This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

Index

A

AADC. *See* Aromatic amino acid decarboxylase
AAV. *See* Adeno-associated virus
Acetylcholine (ACh), functional imaging, 174–175
ACh. *See* Acetylcholine
Adaptive immune system
  central nervous system, 381–382
  cross-regulation with innate immunity in central nervous system, 382–384
  misfolded proteins in immune activation, 384–385
  Parkinson's disease dysfunction, 385–388
  prospects for study, 391
  therapeutic targeting, 388–391
Adeno-associated virus (AAV)
  gene therapy vectors, 129
  mouse models of Parkinson's disease, 265
Aging
  DNA polymerase-γ studies in mutant mice, 218
  macroautophagy in protein quality control effects, 336
  mitochondria aging hypothesis, 211–213, 305–306
Akinesia, motor control, 196–198
α-Methyl-*p*-tyrosine, animal models of Parkinson's disease, 24
α-Synuclein (SNCA)
  aggregation potential, 69–70
  autophagy
    autophagy response, 317–318, 337
    chaperone-mediated autophagy
      degradation, 316
      inhibition by mutant forms, 316–317, 336–337
    mitophagy role, 318
  autosomal dominant Parkinson's disease clinical features, 24, 54–55
  biomarkers, 77–78
  function, 67–69
  gain-of-function and accumulation, 72–74
  gene dosage in Parkinson's disease, 66
  knockdown therapy, 135–136
  Lewy body. *See* Dementia with Lewy bodies; Lewy body
  lipid interactions, 71–72
  loci. *See* PARK1; PARK4
  misfolded proteins in immune activation, 384–385
  pathogenic effects
    cytoskeleton, 74–75
    endoplasmic reticulum/Golgi apparatus, 76
    lysosome, 75
    mitochondria, 75
    nucleus, 76
    proteasome, 75
    secretion and uptake, 77
    synapse, 74
  posttranslational modifications, 70–71
  protein–protein interactions, 71
  structure, 67–68
  synucleopathy models, 69
  therapeutic targeting, 77–78
  transgenic mouse, 266–267
  ubiquitin proteasome system effects of mutation, 331–332
AMPA receptor, neuronal phenotype of Parkinson's disease, 204
Amphetamines, animal models of Parkinson's disease, 248–249
Animal models. *See* α-Methyl-*p*-tyrosine; Amphetamines; *Drosophila*; 6-Hydroxydopamine; Isoquinoline; Lipopolysaccharide; 1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine; Mouse models; Paraquat; Reserpine; Rotenone
Apoptosis. *See* Programmed cell death
Aromatic amino acid decarboxylase (AADC), gene therapy, 130–131
ATP13A2, mutation
  Parkinson's disease, 57–58
  ubiquitin proteasome system dysfunction, 337–338
Autophagy
  α-synuclein
    autophagy response, 317–318, 337
    chaperone-mediated autophagy
      degradation, 316
      inhibition by mutant forms, 316–317, 336–337
    mitophagy role, 318
  cytoplasmic cell death
    overview, 355
    paranatos, 355–356
    necroptosis, 356
  DJ-1 role, 322
  functions, 315–316
  leucine-rich repeat kinase-2 role, 321–322
  macroautophagy in protein quality control

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

Autophagy (*Continued*)
aging effects, 336
impairment in Parkinson's disease, 336
overview, 334–335
oxidative stress effects, 335–336
mitophagy
parkin-dependent mitophagy, 320
Parkinson's disease, 319–320
molecular mechanisms, 315
organelle specificity, 314–315
PINK1 function
isoforms, 321
overview, 320–321
protective function, 321
programmed cell death
defects in Parkinson's disease, 353–354
mitophagy, 354–355
overview, 353–354
prospects for study in Parkinson's disease, 322, 356–357
types, 313–314, 333–334
Autosomal dominant Parkinson's disease
clinical features, 24–25
gene mutations, 24–25, 54–55
mouse models, 263
pedigrees, 50, 52–53
Autosomal recessive Parkinson's disease
clinical features, 25–26
gene mutations, 25–26, 56–57
mouse models, 264
pedigrees, 50, 52–53

B

Basal ganglia
function and motor symptoms, 198–199
functional imaging at rest, 168
functional organization
classic model, 152–154
corticostriatal connections, 155
corticosubthalamic connections, 155–156
domains, 154–155
subcortical connections, 156
gross anatomy, 143–144
nuclei
globus pallidus external segment, 150
substantia nigra pars compacta, 151–152
subthalamic nucleus, 150–151
pathophysiology
dyskinesia, 157
parkinsonism, 156–157
striatum
compartments, 146–147
output nuclei
globus pallidus internal segment, 149
substantia nigra pars reticulata, 149–150
projections
afferents, 147–149
efferents, 149
neurons and interneurons, 144–145
Bcl-2 proteins, apoptosis mediation, 349–350
β-Glucocerebrosidase (GBA)
α-synuclein accumulation effects, 75
mutation and Parkinson's disease risk, 58–59
Bioinformatics
biomarker discovery, 118–120
overview, 115–116
Braak staging, Parkinson's disease, 41
Bradykinesia
motor control, 192–196
Parkinson's disease, 18
speed selection abnormalities, 186

C

Calcium flux
L-type calcium channels
dopaminergic neuron susceptibility role in Parkinson's disease, 214–216
therapeutic targeting, 221–223
metabolic burden on neurons, 205–207
mitochondria in homeostasis, 207–208, 294, 301–303
neuronal pacemaking and ionic homeostasis challenge, 208–209
neuron vulnerability in Parkinson's disease
dopaminergic neurons, 213–220
nondopaminergic neurons, 220
Caspase, activation in apoptosis, 348, 350
CBD. *See* Corticobasal degeneration
CDK5. *See* Cyclin-dependent kinase-5
Charcot, Jean-Martin, 2, 4–5, 7–10, 12, 17
Chronic traumatic encephalopathy (CTE), overview, 43
Clarke, Robert Henry, 11–12
Clinical presentation, Parkinson's disease
autosomal dominant Parkinson's disease, 24–25
autosomal recessive Parkinson's disease, 25–26
exclusion criteria, 38
historical perspective, 1–7
motor symptoms
animal models
assessment, 253–254
MPTP monkey model, 233–234
bradykinesia, 18
overview, 186–188
postural and gait impairment, 19
rest tremor, 18–19
rigidity, 19
nonmotor symptoms, 19–20
Corticobasal degeneration (CBD), overview, 43
CTE. *See* Chronic traumatic encephalopathy

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

Cyclin-dependent kinase-5 (CDK5), dysfunction in Parkinson's disease, 351–352

D

Dardarin. *See* Leucine-rich repeat kinase-2
Default mode network (DMN), functional imaging, 171–173
Dementia with Lewy bodies (DLB)
  differential diagnosis, 23
  parkinsonism etiology, 25
Diagnosis, Parkinson's disease
  clinical examination, 21
  criteria, 22
  differential diagnosis
    dementia with Lewy bodies, 23
    drug-induced parkinsonism, 22–23
    essential tremor, 23
    fragile X-tremor ataxia syndrome, 24
    multiple system atrophy, 23, 37–39
    progressive supranuclear palsy, 23–24, 37–39
    vascular parkinsonism, 22
  historical perspective, 1–7
  imaging, 21–22
  incorrect diagnosis features, 21
  medical history, 20
DIP. *See* Drug-induced parkinsonism
DJ-1
  apoptosis protection, 347–348
  autophagy role, 322
  autosomal recessive Parkinson's disease clinical features, 26, 57, 100
  Drosophila studies of PINK1/Parkin pathway modulation, 285
  evolution, 100–101
  function, 104–106
  genetic testing, 59
  knockout mouse, 268–269
  locus. *See* PARK7
  mutation studies of parkinsonism development, 101–102
  prospects for study, 106
DLB. *See* Dementia with Lewy bodies
DMN. *See* Default mode network
DNA polymerase-γ (POLG)
  aging studies in mutant mice, 218
  mutation effects, 298
L-Dopa. *See* Levodopa
Dopamine
  functional imaging, 165–166, 173–174
  history of Parkinson's disease treatment, 10–11
  striatum dopamine quantification in animal models of Parkinson's disease, 252
Drosophila
  advantages as Parkinson's disease model system, 277–278
  gene identification in Parkinson's disease, 276–277
  genetic and compound screening, 279
  knockdown studies, 279
  mutagenesis and loss-of-function studies, 278
  overexpression studies, 278–279
  prospects for Parkinson's disease studies, 285–286
  PTEN-induced putative kinase-1/Parkin pathway studies
    links with other PARK loci, 284–285
    mitochondrial fission promotion and fusion inhibition, 281–282
    mitochondrial integrity, 279–281
    mitochondrial transport, 283–284
    mitophagy promotion, 282–283
  site-specific transgenesis, 279
Drug-induced parkinsonism (DIP)
  differential diagnosis, 22–23
  drug types, 25
Dyskinesia. *See specific dyskinesias*

E

Endoplasmic reticulum (ER)
  α-synuclein mutant effects, 76
  apoptosis response, 351
  protein quality control. *See* Autophagy; Ubiquitin proteasome system
Epidemiology, Parkinson's disease, 17–18
ER. *See* Endoplasmic reticulum
Essential tremor (ET), differential diagnosis, 23
ET. *See* Essential tremor

F

FDDNP, protein aggregation imaging, 175–176
FDOPA. *See* Positron emission tomography
fMRI. *See* Functional magnetic resonance imaging
Fragile X-tremor ataxia syndrome (FXTAS), differential diagnosis, 24
Functional magnetic resonance imaging (fMRI)
  default mode network, 171–173
  principles, 165
FXTAS. *See* Fragile X-tremor ataxia syndrome

G

GAD. *See* Glutamic acid decarboxylase
Gaucher's disease, parkinsonism risks, 337–338
GBA. *See* β-Glucocerebrosidase
GCH-1. *See* GTP cyclohydrolase-1
GDNF. *See* Glial-derived neurotrophic factor
Gene therapy
  enzyme replacement
    aromatic amino acid decarboxylase, 130–131
    glutamic acid decarboxylase, 132–133
    GTP cyclohydrolase-1, 130, 132
    tyrosine hydroxylase, 130, 132

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

Gene therapy (*Continued*)
glial-derived neurotrophic factor, 134–135
principles, 127–128
viral vectors
adeno-associated virus, 129
lentivirus, 128
Genetics, Parkinson's disease
classification by loci, 50–51
genetic testing, 59
identification of new genes and risk factors, 53–54
linkage analysis, 53–54
loci. *See specific loci*
monogenetic Parkinson's disease, 54–58
pedigrees, 50, 52–53
risk gene mutations in Parkinson's disease, 58–59
Genomics, Parkinson's disease
aberrant network activity identification, 116–118
bioinformatics
biomarker discovery, 118–120
overview, 115–116
historical perspective, 113–114
Mendelian versus complex disease, 112–113
therapeutic application, 120–122
Glial-derived neurotrophic factor (GDNF)
α-synuclein knockdown therapy, 135–136
direct injection studies, 133–134
functional overview, 133
gene therapy, 134–135
parkin, 136–137
prospects, 137–138
Globus pallidus
external segment, 150
internal segment, 149
Glutamic acid decarboxylase (GAD), gene therapy, 132–133
Gowers, William, 2, 7, 10
GTP cyclohydrolase-1 (GCH-1), gene therapy, 130, 132

H

Historical perspective, Parkinson's disease
clinical descriptions, 1–3
differential diagnosis, 2, 4–7
genomics, 113–114
treatment, 7–13
Horsley, Victor, 12
HtrA2. *See* Omi/HtrA2
6-Hydroxydopamine (6-OHDA)
animal models of Parkinson's disease, 244
brain physiology, 243–244
structure, 242
toxicity mechanisms, 246
Hypokinesia, motor control, 192–195

I

Inflammation
adaptive immune response. *See* Adaptive immune system
innate immune response. *See* Innate immune system
Innate immune system
cross-regulation with adaptive immunity in central nervous system, 382–384
inflammation in Parkinson's disease
animal Parkinson's disease model studies
lipopolysaccharide, 376
overview, 374
toxin models, 374–375
transgenic mouse studies, 375–376
epidemiological studies, 374
microglia
activation in Parkinson's disease, 372–374
activators, 376
characteristics and functions in brain, 370–372
prospects for study, 377
systemic inflammation impact on innate immune cells, 372
T cell activation, 374
misfolded proteins in immune activation, 384–385
Isoquinoline, animal models of Parkinson's disease, 249–250

J

Jellinger staging, multiple system atrophy, 42

K

Knockout mouse. *See* Mouse models

L

Lentivirus, gene therapy vectors, 128
Leucine-rich repeat kinase-2 (LRRK2)
autophagy role, 321–322
autosomal dominant Parkinson's disease clinical features, 25, 55–56, 91–92
discovery, 89–90
functions
cytoskeleton, 93–94
membrane trafficking, 92–93
Parkinson's disease protein pathway overlap, 95
genetic testing, 59
locus. *See* PARK8
mutation
frequency, 90–91
functional effects, 94
sites, 92
protein–protein interactions, 92

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

structure, 92
transgenic mouse, 267
Levodopa, history of Parkinson's disease treatment, 10–11
Levodopa-induced dyskinesia (LID)
functional imaging, 168–170
MPTP monkey model, 235
Lewy body. *See also* α-Synuclein; Dementia with Lewy bodies
characteristics, 39–40
detection in animal models of Parkinson's disease, 252–253
immunohistochemistry
multiple system atrophy, 35–36
Parkinson's disease, 35–36, 67
multiple system atrophy glial cytoplasmic inclusions, 40, 66
Lipopolysaccharide (LPS)
animal models of Parkinson's disease, 250
innate inflammation studies in Parkinson's disease models, 376
LPS. *See* Lipopolysaccharide
LRRK2. *See* Leucine-rich repeat kinase-2
L-type calcium channel. *See* Calcium flux

M

Macrophage. *See* Microglia
Magnetic resonance imaging (MRI), Parkinson's disease diagnosis, 22
Methamphetamine, animal models of Parkinson's disease, 248–249
N-Methyl-D-aspartate receptor (NMDAR), neuronal phenotype of Parkinson's disease, 204–205
1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP)
mitochondria effects, 296
monkey models of Parkinson's disease
anatomo-pathology, 232–233, 245
behavioral assessment, 235
cognitive impairment, 234
dyskinesia, 235
Lewy body lack, 233
limitations, 235–236
motor symptoms, 233–234
sleep disturbances, 234–235
species, 232
mouse models of Parkinson's disease, 236–237
species response in modeling Parkinson's disease, 231, 245
structure, 242
toxicity mechanisms, 245
ubiquitin proteasome system effects, 332
Microglia
activation in Parkinson's disease, 372–374, 387
activators in Parkinson's disease, 376
characteristics and functions in brain, 370–372
Mitochondria
aging hypothesis, 211–213, 305–306
α-synuclein function, 75, 318–319
calcium homeostasis role, 207–208, 294, 301–303
compartments, 293–294
Drosophila studies of PINK1/Parkin pathway
links with other PARK loci, 284–285
mitochondrial fission promotion and fusion inhibition, 281–282
mitochondrial integrity, 279–281
mitochondrial transport, 283–284
mitophagy promotion, 282–283
dynamics
fusion/fission, 298–300
motility and regional distribution, 300–301
turnover, 301
genetics, 297–298
mitophagy. *See* Autophagy
neuronal function, 209–210
oxidative phosphorylation system
complex I blockade consequences, 296
overview, 295
oxidative stress, 210–211
Parkinson's disease dysfunction overview, 306–307, 318–319
Parkin targets, 320
programmed cell death
fragmentation, 352–353
pathways, 303–305, 349
Monkey models. *See* 1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine
Motor control
akinesia, 196–198
animal model assessment, 253–254
bradykinesia, 192–196
hypokinesia, 192–195
levels of description, 189–190
motor symptom to motor control, 190–191
overview, 188
rigidity, 190–192
Mouse models, Parkinson's disease
autosomal dominant Parkinson's disease, 263
autosomal recessive Parkinson's disease, 264
characterization, 266
knockout mouse models
DJ-1, 268–269
overview, 264–265
parkin, 267–268
PTEN-induced putative kinase-1, 268
MPTP, 236–237
overview, 262
prospects, 269–271
transgenic mouse models

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

Mouse models, Parkinson's disease (*Continued*)
α-synuclein, 266–267
constructs, 262
innate inflammation studies, 375–376
leucine-rich repeat kinase-2, 267
test-off conditional models, 262, 264
virus-induced models, 265–266
MPTP. *See* 1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine
MRI. *See* Magnetic resonance imaging
MSA. *See* Multiple system atrophy
Multiple system atrophy (MSA)
brain morphology, 34, 39
clinical features, 38
differential diagnosis, 23, 37–39
glial cytoplasmic inclusions, 40
Jellinger staging, 42
Lewy body immunohistochemistry, 35–36
pathology comparison with Parkinson's disease and progressive supranuclear palsy, 40–41
substantia nigra degeneration, 34–35

N

Necroptosis, dysfunction in Parkinson's disease, 356
Neuronal phenotype, Parkinson's disease
calcium channel, L-type targeting, 221–223
metabolic burden
spiking, 205–208
synaptic transmission, 209
mitochondria
aging hypothesis, 211–213
oxidative stress, 210–211
overview, 204–205
pacemaking and ionic homeostasis challenge, 208–209
reconciliation with other pathogenesis models, 220–221
vulnerable neurons
dopaminergic neurons, 213–220
non-dopaminergic neurons, 220
Niemann-Pick disease, parkinsonism risks, 337–338
NMDAR. *See N*-Methyl-D-aspartate receptor
6-OHDA. *See* 6-Hydroxydopamine

O

Omi/HtrA2
Drosophila studies of PINK1/Parkin pathway modulation, 284–285
function, 284
Oxidative stress
α-synuclein role, 75–76
macroautophagy effects, 335–336
mitochondria
MPTP effects, 296
role, 210–211

P

p53, expression in Parkinson's disease, 352
p62, parkin-dependent mitophagy, 320
Paranatos, dysfunction in Parkinson's disease, 355–356
Paraquat
animal models of Parkinson's disease, 246–247
structure, 242
PARK, autosomal dominant Parkinson's disease clinical features, 24
PARK1. *See also* α-Synuclein
autosomal-dominant Parkinson's disease clinical features, 24
PARK2. *See also* Parkin
autosomal recessive Parkinson's disease clinical features, 25, 56–57
mutation and Parkinson's disease susceptibility, 53
PARK4. *See also* α-Synuclein
autosomal-dominant Parkinson's disease clinical features, 24
PARK5. *See also* Ubiquitin carboxy-terminal hydrolase-1
autosomal-dominant Parkinson's disease clinical features, 24–25
PARK6. *See also* PTEN-induced putative kinase-1
autosomal recessive Parkinson's disease clinical features, 26, 57
mutation and Parkinson's disease susceptibility, 53
PARK7. *See also* DJ-1
autosomal recessive Parkinson's disease clinical features, 26, 57
PARK8. *See also* Leucine-rich repeat kinase-2
autosomal dominant Parkinson's disease clinical features, 25, 55–56, 91–92
PARK9. *See* ATP13A2
PARK13. *See* Omi/HtrA2
Parkin
apoptosis protection, 348
autosomal recessive Parkinson's disease clinical features, 25, 56–57, 100
Drosophila studies of PINK1/Parkin pathway
links with other PARK loci, 284–285
mitochondrial fission promotion and fusion inhibition, 281–282
mitochondrial integrity, 279–281
mitochondrial transport, 283–284
mitophagy promotion, 282–283
evolution, 101
function, 102–104
gene therapy, 136–137
genetic testing, 59
knockout mouse, 267–268
locus. *See* PARK2
mitochondrial targets, 320
mitophagy role, 320, 354

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

mutation studies of parkinsonism development, 101–102
prospects for study, 106
ubiquitin proteasome system effects of mutation, 331–332
Parkinson, James, 1–3, 17
Parkinson-dementia complex (PDC), overview, 43–44
Parkinson's disease-related cognitive pattern (PDCP), functional imaging, 171–172
Parkinson's disease-related pattern (PDRP), positron emission tomography, 166–168
Parkinson's disease tremor-related pattern (PDTP), positron emission tomography, 168
PCD. *See* Programmed cell death
PDC. *See* Parkinson-dementia complex
PDCP. *See* Parkinson's disease-related cognitive pattern
PDRP. *See* Parkinson's disease-related pattern
PDTP. *See* Parkinson's disease tremor-related pattern
PET. *See* Positron emission tomography
PIB. *See* Pittsburgh Compound B
PINK1. *See* PTEN-induced putative kinase-1
Pittsburgh Compound B (PIB), protein aggregation imaging, 175–176
Placebo therapy, historical perspective, 12–13
POLG. *See* DNA polymerase-γ
Positron emission tomography (PET)
default mode network, 171
functional imaging
dopaminergic dysfunction and motor symptoms, 165–166
metabolic networks, 166–168
levodopa-induced dyskinesia, 169–170
neurotransmitter imaging, 173–175
Parkinson's disease diagnosis, 21
principles, 164–165
protein aggregation imaging, 175–176
resting metabolism studies, 171–172
Programmed cell death (PCD)
apoptosis
animal models of Parkinson's disease, 347–348
assays, 346–347
Bcl-2 proteins, 349–350
caspase activation, 348, 350
cyclin-dependent kinase-5 dysfunction, 351–352
endoplasmic reticulum response, 351
p53 expression, 352
pathways, 348–349
autophagy
defects in Parkinson's disease, 353–354
mitophagy, 354–355
overview, 353–354
mitochondria
fragmentation, 352–353
pathways, 303–305, 349
overview, 345–346
Progressive supranuclear palsy (PSP)
brain morphology, 34, 39
clinical features, 38–39
differential diagnosis, 23–24, 37–39
pathology comparison with Parkinson's disease and multiple system atrophy, 40–41
staging, 42–43
substantia nigra degeneration, 34–35
tau
immunohistochemistry, 35, 37
pathology, 40
Proteasome. *See* Ubiquitin proteasome system
Protein quality control. *See* Autophagy; Ubiquitin proteasome system
PSP. *See* Progressive supranuclear palsy
PTEN-induced putative kinase-1 (PINK1)
apoptosis protection, 348
autophagy function
isoforms, 321
overview, 320–21, 354
protective function, 321
autosomal recessive Parkinson's disease clinical features, 26, 57, 100
Drosophila studies of PINK1/Parkin pathway
links with other PARK loci, 284–285
mitochondrial fission promotion and fusion inhibition, 281–282
mitochondrial integrity, 279–281
mitochondrial transport, 283–284
mitophagy promotion, 282–283
evolution, 101
function, 102–104
genetic testing, 59
knockout mouse, 268
locus. *See* PARK6
mutation studies of parkinsonism development, 101–102
prospects for study, 106

R

Reserpine, animal models of Parkinson's disease, 248
Rest tremor, Parkinson's disease, 18–19
Rigidity
motor control, 190–192
Parkinson's disease, 19
Rotenone, animal models of Parkinson's disease, 247

S

Single-photon emission computed tomography (SPECT)
Parkinson's disease diagnosis, 21
principles, 164–165
protein aggregation imaging, 175–176

© 2012 by Cold Spring Harbor Laboratory Press

This is a free sample of content from Parkinson's Disease.
Click here for more information or to buy the book.

Sleep disorders, Parkinson's disease
MPTP monkey model, 234–235
overview, 20
SNc. *See* Substantia nigra pars compacta
SNCA. *See* α-Synuclein
SPECT. *See* Single-photon emission computed tomography
STN. *See* Subthalamic nucleus
Striatum
basal ganglia projections
afferents, 147–149
corticostriatal connections, 155
efferents, 149
neurons and interneurons, 144–145
output nuclei
globus pallidus internal segment, 149
substantia nigra pars reticulata, 149–150
compartments, 146–147
dopamine quantification in animal models of Parkinson's disease, 252
dopaminergic terminal quantification in animal models of Parkinson's disease, 252
Substantia nigra, degeneration in parkinsonian disorders, 34–35
Substantia nigra pars compacta (SNc)
dopaminergic neuron quantification in animal models of Parkinson's disease, 251–252
neuron vulnerability in Parkinson's disease, 213–220
Substantia nigra pars reticulata, 149–152
Subthalamic nucleus (STN)
corticosubthalamic connections, 155–156
overview, 150–151
Surgical therapy, historical perspective, 11–12

T

Tau, progressive supranuclear palsy
immunohistochemistry, 35, 37
pathology, 40
T cell
activation in Parkinson's disease, 374, 387–388
central nervous system, 382
cross-regulation with innate immunity in central nervous system, 383–384
regulatory T cell therapeutic targeting, 388–391
TDP-43-related parkinsonism, overview, 44
TH. *See* Tyrosine hydroxylase
Tyrosine hydroxylase (TH), gene therapy, 130, 132

U

Ubiquitin carboxy-terminal hydrolase-1 (UCHL1)
locus. *See* PARK5
Parkinson's disease susceptibility gene, 58
Ubiquitin proteasome system (UPS)
ATP13A2 mutation and dysfunction, 337–338
MPTP effects, 332
overview, 329–331
parkin mutation effects, 331–332
protein misfolding versus clearance in Parkinson's disease, 328–329
α-synuclein mutation effects, 331–332
UCHL1. *See* Ubiquitin carboxy-terminal hydrolase-1

V

Vascular parkinsonism, differential diagnosis, 22
Ventral tegmental area (VTA), dopaminergic neuron susceptibility in Parkinson's disease, 214, 216
Vibratory therapy, historical perspective, 9
VTA. *See* Ventral tegmental area

© 2012 by Cold Spring Harbor Laboratory Press