

## Index

Page numbers in *italics* refer to illustrations

- A**
- A-fibers 8, 67, 215  
 abrasion 18  
 abscess  
   antibiotic treatment 144  
   brain 50, 52  
   drainage 50, 50, 51, 144, 145  
   endodontic 70, 71  
   palatal 49, 115  
   periodontal 56, 69–70, 70, 72  
     apical periodontitis and 49–50, 49, 50, 81, 82  
   pulpal 10, 12, 14, 14  
 access cavity 179–181, 180  
   complications 215, 216  
   mandibular canine 210  
   mandibular first premolar 211  
   mandibular incisors 210  
   mandibular molars 213–214  
   mandibular second premolar 212  
   maxillary canine 205  
   maxillary central incisor 203–204  
   maxillary first premolar 206  
   maxillary lateral incisor 204  
   maxillary molars 208–209  
   maxillary second premolar 206–207  
 accessory canals 5  
 acid-etch technique 88, 182, 182, 239  
   resin technique for tooth strengthening 242–244, 242, 243  
*Actinomyces* 37–40  
 acute necrotizing ulcerative gingivitis 70  
 acute serous pulpitis 67  
 acute suppurative pulpitis 67–68  
 age  
   determination in forensic dentistry 5  
   prognostic significance 247  
*Aggregatibacter actinomycetemcomitans* 41  
 aging  
   dentin 4–5  
   periodontium 32  
   pulp 8–9, 8  
 AH26 173, 200  
 AH Plus 173  
 allergic reactions 49, 227  
   contact allergy 227  
 alveolar bone 6, 31  
 amalgams 22, 88, 88, 167  
   copper-containing 134  
   retrograde fillings 134, 137, 175–176, 175  
   silver-containing 175  
   tooth discoloration and 237, 238  
 ameloblastoma 58–59, 59  
 amelogenesis imperfecta 236  
 amoxicillin 114  
 analgesics 144–145  
   incomplete analgesia 215  
 anesthesia  
   intra-ligament 78–79  
   test 78–79  
 angina pectoris 74  
 ankylosis  
   dentoalveolar 148, 155  
   replantation and 138  
   root resorption and 148, 150, 155, 156  
   spot ankylosis 156  
 anodyne medicament 141  
 antibiotics  
   apical periodontitis treatment 144  
     refractory apical periodontitis 117–118, 118  
   as pulp-capping agents 93  
   postoperative 138  
   prophylaxis with nonvital teeth 114  
   retreatment and 232–233  
 antiseptics  
   adverse reactions to 40, 41, 226  
   controlled-release delivery systems 109, 110, 113  
   root canal disinfection 40, 108–112, 113–114  
 anxiety control 145  
 aortic aneurysm 53  
 apex locators, electronic 183  
 apexification 120–121, 120, 121, 122  
   see also calcium hydroxide  
 apical box preparation 185–187, 186  
   mandibular molars 214  
   mandibular second premolar 212  
   maxillary canine 210  
   maxillary first premolar 206  
 apical cyst 43  
 apical foramen 97, 97  
 apical periodontitis 32–54, 82  
   abscess formation 49–50, 49, 50, 81, 82  
   asymptomatic 68, 81, 82, 114, 176, 231  
   condensing 46–47, 49, 81, 82  
   differential diagnosis 54–62  
   etiology 32–40  
     iatrogenic factors 40  
     infection of periapical lesion 36–40  
     portal of entry of bacteria 36  
     pulp necrosis 33  
     pulpitis 32–33, 33  
     root canal infection 33–36  
   fistula development 81, 82, 135–136  
     see also fistula  
   healing 52–54, 54  
   nonvital teeth 108, 111, 114, 115, 115, 128, 191

apical periodontitis, immature nonvital teeth 121  
 pathogenesis 41–47  
   bacterial action 41–42  
   periapical cyst 43–44  
   periapical granuloma 42–43  
 percussion test 76–77  
 periapical lesion infection 36–40, 37, 38  
 radiographic appearance 54  
 refractory to endodontic treatment 104, 116–119, 116, 117  
   bacteriological sampling 37, 117–118  
   prognosis 119  
   surgical treatment 39, 118–119, 119  
   systemic antibiotic treatment 117–118  
 retreatment 116, 116, 118, 129–130, 230–231, 231, 233  
 surgical treatment 39, 118–119, 119, 127–128  
   *see also* surgical–endodontic treatment  
 symptomatic 48–50, 68–69, 81, 82, 132, 200, 220, 223  
   antibiotic treatment 144  
   drainage 143–144  
   emergency treatment 143–145  
   occlusion 144  
   pain and anxiety control 144–145  
 apical periodontium 31  
   *see also* periodontium  
 apicoectomy 128, 129, 137, 176, 225  
 arteriovenous anastomoses, pulp 7  
 asepsis 132–133  
 attrition 18  
 autolysis 25

## B

B lymphocytes  
 in apical periodontitis 42, 43  
 in pulp 12  
 bacteremia 50–52  
 bacteria  
   antigens 42  
   apical periodontitis 33–36  
     action of 41–42  
     refractory apical periodontitis 37, 117–118, 117, 118  
     sampling 37, 117–118  
   nonvital teeth 104  
   periapical lesion 36–40, 37, 38, 48  
   portal of entry 36  
   prognostic significance 248  
   pulp invasion 15, 19–20  
   red complex 34, 36  
   root canal infection 33–36, 34, 35, 230, 230  
   treatment failure and 230  
   *see also* infection; *specific bacteria*  
 biofilm  
   periapical lesion 36, 37  
   root canal 34, 34  
 biological obturation techniques 201  
 bleaching of discolored teeth 236, 238–241, 238  
 bleaching agents 239  
 bleaching procedures 239

preparation 238–239  
 restoration of the bleached tooth 240  
 vital teeth 240–241  
   dentin discolorations 240–241  
   enamel defects 240  
   *see also* discoloration of teeth  
 bleeding, intrapulpal 84, 85  
 blood clot obturation techniques 201  
 bone  
   alveolar 6, 31  
   resorption 42–43, 49  
   traumatic cysts 57–58, 59  
   *see also* osteosclerosis  
 Bowen's resin 21  
 brain abscess 52  
 broaches 158, 158  
 burs 164  
   cavity and crown preparation 180, 180, 181  
   long-shank fissure 164  
   long-shank round 180  
   microburs 164  
   penetration of obliterated canal 222  
   root perforation 216–217, 216, 217  
   round 164

## C

C-fibers 8, 67, 215  
 calcifications  
   pulp 8–9, 9, 12  
   root canal 222  
 calcium hydroxide 86–87, 89–90  
   application 89–90  
   in pulp capping 89–90, 89, 90, 91  
   in pulpectomy 100, 102  
   in pulpotomy 94, 95, 96  
   in root canal sealers 174–175, 174  
   modes of action 109–112  
   reaction of inflamed pulp 93  
   retreatment 232, 233  
   root canal biological obturation 201  
   root fracture treatment 123, 124  
   root perforation treatment 217, 219, 219, 220  
   root resorption treatment  
     external inflammatory resorption 153–155, 154  
     internal resorption 150  
   use in nonvital teeth 109–112, 110, 111, 113–114, 114  
   immature nonvital teeth 120–121, 120, 121, 122  
 cancer metastases 25  
 canines  
   mandibular 210, 210  
   maxillary 205, 205  
*Campylobacter* 41  
 carcinoma 61, 61  
 carious lesion *see* dental caries  
 Cavit 167, 176  
 cavity  
   base materials 86–88  
   preparation 84–85, 84  
   cleansing and drying 85

- impression methods 85–86
  - pulp protection 86–87
  - varnish 88, 175–176
  - see also* access cavity
  - cellulitis 69
  - cementoblasts 31, 146
  - cementoma 59, 60
  - cements 167
    - pulpal irritation 21
    - see also specific cements*
  - cementum 31
    - age changes 32
  - cervical resorption 130, 133, 147, 148, 150–151, 150, 151, 152
    - treatment 151, 152
  - chelating agents 102, 107
  - chemomechanical instrumentation 105–107, 113, 113, 143, 184
  - chlorhexidine 108, 133, 182
  - chlorhexidine gluconate 106
  - chloroform
    - adverse reactions to 226
    - gutta-percha removal 232, 246
    - resin chloroform 172–173
  - chloropercha 172, 191
  - clindamycin 118, 232
  - clinical examination 76–79
    - anesthesia test 78–79
    - optical tests 79, 79
    - palpation 76–77
    - percussion test 76–77
    - provocation tests 78
    - sensitivity tests 77–78
  - cold test 77
  - collagen fibers 3
    - periodontal ligament 32
    - pulp 7
  - collagen gel obturation techniques 201
  - colophony sealer 172–173
  - complications *see* endodontic complications
  - contact allergy 227
  - coronal restorations 244
    - prognostic significance 248
  - corticosteroids, as pulp-capping agents 93
  - cracks 79
    - enamel–dentin 18
  - CRCS 174
  - crown down preparation 187–188, 188
  - crown fractures 92, 94
    - emergency treatment 142
    - pulpitis and 19
  - crown preparation 84–85
    - impression methods 85–86
  - cusp height reduction 180, 215
  - cysts 43, 57–58
    - apical 43
    - bone 57–58, 59
    - globulomaxillary 57, 58
    - incisive canal 57
    - infection of 70
    - periapical 43–44, 44, 45, 56
      - differential diagnosis 54–55
    - periodontal 57, 58
  - radicular 43
  - radiographic appearance 54–55, 55, 56
- D**
- dens in dentate 204–205
  - dental caries 16, 243
    - emergency treatment 141
    - hypersensitivity and 65
    - outcome of reparative treatment 11, 13
    - pulpitis and 15–18, 16, 17
  - dental history 76
  - dental hypersensitivity 65–66
    - anatomical basis 65–66
    - emergency treatment 142–143
    - hydrodynamic theory 66
    - odontoblast-receptor theory 66
    - symptoms 66
  - dental morphology 203–214
    - mandibular canine 210, 210
    - mandibular first premolar 211, 211
    - mandibular incisors 209–210, 209
    - mandibular molars 212–214, 212, 213, 214
    - mandibular second premolar 212, 212
    - maxillary canine 205, 205
    - maxillary central incisor 203–204, 203
    - maxillary first premolar 205–206, 205
    - maxillary lateral incisor 204–205, 204
    - maxillary molars 207–209
    - maxillary second premolar 206–207, 206
    - prognostic significance 247
  - dental nerves 73
  - dental papilla 56
  - dentin 1–5, 5
    - acid-etched 242, 242, 243
    - adhesives 87, 173
    - age changes 4–5
    - dehydration 21, 22
    - discolorations 240–241
    - exposure to oral cavity 18–19, 19
      - emergency treatment 142–143, 143
    - fractured 1
    - interglobular 2
    - intertubular 2, 4
    - intratubular 4, 5
    - liquor 2
    - peritubular 2, 3
    - primary 1–2
    - reparative 26
    - sclerosis 16–17
    - secondary 2
      - formation of 2, 3, 4–5, 8, 8, 18, 26
  - dentin bridge 6
    - following pulp capping 89–91, 89, 90
    - following pulpectomy 100
    - following pulpotomy 94, 95
  - dentin chips
    - use in pulpectomy 99–100, 100, 101
    - use in treatment of immature nonvital teeth 123, 123
  - dentin–pulp interface 6
  - dental tubules 1–4, 1, 3, 4

- dental tubules, age changes 5
  - in dental hypersensitivity 143
  - emergency treatment 142–143, 143
- dentinogenesis 2
- diagnosis 76, 81–82
  - prognostic significance 247
  - tentative 79–80
- Diaket 173, 200
- diazepam 145
- dipping technique 190–191, 191, 192
- discoloration of teeth 88, 236–238
  - nonvital teeth 237–238
    - endodontic medications and materials 237–238
    - pulp necrosis 237, 237
    - restorative materials 237, 238
  - vital teeth 236–237
    - enamel defects 236, 236
    - secondary mineralization 236
    - systemic drugs 236–237
  - see also* bleaching of discolored teeth
- drainage
  - abscess 50, 50, 51, 144, 145
  - apical periodontitis 143–144
- dressing *see* wound dressing

## E

- EDTA 102, 107, 232
- elastic fibers, pulp 7
- electric sensitivity testing 77–78, 77
- electronic apex locators 183
- elevator 164, 165
- emergency treatment 141
  - nonvital teeth 143–145
    - symptomatic apical periodontitis 143–145
  - vital teeth 141–143
    - crown fractures 142
    - dental hypersensitivity 142–143
    - symptomatic pulpitis 141–142
    - traumatic occlusion 143
- enamel 5
  - defects, discoloration and 236, 236
    - bleaching 240
  - hypoplasia 236, 240
  - invagination 204–205
- enamel–dentin cracks 18
- endo–perio lesions 44–46
  - endodontic treatment 125–127, 126
- endocarditis 52
- endodontic abscess 70, 71
- endodontic complications 215–229
  - access cavity 215, 216
  - adverse reactions to medicaments 226–227
    - allergic reactions 227
    - local tissue irritation 226, 226
    - neurotoxic reactions 226, 226
  - incomplete analgesia 215
  - instrument fracture 223–225
  - obliterated root canal 222, 223
  - overfilling of the root canal 48–49, 227, 227, 228
  - root perforations 130
    - apical perforations 217–220, 218, 220, 221
    - from the pulp chamber 216–217, 216, 217
    - lateral perforations 217, 219, 220–221
    - post perforations 130, 221, 222
    - vertical root fractures 228–229, 228
- endodontic explorer, double-ended 180–181
- endodontic retreatment *see* retreatment
- endodontic techniques 178–201
  - preparation for treatment 179–182
    - access cavity 179–181
    - rubber dam 181–182, 181, 182
  - regenerative endodontics 201
  - root canal instrumentation 183–189
    - apical box preparation 185–187, 186
    - chemomechanical instrumentation 184
    - crown down preparation 187–188, 188
    - curved root canals 188–189, 189
    - length determination 183, 184
    - pulp extirpation 183–184
    - step-back preparation 184–185, 185, 186, 194
    - with engine-driven nickel-titanium instruments 187–188
  - root canal obturation 189–200
    - with adhesive technique 199–200, 200
    - with gutta-percha points 190–199, 191–199
    - with pastes 200
    - with silver points 189–190, 190
- endodontium 1–29
  - systemic influences 24–25
  - see also* dentin; pulp
- Enterococcus faecalis* 111
- eosinophilic granuloma 62
- Epiphany 173, 199–200
- epithelial cell clusters 31–32
- epithelial rests of Malassez 43, 43
- erosion 18
- ethylenediamine tetraacetic acid (EDTA) 102, 107, 232
- eugenol 86, 167, 215
  - adverse reactions to 86, 226, 227
  - emergency treatment 141, 142
  - see also* zinc oxide–eugenol cement; zinc oxide–eugenol paste; zinc oxide–eugenol sealers
- external inflammatory resorption 130–131, 133, 152–155, 153, 154

## F

- facial swelling 69, 69, 72
- fibroblasts 6, 31
- fibrocytes 6
- fibroma, odontogenic 59, 61
- files 159–160, 159, 160
  - see also* K-type instruments
- filling materials
  - adhesive filling materials 87
  - prognostic significance 248
  - pulpal irritation 21
  - root canal filling materials 168–176
    - gutta-percha 168–169
    - materials with assumed therapeutic effect 173–175
    - resin-based material 171
    - retrograde filling materials 134, 137, 175–176

sealers 171–173  
 silver points 169–171, 169, 170  
 temporary fillings 167  
*see also* restoration; *specific materials*  
 film holder 79, 80  
 finger pluggers 163, 164  
 finger spreaders 163  
 fistula 45, 47, 50, 51, 53  
   apical periodontitis 81, 82, 135–136  
   bacteriological sampling 117–118, 118  
   endo-perio lesion 45–46, 46  
   extraoral 52  
   furcation lesion 126  
   palatal 51, 111  
   persisting 129, 129, 232–233, 234  
 flap design 133–134, 134  
 fluorosis, tooth discoloration and 236, 236  
   bleaching 240  
 foramina 55–56  
   apical 97, 97  
   mental 56, 56  
 foreign body granuloma 42  
 formaldehyde-containing filling materials 173  
   toxicity 174, 174, 226, 226  
 formalin cytotoxicity 41  
 formocresol 109, 109  
 furcation lesions 44, 126, 127, 127  
   perforation 130, 216, 217  
*Fusobacterium nucleatum* 36, 41

## G

Gates-Glidden bur 204  
 giant cell granuloma 59–61  
 gingival recession 18  
 gingival scarring, following surgical treatment 133, 134  
 gingivectomy 182  
 glass ionomer cements 21, 24, 88  
 globulomaxillary cyst 57, 58  
 glycosaminoglycan 7  
 gold fillings 21, 22  
 granuloma  
   eosinophilic 62  
   foreign body 42  
   giant cell 59–61  
   infective 42  
   periapical 41, 42–43, 42, 43  
     differential diagnosis 54–55  
     radiographic appearance 54–55, 55  
 Grossman's sealer 171, 171  
 gutta-percha 168  
   fistula investigation 50, 51, 52  
   guns 163  
   root canal obturation 168–169, 190–199  
     accessory points 168, 168, 169  
     dipping technique 190–191, 191, 192  
     following apical perforations 218  
     injection-molded gutta-percha technique 193–194, 193  
     lateral condensation technique 194–195, 194  
     overfilling 227, 227, 228

  removal of 232, 246  
   standardized endodontic technique 195–197, 195, 196, 197  
   standardized points 168, 168, 169, 169  
   thermomechanical condensation techniques 194  
   two-step techniques 197–199, 198, 199  
   warm gutta-percha technique 191–193, 192  
   root canal sealers 172

## H

health, as prognostic factor 247  
 heat carriers 191  
 heat test 77  
 Hedstrom files 137, 159, 159, 160  
   standardization 160  
 hemangioma 61  
 herpes zoster neuritis 72–73  
 Hertwig root sheath 29, 31  
 histiocytosis X 62  
 history taking 76  
 hydrodynamic theory of dental hypersensitivity 66  
 hydrogen peroxide 107, 239  
 hydroxyapatite crystals 16–17, 18  
 hypersensitivity *see* dental hypersensitivity  
 hypoplasia 236, 240

## I

ibuprofen 145  
 immature nonvital teeth, treatment of 120–123  
   apexification 120–121, 120, 121, 122  
   prognosis 121–123  
 impression methods 85–86  
 incisive canal 55  
   cyst 57  
 incisors 2  
   mandibular 209–210, 209  
   maxillary central 203–204, 203  
   maxillary lateral 204–205, 204  
 incomplete analgesia 215  
 incomplete fracture 79  
 infarct 26  
 infection  
   cysts 70  
   nonvital teeth 104  
   prognostic significance 248  
   retreatment and 232–233  
   root canal 33–36, 34, 35, 104  
     disinfection 40, 108–112, 113–114  
     portal of entry 36  
   root resorption and 147–148, 148  
   salivary glands 70  
   superinfections 233  
   *see also* apical periodontitis; bacteria  
 infraocclusion 156  
 injection-molded gutta-percha technique 193–194, 193  
 instruments 158–165  
   fracture of 130, 223–225

instruments, fracture of fragment in root canal 130,  
221, 223–225, 224, 225  
  prognostic significance 248–249  
  root canal instruments 158–163  
    obturation 163, 164  
    surgical instruments 164–165, 165, 166  
interferon-gamma 43  
interleukin-1 43  
internal resorption 147, 148, 149–150, 149  
intra-ligament anesthesia 78–79  
intracoronar restorations 242–244  
intrapulpal injection 215  
intratubular dentin 4, 5  
iodine  
  allergy 49  
  root canal disinfection 108  
IRM-cement 167, 176, 176  
iron, tooth discoloration and 237  
irradiation, pulpal damage 22  
irrigants 105–107  
irritation  
  cumulative effect of irritants 24  
  local tissue irritation 226, 226  
  pulpal 9, 10  
    *see also* pulpitis  
ischemic necrosis, pulp 10, 20, 25–26, 184

## J

jaws  
  cysts of 57–58, 70  
  infection 70  
  tumors of 58–62

## K

K-type instruments 159–160, 159, 183–184, 185  
  K-files 137, 159, 159, 160, 183, 186  
    master apical file 185  
  K-reamer 159, 159  
  standardization 160–161, 161  
Kloroperka N-O 172, 191

## L

lamina dura 31  
lamina limitans 3, 4, 5  
laser Doppler flowmeter 78, 78  
lateral canals 45, 54, 101  
lateral condensation technique 194–195, 194  
lateral periodontitis 32, 44, 45, 203  
lentulo spirals 163, 164  
leukemia 25, 25, 61  
leukotoxin 41  
lidocaine 215  
  intrapulpal injection 215  
lipopolysaccharide 42  
liquefaction necrosis, pulp 25, 184  
local tissue reactions 226, 226  
long cone paralleling technique 79, 80, 180

luxated teeth, pulpal necrosis and 20  
lymphatic vessels, pulp 7, 11  
lymphocytes  
  in apical periodontitis 42, 43, 52  
  in pulpitis 12–13  
lymphoma, malignant 61–62  
lymphotoxin 43

## M

macrophages  
  in apical periodontitis 42, 43, 52  
  in periodontium 31  
  in pulpitis 12, 13  
magnesium oxide 90  
malignant tumors 25  
  lymphoma 61–62  
mandibular nerve paresthesia 226, 226  
marginal leakage 21–22, 87–88, 175, 175  
  tooth discoloration and 238  
mast cells 31  
master apical file 185  
maxillary sinusitis 70  
maxillofacial surgery, pulpal damage 24  
medicaments  
  adverse reactions to 226–227  
  allergic reactions 227  
  local tissue irritation 226, 226  
  neurotoxic reactions 226, 226  
  *see also specific medicaments*  
mental foramen 56, 56  
mesenchymal cells 6  
metastases 25  
methyl methacrylate resin filling 22  
metronidazole 118, 232  
microburs 164  
microhandpiece 164, 165  
migraine 74  
mineral trioxide aggregate (MTA) 123, 176  
mineralization, tooth discoloration and 236  
  bleaching 236, 241  
mirrors 164–165, 166  
molars  
  mandibular 212–214  
    distal root 213  
    first molar 212  
    mesial root 213  
    second molar 213  
    third molar 214  
  maxillary 207–209  
    distobuccal root 208, 209  
    first molar 207, 208  
    mesiobuccal root 207, 209  
    palatal root 208, 209  
    second molar 207  
    third molar 208, 209  
monochlorophenol 109  
MTAD 107

## N

- neuralgia 73
  - neuritis 72–73
  - neuropathic pain 73
  - neurotoxic reactions 226, 226
  - neutrophilic leukocytes
    - in apical periodontitis 42, 49
    - in pulpitis 12–13, 13
  - nickel-titanium instruments
    - engine-driven 161–163, 162, 187–188
    - flexible 161–162, 188
    - K-type instruments 159, 160
    - rotary instruments 161–163, 162
  - nonvital teeth 104
    - apical periodontitis refractory to endodontic treatment 104, 116–119, 116, 117
    - prognosis 119
    - surgical treatment 39, 118–119, 119
    - systemic antibiotic treatment 117–118
  - bleaching 238–240
  - conservative treatment 105–116
    - chemomechanical instrumentation 105–107, 113, 113, 143
    - clinical considerations 112–114
    - disinfection of root canal 108–112, 113–114
    - follow-up 115–116
    - iatrogenic flare-ups 107
    - indications 105
    - obturation of root canal 112
    - prognosis 114–116
    - prophylactic antibiotic treatment 114
    - retreatment 116, 116, 129–130, 130
  - discoloration 237–238
  - emergency treatment 143–145
  - endo-perio lesions 125–127, 126
  - immature nonvital teeth 120–123
    - apexification 120–121, 120, 121, 122
    - prognosis 121–123
  - pulp extirpation 184
  - root-fractured teeth 123–124, 123, 124, 125
  - see also* surgical-endodontic treatment
- nutritional deficiencies 24

## O

- occlusion
  - symptomatic apical periodontitis 144
  - traumatic 143, 144
- odontoblast-receptor theory of dental hypersensitivity 66
- odontoblastic layer 5, 5, 6
  - age changes 8, 8
- odontoblasts 5–6
  - in dental hypersensitivity 66
  - irradiation effects 22
- odontogenic fibroma 59, 61
- operating microscope 178, 178
- optical tests 79, 79
- oral surgery, pulpal damage 24
- orthodontic band 182
- orthodontic treatment

- pulpal damage 22–24
  - root resorption 24
- osteitis deformans 62
- osteoblasts 31
- osteoclasts, mechanical stimulation 146
- osteosclerosis 46, 48
  - periradicular 58
- overfilling, root canal 48–49, 227, 227, 228
- oxidizing agents 107
- oxidoreductase activity, pulp cells 27

## P

- Paget's disease 62, 62
- pain 65, 141
  - acute 73
  - analgesics 144–145
  - chronic neurogenic 73–74
    - psychogenic component 73
  - cyst infection 70
  - following pulpctomy 101
  - neuropathic 73
  - periapical 68–69
  - periodontal diseases 69–70
  - postoperative 101, 138
  - pulpal 65–68
    - dental hypersensitivity 65–66
    - features of 68
    - symptomatic pulpitis 66–68
  - referred 74
  - salivary gland swelling 70
  - sinusitis 70–71
  - temporomandibular joint dysfunction syndrome 71–72
  - tentative diagnosis 79–80
  - trigeminal neuritis 72–73
  - see also* emergency treatment
- palatal abscess 49, 115
- palatal fistula 51, 111
- palpation 76–77
- parathyroid extract 25
- paresthesia
  - mandibular nerve 226, 226
  - overfilling and 227
- parotid gland infection 72
- penicillin 118, 118, 232
- Peptostreptococcus* 69
- percussion test 76–77
- perforation defects 134
- periapical abscess 49–50
- periapical cyst 43–44, 44, 45
  - differential diagnosis 54–55
  - radiographic appearance 54–55, 55
- periapical granuloma 41, 42–43, 42, 43
  - differential diagnosis 54–55
  - radiographic appearance 54–55, 55
- periapical lesion 48
  - bacterial sampling 37, 118
  - infection 36–40, 37, 38
  - surgical treatment 118–119, 139
  - see also* apical periodontitis
- pericoronitis 70



- periodontal abscess 56, 69–70, 70, 72  
 periodontal cyst 57, 58  
 periodontal disease 56–57, 57  
   dentin exposure 18–19  
   pain and 69–70  
   pulpitis and 19, 20  
 periodontal ligament 6, 31  
   necrosis 148, 150, 155, 226  
   vascular supply 32  
   widening of periodontal ligament space 54, 55  
 periodontal pocket 45, 46  
 periodontitis  
   interradicular 46, 108  
   lateral 32, 44, 45, 203  
   see also apical periodontitis  
 periodontium 31  
   age changes 32  
   cells 31–32  
   composition 31  
   fibers 32  
   ground substance 32  
   innervation 32  
   morphology 31  
   repair 52–54, 54  
   vascular supply 32  
   see also apical periodontitis  
 periradicular osteosclerosis 58  
 phosphoric acid etching 239, 242  
 pink spot 151, 151  
 plaque 18, 18, 20, 24  
 plasma cells, in pulpitis 11–12  
 plexus of Raschkow 8  
 pluggers 163, 164, 166  
   finger pluggers 163, 164  
 polyisoprene 168  
*Porphyromonas* 41, 48, 69  
   *endodontalis* 34  
   *gingivalis* 41, 67  
 posts 244–246  
   cementation of root canal posts 246  
   perforations 130, 221, 222  
   preparation of root canal post space 246  
   removal 130, 131  
   tooth strength and 242  
 potassium nitrate 143  
 precementum 146  
   removal in external inflammatory root resorption 153  
 predentin 2  
   mineralization 146  
 premolars  
   mandibular 211–212, 211  
     first 211, 211  
     second 212, 212  
   maxillary 205–207  
     first 205–206, 205  
     second 206–207, 206  
 pressure resorption 146–147, 147  
*Prevotella* 41, 48, 69  
 prognosis 247–249  
   nonvital teeth 114–116, 119  
   immature nonvital teeth 121–123  
   prognostic factors 247–249  
     age 247  
     clinical complications 248  
     coronal restoration 248  
     filling materials 248  
     health 247  
     instrument fragment in root canal 248–249  
     preoperative diagnosis 247  
     root canal instrumentation 247–248  
     root canal microbiological status 248  
     root canal morphology 247  
     technical standard of root filling 248  
   pulp capping 91  
   pulpectomy 102  
   surgical–endodontic treatment 138–139  
   see also treatment failure  
 prostaglandin E2 43  
 provocation tests 78  
*Pseudomonas aeruginosa* 119, 234  
 pulp 5–9  
   abscess 10, 12, 14, 14  
   age changes 8–9, 8  
   amputation see pulpotomy  
   arteriosclerotic changes 8  
   bleeding in 84, 85  
   calcifications 8–9, 9  
   cells 5–7  
   coronal 5, 8  
   exposure 15, 17, 17, 21  
     emergency treatment 141–142  
     pulp capping and 88–93, 93, 94  
   extirpation 97–99, 183–184  
   fibers 7  
   fibrosis 8, 18, 19  
   ground substance 7  
   healthy 81, 82  
   inflammation 9–15, 10–17, 66–67  
     capping and 88–89, 93, 93  
     see also pulpitis  
   innervation 8  
   malignant tumors 25  
   metastases 25  
   mini-amputation 91  
   morphology 5  
   necrosis 11, 13–14, 15, 25–26, 82, 104  
     apical periodontitis and 33  
     calcium hydroxide and 90, 93  
     discoloration and 237, 237  
     internal root resorption and 149–150  
     ischemic necrosis 10, 20, 25–26, 184  
     liquefaction necrosis 25, 184  
     pulpectomy and 97  
     see also nonvital teeth  
   polyp 14–15, 15  
   reaction patterns 9–29  
   removal see pulpectomy  
   repair 12, 20, 26–29, 26, 27  
     local repair 26–27  
     revascularization 27–29, 28, 29  
   root 5, 8  
   stones 18, 18  
   subodontoblastic region 5, 6  
   tissue pressure 9–11  
   vascular supply 7, 7



- recanalization 27
- revascularization 27–29, 28, 29
- pulp capping 88–93, 89, 90, 92
  - failure 90, 91, 91
  - follow-up examination 91–93
  - indications 88–89
  - inflamed pulp 93, 93
  - prognosis 91
  - pulpal seal 90–91
  - tissue reactions 89–90
  - wound dressing 89
- pulpal pain *see* pain
- pulpectomy 96–102, 98, 99, 184, 185
  - clinical considerations 101–102
  - emergency treatment 142
  - follow-up examination 102
  - indications 97
  - prognosis 102
  - treatment principles 97–101
    - apical dentin chips plug 99–100, 100, 101
    - calcium hydroxide-induced apical bridge 100
    - postoperative pain 101
    - pulp extirpation and instrumentation 97–99
    - root canal obturation 99, 99, 100–101, 100
- pulpitis 9–29, 82
  - acute serous 67
  - acute suppurative 67–68
  - anesthesia test 78–79
  - apical periodontitis and 32–33, 33
  - asymptomatic 66, 81, 82
  - etiology 15–25
    - cumulative effect of irritants 24
    - dental caries 15–18, 16
    - dentin exposed to oral cavity 18–19, 19
    - iatrogenic factors 20–24
    - systemic influences 24–25
    - traumatic injuries 19–20, 21
  - pathogenesis 11–15
  - proliferating 14
  - retrograde 19, 20, 45, 46
  - symptomatic 66–68, 81, 82, 95
    - emergency treatment 141–142
  - thermal stimulation 78
- pulpotomy 94–96, 94, 95
  - clinical considerations 96
  - emergency treatment 141–142
  - follow-up examination 96
  - indications 94–95
  - prognosis 96
  - tissue reactions 96
  - wound dressing 96
- pus
  - periodontal abscess 49–50, 49, 50
  - pulpal abscess 12, 14

## Q

- quaternary ammonium compounds 106

## R

- radicular cyst 43
- radiographic examination 79, 80, 180, 180
  - root canal length determination 113, 183, 184
- rasps 158
- reamers 159
- recanalization 27
- referred pain 74
- regenerative endodontics 201
- replacement resorption 148, 148, 150, 155–156, 155, 156
- replantation 137–138, 138
- Resilon 171, 173, 199–200
- resin chloroform 172–173
- resins 167
  - restorations 87, 87, 88
    - tooth discoloration and 88
  - root canal filling 171, 199–200
  - root canal sealers 172–173
    - natural resins 172–173
    - synthetic resins 173
  - tooth strengthening 242–243, 242, 243
- resorption *see* bone; root resorption
- resorption lacunae 133, 134, 149, 149, 152, 153, 198
- restoration 242–246
  - bleached teeth 240
  - marginal leakage 21–22, 87–88, 175, 175
  - prognostic significance 248
  - pulpal irritation 21
  - resin restorations 87, 87, 88
  - retention of prosthetic appliances 244–246
    - cementation of root canal posts 246
    - preparation of root canal post space 246
  - strengthening endodontically treated teeth 242–244
    - coronal restorations 244
    - intracoronal restorations 242–244, 242, 243, 244
  - tooth discoloration and 88, 237, 238
  - see also* filling materials; pulp capping
- retreatment 230–233
  - apical periodontitis 116, 116, 118, 230–231, 231
  - indications 230–232
    - root filled teeth with apical periodontitis 230–231, 231
    - root filled teeth with normal apical periodontium 231–232, 231
  - surgical retreatment 129–130, 129, 233
  - treatment-resistant cases 232–233, 233, 234
- retrograde fillings 134, 137, 175, 176
  - materials 134, 137, 175–176
- retrotips 137, 164, 165
- revascularization 27–29, 28, 29
- Rispi file 158, 158
- root canal
  - access cavity 179–181
  - accessory 5
  - age changes 4–5
  - bacteriological sampling 37, 117
  - blunderbuss-shaped 198–199, 199
  - calcified 222
  - curved, instrumentation of 188–189, 189

- root canal, disinfection 40, 108–112, 113–114  
   divided 197, 198  
   filling materials 168–176  
     gutta-percha 168–169  
     materials with assumed therapeutic effect 173–175  
     resin-based material 171  
     retrograde filling materials 134, 137, 175–176  
     silver points 169–171, 169, 170  
   infection 33–36, 34, 35, 104, 230, 230  
     external inflammatory root resorption and 147–148, 148  
     portal of entry of bacteria 36  
     prognostic significance 248  
     *see also* apical periodontitis  
   instrument fragment in 130  
     prognostic significance 248–249  
   instrumentation 178–179, 183–189  
     apical box preparation 185–187, 186  
     chemomechanical instrumentation 105–107, 113, 113, 143, 184  
     crown down preparation 187–188, 188  
     curved root canals 188–189, 189  
     engine-driven instruments 161–163, 187–188  
     hand instruments 158–161  
     nonvital teeth 105–107, 113, 113, 143  
     prognostic significance 247–248  
     retrograde 137  
     step-back preparation 184–185, 185, 186, 194  
   internal root resorption 147, 148, 149–150, 149  
   irrigants 105–107  
   lateral 45, 54, 101  
   length determination 113, 183, 184  
   location 180–181  
   morphology *see* dental morphology  
   obliteration 127–128, 128, 222, 223  
   obturation 99, 99, 100–101, 100  
     biological obturation techniques 201  
     instruments 163  
     retrograde root filling 134, 137, 175  
     two-step techniques 197–199, 198, 199  
     with adhesive technique 199–200  
     with gutta-percha points 190–199  
     with pastes 200  
     with silver points 189–190, 190  
   overfilling 48–49, 227, 227, 228  
   perforation *see* root perforation  
   pluggers 163, 164  
   posts 244–246  
     cementation 246  
     post space preparation 246  
     removal 130, 131  
   pulpectomy and 97–99  
     apical dentin chips plug 99–100, 100, 101  
   sealers 40, 171–173  
     based on dentin adhesive technology 173  
     based on gutta-percha 172  
     based on natural resins 172–173  
     based on synthetic resins 173  
     based on zinc oxide and eugenol 171–172, 171, 172, 173  
     containing calcium hydroxide 174–175, 174  
     tissue irritation 40, 171, 171, 173  
     spreaders 163, 164  
     weeping 226  
     with incomplete root formation 198–199  
   root fracture 110, 123  
     endodontic treatment 123–124, 124, 125  
     pulpitis and 20  
     surgical–endodontic treatment 131–132  
   root perforations 130  
     apical perforations 217–220, 218, 220, 221  
     from the pulp chamber 216–217, 216, 217  
     lateral perforations 217, 219, 220–221  
     mesiocervical 206  
     post perforations 130, 221, 222  
     strip perforation 220, 221  
   root resorption 146–156  
     ameloblastoma and 58–59  
     cervical resorption 130, 133, 147, 148, 150–151, 150, 151, 152  
     treatment 151, 152  
     endosteal resorption 148  
     external inflammatory resorption 130–131, 133, 147, 148, 152–155, 153, 154  
     following orthodontic treatment 24  
     following pulpectomy 98  
     giant cell granuloma and 61  
     infection and 147–148, 148  
     internal resorption 147, 148, 149–150, 149  
     invasive resorption 151  
     overfilling and 227  
     periapical granuloma and 42–43  
     pressure resorption 146–147, 147  
     replacement resorption 148, 148, 150, 155–156, 155, 156  
     resorption lacunae 133, 134, 149, 149, 152, 153, 198  
     surgical–endodontic treatment 130–131  
     transient resorption 146, 146, 149  
   rubber dam 181–182, 181, 182  
     clamps 181, 181

## S

- salivary gland swelling 70  
 sarcoma 61  
 scalpel blades 164, 165  
 Schwann cells 8  
 Sealapex 174–175, 174  
 secondary dentin *see* dentin  
 sensitivity tests 70, 77–78  
   cold test 77  
   electric sensitivity testing 77–78, 77  
   heat test 77  
   laser Doppler flowmeter 78, 78  
   test cavity preparation 78  
 serrated needle holder 165  
 silicate cement fillings 21, 88  
 silver amalgam 175  
 silver points 169–171, 169, 170  
   corrosion 170, 170, 189  
   root canal obturation 189–190, 190  
 sinusitis 70–71  
 sodium hypochlorite 102, 106, 106, 107, 107, 111–112  
   adverse reactions to 226, 226

sodium perborate 239  
 Sonic Shaper 158, 158  
 spiral filler 163, 164  
 spot ankylosis 156  
 spreaders 163, 164  
   finger spreader 163  
 stainless steel instruments 188  
 standardized endodontic technique 195–197, 195, 196, 197  
*Staphylococcus aureus* 176  
 step-back preparation 184–185, 185, 186, 194  
 strengthening endodontically treated teeth 242–244  
   coronal restorations 244  
   intracoronar restorations 242–244, 242, 243, 244  
 strip perforation 220, 221  
 subluxated teeth, pulpal necrosis and 20  
 sulfur granules 37  
 Super EBA 176  
 superinfections 233  
 surgical instruments 164–165  
 surgical–endodontic treatment 127–139  
   aftercare 138  
   apicoectomy 128, 129, 137, 176  
   asepsis 132–133  
   flap design 133–134, 134  
   follow-up examination 138  
   indications 127–132  
     conventional treatment ineffective 128–129  
     external root resorption 130–131  
     instrument fragment in the root canal 130  
     post in the root canal 130  
     primary surgical treatment 127–128  
     retreatment 129–130  
     root fracture 131–132  
     root perforations 130  
   intentional replantation 137–138, 138  
   microbiological and microscopic examination 134  
   perforation defects 134  
   prognosis 138–139  
   resorption lacunae 133, 134  
   surgical access 133–134  
   surgical retreatment 129–130, 129, 233  
 symptomatic apical periodontitis *see* apical periodontitis  
 symptomatic pulpitis *see* pulpitis

## T

T lymphocytes  
   in apical periodontitis 42, 43  
   in pulp 12  
 temporary filling materials 167  
 temporomandibular joint dysfunction syndrome 71–72  
 tentative diagnosis 79–80  
 test cavity preparation 78  
 tetracycline, tooth discoloration and 236–237  
   bleaching 240–241  
 thermal stimulation 78

thermomechanical condensation technique 194  
 tissue retractors 164, 165  
 tooth-colored materials, pulpal irritation 21–22, 23  
 toothache *see* pain  
 traumatic occlusion 143, 144  
 treatment failure 230  
   pulp capping 90, 91, 91  
   *see also* endodontic complications; prognosis;  
     retreatment  
 trigeminal neuralgia 73  
 trigeminal neuritis 72–73  
 tumor necrosis factor 43  
 tumors  
   of the jaws 58–62  
   of the pulp 25

## U

ultrasonically energized equipment 130, 131, 137, 164, 224  
 ultraspeed equipment 85  
   water spray requirement 84

## V

vertical fracture 57, 57, 228–229, 228  
 Vincent's infection 70  
 vitality testing *see* sensitivity tests  
 vitamin deficiencies 24

## W

walking bleach method 239  
 weeping canal 226  
 whitlockite crystals 17, 17, 18  
 woodpecker method 187  
 wound dressing  
   pulp capping 89  
   pulpotomy 96

## Z

zinc oxide–eugenol cement 80, 86  
   discoloration 237–238  
   emergency treatment 141  
   retrograde fillings 134, 176  
   use in bleaching 239  
   use in pulpectomy 102  
   use in pulpotomy 96  
 zinc oxide–eugenol paste 86, 86, 167  
   pulp capping 89, 91, 93  
 zinc oxide–eugenol sealers 167, 171–172, 171, 173, 192  
   solubility 171–172  
   toxicity 171, 172  
 zinc oxiphosphate cement 182