Index

abstract thinking, assessment of  15
academic achievement
    assessment of  71
    children with NF-I  221, 223–24
    diagnosis relating to  8
    HSCT (hematopoietic stem cell transplantation)
        children  232
    importance of early intervention  74–75
    reduced following radiation therapy  204
tests measuring  62
acute lymphoblastic leukemia (ALL)
    incidence of  57–58
    neuropsychological deficits  58–60
    survival rates  57
    treatment  58
    effect on child's development  58
    MRI studies  23–24
adaptive functioning  67, 71–73, 205
adrenocorticotropic hormone (ACTH)  251, 273
affective distress and cognitive performance  51–52
Alzheimer's disease
    cognitive rehabilitation  285
    external memory aids  286
    versus mental stimulation  286
donepezil, effectiveness of  177
    and low testosterone levels  117–18
    memantine  178–79
    susceptibility to  117
androgens
    androgen deprivation therapy  126–35
    androgen substitution therapy  118
    anti-androgens  120
    effect on spatial abilities  116–18, 125
    intermittent androgen suppression (IAS)  120
anemia and cognition
in cancer patients 51, 102
hematological cancer patients 232–33
in non-cancer patients 233
children and infants 233
animal models 270, 276
associated with cancer cells 271–72
attention deficit hyperactivity disorder (ADHD) 271
cognitive tests 274–75
criteria for 271
distinction from animal tests 270
fatigue tests 275–76
laboratory studies, radiation-induced CNS injury 87–88
models of depression and stress 272–73
and NF-1 gene 215, 217, 224
olfactory bulbectomy model of depression 271
rationale for using and problems with 270–71
tests of depression 273–74
anti-epileptic drugs, negative effect on cognitive functions
51, 151, 177
anti-Hu antibodies 244–46
anti-VGKC antibodies 246–47
antidepressant treatments 266, 274, 298
antineoplastic therapies and cognitive impairment 264
antineuronal antibodies, paraneoplastic limbic
encephalitis (PLE) patients 240–41, 244–47
antipsychotic drugs for delirium 262
anxiety, effect on cognitive performance 51–52, 263
apoptosis, effects of abnormal signaling 214–15
aqueductal stenosis 215
aromatase inhibitors, breast cancer 119, 126
assessment see neuropsychological assessment
astrocytes 84
astrocytomas 143, 216
attention
assessment of 12–13, 62, 68–69, 74
effect of anemia 233
effect of radiation therapy on sustained 204–5
remediation programs for 73–74, 287, 307
strategy training for deficits in 283–84
and working memory 69
attention deficit hyperactivity disorder (ADHD) 215, 271
Attention Process Training (APT) technique 73–74, 287
autoimmunity
children with paraneoplastic opsoclonus-myoclonus
250–51
patients with paraneoplastic limbic encephalitis 244–47
time of 239–40
see also immunotherapy
Beck Depression Inventory II (BDI-II) 296
behavioral intervention strategies 281–82
degenerative conditions 285–87
traumatic brain injury (TBI) 281, 283
attention deficits, strategy training for 283–84
memory and learning deficits, strategy training for
284–85
problem solving for executive function deficits 285
benzodiazepines (BZPs) 262–63
biological response modifiers (BRMs) 106
see also interferon alpha (IFN-α)
brain edema
executive function deficits 174
pharmacological interventions 35, 314–16
symptoms of 175
brain metastases 170
clinical presentation 171
cognitive sequelae of cancer therapy 175
adjuvant medications 177
radiotherapy 175
surgery 176
systemic anticancer therapy 176
diagnosis and treatment in children 58
effect of motexafin gadolinium 322
epidemiology 170–71
neurocognitive impairment 173
due to cancer 174–75
etiology and pathogenesis 174
incidence of 173–74
management of 177; donepezil 177–78; hyperbaric
oxygen 178; methylphenidate 177; NMDA receptor
178–79; transplantation of purified
oligodendrocytes 178
prevention of; avoidance of hippocampus in
whole-brain radiation therapy 180–81;
erthropoietin (EPO) 180; radiation dose and
fractionation 179; radiosurgery alone 179–80
prognosis 171
risk of developing 34
treatment 171–73
brain structure and function
impact of disease, genetics and therapies 104–6
nervous system development 56–57
brain tumors
growth rate 35
location and size of
and degree of deficits 34–35, 174, 203
and presenting symptoms 34
and psychiatric symptoms 37
neurofibromatosis NF-I 215–17
symptoms/symptom clusters 312, 314
see also childhood brain tumors; high-grade gliomas;
low-grade gliomas
breast cancer
and chemotherapy 36
MRI studies of cognitive changes 25–28, 104
and hormonal therapy 119
impact on cognitive function 120–26
cardiac complications of childhood cancer survivors 199–200
central nervous system (CNS)
disease, assessment of patients with 48–49
radiation-induced toxicities 91
see also nervous system; radiation-induced CNS injury
cerebral vascular accident (CVA), behavioral intervention strategies for 283–85
“chemobrain”/“chemofog” 49–50
in children 98
patient-reported 98–99
retrospective studies 98
symptoms of 97–98
chemotherapy
for brain metastases 173
chemotherapeutic agents
neurotoxicities associated with 50, 99; risk factors underlying 99–103
and cognitive dysfunction 49–50, 97, 176
etiological mechanisms underlying 176
hematological malignancies 230–31
incidence and nature of 97–99
neuroimaging and EEG studies 103–4
pharmacogenetic modulation of 104–6
high-dose methotrexate for primary central nervous system lymphoma 188–89
intrathecal methotrexate, effects on children 59
for low-grade gliomas 147, 151
neurocognitive changes following
risk factors implicated in 20
studies demonstrating 19–20
neuroimaging of cognitive changes 19, 23
breast cancer patients 25–28
childhood leukemia treated without radiation therapy 23–24
leukoencephalopathy in adults 25
osteosarcoma patients treated with high-dose methotrexate 24–25
childhood brain tumors 58, 198
lifelong annual medical follow-up 206
medical late effects 198–99
cardiac complications 199–200
dermatological complications 200–1
gastrointestinal and hepatic complications 201–2
hearing and sight disorders 201
neurological complications 202
pulmonary complications 200
renal complications 201
secondary malignancies 199
neuropsychological late effects 202
neurocognitive late effects 202–5
psychosocial late effects 205–6
treatment and rehabilitation 206
childhood cancer
assessment see neuropsychological assessment, children
behavioral interventions 73–74
common forms of 57–58
acute lymphoblastic leukemia (ALL) 23–24, 58
brain tumors see childhood brain tumors
increase in survival rates 57
neuropsychological deficits 58–59
children treated for ALL 59–60
children with brain tumors 202–6
school and educational support 301–2
support for parents 303
see also paraneoplastic opsoclonus-myoclonus (POM)
childhood leukemia see acute lymphoblastic leukemia (ALL)
Children's Oncology Group (COG)
neuropsychological test battery 72–73
screening guidelines 206
cyclosporin 229
cisplatin
and hearing loss in children 70, 201
nephrotoxic effects of 201
and osteosarcoma 25
clinical neuropsychology 6
assessment goals 8–10
assessment tests 12–16
historical background 7–8, 56
standard evaluation procedures 10–12
see also neuropsychological assessment
clinical trial endpoints 4, 40, 45, 48, 162, 320, 327
clinical trials see neurocognitive testing
cognitive dysfunction
in adult cancer patients 33
due to tumor progression in high-grade glioma 160
paucity of research 33
in brain metastases patients 173–74
deficits due to cancer 174–75
correlation to caregiver burden 39
due to antineoplastic therapies 264
IFN-α causing 107–8
late delayed effect of radiation therapy 316
in pediatric brain tumors, late effects 202–5
potential causes of 4
predictors of 4
symptoms and effects of 3–4
cognitive function
assessment of 4
for descriptive reports 8–9
following surgery 9
goals of 8–10
reasons for referral 9–10
serial assessments 9
see also neuropsychological assessment
role of reproductive hormones 115–16
androgen substitution therapy 118
estrogen in women 103, 116
hormone replacement therapy (HRT), studies of 116
testosterone in men 117–18
cognitive rehabilitation 281–82
cancer patients 287, 307
adults with primary brain tumors 287–88, 307
clinical application 289; guided questions 290–91;
selecting appropriate intervention 289–91; timing
of intervention 291
Cognitive Remediation Program (CRP) 287
low referrals for rehabilitation 287
problem-solving therapy 288, 291–93
and randomized controlled trials 289
research questions 288–89
definition of 282–83
degenerative conditions 285
cognitive rehabilitation versus mental stimulation 286
external memory aids 286
strategies for acquired brain injury
Cicerone recommendations 283
strategy training 282
attention deficits 283–84
executive function deficits 285
external and internal procedures 282–83
memory and learning deficits 284–85
Cognitive Remediation Program (CRP) 73–74, 287
cognitive set shifting, assessment of 15–16
community re-integration 301
complementary and alternative medicine 307–8
computerized axial tomography (CAT) 20–21
low-grade gliomas 144
in osteosarcoma 24
patients with paraneoplastic limbic encephalitis 248
core cognitive processes
assessment of 68
attention 68–69
processing speed 69
working memory 69
deficits in children
reated for ALL 59–60
reated for brain tumor 204–5
corticosteroids 25, 36, 160, 251
ounseling 304
cranial radiation therapy
childhood brain tumors
age risk factor 203
brain injury caused by 203
cognitive deficits caused 203
impact on attention, processing speed and working
memory 204–5
impact on global IQ 203–4
impact on non-dominant hemisphere processes 204
neuropsychological outcome of 59
treatment of optic glioma 216–17
see also radiation therapy (RT)
cytokines
and immune response 233–34
indirect effects on CNS function 176
neurotoxic side-effects of 50
pro-inflammatory activity of 103, 105
see also interferon alpha (IFN-α)
data collection, test administration 324
delirium
assessment of 260
EEG and neuroimaging 262
laboratory assessment 261–62
rating scales 261
classification of 259
common causes of in cancer patients 260
definition and classification of 258–59
management of 262–63
in palliative care settings 264–65
risk factors 259–60
dementia
cognitive rehabilitation 286–87
and complementary and alternative therapies 308
depression dementia/pseudodementia 263
evaluation to rule out 46–47
and hormone replacement therapy (HRT) studies 116
screening tools 162
and whole-brain radiation therapy 173, 175
demyelination, radiation-induced 84, 148, 188
depression 37, 298
animal models of 272–73
animal tests of 273–74
Beck Depression Inventory II (BDI-II) 296
differentiating from neurocognitive impairment 37
effect on cognitive performance 51–52
major depression in cancer survivors 263
side-effect of interferon treatment 107
dexamethasone 87, 314–16
differential diagnosis 8, 40
patients with suspected paraneoplastic limbic encephalitis 247
of seizures in cancer patients 161
diffusion tensor imaging (DTI) 22
Distress Thermometer and Problem List 296–97
donepezil
Alzheimer’s disease 177
for fatigue and sedation 266
late radiation-induced brain injury 317
lung cancer patients 177–78
trials for brain tumors/metastasis 164, 178
Drosophila NF-1 protein 217
dyslexia, MRI studies 215, 223–24
edema see brain edema
electroencephalography (EEG) 104, 244, 262
embryogenesis, impact of NF-1 gene 214–16
emotional functioning
assessment of in children 71–72
demoralization and distress 298–99
psychiatric medications 234
support services 297–99
see also anxiety; depression; mood
employment
return to work 46, 299
support needed in work settings 302
vocational status of children with cancer 205
encephalopathy
chemotherapeutic agents associated with 99–100, 102–3
following radiotherapy 148–50, 175
hematological cancer patients 229
and high-dose methotrexate treatment 24
methotrexate-induced 229
see also leukoencephalopathy; paraneoplastic disorders
endocrine complications in long-term survivors of childhood brain tumors 200–1
epidemiology
brain metastases 170–71
low-grade gliomas 142–43
secondary malignancies 199
epileptic seizures see seizures
erythropoietin (EPO), brain metastases 180
estrogen 115
aromatase inhibitors, impact of 119, 126
effect on cognitive function 103, 116–17, 126–35, 176
estradiol therapy for prostate cancer 136
luteinizing-hormone-releasing hormone (LHRH) suppressing production of 119
see also tamoxifen (TAM)
European Organization for Research and Treatment of Cancer QLQ-C30 (EORTC) 38, 48, 91, 146, 158, 163
executive function (EF) 69
assessment of 15–16
in children 66, 89–70
sample tests for 62
compensation-oriented cognitive rehabilitation 289–91
impairment of following IFN-α treatment 232
formal problem-solving strategies for 285
improved with Ginkgo biloba 317
rehabilitation strategies 307
experimental neuropsychology 6
external radiation therapy (XRT) 36–37
eye, formation of 215–16
family caregivers
factors predicting improvement in children with brain tumors 205–6
quality of life (QOL) benefits of neuropsychological assessment 38–40
support for 302–3
farnesyltransferase inhibitors 213–14, 217
fatigue 51, 295
animal models and tests 275–76
associated with anemia 232–33
complementary and alternative medicine therapies for 307–8
pharmacological interventions 266, 312–13
fatigue (cont.)
and return to normal functioning 299
side-effect of interferon treatment 107, 232
Food and Drug Administration (FDA) 40, 45, 48, 320
Functional Assessment of Cancer Therapy (FACT) 48, 313, 317
functional MRI (fMRI) 22–23
breast cancer survivors 26–27, 104
high-grade gliomas (HGG) 160
neurofibromatosis (NF-I) studies 222–23
reading and visual-spatial processing 223
genetics
animal studies and NF-I gene 215, 217, 224
low-grade gliomas 143–44
polymorphisms of genes and cognitive function 104–7
gliomas see high-grade gliomas
in low-grade gliomas
 gluocorticoids 35, 177, 273
gray matter (GM)
volume increase in NF-I patients 222
volume loss following chemotherapy 26–27, 103
growth mixture modeling 327
hair loss following radiation therapy 313
effects on cognition
 prospective studies 190–91
retrospective studies 191–93
interactions with whole-brain radiation therapy 188–89
and white matter abnormalities 193–94
hearing loss in childhood tumor survivors 201
hematological malignancies 228
cognitive deficits 229
due to anemia and iron deficiency 232–33
immune response mechanisms 233–34
treatment effects 229–30; biological response
 modifiers 232; chemotherapy 230–31;
 hematopoietic stem cell transplantation (HSCT)
231–32; radiation therapy 231
neurological complications of 228–29
treatment for cognitive and emotional dysfunction 234
hematopoietic stem cell transplantation (HSCT) 231–32
effects on neuropsychological functioning 230, 232
neurological complications 228–29
high-dose-methotrexate-based chemotherapy for primary
central nervous system lymphoma 187–88
high-grade gliomas (HGG) 156
nervous system problems 158
neurocognitive assessment 162
importance of 162–63
neurocognitive deficits
causes of 158–62
cognitive rehabilitation 165
prevention of 164–65
treatment of 163–64
and survival 156–58, 163
hippocampus
avoidance of during whole-brain radiation therapy
180–81
hippocampal neurogenesis 85–86, 103, 164
history of neuropsychology 7–8, 56
hormonal deficiencies in long-term survivors of childhood
brain tumors 200–1
hormonal therapy 115
in cancer treatment 119, 176
breast cancer 119; influence on cognitive functioning
50, 120–26
factors to include in studies 138
prostate cancer 119–20; influence on cognitive
functioning 50, 126–35
hormone replacement therapy (HRT)
dementia studies 116
for growth hormone deficiency 201
methodological aspects 136
cross-sectional versus prospective studies 136
group means comparison versus individual test score
analysis 137
mood and psychosocial factors 137
sample size 136
selection of cognitive tests 137
self-reported cognitive problems 137
neuroimaging studies 118
reproductive hormones and cognition 115–18
hospice agencies and quality of life 300
hyperactive delirium 259–60, 262
hyperbaric oxygen (HBO)
myelopathy prevention, animal studies 87
treatment for brain metastasis 178
hypoactive delirium 259, 262–63, 266, 300
IFN-α see interferon alpha
immune response mechanisms 233–34
immunotherapy
biological response modifiers (BRMs) 106
impact on cognitive function 50
for paraneoplastic disorders 241
factors influencing response to 241–42
poor prognosis for neurological improvement
242
response of patients with paraneoplastic limbic encephalitis 248–49
individual psychotherapy 304
indomethacin, preventative trials 164
intellectual functioning
children with NF-I 217–18
clinical tests of intelligence 12, 62
global IQ 66–67, 203–4
impact of cranial radiation therapy on children 59, 202–5
impact of intrathecal methotrexate 59, 231
see also academic achievement; core cognitive processes
interferon alpha (IFN-α) 106–7
animal studies of fatigue 276
and cognitive impairment 107–8, 232
mechanisms underlying 108–9
side-effects of 107
interventions for 109
intrathecal methotrexate, effects of treating children with 59, 231
iron deficiency, effects of 232–33
irradiation see cranial radiation therapy; radiation therapy (RT)
Judgment of Line Orientation (JLO) test 219–20
language
assessment of 14, 62, 70, 74
critical period for development of 56
see also reading ability
learned helplessness, animal stress models 273
learning disability (LD), children with NF-I 212, 217–19
learning and memory
animal tests 274–75
assessment children 62, 67–68
strategies for Alzheimer’s disease 286
see also memory
leukoencephalopathy
in adults, chemotherapy-induced 25
chemotherapeutic agents associated with 99, 189
following high-dose methotrexate treatment 24
limbic encephalitis see paraneoplastic limbic encephalitis
low-grade gliomas (LGG) 142
clinical features 144
epidemiology and biology 142–43
genetics 143–44
imaging features 144
neurocognitive deficits, factors causing 147
medical therapy 151
mood disorder 151
primary tumor 147–48
radiation 148–50
surgery 148
pathology 143
prognostic factors 144–45
therapeutic management
chemotherapy 147, 151
radiotherapy 146–47
surgery 145–46
luteinizing-hormone-releasing hormone (LHRH) agonists 119
impact on women 120
prostate cancer treatment 50
impact on cognitive functioning 126, 135, 176
prevention of tumor flare with anti-androgens 120
macrocephaly in patients with NF-I 222
magnetic resonance imaging (MRI) 20
and CNS tumors 320
dyslexia/reading-disabled patients 215
effects of tamoxifen on hippocampal atrophy 125
leukoencephalopathy in adults 25
low-grade gliomas (LGG) 144, 146
MR hyperintensities in children with NF-I 221–22
osteosarcoma patients 24–25
paraneoplastic limbic encephalitis patients 244
primary central nervous system lymphoma patients 189, 194
see also functional MRI (fMRI); positron emission tomography (PET); structural brain imaging methods
magnetic resonance spectroscopy (MRS) 22
comparison with MRI in breast cancer patients 28, 34
impact of tamoxifen and hormone replacement therapy on brain function 125
medications
antidepressants 266, 274, 298
antipsychotics for managing delirium 262–63
assessment results confounded by 51
confounding tumor-related causes of cognitive deficits 160–61
delirium-inducing in cancer patients 260
symptomatic pharmacotherapy 265–66
medulloblastomas 57–58, 164

- effect of age at time of cranial radiation therapy 203
- evaluation of 10-year survivors 299
- psychosocial effects of treatment 205
- risk of secondary malignancies 199
- treatment affecting attention, memory and new learning 204–5

memory

- animal tests 274–75
- assessment of 14–15, 67–68, 74
- effects of androgen deprivation therapy 126, 135
- impairment 3
  - in Alzheimer’s disease 285
  - amnesia in paraneoplastic limbic encephalitis patients 243
  - combined modality therapy in patients with primary central nervous system lymphoma 192–93
  - due to anxiety and depression 51–52
  - following chemotherapy 27–28, 98, 230
  - following hormonal therapy 135
  - from radiation therapy 49
  - hematopoietic stem cell transplantation patients 232
  - IFN-α treatment 232
  - in patients with delirium 260
  - and tamoxifen 120
- processes 15
  - rehabilitation
    - external memory aids 286
    - internal procedures, other regulated 286
    - memory notebook 282, 284–85, 288
    - using calendar system 291–92
    - role of hippocampus 180–81
    - role of NMDA receptor 178–79
    - see also non-verbal memory; verbal memory; working memory
- menopause
  - chemotherapy and surgically induced 102, 116
  - effect of hormone levels during 116
  - hormone replacement therapy (HRT), studies of 116
  - mental stimulation tasks for Alzheimer patients 286
  - metastatic brain tumors see brain metastases
  - methotrexate (MTX)
  - causing microvascular injury and myeloencephalopathy 103
  - for hematological malignancy 229
  - intrathecal methotrexate, effects of treating children with 58–59
  - leading to metabolic abnormalities 99–102

for osteosarcoma 24–25

see also high-dose-methotrexate-based chemotherapy for PCNSL

methylphenidate (Ritalin®) 177

- for attention deficit hyperactivity disorder (ADHD) 271
- for fatigue 313, 316
- high-grade glioma patients 164, 177
- for hypoactive delirium 266, 300
- microglia, impact of irradiation on 84–85
  - Mini-Mental State Examination (MMSE) 38, 46, 117, 162, 261, 321
- modafinil 164, 266

molecular imaging methods 23

mood

- assessment of 16
  - cluster in newly diagnosed brain tumor patients 312
  - detrimental effect on test performance 137
  - disorders, link to cognitive dysfunction 51–52, 98–99, 151, 263
- motor and sensory-perceptual function, assessment of 16, 62, 71
- myelination 56–57
  - demyelination, radiation-induced 84, 91, 148, 188
  - remyelination, transplantation of oligodendrocytes 178
- myelonecephalopathy 103
- myoclonic encephalopathy of infancy 249

nervous system

- development of 56–57
- effects of early brain damage 57
- plasticity of 57
- treatment-related injury, effects on children 58
  - see also central nervous system (CNS)

neurocognitive impairment see cognitive dysfunction

neurocognitive testing

- Children’s Oncology Group (COG) test battery 72–74
- implementation in clinical trials 323
- data collection 324
- personnel and training needs 323–24
- importance of formal testing 320–21
- Oregon Health Sciences University test battery 73

statistical and interpretive issues

- analytical approaches; growth mixture modeling 327;
  - Q-TWiST methods 327; regression-based methods for predicting change scores 326; reliable change index (RCI) 325–26; repeated measures analyses 327; time to event analyses 326–27
- confounding variables and missing data 324–25
test selection
- factors influencing: focal versus diffuse function 321–22; frequency of testing 322; impact of disease and treatment 322; psychometric properties 321; study design: baseline versus repeated testing 323
- see also neuropsychological assessment
neurodegenerative conditions, cognitive rehabilitation 285–87, 291
neurofibromatosis (NF)
- brain structure and function correlates 221
- brain tumors 221
- congenital malformation 222
- macrocephaly 222
- MR hyperintensities 221–22
- children with NF-1 217
- academic achievement of; impact of visual spatial abilities 219–21; and learning disability (LD) 218–19
- intellectual functioning 217–18
- diagnostic criteria 212, 219–21
- functional imaging studies 222–23
- genotype 212–13, 224
- history 211
- phenotype 211–13, 223–24
- Ras signaling system 213, 217
- systemic impact
- benign tumors, focal growth dysregulation in 214
- brain malformations 214–15
- brain tumors 215–17
- farnesyltransferase inhibitors, positive effect on learning 217
- on function 217
- role of NF-1 gene, animal studies 217
neurogenesis
- attempts to rectify RT-induced decrease 87, 164
- in hippocampus of rat brain 86
- impact of chemotherapies on 103
- of neural stem cells, effects of radiation 85–86
- neuroimaging technologies 20–23
- see also magnetic resonance imaging (MRI)
neurons
- and neurogenesis 85–87
- rapid growth and pruning 56
- sensitivity to radiation 85
neuropsychological assessment 44–45
- adult cancer patients 33–34, 44
- benefits for patient’s clinical medical management 34; cancer surveillance 35; depression, effects on cognition 37; presenting symptoms and tumor location 34–35; prognostic value of assessment 37–38; side-effects of treatment 35–37
cancer research benefits 40
- clinician benefits 38
disease and treatment issues; adjunctive medications 51; affective distress 51–52; anemia 51; assessment of patients with CNS disease 48–49; chemotherapy 49–50; fatigue 51; hormonal therapies 50; immunotherapy 50; radiation therapy 49
- high-grade gliomas 162–63
- principles of assessment 45–46; assessment process 47; cognitive areas of interest 47–48; patient-reported outcomes (PROs) 48; test selection 46–47; timing of assessments 47
- quality of life benefits for patient and family caregivers 38–40
- children 60
- approaches to assessment 61–66
- areas to evaluate; academic achievement 71; core cognitive processes 68–69; executive function (EF) 69–70; language 70; learning and memory 67–68; motor and sensory-perceptual function 71; non-verbal skills 70–71; overall intellectual functioning 66–67; psychosocial and adaptive functioning 71–72
- future directions 75
- liaison with schools 61
- serial assessments 60–61
- test batteries; Children’s Oncology Group (COG) 72–73; Oregon Health Sciences University 73
- see also cognitive function, assessment of neuropsychology 6
- ecological validity 75
evaluation
- for descriptive reports 8–9
- following surgery 9
- goals of 8
- reasons for referral 9–10
- serial assessments 9
- standard procedures; clinical interview 10–11; dissemination of findings 11–12; history taking 10; interpretation of results 11; test administration 11; test selection 10
- future directions in 73–75
- history of 7–8, 56
- terminology issues 71
- neurosurgery see surgery
NF-1 (neurofibromin-1) see neurofibromatosis (NF)
NMDA (N-Methyl-D-aspartate) receptor 178–79
non-verbal learning disability (NVLD) 218–19
non-verbal skills, assessment of in children 70–71
non-verbal memory 14, 59, 68
object perception, assessment of 13
oligodendrocytes
  effect of radiation on 84, 91, 188
  oligodendroglioma 144–45, 147
  transplantation of promoting remyelination 178
onconeural antigens 239–41, 251
online support groups 306
opsoclonus-myoclonus see paraneoplastic opsoclonus-myoclonus (POM)
optic tumors in neurofibromatosis (NF-I) patients 215–17
Oregon Health Sciences University test battery 73
osteosarcoma, neuroimaging studies 24–25
oxidative stress, radiation-induced 86, 92
oxygen treatment for brain metastasis 178
palliative care settings
  hospice agencies 300
  management of delirium 264–65
  symptoms requiring pharmacotherapy 265–66
  see also supportive care
paraneoplastic disorders 239
  antineuronal antibodies 240–41
  and autoimmunity theory 239–40
  clinical importance of 239
  clinical neurological outcome 241
  factors causing neuronal injury 241
  immunotherapy for 241–42
  limbic encephalitis (PLE) 242–43
    autoimmunity 244–47
    clinical features 243–44
    diagnostic studies 244
    differential diagnosis 247
    pathology 243
    patient management 248–49
  opsoclonus-myoclonus (POM)
    autoimmunity 250–51
    clinical features 249–50
    pathology 250
    patient management 251–52
  parenchymal hypothesis for radiation-induced CNS injury 84
  parents of childhood cancer survivors
    information provision 75
    support for 303
    see also family caregivers
  patient-reported outcomes (PROs) 48
  pediatric oncology see childhood cancer
  peer support groups 304–6
  personality, assessment of 16
  phonological processing, functional MRI studies 223
  pituitary tumors 200
  planning ability, assessment of 15
  PLE see paraneoplastic limbic encephalitis
  polyunsaturated fatty acids, reducing paralysis, animal studies 87
  POM see paraneoplastic opsoclonus-myoclonus (POM)
  Pursolt Forced Swim Test, animal test of depression 273–74
  positron emission tomography (PET) 23
    effects of tamoxifen and estrogen on brain glucose metabolism 125
    hippocampal hypermetabolism in patients with paraneoplastic limbic encephalitis 244
    neural effects of chemotherapy in breast cancer patients 27–28
  PPARγ agonists, role of pioglitazone in reducing inflammation 87–88
  practical needs of cancer patients 299
  practice effects, test administration 9, 60, 136, 323, 325
  primary CNS lymphoma (PCNSL) 187
    cognitive dysfunction 189–90
    prospective studies 190–91
    retrospective studies 191–93
    and treatment-related white matter abnormalities 193–94
    diagnosis 187
    treatment 187–88
    delayed neurotoxicity 188–89
    problem-solving therapy 292–93
    for adults with cancer 288
    for executive functioning deficits 285
    at the Mayo Clinic 288, 291–93
Index

processing speed
assessments of 13, 69
psychometric tests 62
deficits following cranial radiation therapy 204–5, 230
effects of hormone therapy 126, 135
and IFN-α treatment 232
prophylactic interventions
for children with cancer 73–75
prophylactic cranial irradiation (PCI) 36
prostate cancer, hormonal therapy 119–20
impact on cognitive function, studies 127
influence of luteinizing-hormone-releasing hormone
agonists 50, 126–36
psycho-education 296–97, 306
psychosocial functioning
assessment of in children 62, 71–72
late effects, childhood brain tumor survivors 205–6
measures of 73, 75
psychosocial interventions 234, 304–6
pulmonary complications in long-term survivors of
childhood brain tumors 200
Q-TWiST methods 327
quality of life (QOL) of cancer survivors 156
assessment feedback helping to maximize 39–40
clinical trial endpoint 40
for primary brain tumors 320
for radiation-induced brain injury 317
complementary and alternative medicine therapies
improving 307–8
hospice care 300
importance of multidisciplinary approach to
interventions 312
interventions to improve, symptom-focused 281
patient-reported outcomes (PROs) 48
patient’s appreciation of 163
in primary central nervous system lymphoma patients
192
and problem-solving therapy 288
psychosocial support 234, 304–6
relationship to cognitive impairment 38–39
research on health related 58
support services improving 296
tests measuring 73, 159, 296–97
radiation-induced CNS injury
indomethacin reversing 86, 164
laboratory studies of therapeutic interventions 87–88
oxidative stress 86, 92
pathogenesis 83, 175
astrocytes 84
classical model 83
contemporary view 86
microglia 84–85
neural stem cells and neurogenesis 85–86
neurons 85
parenchymal hypothesis 84
vascular hypothesis 83
pharmacological interventions for 312
acute reactions 312–14
early delayed reactions 314
late delayed reactions 314–17
preventative and therapeutic interventions 92
quantitative scoring of CNS toxicity 90–92
radiation necrosis 83, 91–92, 202
radiation tolerance of CNS tissues
factors associated with 88
importance of dose and fraction size 90
mathematical models for tolerance doses 89
neuret model of brain tolerance 90
see also central nervous system (CNS); radiation
therapy (RT)
Radiation Therapy Oncology Group (RTOG) 91, 149, 171,
174, 179
radiation therapy (RT) 231
acute reactions 175, 312–14
early delayed reactions 91, 175, 314
endocrinological sequelae 200–1
focal versus whole brain 149
late delayed reactions 91, 175, 314–17
for low-grade gliomas 146–47
negative effects on cognitive performance 23
childhood brain tumor patients 203–5
CNS disease patients 49
low-grade glioma patients 148–51
tolerance doses
for normal CNS tissues 88–89
for other normal CNS tissues 90
treatment volumes and doses for brain tumors 313
see also cranial radiation therapy; whole-brain
radiation therapy (WBRT)
radiosensitizers 173
radiosurgery 172–73, 179–80
raloxifene 125
reactive oxygen species (ROS) 85–86
reading problems in NF-1 children 218–19
functional MRI studies 215, 223
and malformation in brain regions 222
Index

Recklinghausen’s disease see neurofibromatosis (NF) 326
regression-based methods for predicting change scores 326
rehabilitation
brain tumor patients 165
children with brain tumors 206
children with cancer 73–75
see also cognitive rehabilitation; support services
reliable change index (RCI) 325–26
renal complications, long-term survivors of childhood brain tumors 201
repeated measures analyses 327
reports, neuropsychological evaluations 8–9, 12
reproductive hormones and cognition 119
in healthy men 117–18
in healthy women 116–17
neuroimaging studies 118
see also hormonal therapy
response inhibition, assessment of 15
secondary malignancies 199
seizures 160
anti-epileptic drugs, negative effect on cognitive functions 51, 151, 177
chemotherapeutic agents associated with 100
differential diagnosis of patients with cancer 161
effects on cognitive function 151
in low-grade glioma 144
selective estrogen receptor modulators (SERMs) see
tamoxifen; raloxifene
self-instruction training 285
sensorimotor ability, assessment of 16, 62
serial assessments 9, 60–61
small cell lung carcinoma (SCLC) 239
antineuronal antibodies associated with 243–44
onconeural antigens 241
presence of anti-Hu antibodies 245–46, 248
prognosis 242, 248
prophylactic cranial irradiation (PCI), effects of 36, 173–74
whole-brain radiation therapy, response to 171
socialization problems in childhood brain tumor survivors 205–6
somnolence syndrome 91, 314
spatial perception
assessment of 13
role of androgens 116–18
special education services 301–2
statistical methodologies 325–27
steroids
for brain edema 314–15
side-effects 35, 51
for somnolence syndrome 314
see also corticosteroids; dexamethasone; glucocorticoids
stress
animal and human models of 272–73
and brain norepinephrine (NE) activity 273
reduction of with complementary and alternative medicine therapies 307–8
underlying physiology of 273
structural brain imaging methods 20–22
analysis of data using voxel-based morphometry 21–22
in breast cancer patients 25–27
childhood leukemia studies 23–24
support services 295–96
community re-integration 301
complementary and alternative medicine 307–8
during active treatment 298–99
end of life/palliative care 300
family settings 302–3
modalities of support 303–4
needs assessment 296–97
across the disease continuum 297
newly diagnosed patients 297
post-treatment 299–300
psychosocial support 304–6
rehabilitation programs 306–7
school settings 301–2
work settings 302
supportive care 258
drugs used 264
future research
detection and screening 266
treatment of delirium 266
see also delirium
surgery
childhood brain tumors 58
low-grade gliomas 145–46, 148
neuropsychological evaluation to clarify outcome of 9
risks of damage to healthy tissues 35
in treatment of brain metastases 172
effects on cognition 176
radiosurgery alone 172–73, 179–80
radiosurgery with whole-brain radiation therapy 172
survival
acute lymphoblastic leukemia (ALL) 57, 228
childhood brain tumors 198–99
high-grade gliomas 156–58
low-grade gliomas 138, 142, 144–45
predictors of length of 37–38
primary CNS lymphoma with methotrexate 188
versus “compression of morbidity” 156, 163
switching, assessment of 15–16
symptom management see supportive care
systemic anticancer therapies, effect on brain function 176
tail suspension test (TST) 274
tamoxifen (TAM)
effects on cerebral metabolism 28
estrogenic and anti-estrogenic qualities 119
impact on cognitive function 36, 50
studies of 120–26
testosterone levels
anti-androgens 120
effect of aromatase inhibitors 119
effect on cognitive performance 116–18, 126–34
and visual–spatial abilities 137
see also androgens; luteinizing-hormone-releasing hormone (LHRH) agonists
thyroid gland abnormalities 108–9, 201
Time Pressure Management (TPM) 283–84
time to event analyses 326–27
traumatic brain injury (TBI), cognitive rehabilitation 281, 283–85
twin studies, breast cancer and chemotherapy 27
vascular damage, radiation-induced 83, 202
verbal memory
assessment of 14
influence of high levels of estrogens 116
influence of hormonal therapy
in men 126, 135
in women 120, 126
tests for measuring in children 62
visual ability 70–71
assessment of 13–14
psychometric tests 62
visual spatial abilities
animal studies 217
and children with non-verbal learning disability 218–19
functional MRI studies 223
and reading problems in children with NF-I 219
tests measuring 74
tests predicting NF-I diagnosis 219–21
see also spatial perception
voxel-based morphometry (VBM) 21–22
breast cancer studies 25–27
Wake Forest University School of Medicine clinical trials 316–17
Wechsler tests 12, 62, 67
white matter (WM)
abnormalities in primary central nervous system
primary CNS lymphoma patients following treatment 193–94
changes in breast cancer patients after chemotherapy 25–26, 28
demyelination 84, 148, 188
investigation of using diffusion tensor imaging 22
necrosis following radiation therapy 83, 91–92
animal studies showing delayed 87
neurological complications caused by 202
pharmacological interventions 315–16
radiation dose influencing 90, 150
reduction in volume following chemotherapy and radiation therapy 24, 103
whole-brain radiation therapy (WBRT) 175
brain metastases treatment 171–72
conflicting results of studies 175
regulation of dose and fractionation 179
response to 171
primary CNS lymphoma (PCNSL) 187–88
delayed neurotoxicity 188–89
Women’s Health Initiative Memory Study (WHIMS) 116–17
work settings
providing support in 302
returning to work 299
working memory
assessment of 13, 69
impact of chemotherapy on 27, 98
influence of hormonal therapy 135
psychometric tests 62, 74