Index

acetylcholinesterase inhibitors 106 action potentials saltatory conduction 8, 29, 67 sodium channel activity and 37-9 transmission in demyelinated axons 29 - 30adaptation, rehabilitation and 153 adenosine triphosphate (ATP) levels 31 aerobic training 145, 153 airway protection 219 alpha blockers 4 amantadine 187 4-aminopyridine 114 amitriptyline 187 AMPA receptor antagonists 24 anesthetics, local 33 anisotropy 80 antidepressant drugs 146, 185, 187 antimuscarinic agents 192 antipsychotic drugs 186 antispasticity drugs 168-71, 172 anxiety 184 apparent diffusion coefficient (ADC) 80 aquatic therapy 146 arteriovenous malformation (AVM) pre-surgical mapping 106-8 Ashworth Scale 132, 166-7 aspiration 220, 223, 227 astrocytes CNS precursor differentiation determination and 74 oligodendrocyte precursor cells (OPCs) and 53, 55-6 remyelination role of 55 Schwann cell (SC) interaction 69, 70 ataxia and imbalance

as cognitive and metabolic impairment 211-12 decomposing sensory-motor disturbance 205-6 diagnosis of 203 future research directions 212 individual training program for 209 - 11muscle chaining in voluntary and involuntary actions 203-5 paroxysmal attacks 37 pathophysiology 201-2 postural training principles and rationale 207-8 rehabilitation conceptual framework 203 sodium channel blocker use 40 specificity in MS 202 terminology of 201 atrophy CIS and early RRMS findings 10 cognitive rehabilitation studies 181 gray matter imaging 88-9 spinal cord 10, 14 white matter measurement 79, 80 atropine, intravesical 3 attention 177-8 axonal assay, in vivo techniques 25-7 axonal damage/degeneration/loss axonal die-back 46 calcium-mediated injury 30, 31, 32 diffuse white and gray matter damage and 13-16 energy insufficiency and sodium influx 31 excitotoxicity and 24-5 inflammation and 9, 10 lesion-related 9-13, 16 mechanisms in traumatic injury and MS 45 secondary degeneration in inactive lesions 13 sodium channels as therapeutic targets 30-1

axonal regeneration 13, 45-8 azathioprine 114 baclofen 168, 169, 172 intrathecal (ITB) 169, 170-1, 172 balance disturbances see ataxia and imbalance Balance Master 210-11 bands of Bügner 68 Barthel Index (BI) 132 basal lamina (BL) 61 B cells 16 Beck Fast Screen for Depression in Medically Ill Patients 184 benzodiazepines 169, 186 beta-amyloid precursor protein (β-APP) 32, 33 bipolar disorder 185-6 bladder dysfunction antimuscarinic medication use 192 botulinum toxin use 197-8 cannabinoid use 196 clean intermittent selfcatheterization (CISC) 192-5 DDAVP 194 long-term indwelling catheter use 197-8 management of incomplete emptying 193 mood stabilizing drugs and 186 pelvic floor training 146 sexual dysfunction and 216 urological damage risk 194-5 blood-brain barrier (BBB) increased permeability of 44 magnetic resonance imaging (MRI) and 79, 80, 83 bone marrow, mesenchymal stem cells in 73 bone morphogenetic protein (BMP) 53, 63, 68, 74

More information

botulinum toxin bladder dysfunction treatment 197 spasticity treatment 169, 171, 172 boundary cap cells (BC) 71 bowel dysfunction, sexual dysfunction and 216 brain-derived neurotrophic factor (BDNF) 70 brain parenchymal fraction (BPF) 181 brain tumor, pre-surgical mapping 106 - 8brainstem respiratory control 227 swallowing control 220 bromocriptine 217 bulbar problems dysarthria 146, 219, 224–7 dysphagia 146, 219–24 future research directions 228 interdependence of 219 respiratory impairment 227-8 bupropion 185 Cajal, R. 60, 68 calcium ions calcium-mediated axonal injury 30, 31, 32 sodium-calcium exchanger (NCX) 30, 32 synaptic plasticity 23 cAMP-response-element-binding protein (CREB) 62 Canadian Occupational Performance Measure (COPM) 130 cannabinoids 170, 196 capsaicin 196 carbamazepine ataxia treatment 37 bipolar disorder treatment 186 dysesthesia treatment 217 neuroprotective effect of 33, 34, 36 paroxysmal pelvic pain treatment 215 spasticity treatment 170 carers dysphagia rehabilitation 223 home-based care issues 232, 236 quality of life 140 Caspr (contactin-associated protein) 30, 32, 33 CD45, 35, 36

central conduction central motor conduction time (CMCT) 2, 4-5 conduction block 5, 8, 44 difficulties in failure assessment 3 evoked potential (EP) studies, see evoked potentials (EPs) failure in MS 3-6 pathophysiology in MS 2 saltatory conduction 8, 29, 67 central motor conduction time (CMCT) 2 methylprednisolone treatment studies 4-5 temperature vulnerability and 5 cerebellar dysfunction ataxia and 36, 201-2 dysphagia and 220 sodium channel blockers and 40 cerebellum, Nav1.8 in 36-40 cerebral perfusion 83 chest infections 146 chlorpromazine 186 Cho (choline-containing phospholipids) 81, 82, 88 choking 223 cholinesterase inhibitors 100 chondroitin sulfate proteoglycan 53 clinical nurse specialists, dysphagia management role 222 clinical trials rehabilitation trial problems 152, 158-9, 176-7, 209 source of error in RCTs 157-8 UK Medical Research Council framework 161-2 clinically isolated syndrome (CIS) imaging studies 9, 81, 95 progressive brain atrophy in 10 clinico-radiological paradox 79 clonidine 169, 170 Cofilin 47 cognitive behavioral therapy (CBT) 146, 185 cognitive impairment 176 antimuscarinic medication use and 3 ataxia and 212 electrophysiological assessment of function 114-16 fMRI studies 95-6

cognitive rehabilitation assessment for 177 attention training 177-8 executive skills training 180 memory training 178-80 methodological difficulties in evaluation 176-7 MRI findings 181 patient evaluation of 180-1 research findings 146-7, 161 use of technology and aids 180 communication augmentative and alternative communication (AAC) systems 227 functional techniques 227 speech disturbances, see dysarthria conduction block 5, 8, 44 confocal microscope technology 25-7 contactin-associated protein (Caspr) 30, 32, 33 cooling therapy 146 cortical reorganization see also neuroplasticity dislocation and relocation 107 fMRI findings, see functional magnetic resonance imaging (fMRI) learning in the healthy brain 121 longitudinal changes assessment 98 rehabilitation mode of action and 143 role of 98, 98 structural MR damage and extent of 97 creatine (Cr) 81, 82 Cronbach's coefficient alpha 133 cytokines, inflammatory 5 dantrolene 169 darifenacin 192 DDAVP 194 demyelination, functional effects of 8 dendritic arborisation, increased 13 depression anxiety and 184 etiology of 184-5 in caregivers 236 major or subsyndromal 183 prevalence of 183-4 suicide 184, 185 symptoms of 184 treatment of 146, 185 desire, sexual 215

Index

Detrusitol (tolterodine) 190 detrusor overactivity (DO) 190-3, 195 detrusor-sphincter dyssynergia (DSD) 190-3, 195 dextromethorphan 187 diagnosis evoked potentials (EPs) use 1, 112-13 magnetic resonance imaging (MRI) use 1, 6, 79 3,4-diaminopyridine 100, 114, 123 diaschisis 104, 106 diazepam 169 dietitian, dysphagia management role 222 diffusion tensor (DT) tractography 82-3, 98 diffusion tensor imaging (DTI) diffuse white and gray matter damage studies 14-15 pre-surgical mapping 107 structural MR damage and functional cortical reorganization studies 97-8 white matter (WM) damage studies 80, 81-2 disability correlation with cMRI-visible lesions 79-80 lesion-related nervous damage and future 9 outcome measures 132 disease activity evoked potential (EP) studies 112-13 physical activity and 147 disease progression evoked potential (EP) studies 1-2, 113 - 14therapeutic interventions and 140 Dizziness Handicap Inventory short form (DHIsf) 211 donepezil 106 dorsal root ganglion, neural crestderived stem cell (NCSC) in 72 dysesthesiae 215, 217 dysarthria assessment of 225-6 features and classification of 224-5 incidence of 224 interdependence with respiration and swallowing 219 therapeutic interventions 146, 226 - 7

dysarthrophonia 146 dysphagia airway protection 219 assessment of 221 clinical characteristics in MS 219, 220 incidence of 219 interdependence with speech and respiration 219 interdisciplinary team management approach 221-3 non-oral route feeding 224 pathophysiology 219-20 rehabilitation of 146, 223-4 symptoms of 220-1 edema 5, 9 ejaculatory problems 216 electroconvulsive therapy (ECT) 185 electroencephalography (EEG) epilepsy use 108-9 magneto-EEG (MEG) 115 oscillatory activity investigations 115 - 16simultaneous fMRI (SEM) 109 emotional well-being, outcome measures 132 employment issues 140 Emselex (darifenacin) 192 endocannabinoid neurotransmitter 166 endosomal acidification 36 endothelin 3, 73, 74 endurance training 145 energy conservation training 146 energy insufficiency, axonal degeneration and 31 Environmental Status Scale 132 eperisone hydrochloride 169, 170 ephrins 47 epilepsy, fMRI use 108-9 episodic ataxias 37 Epstein-Barr virus 8 equipment, provision of 145 EquiScale questionnaire 211 EquiTest 205-6, 209 erectile dysfunction 216, 217 euphoria 186-7 event-related desynchronization (ERD)/synchronization (ERS) 116

central conduction pathophysiology in MS 2 diagnostic use 1, 112-13 difficulties in central conduction failure assessment 3 disease activity assessment 112-13 disease progression 1-2, 113-14 event-related (ERPs) 115 prognostic use 1-2, 112 sexual dysfunction 216 treatment response measurement 113–14, 115 triple stimulation technique (TST) 3-6, 113excitatory post-synaptic potential (EPSP) 23 executive function atrophy and performance 89 cognitive rehabilitation and 180 exercise interventions, in rehabilitation 144-6 expanded disability status scale (EDSS) evoked potential (EP) studies and 2 rehabilitation evaluation and 131 experimental autoimmune encephalomyelitis (EAE) confocal microscope studies 26 lesion location in 10 sodium channel studies 31-2, 33-5, 36, 37-40 synaptic and axonal changes 24 external bladder stimulator 146 fan rule, the 204-5 fatigue ataxia and 211-12 cortical reorganization and 98 drug-induced 122 dysphagia and 223 event-related desynchronization (ERD)/synchronization (ERS) and 116 evoked potentials (EPs) studies 114 outcome measures 132 thermosensitivity and motor fatigue 148 Fatigue Impact Scale 132 Fatigue Severity Scale 132 fiberoptic endoscopic evaluation of swallowing (FEES) 221 fibroblast growth factor (FGF) 53, 55 financial issues 140, 148, 231 home-based care 232-3, 234, 235

evoked potentials (EPs)

More information

flecainide 33, 36

fluorescence activated cell sorting (FACS) 56-7 fluoxetine 106 Functional Assessment Measure 132 Functional Independence Measure 132 functional magnetic resonance imaging (fMRI) blood oxygenation level dependent (BOLD) mechanism 93, 96 cognitive system investigations 95-6 epilepsy use 108-9 functional cortical reorganization and structural MR damage correlation 97-8 general considerations 93-4 learning in healthy brain 121-2 longitudinal changes of cortical reorganization assessment 98-100 longitudinal study design issues 120 - 1motor system investigations 95 pre-surgical mapping 103, 106-8, 108 - 9role of cortical reorganization studies 98 signal enhancement by extravascular protons (SEEP) effect 96 simultaneous EEG (SEM) 109 spinal cord investigations 96-7 stroke studies 103-6 therapeutic intervention monitoring 120 - 3transcranial magnetic stimulation (TMS) combined with 123 visual system investigation 94 GABA (gamma-aminobutyric acid) 166 GABA receptors 168, 169 gabapentin 169, 170 galactorrhea 217 General Health Questionnaire 132 glatirameracetate 140 glial cells see also specific types gliogenesis 60, 61 increased activity of 82 glial fibrillary acidic protein (GFAP) 61 glutamate 23, 24-5 glutamate-glutamine 88 glycine 166 Goal Attainment Scaling (GAS) 130

gray matter (GM) damage atrophy 88-9 diffuse 13-16, 87-8 lesion imaging 86-7 pathological studies 86 spinal cord imaging 89

gray matter fraction (GMF) 88

green fluorescent proteins (GFP) 26

group therapy 147

Guy's Neurological Disability Scale 132

haloperidol 186

Hebb, D. 22 heregulin 68

hippotherapy 146

home-based care 230, 232-6 caregivers and 236 future objectives 236-7 MS Centers 231-2

horse-riding therapy 146

Hospital and Anxiety Depression Scale 184

hydration dysphagia rehabilitation 223-4 non-oral route feeding 224

- hyperprolactinemia 217
- hypersexuality 215
- hypomania 185-6
- imbalance, see ataxia and imbalance

immune modulation, see also specific immuno-modulatory therapies sodium channels and 35 therapies and disease progression 140

incontinence, see bladder dysfunction

inflammation

axonal damage and 9, 10 early and late disease phase differences 11 neural stem/precursor cell (NPC) mediated repair and 62-4 reasons for lack of resolution 8 remyelination and 55 resolution of 12

insulin-like growth factor 1 (IGF-1) 53, 55

intention tremor 40, 201, 203

interferon-beta disease progression and 140 drug-induced fatigue 122 evoked potentials (EPs) after 114, 115

interleukin 6 (IL-6) 63 International Classification of Functioning, Disability and Health (ICF) 128 International Classification of Impairments, Disabilities, and Handicaps (ICIDH) 128 intraclass correlation coefficient (ICC) 133 intrathecal baclofen (ITB) 169, 17-171, 172 involuntary emotional expression disorder/pseudobulbar affect (PBA) 187 Item Response Theory (IRT) 135 kainate (KA) 24 kinases 47 L'Hermitte's syndrome 224 Lac (methyl resonance of lactate) 81, 82 lamotrigine 33 language function, pre-surgical mapping 106-8 lateral geniculate nucleus (LGN) 94 Lee Silverman Voice Treatment Programme (LSVT®) 227, 228 lesion-related nervous damage gray matter imaging 86-7 lesion probability maps 15 physiopathology of 9-13, 16 white matter imaging 79-80 levodopa 187 lidocaine 33 lifestyle changes 153 lithium carbonate 186 London Handicap Scale (LHS) 132 long-term depression (LTD) 23-4, 48 long-term potentiation (LTP) 13, 23-4, 48 Lyrinel 4 M.D. Anderson Dysphagia Inventory 221 macrophages axonal transection and 9 glutamate release 24 remvelination role of 55

sodium channels and 35-6

magnesium ions 23

Index

magnetic resonance imaging (MRI) black holes 79, 80 cognitive rehabilitation findings 181 diagnostic use 1, 6, 79 diffusion tensor (DT) tractography 82-3, 98 diffusion tensor imaging (DTI) see diffusion tensor imaging (DTI) disorders of mood and affect studies 184, 186, 187 findings in clinically isolated syndrome (CIS) and early RRMS 9 functional (fMRI) see functional magnetic resonance imaging (fMRI) gray matter (GM) damage studies 14.86-9 magnetization transfer imaging (MTI) see magnetization transfer imaging (MTI) perfusion 83 proton MR spectroscopy (¹H-MRS) see proton MR spectroscopy (¹H-MRS) secondary axonal degeneration study 13 sexual dysfunction studies 216 structural MR damage and functional cortical reorganization correlation 97-8 suboptimal correlation with clinical findings 93 white matter (WM) damage studies 14, 79-83 magnetization transfer imaging (MTI) clinically isolated syndrome (CIS) findings 9 gray matter (GM) damage studies 14-15, 87, 89 lesion evolution studies 13 structural MR damage and functional cortical reorganization studies 97-8 white matter (WM) damage studies 14-15, 80, 81 mania 185-6 medication administration 223 memory atrophy and 89 cognitive rehabilitation and 178-80 fMRI studies 95-6 mesenchymal stem cells 72, 73 methylprednisolone 4-5, 114, 115, 235 mexilitine 33

microglia activated 14, 15, 16, 24 remyelination role of 55 sodium channels and 35-6 mirtazapine 185 mitochondria 31 mitoxantrone 140 moclobemide 185 modafinil 115 mood and affect disorders anxiety 184 bipolar disorder 185-6 categorization of 183 depression, see depression euphoria 186-7 pseudobulbar affect (PBA) 187 terminology of 183 motor system fMRI studies 95 pre-surgical mapping 106-8 MS Centers 231-2 MS Impact Scale 132 MS Impairment Scale 132 MS Relapse Management Scale (MSRMS) 235 MS Spasticity Scale 132 MS Walking Scale 132 MS-Specific Fatigue Scale 132 Multiple Sclerosis Spasticity Scale (MSSS-88) 167 myelin basic protein (MBP) 67 myelin-associated glycoprotein (MAG) 47 myofibroblasts 74 myoinositol 88 Na⁺/K⁺ ATPase 31 NAA (N-acetyl-aspartate) 10, 12, 81, 82, 88 nasogastric (NG) tube feeding 224 natalizumab 140 n-back test 95-6 nerve growth factor (NGF) 39 neural crest cells (NCC) 68, 70, 71 neural crest-derived stem cells (NCSC) 72-3, 74-5 neural stem/precursor cells (NPCs) 61 - 2

inflammation and demyelination 62 - 4regional tropism of associated repair 64 role in regeneration/repair in MS 60 neuregulins 68 neurogenesis 13, 60, 61-5 neuroplasticity, see also cortical reorganization activation after acute lesion 12 fMRI studies, see functional magnetic resonance imaging (fMRI) pharmacological agents' effect on 106 redundancy 104 sprouting 104 stroke studies 103 neuropsychologist, dysphagia management role 222 neurotransmitters baclofen's mode of action and 168 release of 23, 26 spasticity and decrease in 166 neurotrophins 70 nitric oxide 10, 24, 31 NMDA (N-methyl-D-aspartate) 24 NMDA receptors 23 nodes of Ranvier 8, 11, 29, 67 Noggin 63 Nogo-66-receptor (NgR) 47 Nogo-A 46, 47-8, 49 non-steroidal anti-inflammatory drugs (NSAIDs) 64 Nottingham Health Profile 132 nucleus ambiguus (NA) 219 nucleus tractus solitarii (NTS) 219 nutrition dysphagia rehabilitation 223-4 non-oral route feeding 224 O2A progenitor cells 53 occupational therapy 146, 222 olanzapine 186 oligoclonal banding 2 oligodendrocyte myelin glycoprotein (OMgp) 47 oligodendrocyte precursor cells (OPCs) development and properties of human 55-7

Index

stem cell transplantation and 45

development and properties of rodent 53-4 nomenclature of 53, 55 remyelination and 54-5, 57, 61 Schwann cell (SC) differentiation and 74 transplantation of 45, 55, 56-7 oligodendrocytes as remyelination requisite 45 differences from Schwann cells (SC) 67 - 8optic neuritis evoked potentials (EPs) studies 112–13, 114 fMRI studies 94, 95 orgasmic dysfunction 215, 216 outcome measures 130-1 ataxia rehabilitation 210-11 current and future approach considerations 134-6 rehabilitation trials 152, 159 selecting appropriate 131-4 oxybutynin 192 Paced Auditory Serial Addition Test (PASAT) 95 Paced Visual Serial Addition Task (PVSAT) 95 pelvic floor training 146 Penn Spasms Scale 167 percutaneous endoscopic gastrostomy (PEG) tube feeding 224 perfusion MRI 83 periaqueductal gray (PAG) 1, 2 peripheral nerve blockage 171, 169 phenol 169, 171 phenytoin 33-5, 36 phosphocreatine (Cr) 81, 82 physical therapy/physiotherapy 144-5 aerobic training comparison 145 dysphagia management 222 research findings 159-61, 234 spasticity treatment 168, 172 physiopathology (of MS) demyelination and axonal loss functional effects 8 different types of MS 8-9 diffuse white and gray matter damage 13-16 lesion-related nervous damage 9-13, 16 Physiotherapy Evidence Database (PEDro) scale 159

53, 55 platelet-derived growth factor α receptor (PDGFaR) 53 pneumonia 220 pontine micturition center (PMC) 190 - 1positron emission tomography (PET) studies sexual dysfunction 216 stroke 104-5 posturography 210-11 potassium channel blockers 100 pre-surgical mapping 103, 106-8, 108-9 primary progressive multiple sclerosis (PPMS) characteristics 9 procaine 33 progabide 170 prognosis evoked potential (EP) studies 1-2, 112 lesion-related nervous damage and 9 proteoglycans 47 proton MR spectroscopy (¹H-MRS) gray matter (GM) damage studies 88, 89 white matter (WM) damage studies 80, 81, 82 pseudobulbar affect (PBA) 187 psychotherapy 146, 185 Purkinje neurons 37-40 pyramidal dysfunction 4, 5 Pzero myelin protein (P0) 67 quality of life caregiver's 236 determinants of 230 home-based care and 233-4 outcome measures 132 Queen Square Stimulator 146 quetiapine 186 quinidine 187 Rasch measurement 135 recovery mechanisms axonal regeneration 45-8 recession of pathophysiological processes 44 remyelination 44-5 reorganization and neuronal plasticity 48-9 sodium channel density and 30

platelet derived growth factor (PDGF)

types of 12-13 regeneration (of CNS) brain repair system 60 in MS 60-1 Regurin (trospium chloride) 192 rehabilitation adaptation and 153 ataxia and imbalance 203, 207-11 cognitive, see cognitive rehabilitation dysphagia 223-4 evaluation of 127, 130-6, 141, 147, 154 extended program of 234 factors influencing outcome of 143 home-based programs 231 mode of action in MS 143 MS Centers 231-2 overview of 230-1 philosophy and principles of 127-31, 141 problems and limitations of 147-8 research findings 143-7, 152-4, 159-61, 234-5 research problems 152, 158-9, 161-2, 209 role in MS 127 service delivery modes 142-3 sexual dysfunction 217 summary of phases and pitfalls 155 timing during disease course 142 value of multidisciplinary approach 143-4, 161 value of specific treatment modalities 144-7, 159-61 relapse management 235 relapsing-remitting MS (RRMS) characteristics of 8 early MRI findings 9 remyelination background to experimental therapeutic approaches 44-5 causes of failure of 61 extent of 60-1, 64 oligodendrocyte precursor cells (OPCs) and 54-5, 57 Schwann cells (SC) and 67-75 stem cell transplantation strategies 45 reserve capacity, concept of 49 resiniferatoxin (RTX) 7 resistance training 145, 153 respiratory impairment 227-8 interdependence with speech and swallowing 219

245

Index

respiratory impairment (cont.) respiratory training for 146, 227 treatment in dysarthria 227 risperidone 186 rivastigmine 100, 123 robot-assisted gait training 145 saltatory conduction 8, 29, 67 Satisfaction with Performance Questionnaire 130 Schwann cells (SC) adult sources of 71-3 advantages and limitations of CNS grafting of committed 68-70 CNS neural precursors 73-4 differences from oligodendrocytes 67 - 8embryonic sources of 70-1 environmental modification 70 future research directions 74-5 intrinsic properties modification 70 plasticity in PNS development and repair 68 secondary progressive MS (SPMS) characteristics 9 selective serotonin reuptake inhibitors (SSRIs) 106, 185, 187, 217 Self Assessment of Occupational Functioning (SAOF) 130 Self-Identified Goals Assessment (SIGA) 130 semaphorins 47 sensory disturbances 215, 217 Sensory Organization Test (SOT) 206, 210 sexual dysfunction antidepressant drugs and 185 female problems 215 incidence of 215 male problems 215-16 neurophysiology 216 rehabilitation 217 treatment 217 Shaker exercise 224 Short Form Health Survey (SF-36) 132, 134, 135, 152, 233 Sickness Impact Profile 132 sildenafil 217 simultaneous EEG and fMRI (SEM) 109

axons 31 Nav1.2 and Nav1.6 in EAE 31-2 Nav1.2 and Nav1.6 in MS 32-5 Nav1.8 in cerebellum in MS 36-40 plasticity in demyelinated axons 29 - 30saltatory conduction and 8 therapeutic target role of 30-1 unrestrained influx and energy insufficiency 31 sodium/potassium pump (Na⁺/K⁺ ATPase) 31 sodium-calcium exchanger (NCX) 30, 32 solifenacin 4 Sonic hedgehog (Shh) 53, 68 Sox10, 73, 74 spasticity definition of 165 epidemiological aspects of 165 management approaches 167-8, 172 measurement of 166-7 outcome measures 132 palliative surgery 171 pathophysiology of 165-6 pharmacological therapy 168-71, 172 physical therapy 168, 172 sexual dysfunction and 216 speech and language therapy 146, 222, 223 speech disturbances, see dysarthria spinal cord atrophy 10, 14 fMRI studies 96-7 gray matter imaging 89 regeneration following injury 62 stem cells mesenchymal 72, 73 neural crest-derived (NCSC) 72-3, 74 - 5neural stem/precursor cells (NPCs) see neural stem/precursor cells (NPCs) oligodendrocyte precursor cells (OPCs) see oligodendrocyte precursor cells (OPCs)

sodium channel blockers 33-6, 37, 40

distribution in myelinated axons 29

myelinated and demyelinated

immune modulation and 35-6

isoform expression along

sodium channels

skin derived precursors (SKP) 72–3

evoked potentials for monitoring 1 home-based administration 235 mania and 185 methylprednisolone 4-5, 114, 115, 235 stroke CNS regeneration following experimental acute 62 fMRI studies 103-6 home-based care studies 232 positron emission tomography (PET) studies 104-5 prevalence of 103 Stroop task 96, 100, 123 sub-granular zone (SGZ) 61-3 sub-ventricular zone (SVZ) 61-3 suicide 184, 185 swallowing disturbances, see dysphagia SWAL-QOL 221 synapses activation and potentiation of functionally silent connections 13 changes in MS 24-5 current understanding and future directions 22 in vivo assay techniques 25-7 synaptic homeostasis/scaling 25 synaptic plasticity 22-4, 48 synaptogenesis 13, 23-4, 48 T cells 9, 15, 16 Tello, F. 60 telomerase activity 54 temperature vulnerability (Uhthoff phenomenon) central motor conduction time (CMCT) and 2, 5 cooling therapy 146 physical activity and 148 TST amplitude ratio and 5 tetrodotoxin (TTX) 30, 31, 33, 36, 37 tizanidine 168, 169 tolterodine 192

steroid therapy

tractography (diffusion tensor) structural MR damage and functional cortical reorganization studies 98

white matter (WM) damage studies 82-3

skin derived precursors (SKP) 72-3

Index

transcranial magnetic stimulation (TMS) 3, 106, 113 fMRI combined with 123 triple stimulation technique (TST) 3-6, 113

treadmill training 145, 153

tremor 40, 201, 203

tricyclic antidepressants 185, 187 triple stimulation technique (TST) 3-6, 113

trospium chloride 192

tumor necrosis factor 10

Uhthoff phenomenon, *see* temperature vulnerability (Uhthoff phenomenon) urinary catheterization clean intermittent self (CISC) 192–5 long-term indwelling 197–8 urological damage, risk of 194–5 vaginal dryness 215, 217 valproic acid 186 veratridine 38 Vesicare 4 videofluoroscopy (VFS) 221 vigabatrin 170 vimentin 36 viruses 8

vision optic neuritis, *see* optic neuritis recovery of visual acuity 30 visual preference 205-6, 209

Wartenberg pendulum test 167

white matter (WM) damage conventional MRI (cMRI) studies 79–80 diffuse damage as pathophysiological mechanism 13–16 novel MR-based studies 82–3 structural MR-based studies 80–2 Wnt signals 53