951
 acute prognostic indicators of, 945–948
 tools for, 949
 paroxysmal sympathetic hyperactivity and, 934–935
 pathophysiology of, 918–923
 patient with disorders of consciousness, management of, 928–929
 pediatrics and, 944–945
 pharmacologic intervention in, 941
 positron emission tomography, 948
 posttraumatic headache and, 935–936
 posttraumatic seizures and, 930–931
 posttraumatic stress disorder and, 942
 prevention, 951–952
 primary injury in, 918–919
 proteomics, 946–947
 psychiatric issues in, 941
 psychosocial factors and, 918
 rehabilitation of, behavioral, emotional, and mood issues in, 939–942
 research for, neuroimaging modalities in, 948–949
 resources, 949–951
 secondary complications, in intensive care unit, 925
 secondary injury in, 919–921
 secondary prevention, 951
 severity, defining, 916
 sexual dysfunction and, 436
 single photon emission computed tomography in, 948
 sleep disturbance in, 940–941
 socioeconomic status and, 917–918
 Traumatic brain injury (TBI) (*Continued*)
 spasticity in, 933–934
 surgical treatment for, 925
 swallowing/nutrition and, 931–932
 systemic pharmacologic agents in, 933–934
 tertiary prevention, 952
 tracheostomy for, 932–933
 treatment interventions for, 925
 vestibular dysfunction and, 943
 violence and, 918
 visual/perceptual dysfunction in, 943
 vocational rehabilitation, 950
 Traumatic Brain Injury Act of 2008, 951
 Traumatic injury, anatomy, mechanics and syndromes of, 1051–1057
 Traumatic nerve injuries, 142–143
 Traumatic spinal cord injury
 outcomes of, 1063–1065
 spinal cord compression association with, 1071
 Traumatic upper limb loss, 161
 Traumatically amputated limbs, hand replantation, 156
 Trazodone, 439t
 for sleep disturbances, 941
 Treadmill, body weight support ambulation training on, 1077
 Treadmill training, 944
 Tremor, 972–973
 Trendelenburg gait, 16, 17t
 Triangular fibrocartilage complex (TFCC) injuries, 723–724
 Triazolopyridines, 768
 Tricyclic antidepressants (TCAs), 439t, 768
 analgesic effects of, 768
 for pseudobulbar affect, 1003t
 Tridoshas, 364
 Trigeminal nerve (cranial nerve V), 55
 examination of, 10
 Trigeminal neuralgia (TN), in multiple sclerosis, 999
 Trigger finger
 orthosis, 218f
 snapping sensation, 213
 Trigger point injections, 672
 Triphasic fibrillation potentials, 125
 Triphasic waveform, 123–124
 Trochanteric hip fracture, 695–696
 Trochlear nerve (cranial nerve IV), examination of, 9
 Tropical diseases, 78–79
 Tropomyosin molecules, 298, 301f
 True leg length, measurement of, 232
 Trunk flexibility, measurement of, 305
 Trunk flexion, lateral, 451t–453t
 TSB. *See* Total surface bearing
 Tuberculosis, of spine, 1060
 TUE. *See* Therapeutic use exemption
 Tui na, 335–336
 Tulp, Nicolaes, 1027, 1028f
 Tumor(s), 403
 dysphagia and, 58
 impairments caused by, 573–577
 Turk, Dennis, 751
 Turmeric, 370t–372t
 TV. *See* Tidal volume
 Twin Cities Marathon, 805
 Two-Minute Walk Test, 994–995
 Two-point discrimination, test for, 11
 Tympanic membrane, 1101
 Tympanogram, types of, 1105, 1105f
 Tympanometry, 1104–1105
 Type 1 acromion, 718f
 Type I spinal arteriovenous malformation (AVM), 1063
 Type 3 acromion, 718f

- U**
- UCL. *See* Ulnar collateral ligaments
- UES. *See* Upper esophageal segment
- Ullrich congenital muscular dystrophy, 900
- Ulnar collateral ligaments (UCL)
- composition of, 722
 - rupture of, 721
 - sprain, 722–723
 - stability test of, 716
- Ulnar deviation, 29f
- Ulnar deviation orthosis, 218, 219f
- Ulnar-minus variant, 724f
- Ulnar mononeuropathies, 850–852
- Ulnar nerve, 851f
- CMAP reduction in, 144–146
- Ulnar nerve palsy orthosis, 219–221, 220f
- Ulnar neuritis, in wheelchair athletes, 816
- Ulnar neuropathies, 135t–138t
- Ultralight wheelchairs, 268, 269f
- Ultrasonic energy, 343
- Ultrasonography, for swallow evaluation, 62
- Ultrasound, 343–346
- delivery, 345
 - history of, 343
 - indications and evidence basis of, 345–346, 345f
 - physics and devices of, 343, 345f
 - physiology and mechanism of action of, 343–344, 344f, 344t, 351t
 - techniques of, 344–345
 - therapeutic, 624
 - three-dimensional, 258
- Ultrasound diathermy, 345–346
- contraindications and precautions of, 346b
 - and extracorporeal shock wave therapy, 357b
 - unit, 343, 343f
- Ultrasound transducer, 345
- UMN. *See* Upper motor neuron
- UMNB. *See* Upper motor neurogenic bowel
- Uncovertebral (Luschka) joints, 629f
- Underactive pelvic floor muscles, 775
- Undifferentiated spondyloarthropathies, 677
- Uneven stride length, transtibial gait deviations, 205
- Unilateral spastic CP, 1008
- Universal cuff, 222–223
- Universal goniometer, 27, 27f
- Universal splint, fabrication of, 227
- University of California Biomechanics Laboratory (UCBL) orthosis, 231
- Unmyelinated C fibers, 864
- Unstageable pressure injury, 476, 476f
- Upper body mobility devices, 379
- Upper esophageal segment (UES)
- impaired opening of, 56
 - in swallowing, 55
- Upper extremity, orthopedic management, 1020
- Upper limb(s), 80–81
- amputation, 153–173, 154t
 - biomechanical and anatomic considerations in, 209–212
 - congenital deficiencies in, 153–154
 - decreased tone of, 222
 - fractures in, and wheelchair athletes, 816
 - as funnel, 792
 - injury, 716–717
 - lateral epicondylitis, 213, 218f
 - muscle testing, 32t–35t
 - musculoskeletal problems of, 717–724
 - orthotic devices, 209–228
 - classification, 209, 210t–211t
 - diagnostic categories, 212–225, 214t–217t
 - indications for, 209
 - international considerations for, 227
 - materials for, 226–227
 - principles of, 209
 - special considerations in, 226
- Upper limb(s) (*Continued*)
- pain and dysfunction, 715–726
 - paralysis of, 221–222
 - pediatric applications of, 225–226, 225f–226f
 - physical examination of, 715–716
 - prostheses, 162–168
 - prosthetic systems, 162, 162b–163b
 - reconstructive surgery of, 1076
 - temperature and NCV relationship in, 152.e2
- Upper motor neurogenic bowel (UMNB)
- appearance of, 416f
 - colorectal function, 415t
 - delineation, 425
 - lesions, 414
- Upper motor neuron (UMN)
- corticospinal neuron as, 1052–1053
 - diseases, 820
 - weakness and, 6–7 - dysfunction of, 831
 - reflexic, management of, 425
 - spinal cord injury and, 435
- Upper tract
- dilation, 404
 - tests, 392–394
- Uremia, 531
- renal failure and, 532
- Ureteral reflux dilation, 404
- Urethra, parasympathetic, sympathetic, and somatic
- nerve supply to, 390f
- Urethral bulking agents, 401
- Urethral stents, 401–402
- Urge urinary incontinence (UII), 777–778
- Urinary diversion, 400
- Urinary frequency, 779–780
- definitions and etiology of, 779
 - diagnosis and physical examination of, 779
 - treatment of, 779–780
- Urinary incontinence, 777–779
- definitions and etiology of, 777–778
 - diagnosis and physical examination of, 778
 - epidemiology of, 778
 - and TBI, 932
 - treatment of, 778–779
- Urinary tract, plain radiography of, 393
- Urinary tract infection (UTI)
- as complication of SCI, 1086
 - suspected, 394
 - treatment, complication of, 403–404
- Urinary tract surveillance, 403b
- Urinary urgency, 779–780
- definitions and etiology of, 779
 - diagnosis and physical examination of, 779
 - treatment of, 779–780
- Urine collection devices, 397–398
- Urodynamics, 394–395
- definitions, 393t
- U.S. Department of Veterans Affairs (VA)
- Compensation and Pension Service (C&P) and Programs, 78
- U.S. disability systems, examining physician and, 77–79
- UTI. *See* Urinary tract infection
- UII. *See* Urge urinary incontinence
- V**
- Vacuum constriction devices, negative pressure, 443
- Vacuum tumescence devices, 1087
- Vagal afferents, 408
- Vaginismus, 434, 446
- Vagus nerve (cranial nerve X), 56
- examination of, 10–11
- Valerian, 370t–372t
- Valsalva maneuvers, 396
- Valvular heart disease, cardiac rehabilitation for, 521
- Vascular anatomy, 956–959
- Vascular diseases, 485–498, 687
- conclusion for, 497
- Vascularized bone transplant, 156
- Vasculitic disorders, neuropathy and, 870–874, 873b
- Vasculitic syndrome, 485–486
- rheumatoid, 485–486
- Vasodilators, 439t
- Vasopneumatic compression therapy, for lymphedema, 496–497
- Vasopressin, 935
- Vaulting, transfemoral gait deviations, 207
- VAX-D. *See* Vertebral axial decompression
- VC. *See* Vital capacity
- Vegetative state, 7, 916, 928
- functional MRI/PET, usage for, 928
- Vehicle lift systems, 286f–287f
- Venous disease, 491–493, 492f
- Venous flow, 492
- Venous return, 293
- Venous thromboembolism, 491–492
- Venous ulcers, 469, 471f
- management of, 470–472
- Ventilatory dependence, frailty and, 529
- Ventilatory failure
- causes of, 523t
 - pulmonary rehabilitation for, 523
 - support for, indications for, 524t
- Ventricular fibrillation (VF), 804
- Ventricular tachycardia (VT), 804
- Ventriculoperitoneal (VP) shunt, 1032–1033
- Verbal apraxia, 9
- Vertebrae, 652, 652f
- Vertebral axial decompression (VAX-D), 329
- Vertebral body, 655
- Vertebral body osteophytes, 636–638
- Vertebral column, 249
- movement of, 249
- Vertebral compression fractures, 574, 694, 694f–695f, 703f
- Vertebral end plates (Modic changes), 668
- Vertebral fractures, 693–694
- exercise for reduction of risk for, new hypothesis on, 694
 - percentage of, 707f
- Vertebral motion, Educational Council on Osteopathic Principles naming of, 320
- Vertebral osteomyelitis, 676–677
- Vertebroplasty, 676, 694, 695f
- Vertical axle position, 272, 273f
- Vertigo, benign paroxysmal positional, 1110
- Vest Airway Clearance System, 542
- Vestibular assessment, 1111–1112
- Vestibular dysfunction, and TBI, 943
- Vestibular end organs, 1110, 1111f
- Vestibular impairments, 1110
- Vestibular rehabilitation, 806–807, 1113–1114
- efficacy of, 1115
- Vestibular system
- anatomy and physiology of, 1110–1111, 1111f
 - cervical/ocular vestibular evoked myogenic potential of, 1112
 - computerized testing of, 1111
 - disorders of, risk factors, comorbidities and epidemiology of, 1112–1114
 - electronystagmography of, 1112
 - physical examination of, 1111
 - rotational chair testing of, 1113f
 - video head impulse test of, 1112
- Vestibulocochlear nerve (cranial nerve VIII), examination of, 10
- Vestibulocollic reflex, 1110
- Vestibulodynia, 434
- Vestibulo-ocular reflex (VOR), 1110
- adaptation of, 1114

- Vestibulospinal reflex, 1110
 Veterans, TBI and, 951
 Veterans Health Administration (VHA), 78
 VF. *See* Ventricular fibrillation
 VFSS. *See* Videofluoroscopic swallow study
 VHA. *See* Veterans Health Administration
 vHIT. *See* Video head impulse test
 Vibration, test for, 11
 Vibration syndrome, 486
 Vibrator disc position, 444f
 Video fluoroscopy, swallowing evaluation with, 932
 Video head impulse test (vHIT), 1112
 Videofluoroscopic swallow study (VFSS), 60–61
 versus FEES, 62
 Videourodynamic study, 395, 396f
 Vinca alkaloid, neuropathy related to, 581
 Vineland Adaptive Behavioral Scale, 52, 52t
 Vinyasa, 367
 Violence-related TBI, 918
 Virchow, Rudolf, 1027
 Visceral pain, cortical and subcortical networks, 754
 Visible “Pistoning”, transtibial gait deviations, 205
 Vision
 anatomy and physiology of, 1115–1116, 1116f
 assessment of, 1117–1119
 stroke and, 965
 Vision impairment, 266–267
 Vision loss, brain injury-related, 1117
 Vision rehabilitation (VR), 1117–1119
 service delivery for, 1118
 Vision rehabilitation specialists (VRS), 1117
 Visual changes, neurologic complaints and, 115
 Visual dysfunction, 943
 Visual impairment cane, 243–244
 Visual impairments, 1115
 age-related, 1117
 assistive technology for, 382–384
 cane, 382f
 case study on, 1115b, 1118b
 definition of, 1115
 diabetic retinopathy and, 1117
 distance vision activities for, 1118
 glaucoma and, 1117
 macular degeneration and, age-related,
 1116–1117
 near vision activities for, 1118
 psychological adjustment with, 1119
 rehabilitation for, 1119
 risk factors for, 1116–1117
 summary of, 1119
 symptoms, 1110–1111
 Vital capacity (VC), 514, 1079
 Vitamin D, 369, 691–692
 supplementation of, 711
 Vitamin K therapy, 692
 Vocal communication, 377
 impaired, head and neck cancer and, 589–590
 Vocational activities, 6
 Vocational rehabilitation, 89–99, 95f, 761, 950,
 1075–1076
 assessment and evaluation, 96
 definition of, 94–95
 Vocational Rehabilitation Act of 1973, 1014t
 Vodder, Estrid/Emil, 334
 Voice recognition (VR), 379
 limitations of, 384
 software, 380, 384
 Voiding dysfunction, 1013
 Volleyball players, BMD of, 701
 Voltage-gated sodium, resting membrane potential
 and, 152.e1
 Volume conductor theory, 152.e4, 152.e4f
 Voluntary closing mechanism, 167
 Voluntary contraction, 775
 of pelvic floor muscles, 777
 Voluntary relaxation, 775
 of pelvic floor muscles, 777
 Vomiting, 412, 422–423
 von Monakow, Constantin, 919
 VOR. *See* Vestibulo-ocular reflex
 VR. *See* Vision rehabilitation
 VRS. *See* Vision rehabilitation specialists
 VT. *See* Ventricular tachycardia
 Vulvar pain, 787–788
 Vulvodynia, 446, 787–788
- W**
 WADA. *See* World Anti-Doping Agency
 Wage-loss benefits, 78
 Walker, 244
 as mobility assistive device, 3t
 Walking
 gait cycle, 796, 797f
 double limb support in, 796
 slow speed of, Fried Frailty phenotype and, 525
 speed, observation of, 15–16
 Wallerian degeneration, 116–117
 study of, 143
 Ward, Robert, 334
 Warm whirlpool, 342
 Watson test, 716, 723
 WBV. *See* Whole body vibration therapy
 Weakness
 intensive care unit-acquired, 529
 renal failure and, 532
 Wearing off, 977
 Weight-activated stance control, 191
 Weight disparity, 266
 Weight loss, in Fried Frailty Phenotype, 525
 Weighted kypho-orthosis (WKO), 694–695, 711f
 thoracic, 701–703
 use of, 701, 709f
 Welander distal myopathy, 900
 Well Spouse Association, 950
 Wellness centers, community mobilization and,
 530–531
 development of, 530–531
 community outreach and resource
 identification in, 530–531
 determination of the target population in, 530
 evaluation plan in, 531
 health risk appraisal, needs assessment via, 530
 identification of health goals for intervention
 in, 530
 implementation in, 531
 incentive plan in, 531
 organization of advocates and advisors in, 530
 program development in, 531
 West Point view, 719–720
 Wheel locks, 277
 Wheelchair athletes, 815–817
 acute mountain sickness in, 817
 autonomic dysreflexia in, 816
 elbow injuries in, 816
 heterotopic ossification in, 816–817
 orthostatic hypotension in, 817
 osteoporosis in, 817
 shoulder injuries in, 815–816
 skin breakdown in, 816
 spasticity in, 817
 thermoregulation in, 816
 upper limb fractures in, 816
 wrist injuries in, 816
 Wheelchair mobility, assessment of, 4
 Wheelchair-mounted accessories, 288
 Wheelchair seating, 274
 adjustment of, 270–271
 buttocks interface, pressure mapping of, 267f
 cushions for, 274, 275t
 depth of, 269
 Wheelchair seating (*Continued*)
 functions of, 288
 height of, 269
 width of, 269–270
 Wheelchairs, 261–290, 1014
 antitipper for, 272, 272f
 armrests for, 274–275
 height of, 270
 assessment of, 262–264
 aesthetics in, 263–264
 anthropometrics for, 267
 environmental variables in, 263
 functional variables in, 263
 initial interview for, 262
 medical variables in, 262–263
 physical variables in, 263
 pressure analysis for, 267
 professionals and participants for, 262
 propulsion analysis for, 267
 skills, 267–268
 tools for, 267–268
 transportation variables in, 264
 assistive technology for, 288
 back angle adjustments for, 270–271
 back height of, 270
 back supports for, 271t, 274
 body measurements for, 270f
 considerations for, 266
 contractures and, 264
 cushions for, 264, 274, 275t
 definition of, 262b
 delivery of, 265
 delivery process of, 261–262
 dimensions of, 269–270
 elevation of, 288, 289t
 equipment recommendation and selection
 (prescription) of, 264–265
 fitting for, 265
 follow-up appointments for, 265
 footrests, leg rests and footplates for, 276–277
 funding for, 265
 headrests for, 276
 horizontal axle position for, 272
 input methods for, 282–283
 integrated controls for, 283, 283f
 laterals and chest harnesses for, 275–276
 lifts for, 285, 286f–287f
 maintenance of, 265
 as mobility assistive device, 3t
 myopathy and, 913
 outcome measures of, 265
 paralysis/paresis and, 264
 pediatric patients for, 266, 266f
 pressure-relieving cushions for, 1090
 progressive disorders and, 266
 propulsion of, 272–274, 273f
 quality of, 273
 ramps for, 285, 287f
 rear axle position of, 272
 rear wheel camber of, 271–272, 272b
 recline of, 288, 289t
 referral for, 262
 reimbursement of, 265
 repair of, 265
 restraint system for, 288f
 rugby, 1082
 seating principles for, 264
 sensory loss and, 264
 setup quality of, 273
 skills for, 1073–1074
 spasticity/hypertonicity and, 264–265
 speech-generating devices for, 290
 for sports, 815
 standards for, 285–287
 tie-downs and securement for, 285, 288f

- Wheelchairs (*Continued*)
 tilt of, 288, 289t
 training for, 265
 transportation of, 284–285
 vertical axle position for, 272
 vision impairment and, 266–267
 weight disparity and, 266
 weight of, 272–273
 wheels and tires of, 277
- Wheeled mobility device, 262b
- Wheels, 277
- Whip-kick, 798
- Whiplash event, 649
- Whiplash injury, 649
- Whiplash syndrome, 649
- Whirlpool, 342, 343f
- Whisper Voice, 382
- White matter, 1052
- WHO. *See* World Health Organization
- Whole body activity, 795
- Whole body vibration therapy (WBV), 356–358, 357f
- Whole medical systems, 364–365
- Wilmington brace, 257–258
- Windup, 795
- WIOA. *See* Workforce Innovation and Opportunity Act
- WKO. *See* Weighted kypho-orthosis
- WM. *See* Working memory
- WMSDs. *See* Work-related musculoskeletal disorders
- “Wobble” switch, activation of, 376
- Wolff-Parkinson-White syndrome, 513
- Women
 back extensor strength of, 707f
 osteoporosis and, 697
- Work conditioning, 83
- Work Conditioning Program, 98
- Work hardening, 83
- Work Hardening Program, 98
- Work-related injury, epidemiology of, 90
- Work-related musculoskeletal disorders (WMSDs), 92, 92b
- Worker disability, treatment of, 91–92
- Workforce Innovation and Opportunity Act (WIOA), 375
- Working memory (WM), 936–937
- Workplace environment, 90–91
- Workplace violence, 90
- World Anti-Doping Agency (WADA)
 banned substances by, 798
 prohibited list of substances/methods, 791, 798
- World Anti-Doping code, 798
- World Health Organization (WHO)
 Collaborating Centre Task Force, on Mild TBI, 923
 definitions, 2t
 International Classification of Function, measures of spasticity according to, 455t
- “Wringing”, 333
- Wrist
 conditions of, 723–724
 disarticulation, 154
 extension stability of, 211
 flexion and extension of, 29f
 injuries to, in wheelchair athletes, 816
 median mononeuropathy (carpal tunnel syndrome), 848–850, 850f
 median nerve at, tests for, 18t–26t
 radial and ulnar deviation, 29f
 radiographic evaluation of, 723
 special tests of, 716
- Wrist (*Continued*)
 ulnar neuropathy at, 852
 unit, 166–168, 169b
 “Wrist cock-up orthosis”, 221
 Wrist driven prehension splint, 214f–217f, 214t–217t
 Wrist extension, 451t–453t
 Wrist flexion, 451t–453t
 Wrist orthosis, for carpal tunnel syndrome, 214f
 Writing aid, 621f
- X**
- Xerostomia, 56
- X-frame shoulder socket, 166
- X-linked centronuclear (myotubular) myopathy, 902–903
- X-linked recessive disorders, 883
- X-linked spinobulbar muscular atrophy, 825–826, 826f
- Y**
- Yale Swallow Protocol, 59
- Yergason test, 715
- Yoga, 367, 670, 761
 back pain after, 703f
 common positions of, 702f
- Yohimbe, 370t–372t
- Z**
- Z disks, actin filaments and, 298
- Zackery Lystedt Law, 807
- Zenker diverticulum, dysphagia and, 65
- Ziconotide, for neuropathic pain, 999
- Zoledronate, for osteoporosis, 704–707
- Zolpidem, 928–929
- ZoomText, 383–384, 384f
- Zygapophyseal joints, 653, 654f