

# Index

Numbers in *italics* refer to *tables* and *figures*; *f* indicates footnote.

- ablative surgery 179, 198–9, 200
- acetylcholine 22f, 234
- acetylsalicylic acid *see* aspirin
- acoustical masking *see* masking of sounds
- acoustic impedance tests 73–4
- acoustic neuroma *see* vestibular schwannoma
- activities affected by tinnitus 70, 147–8
- acupuncture 219
- acute cochlear deafness 183
- adaptation 34
- Addison's disease 233
- agonists 233
- alcohol and tinnitus 188
- alprazolam 185, 187
- alternative therapies 218–22
  - acupuncture 219
  - herbal remedies 221
  - homeopathy 219
  - for hyperacusis 221–2
  - hyperbaric oxygen 220, 237
  - lasers 220
  - magnetic stimulation 220
  - music-based 221
  - others 221
  - practitioners 218
  - transcutaneous black boxes 219
  - ultrasonic stimulation 220
  - use of the term 218
- aminoglycosides 195
- amylobarbitol 189
- anemia 207
- angiography 233
- annoyance induced by tinnitus, evaluation of 148
- anodal blocks 214
- antagonists 233
- antibiotics 195–6
- anticonvulsants 189–90
- antidepressants 188–9
- anxiety and tinnitus 96
  - behavioral management techniques 185, 213–14
  - medication 185–8
- aromatherapy 221
- aspirin
  - tinnitus evocation 25, 195
  - treatment of spontaneous otoacoustic emissions 11, 190
- Atlanta study results 156–62
- attention
  - distraction of 103, 214
  - limitation of 91–3
- audiograms 233
- audiological evaluation 72–6
  - crucial tests 72
  - explanation of results to patients 87
  - follow-up 135
  - protocol 74–6
  - traditionally used/superfluous tests 73–4
  - useful tests 73
- auditory brainstem responses 74
- auditory (cochlear) nerve 233
- auditory hallucinations 1, 3, 7–8
- auditory imagery 7, 233
- auditory integration 222
- auditory nerve compression 204
- auditory nerve section 179, 198–9, 200
- auditory pathways 89, 233
- auditory system
  - anatomy 87, 109, 199
  - control of gain 23, 90
  - desensitization 130
  - electrical activity of single neurons 23
  - functions 18–19, 87–90
  - pattern recognition 89, 90–1, 239
  - reduced sound environment 25
  - tinnitus as by-product of compensatory action 23–6
- automatic gain control 23
- autonomic nervous system
  - activation 21–2
  - control over 94
  - effects of sound therapy 60
  - effects of TRT counseling 56
  - familiar, significant sounds 37, 42
  - new sounds 35, 37
  - prolonged 94–5
  - and tinnitus 95, 98

- overviews 21–2f, 94f, 234
  - and sleep impairment 39–40, 40f
  - see also* feedback loops
- avoidance strategies 103, 169, 180, 212–13
- axons 234
- background noise and sound perception 23–5
- barbiturates 189
- baclofen 189–90
- Baltimore study results 151–6
- basilar membrane 235
- beating of tones 6
- behavioral techniques for anxiety management 185, 213–14
- Bell's palsy 208, 235
- benzodiazepines 185, 186–7
- betahistine 183
- BICROS 126, 235
- binaural amplification 125
- blending (mixing) point 116, 117
- borreliosis *see* Lyme disease
- brain
  - effects of sleep deprivation 40
  - plasticity *see* plasticity of the brain
  - responses to sensory overload 91–3
  - responses to sounds
    - familiar, non-significant 36, 37–8
    - familiar, significant 37, 42
    - new 34–7, 99–100
  - sound processing 9–10
    - subconscious selection 37–8
  - see also* autonomic nervous system; limbic system
- bruits 235
- caffeine 196
- calcium channel blockers 191
- cancer chemotherapy 196
- carbamazepine 189
- caroverine 192
- categories in tinnitus classification
  - allocation 84
  - basis of 80–1
  - category 0 121–2
  - category 1 122–3
  - category 2 124–7
  - category 3 128–30
  - category 4 131–3, 139–40
  - features of TRT for 82–4
- central processing disorder 74
- cerebral cortex 235
- CHABA report 1, 2
- cinnarizine 190
- classification of tinnitus 2, 3
- clonazepam 186
- cochlea
  - anatomy 235
  - discordant hair cell damage 27–8
  - function explained to patients 88–9
  - over-amplification by 131
  - surgical destruction of 198
  - and tinnitus interaction with external sounds 6
- cochlear implants 126, 127, 202, 214, 215–16, 235
- coffee/tea 196
- cognitive behavioral therapy 212–13
- cognitive reclassification of tinnitus 102
- cognitive reconstruction 213
- computed tomography (CT) 235
- conditioned reflexes 38, 41–4, 54f, 236
  - active extinction 51
  - automation of repetitive activity 92
  - mechanism hindering spontaneous extinction 46, 49
  - passive extinction 44, 101
  - see also* habituation of tinnitus
  - superstitious 44f
- conscious feedback loops 45, 98
- contralateral suppression 5, 9, 127, 235, 236
- contrast and loudness perception 91
- coping strategies 180, 212–13
- counseling
  - negative 79–80, 109–10, 121, 173–4, 175
  - pre-MRI 199–200
  - preventive 174–6
- counseling (retraining) 55, 56–8, 85–115
  - about sound therapy 111–14
  - approach 86
  - concepts to be conveyed 81–2, 106
  - decreased sound tolerance 106–8
  - discussion of options 105
  - elements discussed in sessions 86
    - audiological test results 87
    - brain plasticity 93
    - effect of contrast on perception 91
    - functions of the auditory system 87–90
    - habituation of tinnitus 99–105
    - how tinnitus becomes a problem 95–9
    - limbic/autonomic nervous system activation 93–5
    - limitation of attention 91–3
    - pattern recognition 90–1
  - examples/parables used in 86
  - factors affecting implementation
    - beliefs about evolution 110
    - culture and background 108–9
    - musicians/patients with auditory training 110
    - participation of family/friends 109
    - patient's scientific knowledge 109–10
    - strength of inappropriate beliefs 108
  - general considerations 79–86
  - inadequate 137–8, 143
  - in groups 143
  - minimal requirements 143
  - modifications for treatment categories
    - category 0 121
    - category 1 122–3
    - category 2 124–5
    - category 3 128–9
    - category 4 132
  - outlined 64
  - provision of supplementary information 106
  - terminology 85–6
- craniosacral therapy 221
- critical band 4–5, 236

- CROS 126, 236  
culture and tinnitus 108–9  
cure for tinnitus 226
- deafness *see* hearing loss  
decibels (dB) 236  
decreased sound tolerance  
  associated medical conditions 14  
  combined components 14, 51  
  counseling for 106–8  
  effects on quality of life 69–70  
  evaluation 14  
  hearing protection for MRI 79  
  impact on life 51  
  patient interview 69  
  prediction by neurophysiological model 32  
  prevalence 13, 32  
  recruitment 48, 241  
  scoring of 71–2  
deep brain stimulation 217–18  
definitions of tinnitus  
  commonly used 1–3  
  phantom auditory perception 3–4  
    justification 4–7  
    summary 15  
  traditional 1  
demystification of tinnitus 56–7, 236  
depression and tinnitus 39, 39f  
  medication 188–9  
  TRT 138–9  
desensitization 128  
diabetes and tinnitus 207  
diazepam 186  
dietary restriction, self-imposed 180, 194  
dietary supplements 193–4  
dihydropyrimidines 236  
discordant dysfunction (damage) theory of  
  tinnitus production 26–8, 30–1, 33, 89  
Distortion of sound 129  
distortion product otoacoustic emission (DPOAE)  
  73, 76, 236  
distraction techniques 103, 214  
dorsal cochlear nuclei 27, 28  
double-blind studies 236  
drugs *see* medications  
duration of tinnitus 10
- ear-plugs 79, 173, 212, 221  
ears, destructive surgery 198–9, 200  
electrical stimulation 214–18  
  anodal suppression of tinnitus 215  
  deep brain 217–18  
  early work 215  
  external cochlear stimulation 216  
  high frequency 217  
  potential of 214  
  transcutaneous 217  
emergency help lines 174  
Emory Tinnitus and Hyperacusis Centre study  
  results 156–62  
endolymph 236  
endolymphatic hydrops *see* Ménière's syndrome  
endolymphatic sac surgery 201  
environmental sound 7, 12, 16, 32, 33, 58, 59, 69,  
  111–14, 117, 118–19, 126, 128, 131, 140,  
  144, 197  
eperisone 192  
epidemiology of tinnitus 10, 17  
ethanol *see* alcohol  
eustacian tube 236  
evaluation of TRT 145–70  
  approaches used by other investigators 168–9  
  comparison group 162, 165  
  criteria for case inclusion 147  
  criteria for improvement 147  
    individual patients 148–50  
  goal of treatment 145  
  methods of data collection 146–7  
  minimal requirements 143  
  modification of patients' expectations 146  
  placebo effect 150, 177–8  
  questions asked 135, 147–8  
  results from centers  
    Atlanta 156–62  
    Baltimore 151–6  
    London 162–8  
    others 168  
  spontaneous recovery 151  
  time frame 150
- failure of TRT 84, 136  
  category 4 patients 139–40  
  effects of litigation 138  
  effects of medications 139  
  focus on cure 140  
  inadequate counseling and follow-up 137–8  
  psychological problems 138–9  
  temporary worsening of symptoms 136–7  
  tinnitus suppression by hearing aids 140  
feedback loops 45–6, 98  
fight or flight response 94–5, 96  
flecainide 184  
flunarizine 191  
fluoxetine (Prozac) 188–9  
furosemide 191–2
- generalization principle 117f  
gentamycin 195  
*Ginkgo biloba* 192–3  
glutamate 192  
global hypersensitivity 96, 208  
glutamic acid diethylester 192
- habituation of tinnitus 16  
  as basis of TRT 54–5, 100–1  
  clinical approach 55, 56  
  combined therapies 61  
  continuous promotion of habituation 19, 60  
  follow-up questions 134–5  
  stress management 103  
  time frame 105  
  TRT counseling *see* counseling (retraining)

- clinical goals 54, 101
- effects of medication 104–5
- explanation in counseling sessions 99–105
- habituation of perception 37, 52–3, 55, 57, 56–8, 101, 148
- habituation of reaction 52, 55, 56, 57, 101
- mechanisms 52–4, 102–3
- natural 33–4
- passive extinction of conditioned reflexes 44, 101
- spontaneous 96
- time frame 105
- hair cells
  - regeneration of 226
  - see also* inner hair cells; outer hair cells
- hallucinations, auditory 3, 7–8
- hearing
  - restoration, future for 226
  - selective 35
  - thresholds 237
  - see also* auditory system
- hearing aids
  - BICROS 126, 235
  - category 2 (tinnitus and hearing loss) patients 83, 124, 125–7
  - combined with sound generators 83–4, 127
  - CROS 126, 236
  - deep canal types 114
  - in hyperacusis treatment 212
  - noise cancellation programs 125
  - tinnitus suppression by 125, 140
  - use in tinnitus patients 211–12
- hearing level 237
- hearing loss
  - discussion with patients 87
  - evaluation before TRT 79
  - hearing aids, criterion for use 124
  - not predictor of tinnitus 180
  - profound, challenge to TRT 226
  - scoring of subjective effects 72
  - sound enrichment in 114–15
  - and tinnitus 14–15, 32–3, 70–1, 124–5
  - unilateral 126
  - see also* audiological evaluation
- help lines 174
- herbal remedies 221
- high-frequency sounds 75–6
- histamine and dextran infusions 183
- homeopathy 219
- homeostasis 31f
- hummers 100f
- hydrops 237
- hyperacusis
  - alternative therapies 221–2
  - associated medical conditions 207–8
  - counseling for 106–7
  - defense mechanism 129
  - defined 11, 237
  - easier to treat 155
  - effect on TRT outcome, Baltimore study 154, 153–4, 155
  - emergence with tinnitus 129
  - features 12, 48, 50
  - hearing aids in treatment of 212
  - high-frequency sounds 75–6
  - in medical disorders 207–8
  - mechanism 53
  - over-protection of hearing 68
  - prevalence 13
  - sound distortion 129
  - symptom worsening after sound exposure 129, 131–3
  - treatment approaches 51, 128–30, 131–3
  - wearable sound generators 83–4, 120, 130
- hyperbaric oxygen therapy 220, 237
- hypertension and tinnitus 207
- hypnosis 221
- hypnotics 185
- IHC *see* inner hair cells
- imipramine 188–209
- impedance audiometry 76
- inferior colliculus 28
- inner hair cells (IHCs) 9, 14, 27, 28, 31, 32, 88, 89, 192, 198, 226, 237, 242
  - damage to 9, 27, 32, 68, 88, 129, 202, 204, 207, 215, 240
  - function 27, 32, 87, 88, 89, 124, 131
- insomnia *see* sleep impairment
- intensity of sound 237
- iontophoresis of local anesthetics 184–5
- kindling 131, 237
- labyrinthectomy 199, 201, 238
- lamotrigine 190
- lasers 220
- lateral inhibition 25–6
- lidocaine 184–5
- limbic system
  - activation 22
    - effects of high levels of 39f
    - effects of sound therapy 60
    - effects of TRT counseling 56
    - familiar, significant sounds 37, 42
    - new sounds 35, 37
  - anatomy 20
  - features f21, 238
  - functions 21, 39f, 94
- litigation effects on TRT 138
- local anesthetics 184–5
- London study results 162–8
- lorazepam 186
- loudness
  - effect of contrast on perception 91
  - matching 73
- loudness discomfort levels (LDLs) 14, 238
  - explanation of reduction to patients 87
  - importance of testing 75
  - testing protocol 75
- Lyme disease 139, 208, 238

- magnetic resonance imaging (MRI) 238
  - auditory nerve compression 204
  - hearing protection 79
  - vestibular schwannoma 199–200
- magnetic stimulation 220
- masking of sounds
  - critical band 4–5
  - defined 4, 238
  - mechanism 127
  - partial 117
  - tinnitus *see* tinnitus masking
  - use in somatosounds 1, 2, 5, 11, 15, 16, 77, 78, 79, 100, 170, 190, 205, 207
- Ménière's syndrome
  - betahistine treatment 183
  - features 203, 238
  - tinnitus 203–4
    - treatment 199, 203, 204
- medical conditions associated with hyperacusis 207–8
- medical conditions associated with tinnitus 205–7
  - anemia 207
  - hypertension 207
  - low blood sugar on waking 207
  - migraine 207
  - syphilis 207
  - temporomandibular joint dysfunction 206
  - tensor tympani syndrome 206
  - thyroid dysfunctions 207
- medical evaluation for TRT 76–80
  - avoidance of negative counseling *see* negative counseling
  - head and neck examination 77–8
  - hearing loss 79
  - history 76–7
  - importance 76
  - medications taken 78
  - prior treatments 77
  - psychiatric problems 78
  - somatosounds 78–9
  - tinnitus modulation by somatosensory stimulation 77
  - verbal description of tinnitus 77
- medications 181–97
  - dietary supplements 193–4
  - drugs/substances implicated in tinnitus 194–6
    - antibiotics 195–6
    - aspirin 25, 195
    - caffeine 196
    - cancer drugs 196
    - elderly patients 195
    - psychotropic drugs 194
    - quinine 195
    - recreational drugs 196
    - unfair blame 78, 194
    - withdrawal 78, 104, 139, 182, 185, 186
  - effects on TRT 139
  - general considerations
    - assumption of cochlear damage 182
    - effects on habituation 104–5, 139
    - future developments 182
    - selection based on anecdotal reports 181
    - syndromic tinnitus 181
- neural networks 89
- tinnitus treatment
  - applicability summarized 196–7
  - antiallergenic, anti-inflammatory agents 190–1
  - anticonvulsants 189–90
  - antidepressants 188–9
  - calcium channel blockers 191
  - local anesthetics 184–5
  - sedatives and tranquilizers 185–8
  - vasodilators 183
  - others 191–3
- mexilitene 184
- microvascular decompression 204
- migraine and tinnitus 207
- minimal suppression levels (MSLs) 73, 164–5, 166
- misophonia
  - counseling for 107–8, 122
  - defined 239
  - examples of beliefs 48f
  - features 12–13, 48, 50–1
  - mechanism 53
  - patient interview 69
  - prolonged symptoms after sound exposure 131
  - treatment approach 51
- mixing (blending) point 116, 117
- molecular orthogonal medicine 193
- monotonic sequences 239
- MRI *see* magnetic resonance imaging
- music therapies 221
- musicians 110
- myringoplasty 201, 239
- natural habituation of tinnitus 33–4
- negative counseling 79–80, 109–10, 121, 173–4, 175
- negative emotions/beliefs 38–9, 67, 213
- negative reinforcement 44–5, 101
- neuronal activity, tinnitus-related 9, 227
- neurophysiological basis for TRT
  - brain plasticity 54
  - dissociation of tinnitus from reflex responses 54–5
- neurophysiological model of tinnitus 16–62
  - clinical implications *see* habituation of tinnitus, clinical approach
  - components
    - conditioned reflexes 41–4
    - feedback loops 45–6, 98
    - irrelevance of signal strength 47–8
    - main systems involved 41
    - negative reinforcement 44–5, 101
  - decreased sound tolerance 32, 48–52
  - development 16–22
    - autonomic nervous system involvement 21–2
    - clinical findings 17
    - crucial concept 18
    - limbic system involvement 20–1, 22

- psychoacoustical characterization, lack of
  - clinical importance 18
  - research findings 17–18
  - role of non-auditory centers 18–19
- explanation in counseling sessions
  - habituation of tinnitus 99–105
  - how tinnitus becomes a problem 95–9
- mechanisms of tinnitus signal generation 23–31
  - by-product of auditory system compensatory actions 23–6
  - combined 30
  - discordant dysfunction theory 26–8, 30–1, 33, 89
  - summarized 29–30
- relationship of tinnitus to hearing loss 32–3
  - summarized 60–2
  - vicious cycle development 41, 43, 47–8
- nicotinic acid (niacin) 193
- nifedipine 191
- night cramps 195
- nimodipine 191
- noise, avoidance of excessive 173
- norepinephrine 22f
- nortriptyline 188
  
- objective/subjective tinnitus 2
- OHC *see* outer hair cells
- organ of Conti 88
- otosclerosis 239
  - surgery 202–3
- outer hair cells (OHCs)
  - damage to 27, 88–9, 173
  - function 27, 88, 239
  - redundancy of 89
  - in tinnitus 89, 239
  
- palatal myoclonus 77, 239
- parasympathetic nervous system 21–2f
  - see also* autonomic nervous system
- partial masking/suppression 117, 210
- passive extinction of conditioned reflexes 44, 101
- patch test, pre-myringoplasty 201
- patients
  - beliefs about ear pain 88
  - beliefs about tinnitus and hearing loss 70–1, 108
  - culture/background and TRT counseling 108–9
  - development of negative associations about tinnitus 63–4, 109–10
  - expectations of treatment 146–7
  - focus on cure 140
  - introductory contact with 65–6
  - obsessive searches for cures 20
  - partners of 109
  - quality of life with tinnitus 69–70
  - rules for sound use 225–6
  - scientific knowledge 109–10
  - scoring of tinnitus, decreased sound tolerance and hearing loss 71–2
  - self-imposed dietary restriction 180, 194
  - tinnitus-related complaints 19–20
  - treatment categories *see* categories for tinnitus classification
  
- pattern recognition 89, 90–1, 239
- perception
  - effect of contrast 91
  - pattern recognition 89, 90–1, 239
  - selective 36, 37–8
- perception of tinnitus
  - auditory imagery 7, 233
  - beating of tones 6
  - experiencing versus suffering 17, 97
  - formless sound 7, 8
  - neuronal activity and 9
  - understandable speech 7–8
  - versus perception of external sounds 4
  - see also* masking of sounds; suppression of tinnitus
- perilymph 239
- perilymphatic fistulae 201–2
- phantom auditory perceptions 33
  - categories 7–8
  - definition of tinnitus 3–4
  - justification 4–7
- phantom (non-auditory) perceptions 8
- phenobarbital 189
- phobic reactions to tinnitus 98–9
- phonophobia
  - examples of beliefs 48f
  - features 12, 13, 48
  - patient interview 69
  - prolonged symptoms after sound exposure 131
  - treatment approach 51
  - use of term 12
- physiological homeostasis 31f
- pink noise therapy 132–3, 221
- pitch matching 73
- placebo effect 150, 177–8
- plasticity of the brain 10, 54, 93
  - benzodiazepines and 186, 187
- positive associations with tinnitus 102–3
- positive emotions, suppression 38–9
- presbycusis 240
- prevention of tinnitus 171–6
  - avoidance of excessive noise 173
  - avoidance of negative counseling *see* negative counseling
  - avoidance of silence 84, 111, 171–2
  - education 175–6
  - emergency help lines 174
  - identification of predisposed subjects 174–5
  - provision of sound enrichment 172
- primidone 190
- promontory of tympanic cavity 240
- Prozac (fluoxetine) 188–9
- psychoacoustical masking *see* masking of sound
- psychoacoustics 240
- psychological problems
  - effects on TRT 138–9
  - medical evaluation for TRT 78
- psychological treatments 212–14
- psychotropic drugs 139, 180–2, 185–9, 194
- pure tone audiometry 74, 240

- quality of life with tinnitus 69–70
- questionnaires for tinnitus evaluation 146
- quinine 195
  
- Ramsay Hunt syndrome 208, 240
- randomized, double-blind studies 177, 179
- rapid eye movement (REM) sleep 40
- rebound phenomenon 6, 211
- reclassification of tinnitus 102
- recruitment 48, 241
- reflexes, conditioned *see* conditioned reflexes
- reflexology 221
- reinforcement 44
  - negative 44–5
- relapse 142, 150–1
- relaxation 214
- residual inhibition of tinnitus 6, 74, 210–11, 241
- results of TRT *see* evaluation of TRT
- retraining counseling *see* counseling (retraining)
  
- schizophrenia 7, 8
- scoring of tinnitus, decreased sound tolerance and hearing loss 71–2
- sedatives 185
- selective perception 36, 37–8
- sensation level 241
- severity, subjective scores of 71–2
- signal strength of tinnitus, irrelevance to clinical effects 47–8
- silence
  - avoidance of 84, 111, 171–2
  - random auditory neuronal activity 23, 198–9
  - seeking by patients 113
  - see also* sound deprivation
- sleep impairment
  - cat naps 70
  - management 97, 113–14, 185–6
  - and tinnitus 39f, 39, 40f, 41, 70, 96–7
- sleeping pills 97
- sodium amytal 189
- somatosensory input and tinnitus 206
- somatounds
  - categories 205
  - evaluation before TRT 78–9
  - exclusion from tinnitus definition 11
  - treatment 205
- sound deprivation 58–9
  - see also* sound-proofed room experiment
- sound enrichment 172
  - approaches 111
  - devices 111–12
  - see also* sound generators
  - in hearing loss 114–15, 125
  - need for 111
  - night-time 113–14, 185
  - suitable sounds 111, 112
- sound exposure, worsening symptoms 132
- sound generators 84
  - combined with hearing aids 83–4, 127
  - unnecessary use 121–2
  - wearable *see* sound therapy: wearable sound generators
- sound pressure level 241
- sound-proofed room experiment 25, 90, 114, 124, 129, 172
- sounds
  - brain responses to
    - familiar, nonsignificant 36, 37–8
    - familiar, significant 37, 42
    - new 34–7, 99–100
  - calming 172
  - categories of 35
  - formless 7, 8
  - high frequency 75–6
  - processing within the brain 9–10
    - subconscious selection 37–8
    - worsening tinnitus symptoms 131–3
- sound therapy 115–20
  - approaches 111
  - combined with counseling 120
  - counseling about 111–14, 122–3
  - distortion 129
  - good for everyone 114, 141
  - in habituation of tinnitus 103–4
  - with hearing loss 125–7
  - with hyperacusis 130
  - London study results 164
  - minimal requirements 143–4
  - modifications for treatment categories
    - category 0 121–2
    - category 1 122–3
    - category 2 125–7
    - category 3 130
    - category 4 131–3
  - optimal sound selection
    - avoidance of “masking” 116–17
    - avoidance of negative reactions 115, 132
    - effects on habituation 115
    - preservation of tinnitus signal 115–17
    - symmetrical stimulation 119
    - unintrusiveness 117–18
    - weakening of the tinnitus signal 115
  - outlined 58–60, 64–5
  - using TV or radio 111, 112
  - wearable sound generators
    - advantages 118–19
    - bilateral 119
    - category 4 patients 132
    - counseling patients about 122–3
    - daily use 120
    - fitting and adjustment 123
    - hyperacusis treatment 83–4, 120, 130
    - open ear-molds 119
    - see also* sound enrichment
  - sound use, rules for patients 225–6
  - speech discrimination testing 74–5
  - spontaneous otoacoustic emissions (SOAE) 2, 11, 190–1
- stapedectomy 202, 241
- stapedotomy 202, 241
- startle reflex 35f

- steroids 190
- streptomycin 195
- stress
  - management 103
  - and tinnitus 213
- structured interviews 66, 134–5, 146–7
- stump neuromas 198
- subconscious feedback loops 45, 98
- subjective/objective tinnitus 2
- superstitious reflexes 44f
- suppression of positive emotions 38–9
- suppression of tinnitus
  - as avoidance strategy 104
  - contralateral ear 5
  - partial 117
  - terminology 5–6
  - see also* tinnitus masking
- surgery 197–205
  - ablative 179, 198–9, 200
  - approaches summarized 205
  - auditory nerve compression 204
  - cochlear implants 202
  - general considerations 197–8
  - importance of hearing preservation
    - 200–1
  - Ménière's disease 199, 203
  - otosclerosis 202–3
  - perilymphatic fistulae 201–2
  - somatosounds 205
  - tympanic membrane perforations 201
  - vestibular schwannoma 200–1
- sympathetic nervous system
  - activation by tinnitus 39f, 95
  - effects of prolonged activation 95
  - fight or flight response 94–5, 96
  - overview 21–2f
  - see also* autonomic nervous system
- symptoms in tinnitus, *see* categories in tinnitus
  - classification
- syphilis and tinnitus 207
- table-top sound machines 112
- tea/coffee 196
- temporomandibular joint dysfunction (TMD)
  - 206
- ten second exercise 104
- tensor tympani syndrome 206
- Therapak 219
- thyroid dysfunctions and tinnitus 207
- tinnitophobia 98–9
- tinnitus
  - at risk population 171, 174–5
  - cure for 226
  - definitions *see* definitions of tinnitus
  - development as a problem 34–41, 95–9
  - duration 10
  - epidemiology 10, 17
  - with normal hearing 31
  - objective 2
  - phobic reactions to 98–9
  - prevention *see* prevention of tinnitus
  - subjective 2
  - tonal 241
  - on waking 206–7
- Tinnitus Handicap Inventory (THI) 159–61
- Tinnitus Instrument 127
- tinnitus masking 104, 139, 208–11
  - cochlear damage from 209
  - frequency-independence 5, 208–9
  - habituation of suppressing sound 209–10
  - partial 117, 210
  - problem of high levels of sound 209
  - rationale 208, 209
  - residual inhibition and 210–11
  - TRT effective after 116, 140
  - see also* masking of sounds; suppression of tinnitus
- tinnitus-related neuronal activity 9
- tinnitus retraining therapy (TRT)
  - advantages 170, 223–4
  - disadvantages 170, 224–5
  - group therapy 143
  - failure *see* failure of TRT
  - future directions 225, 226–7
  - minimal requirements 142–3
    - evaluation 143
    - follow-up 144
    - treatment 143–4
  - outlined 63–5, 223–6
- tinnitus retraining therapy (TRT) protocol 65–142
  - categorization of patients
    - basis outlined 80–1
    - category allocation 84
    - features of TRT for categories 82–4
  - a comparison group 162
  - components 65
  - counseling *see* counseling (retraining)
  - follow-up contacts
    - aim of measurements 135–6
    - audiological evaluation 135
    - compliance-checking 134
    - counseling approach 133–4
    - intervals between 133
  - introductory contact 65–6
  - initial visit, interview
    - assessment of patient's concerns 67
    - discussion of patient's subjective experience 68–9
    - effects on individual's life 69–70
    - family information 67
    - importance of detailed history 68
    - patient's assessment of tinnitus and hearing loss 70–1
    - psychological profile 72–6
    - scoring of tinnitus, decreased sound tolerance and hearing loss 71–2
    - structured interview forms 66
    - tape recording interviews 106
    - tinnitus questionnaire review 66
    - triggering factors 67–8
    - medical evaluation *see* medical evaluation for TRT

- tinnitus retraining therapy (TRT) protocol (*cont.*)
  - modifications for treatment categories 121–33
    - category 0 (mild/recent symptoms) 121–2
    - category 1 (high impact tinnitus) 122–3
    - category 2 (tinnitus and hearing loss) 124–7
    - category 3 (hyperacusis) 128–30
    - category 4 (prolonged worsening on sound exposure) 131–3, 139–40
  - relapse of symptoms 142
  - study, need for 106
    - minimal requirements 144
    - structured interview 134–5
  - termination of treatment 140–1
    - how 141
    - when 141
  - see also* evaluation of TRT
- TMD *see* temporomandibular dysfunction
- tocainide 184
- tonal tinnitus 241
- tranquilizers 185–8
- transcutaneous black boxes 219
- transcutaneous electrical nerve stimulation (TENS) 217
- treatment categories
  - allocation 84
  - basis outlined 80–1
  - features of TRT for 82–4
  - see also* tinnitus retraining therapy (TRT) protocol: modifications for treatment categories
- treatments for tinnitus
  - coping strategies 180, 212–13
  - inner ear-based 179
  - open trials 177
  - placebo effect 150, 177–8
  - randomized, double-blind studies 177, 179
  - see also* alternative therapies; *specific treatments*
- tricyclic antidepressants 188
- TRT *see* tinnitus retraining therapy
- tympanic membrane perforations 201
- ultrasonic stimulation 220
- valproate 190
- vasodilators 183
- vestibular nerve section 199, 201
- vestibular schwannoma
  - MRI 199–200
  - prevalence of tinnitus 199
  - surgery 200–1
- vicious cycle of tinnitus development 41, 43, 47–8
- vitamin supplements 193–4
- waking tinnitus 206–7
- wax removal 79
- wearable sound generators *see* sound therapy:
  - wearable sound generators
- Wilcoxon test 157
- Williams syndrome 208, 241
- winding-up effect 131, 132, 242
- work, tinnitus effects on 70
- Xanax *see* alprazolam
- zinc 193