Index

Academic health center
  mentoring program, 140
  research, 1

Addiction. See also Cocaine;
  Psychostimulants
    drugs, 67–69
    drug self-administration studies, 77–79
    fMRI, 30
    models of, 67–69
    nicotine, 58
    psychostimulants, 67–68
    stimulants, 69–70
    tobacco, 50–54
  AEP. See P50 auditory evoked potential
  Algorithms, 136
  American Recovery and Reinvestment Act, 8
  Anatomy studies, 29–30
  Anesthesia, 56–57, 57f
  Animal models, 2. See also Rat studies;
    repetitive transcranial magnetic stimulation
      alert, 57–59, 59f
      anesthetized, 56–57, 57f
      cocaine binge administration, 70
      complete SCI, 106
      drug addiction using, 67–69
      drug self-administration studies, 77–79
      electrophysiology
        in vivo and in vitro studies, 83–84
        H-reflex FDD, 98–99, 99f
        NO, 84–86, 106
        neonatal diseases and, 111
        rat, 100
        reinforcer delivery, 76
        rTMS with
          future directions of, 60
          sensorimotor tests, 72
      Arousal gating, 52
      ASIA, 12
      Atonia, 32
      Attentional measures, 35–36

Attention test, 35–36
  Automated gait analysis, 73
  Automated video tracking, 71

Basic science departments
  mentoring leader, 140–42
  reshaping, 139–42

BBSRC. See Biotechnology and Biological Sciences Research Council
  Beck Depression Inventory (BDI), 48
  Behavior
    attention and behavioral alertness, 53
    human, 89–90
    rTMS, 55
  Behavioral core facility, 70–75
  Behavioral tests, 71–75
  Behaviorism, 75–76
  Belmont Report, 17
  Betamethasone, 110
  Binge administration, 70, 73
  Biomedical research funding, 8
  Biomedical science programs curricula, 139–40
  Biostatistics and Experimental Design program, 25
  Biotechnology and Biological Sciences Research Council (BBSRC), 11
  Brain
    anatomy studies, 29–30
    function
      techniques detecting, 136
      MEG and, 92
    science technology, 135–36
    structures
      rTMS and, 54
    Brainstem-thalamus processing, 83
  Cameras, 39–42
  Carbachol (CAR), 87, 89, 90f
  Career Development Plan
    mentoring plan within, 26–27
    performance milestones in, 26–27
Career Development Programs, 21
mentoring, 23–24
Catwalk system, 73, 75
CDH telemedicine infrastructure. See UAMS
Center for Distance Health
telemedicine infrastructure
Cellular imaging, 38
Centers of Biomedical Research Excellence
(COBRE) programs, 6, 7
Central nervous system (CNS), 93
CER. See Comparative effectiveness research
Cerebellum, 91
Chloramphenicol, 109
Cholinergic agents, 84
Cigarette smokers, 59
Clinical Translational Science Award (CTSA)
program, 4–5, 140
human research programs, 16, 18
mentoring, 24
research support individuals, 18
CNS. See Central nervous system
CoBRE Core facility. See Community-Based
Research and Education Core facility
COBRE programs. see Centers of Biomedical
Research Excellence programs
Cocaine
binge administration, 70, 73
craving, 69
reward pathway, 67–68
Cocaine-induced delirium, 69–70
Cocaine-induced hyperlocomotion, 73
Cocaine-mediated locomotor effects, 73, 74f
Collaborative research, 24
Community-based research, 123, 132
Community-Based Research and Education
(CoBRE) Core facility, 126
Comparative effectiveness research (CER)
data sources and, 137–38
funding for, 138
neonates and, 116–18
Conditioned place aversion, 69
Conditioned place preference (CPP), 69, 71
experimental procedure for, 71–72
Conditioning sessions, 71–72
Congenital defects, 117
Core facilities, 126, 142
behavioral, 70–75
electrophysiology, 37, 83
Telemedicine Core Facility, 116, 126–29
for translational neuroscience, 29–42
designing, 31–33
types, 135
Cortex, 87
Cortical neurons, 44
Cost. See also Funding
healthcare, 136–39
NIH, 139, 142
research, 21–22
CPP. See Conditioned place preference
Craving, 69
CTSA program. See Clinical Translational
Science Award program
Cyclical research model, 2, 3f
DA pathway. See Mesoaccumbens dopamine
Databases, incompatible, 136–38
Data sources
CER, 137–38
integrated, 136–38
DAIs. See Mesoaccumbens dopamine
reuptake transporters
Death, 110. See also Infant mortality;
Mortality
Deep brain stimulation, 90
Delay discounting graphs, 54f
Discounting rate (K), 54f
Discoveries
translational implementation of
lag time in, 138
Diseases, 111
Doctors. See Medical doctor training
Drugs. See also Addiction; Betamethasone;
Carbachol; Chloramphenicol;
Cocaine; Food and Drug
Administration; Generics;
Intravenous drug self administration;
Mefloquine; Mibefradil; Modafinil;
Psychostimulants; Steroids;
Stimulants
abuse
behavioral core facility, 70–75
translational studies in, 67–79
addiction, 67–69
cholinergic agents, 84
efficacy of
generics and, 137–38
epilepsy and, 138
hexachlorophene, 109
reinforcement, 76, 79
SCI
pharmacology interventions, 105–6
self-administration
animal model studies, 77–79
intravenous, 75–79
treatment outcome measures, 79
steroids, 110
translational studies, 67–79

EDs PLACE. See Emergency Department Physician Learning and collaborative Education

EEG. See Electroencephalography
EEGLAB MatLab Toolbox, 89
Electrical coupling, 85–86
Electroencephalography (EEG), 30
Electron multiplying charge-coupled device (EMCCD) cameras
imaging resolution, 40–42
sensors, 39

Electrophysiology, 31–33
SCI, 98–100
in translational neuroscience, 83–94
animal model studies, 83–84
Electrophysiology Core Facility, 37, 83
EM-C2 camera, 42
EMCCD. See Electron multiplying charge-coupled device
Emergency department, 131–32
Emergency Department Physician Learning and collaborative Education (EDs PLACE), 131–32
Emergency department telemedicine, 131–32

Epidural stimulation of spinal cord, 97
Epilepsy, 138
ERSP. See Event-related spectral perturbation
Ethovision, 71
Europe, 11
European Mentoring and Coaching programs, 27
medical research funding, 10–13
translational research, 12
European Clinical Trials Network, 11
European Medicine Agency, 11
Europrevail Network, 117
Event-related spectral perturbation (ERSP), 89
Evoked potential recording studies, 32–33
waveform measurements, 58–59
Evoked response (during sleep), 33
Evolve unit, 41, 42
Exercise, 103. See also Passive exercise
External speaker programs, 25

False response frequency, 36
Fatigability function, 36

FDA. See Food and Drug Administration
FDD. See H-reflex frequency-dependent depression
fMRI. See Functional magnetic resonance imaging
Food and Drug Administration (FDA), 6
neonatal research, 112–13
rTMS and, 45
TMS and, 43
Fragmented infrastructure, 135–36
Frequency of lapses, 36
Frontal lobe blood flow measures, 36–42
Functional imaging, 30
Functional magnetic resonance imaging (fMRI), 30, 69
Funding. See also Healthcare; National Institutes of Health
biomedical research, 8
for CER, 138
in Europe, 10–13
grants, 20
investigators, 21
translational research, 3–6
lack of, 4–6

GABAergic mini-inhibitory postsynaptic currents (IPSCs), 73, 74f
Gamma-band activity, 86–88
CAR and, 87, 89, 90f
preconscious awareness, 89–91
RAS and, 87–88, 88f, 89–91
Gamma frequency oscillations, 86–87
General Clinical Research Center (GCRC) program, 4
Generics, 137–38
Grants
funding, 20, 22, 25
reviews, 9
writing, 25
Gray baby syndrome, 109

Habituation phase, 71
Healthcare
costs, 136–39
databases and, 136–38
spending, 8
telemedicine, 125–26
Hexachlorophene, 109
High-resolution interline CCD camera, 41
Hippocampus, 91
Hospitals, 116
H-reflex frequency-dependent depression (FDD)
  human and rat, 98–99, 99f
hyperreflexia, 102, 102f
  passive exercise, 101–4
  pharmacology and, 105–6
SCI, 98–100, 102, 102f, 103–4, 103f, 104f
Human Electrophysiology Core Facility, 37
Human Genome Project, 110–11
Human subjects. See also Behavior
  CTSA, 16
  H-reflex, 98–99, 99f
  Human Electrophysiology Core Facility, 37
  Human Genome Project, 110–11
  human research programs, 16, 18
  P50 potential studies, 86
  research, 4, 16–17
  rTMS, 54
  sham stimulation technique, 45–46, 46f
Hyaline membrane disease, 109–10
Hyperreflexia, 101
  delayed-onset, 102, 102f
  SCI animal model, 98
IAC. See Internal Advisory Committee
IDeA program. See Institutional Development Award program
Imaging resolution, 40–42
Imageing studies. See also PET-guided TMS studies
  brain anatomy, 29–30
  cellular, 38
  EEG, 30
  fMRI, 30, 69
  functional, 30
  magnetoencephalography, 91–94
  clinical applications of, 136
  PET, 30, 37, 69
  verum transcranial magnetic stimulation, 46
  voltage-sensitive dye imaging, 75
  VSDI, 75
Infant mortality, 114f, 113–15, 137
Information systems, 136. See also Databases
  Infrastructure fragmentation, 19
  Institute of Medicine (IoM) report, 1
  Institutional Development Award (IDeA) program, 6
  Institutional Review Board (IRB)
  neonatal research, 112
  regulatory burdens and, 16
  Interdisciplinary care approach, 1
Internal Advisory Committee (IAC), 26
  Interstimulus intervals (ISIs), 34
  Intravenous drug self administration, 75–79
  Investigators, 5
  funding, 21
  T1 blocks, 19–20
IoM report. See Institute of Medicine report
IPSCs. see GABAergic mini-inhibitory postsynaptic currents
IRB. See Institutional Review Board
ISIs. See Interstimulus intervals
K. see Discounting rate
L-DOPA, 105–6
Leader. see Mentoring leader
Locomotor tests, 72–73
Magnet areas, 141
Magnetic fields, 44
Magnetoencephalography (MEG), 91–94
  central nervous system and, 93
  clinical applications of, 136
  Malaria, 117–18
MBET. See Motorized bicycle exercise trainer
Medical doctor training, 12
Medical research
  European funding, 10–13
  NIH, 2–3
Medical Research Council (MRC), 11
Mefloquine, 85–86
MEG. See Magnetoencephalography
Mental health, 8
Mentoring leader
  clinical departments, 141–42
  translational research program and, 140, 141, 142
Mentoring program, 19
  in academic health center department, 140
  Career Development Plan, 26–27
  Career Development Program, 23–24
  collaborative research, 24
  CTSA program, 24
  established, 24–27
  experience in, 140–41
  plan, 25–27
  self-assessment and, 23–24
  T1 and T2 blocks, 22–23
  translational neuroscience, 15–27
Mesoaccumbens dopamine (DA) pathway, 68
Mesoraccumbens dopamine reuptake transporters (DATs), 68
Mibebradil, 73
Mortality
infant, 114f, 113–15, 137
neonates, 114f, 113–15
Mortality rates. See Neonates
Motorized bicycle exercise trainer (MBET)
SCI and, 101, 103–4, 104f
training cessation in, 102f, 103f, 104
Motor threshold (of TMS), 44
MRC. See Medical Research Council
Multidisciplinary collaborations, 138
National Center for Advancing Translational Science (NCATS), 5–6, 135
National Center for Research Resources (NCRR), 4–6
National Institutes of Health (NIH), 1
budget, 142
funding, 4–7
amount needed, 7–10
as equitable and efficient, 6–7
grant awards, 20
health care costs and, 139
medical research and, 2–3
review committees
scoring methods, 9
NCATS. See National Center for Advancing Translational Science
NCRR. See National Center for Research Resources
Near infrared spectroscopy (NIRS), 36–37
Neonatal diseases and death. See Neonates
Neonatal intensive care unit (NICU)
hospitals, 116
mortality and, 113
telemedicine, 129–30
Neonatal translational research, 109–19
barriers and rewards, 118–19
basic, 110–11
conclusions for, 119
need for, 110
opportunities in, 119
problem identification, 112–13
steps involved, 112–13, 112t
T2 research, 113–16
Neonates
CER, 116–18
death, 110
diseases, 111
mortality rates, 114f, 113–15
Neonatology research networks, 116
Neuronal studies
camera speed in, 39–40
imaging resolution, 40–42
sensitivity in, 38–39
Neurons, 84, 87–89
NeuroQ Display and Analysis Program, 48
Neuroscience departments, 139–40
Neuroscience research, 11
Newborn Screening Translational Research Network, 117
NICHD Maternal-Fetal medicine units Network, 116
NICHD Network, 116
Nicotine addiction, 58
NICU. See Neonatal intensive care unit
NIH. See National Institutes of Health
NIRS. See Near infrared spectroscopy
Office of Grants and Scientific Publications, 27
Opioid studies, 77
Optimum response times, 36
P13 potential, 83–84
amplitude, 59, 59f, 60
anesthesia and TMS, 56–57, 57f
in animals, 84
modafinil, 86
PPN and, 83–84, 86
vertex recorded, 91
P50 auditory evoked potential (AEP), 52, 83
P50 potential, 33, 34, 59
P50 potential studies, 86
Parkinson’s disease (PD), 35, 93
Passive exercise
H-reflex FDD, 101–4
MOD and, 106
for SCI, 97–98, 101–5
Patch clamp recordings, 85–86
PD. See Parkinson’s disease
Pediatrix Network, 116
Peds PLACE telemedicine program, 128, 130
Pedunculopontine nucleus (PPN), 83–84
deep brain stimulation, 90
gamma band oscillations, 87
neurons, 84, 87–89
population responses and, 87–89
Peer review process, 10
Performance milestones, 26–27
Persistent inward currents (PICs), 100
PET. See Positron emission tomography

PET-guided TMS studies
  tinnitus perception and, 46–50
  methods of, 47–48
  results, 48–49
  transitional research implications, 49–50

PICs. See Persistent inward currents

PPN. See Pedunculopontine nucleus

Population responses, 87–89

Positron emission tomography (PET), 30, 37, 69

Postconditioning bias test, 72

Posttraumatic stress disorder (PTSD), 34, 94

Practice limitations, 21

Preattentional measure, 33

Preattentional processes, 34–35

Preconditioning bias test, 71

Preconscious awareness, 89–91

Prenatal care, 114

Psychomotor vigilance task (PVT), 35–36

attention and behavioral alertness, 53

performance parameters, 36

Psychostimulants
  abuse, 71–75

addiction, 67–68

PTSD. See Posttraumatic stress disorder

PVT. See Psychomotor vigilance task

Rapid eye movement sleep (REM sleep), 32, 35, 84, 85

RAS. See Reticular activating system

Rat studies, 100

thalamus in, 69

transcranial magnetic stimulation, 54–60, 56f

Reaction time (rT), 35

Readiness potential (RP), 90–91

Real-time communication telemedicine, 124

Region of interest plot, 48, 49f

Regulatory burdens, 16–19

Reinforcer delivery, 76

REM sleep. See Rapid eye movement sleep

repetitive transcranial magnetic stimulation (rTMS)

animal models, 56–57, 57f

alert, 57–58, 59, 59f

anesthetized, 56–57, 57f

future directions of, 60

behaviors and, 55

humans, 54

P13 potential amplitude, 59, 59f, 60

sham stimulation and, 45

therapy administration, 56

Research, 12. See also Biomedical research;
  Collaborative research;
  Community-based research;
  Comparative effectiveness research;
  Cyclical research model; Funding;
  General Clinical Research Center program; Medical research; Neonatal translational research; T1 research; T2 research; Translational research

academic health center department, 1

BBSRC, 11

biomedical research funding, 8

clinical framework and orientation, 4–5

CoBRE Core facility, 126

COBRE programs, 6

costs, 21–22

CTSA program, 16

FDA, 112–13

GCRC program, 4

human subjects, 4, 16–17

investigators, 17–18

IRB, 112

mental health, 8

mentoring leader, 140, 141, 142

mentoring program, 24

MRC, 11

NCRR, 4–6

neonatal, 112–13

neonatology, 109–19, 116

neonatology research networks, 116

neuroscience, 11

Newborn Screening Translational Research Network, 117

NIH, 2–3

PET-guided TMS studies, 49–50

Research Counsels, 11

research support individuals, 18

Research Counsels, 11

Reticular activating system (RAS)

gamma band activity in, 87, 88, 88f, 89–91

nuclei, 85, 87

Retinopathy of prematurity, 109

Review committees, 9

Reward pathway, 67–68

Rodent studies. See Rat studies

RP. See Readiness potential

RT. See Reaction time

rTMS. See repetitive transcranial magnetic stimulation

SCI. See Spinal cord injury

Scientific environment, 5

Seizures, 92
Sensorimotor tests, 72
Sensors, 39
Sensory gating, 52–53, 55
Session Initiation Protocol (SIP) video devices, 127
Sham stimulation technique for humans, 45–46, 46f
translational applications, 46
Simple reaction time task, 53
SIP video devices. See Session Initiation Protocol video devices
Sleep, 31–33. See also Evoked response (during sleep); Rapid eye movement sleep; Wake/REM-on sleep; Waking Sleepiness, excessive, 85
Spasticity, 100, 101
Spinal cord injury (SCI), 97–106
animal models, 106
biomechanical approach to, 100–101
electrophysiological approach to, 98–100
H-reflex FDD changes in, 98–100, 102, 102f, 103–4, 103f, 104f
interventions for, 97–106, 101–5
MBET, 101, 103–4, 104f
pharmacology interventions, 105–6
stretch reflex changes, 103, 103f
SQUIDs. See Superconducting Quantum Interference Devices
Steroids, 110
Stimulants, 69–70
Stretch reflex
eexercise effect on, 103
SCI, 103, 103f
windup of, 100–101
Subject populations, 5
Superconducting Quantum Interference Devices (SQUIDs), 92
T1 blocks
infrastructure fragmentation and, 19
investigators, 19–20
mentoring, 22–23
regulatory burdens and, 16–19
willing participants, 15–16
T1 obstacle, 2
T1 research, 2, 111
T2 blocks
career disincentives, 20–21
mentoring, 22–23
practice limitations, 21
research costs, 21–22
T2 research, 2, 113–16
Translational neuroscience (Continued)

history, 1–13
recent, 1–3
mentoring in, 15–27
telemedicine in, 123–32

Translational research. See also Neonatal translational research
benefits of, 138–39
blocks to, 1–2
cyclical model, 2, 3f
in Europe and Asia, 12
funding for, 3–4
lack of, 4–6
future implications for, 135–42
linear research, 2
neonatology, 109–19
new discoveries and
lag time in, 138
program requirements, 140–42
self-assessment and, 23–24
T1-T2 research blocks, 2

Translational studies

drug abuse, 67–79
TMS and, 43–61

TSL. See Tinnitus severity index
T-type calcium channels
cocaine-induced hyperlocomotion and, 73
cocaine-mediated locomotor effects, 73, 74f

UAMS Center for Distance Health (CDH)
telemedicine infrastructure, 126, 129

Vermont-Oxford Network, 116
Verum transcranial magnetic stimulation
(TMS), 46
Very-low birth weight (VLBW) babies
studies, 113, 116
telemedicine for, 129, 130

Videoconferencing, real-time, 128–29. See also Automated video tracking; Session Initiation Protocol video devices
high-resolution interline CCD camera, 41
VLBW. See Very-low birth weight
Voltage-sensitive dye imaging (VSDI), 75, 76f

Wake/REM-on sleep, 84
Waking, 84
Whole cell patch clamp recordings, 89