



american association of
endodontists

Glossary of Endodontic Terms

Tenth Edition

180 N. Stetson Ave.
Suite 1500
Chicago, IL 60601
aae.org

Preface

The Tenth Edition of the AAE Glossary of Endodontic Terms was updated in 2020 by the 2019-2020 AAE Special Committee to Revise the Glossary. The latest revisions include contemporary definitions based upon the current science and removes terms no longer in use.

The prior edition of the Glossary was developed in 2012 by an AAE Special Committee of full-time educators and approved by the AAE Board of Directors. In determining the terms to add, delete or revise in this edition, the committee consulted a number of sources including (but not limited to) *Journal of Endodontics* articles, *Pathways of the Pulp* (10th Edition), *Stedman's Medical Dictionary* and the National Center for Biotechnology Information's PubMed.gov. The Committee also solicited suggestions from the entire AAE membership.

The Glossary was revised in 2015 to reflect changes in terms relating to tooth fractures that were developed by a Special Committee on Cracked Tooth Initiative and approved by the AAE Board. The Special Committee was charged with scanning non-endodontic and endodontic literature and developing, editing, or confirming diagnostic nomenclature to describe tooth fractures and other wear effects to teeth that result from chronic (non-acute) trauma. The terms impacted include abfraction, cracked tooth, fracture (and subdefinitions within). The term crown infraction was removed.

In 2018, the AAE Board of Directors approved additional revisions presented by the AAE *Special Committee to Develop Position Statement on Maxillary Sinusitis of Endodontic Etiology* to define maxillary sinusitis of dental origin, maxillary sinusitis of endodontic origin, odontogenic sinusitis, odontogenic maxillary sinusitis, periapical mucositis, and periapical osteoperiostitis.

Special thanks to the AAE members who participated in all the committees that have developed and maintained the Glossary for the benefit of endodontics. While the *Glossary* continues to be reviewed in its entirety on a periodic basis, the AAE welcomes suggestions for revisions, additions and deletions on an ongoing basis:

Special Committee to Revise the Glossary (2012)

Paul D. Eleazer, D.D.S., M.S., Chair
Gerald N. Glickman, D.D.S., M.S., J.D.
Scott B. McClanahan, D.D.S., M.S.
Terry D. Webb, D.D.S., M.S.
Bruce C. Justman, D.D.S., Board Liaison

Special Committee on Cracked Tooth Initiative (2015)

Louis H. Berman, D.D.S., Chair
Scott L. Doyle, D.D.S., M.S., M.A.
Gary G. Goodell, D.D.S., M.S., M.A.
Keith V. Krell, D.D.S., M.S., M.A.
Mark A. Odom, D.D.S., Board Liaison

Special Committee to Develop Position Statement on Maxillary Sinusitis of Endodontic Etiology (2018)

Roderick W. Tataryn, D.D.S., M.S., Chair
Anthony L. Horalek, D.D.S., M.S.

Michael J. Lewis, D.M.D.
Chase G. Thompson, D.M.D.
Al Pokorny, M.D., Consultant
Bruce Y. Cha, D.M.D., Board Liaison

Special Committee to Revise the Glossary (2020)

Scott B. McClanahan, D.D.S., M.S., Chair
Joseph T. Crepps III, D.D.S.
Maria C. Maranga, D.D.S.
Dentonio E. Worrell, D.D.S.
Ali Behnia, D.D.S., M.S., Board Liaison

NOTES

Main entries appear in boldface type and are set flush with the left-hand margin.

Subentries appear in boldface type indented slightly from the main entry.

(Synonyms) appear in parenthesis following the main or subentry to which they apply.

A

aberrant — A deviation from the normal or usual course, form or location.

abfraction — A V-shaped loss of hard tooth structure caused by biomechanical loading forces such as from flexure and/or chemical fatigue degradation of enamel and/or dentin at some location distant from the actual point of loading.

ablation — The removal, detachment or eradication of a structure; commonly used in laser treatment of dental tissue or nerve resection.

abrasion — The pathologic wearing away of a substance or structure (such as a tooth), through some unusual or abnormal mechanical process.

abscess — A localized collection of pus within a tissue or a confined space.

acute apical abscess — An inflammatory reaction to pulpal infection and necrosis characterized by rapid onset, spontaneous pain, tenderness of the tooth to pressure, pus formation and swelling of associated tissues.

chronic apical abscess — An inflammatory reaction to pulpal infection and necrosis characterized by gradual onset, little or no discomfort and the intermittent discharge of pus through an associated sinus tract.

microscopic abscess — Incipient collection of pus, typically so small as to be visualized only at the light microscope level.

periodontal abscess — An inflammatory reaction originating in the periodontium; usually characterized by rapid onset, spontaneous pain, tenderness of the tooth to pressure, pus formation and swelling; frequently caused by foreign body entrapment and often associated with a tooth with a vital pulp.

pulp abscess — A localized collection of clinically visible pus within the pulp of the tooth; initiated by microorganisms and/or its byproducts.

absorption — The uptake or removal of substances into or through tissues, such as the biological removal of extruded sealer.

access cavity (access preparation, endodontic access, root canal access) — The opening prepared in a tooth to gain entrance to the root canal system for the purpose of cleaning, shaping and obturating.

access, surgical — The opening prepared through soft tissue and bone surrounding a tooth to expose the root and periradicular tissues.

accessory canal — *See canal, pulp-accessory canal.*

accessory foramen — *See foramen-accessory foramen.*

acoustic streaming (acoustic microstreaming) — The circulation of fluid and hydrodynamic shear forces in the vicinity of a small vibrating object such as an ultrasonically activated endodontic file.

actinomycosis — Clinical infection caused by a species of the genus *Actinomyces*; abscess and multiple or persistent sinus tract formations are common and, in the cervicofacial form of the disease, usually drain through the skin surface.

aerodontalgia — *See barodontalgia.*

Akinosi-Varizani (closed mouth mandibular nerve block) – indications are the same for IANB or Gow-Gates but especially if intraoral landmarks for IANB are challenging or the patient has trismus. The patient's mouth is closed, and the objective is to place the needle between the medial pterygoid muscle and the ramus.

allodynia — Pain resulting from a non-noxious stimulus to normal skin or mucosa.

allograft — *See graft—allograft.*

alloplast — *See graft—alloplast.*

anachoresis — Active chemotaxis of bloodborne bacteria to area of inflammation.

analgesia — Absence of sensibility to pain, designating particularly the relief of pain without loss of consciousness.

analgesic — Pharmacological agent used to reduce sensibility to pain.

nonsteroidal anti-inflammatory drugs (NSAIDs) — Pharmacological agents that inhibit the cyclooxygenase pathways.

opioid agonist analgesics — Pharmacologic agents that bind to opioid receptors thereby mimicking the action of morphine; opioid agonists induce analgesia, sedation, euphoria, dysphoria, emesis, constipation, respiratory depression and addiction.

opioid agonist/antagonist analgesics — Pharmacologic agents that include a combination of agonist effects, as well as an antagonist effect similar to naloxone; opioid agonist/antagonist analgesics have a similar effect as the agonists but do not induce respiratory depression and addiction; they have potential to induce drug withdrawal syndrome in opioid-addicted individuals.

anaphylactic shock — A severe, sometimes fatal, immediate allergic reaction, usually occurring seconds to minutes after exposure to an antigen and mediated via histamine.

anaphylaxis — Immediate hypersensitivity response to antigenic challenge, mediated by IgE and mast cell histamine release, typically life-threatening.

anastomosis—. *See isthmus.*

anatomic apex — *See apex—**anatomic apex**.*

ANSI (American National Standards Institute) — The national clearing organization for standards; formerly called the American Standards Association. The American National Standards Committee MD 156 for Dental Materials and Devices is one arm of the ANSI.

anesthesia — The loss of feeling or sensation as a result of an anesthetic agent to permit diagnostic and treatment procedures.

anesthetic test — A diagnostic procedure in which a tooth suspected of being the source of referred pain is anesthetized with a local anesthetic. If the pain is alleviated, the suspected tooth may be the source of the pain.

anodyne — A medicine that relieves pain.

anomaly — An aberration or deviation from normal anatomy, development or function.

antibiotics — Soluble substances derived from a mold or bacteria that inhibit the growth of other microorganisms.

cephalosporins — Broad spectrum beta-lactam antibiotics chemically related to and having the same mechanism of action as the penicillins.

clindamycin — A lincosamide antibiotic that inhibits protein synthesis. It may be bacteriostatic or bactericidal depending on the organism and drug concentration.

macrolides — Narrow-spectrum antibiotics with a lactone ring that inhibit protein synthesis. Includes erythromycin, axithromycin and clarithromycin.

metronidazole — An antibiotic with bactericidal activity (by inhibiting protein synthesis) primarily against obligate anaerobic bacteria.

penicillins — Antimicrobial agents in the beta-lactam group; inhibits cell-wall biosynthesis; drug of choice for most endodontic infections in the non-penicillin allergic patient.

quinolones — A class of synthetic, broad spectrum antibacterial agents that include ciprofloxacin that exhibit bactericidal action by inhibiting DNA replication.

tetracyclines — Broad-spectrum antibiotics that inhibit protein synthesis.

antibody — Serum proteins that are produced following interaction with an antigen; they bind specifically to the antigen that produced their formation, thereby causing or facilitating the neutralization of the antigen.

anticurvature filing (reverse filing) — Intentional alteration of canal shape by the removal of structure from thicker regions of the root canal wall to prevent a perforation (strip) into the furcation adjacent to a curved canal.

antigen — Any substance recognized by the immune system that induces antibody formation.

antinode — Point of maximum oscillation or displacement amplitude of object vibrating in a sinusoidal pattern, such as an ultrasonically-activated endodontic file.

apex — The tip or end of the root.

anatomic apex — The tip or end of the root as determined morphologically.

radiographic apex — The tip or end of the root as determined radiographically; its location can vary from the anatomic apex due to root morphology and distortion of the radiographic image.

apex locator — An electronic instrument used to assist in determining the root canal working length or perforation; operates on the principles of resistance, frequency or impedance.

apexification — A method to induce a calcified barrier in a root with an open apex or the continued apical development of an incompletely formed root in teeth with necrotic pulps.

apexogenesis — A vital pulp therapy procedure performed to encourage continued physiological development and formation of the root end; frequently used to describe vital pulp therapy performed to encourage the continuation of this process.

apical barrier — A blockage of the apical foramen; may be an induced hard tissue or artificial materials, such as clean dentin chips, Ca(OH)₂, collagen, mineral trioxide aggregate or other bioceramic material.

apical barrier technique — Placement of a matrix in the apical region to prevent extrusion of endodontic filling materials; typically refers to teeth with open apices.

apical clearing — A technique that involves enlargement of the apical preparation followed by dry reaming to remove dentin debris and to produce a more defined apical stop.

apical constriction (minor apical diameter, minor diameter) — The apical portion of the root canal having the narrowest diameter; position may vary but is usually 0.5–1.0 mm short of the center of the apical foramen.

apical curettage — *See curettage, periradicular.*

apical cyst — *See cyst–periradicular cyst.*

apical delta — A pulp canal morphology in which the main canal divides into multiple accessory canals at or near the apex.

apical foramen — *See foramen–apical foramen.*

apical gauging — Estimated measurement or confirmation of the terminal diameter or shape of a canal after initial crown-down shaping.

apical patency — A technique where the apical portion of the canal is maintained free of debris by recapitulation with a small file through the apical foramen.

apical scar — Dense collagenous connective tissue in the bone at or near the apex of a tooth with a distinctive radiolucent presentation; a form of repair usually associated with a root that has been treated and typically having perforation of both the facial and lingual osseous cortices.

apical seat — An incomplete barrier at the apical end of the root canal preparation.

apical stop — The matrix of dentin or other materials at the apical end of a root canal preparation that prevents further advancement or progression of both endodontic instruments and obturation materials.

apicoectomy — *See root-end resection*

apoptosis — Programmed cell death via fragmentation into membrane-enclosed particles that can be phagocytized by other cells.

Archaea — An ancient bacteria-like division of life that use primitive metabolism. They are so different as to be classified separately from bacteria. Current divisions of life are Archaea, Prokaryotes and Eukaryotes (True nuclei).

argyria — A bluish-gray discoloration of tissue from prolonged exposure to silver; discoloration usually occurs from over-extended silver points, silver-containing sealer or amalgam in tissues.

aseptic — Preventing infection; free from pathogenic microorganisms.

astringent — An agent that causes contraction of tissues, arrests secretion or controls bleeding.

attachment level, clinical — The distance from the cemento-enamel junction to the tip of the periodontal probe during periodontal diagnostic probing.

attrition — The physiologic wearing away of a substance or structure, such as a tooth, in the course of normal use or parafunctional habits.

atypical facial pain — A syndrome characterized by a long-term continuous aching or throbbing pain that does not follow established neural pathways and a clinical examination that does not reveal an apparent cause. Multiple etiologies have been suggested.

atypical odontalgia (phantom tooth pain) — Pain with all the classic features of pulpalgia, usually following an extraction but not appearing to be of peripheral origin.

austenitic phase — *See martensitic phase*—A crystalline unstressed phase of stainless steel and nickel titanium alloy.

autograft (autogenous graft) — *See graft—autograft (autogenous graft)*.

autotransplantation — The transplantation of teeth from one site to another in the same individual, involving the transfer of embedded, impacted or erupted teeth into extraction sites or into surgically prepared sockets.

avulsion (exarticulation) — The complete separation of a tooth from its alveolus by traumatic injury; most commonly used in reference to dental injuries resulting from acute trauma.

B

backfilling — The injection and/or compaction of gutta-percha into a canal after creation of an apical seal.

bacteremia — The presence of bacteria in the bloodstream that can be transient, intermittent or continuous.

bacteria — Members of a group of single-celled prokaryotic microorganisms; many of these are etiologic in diseases that affect all life forms including humans and other animals.

balanced force technique — A technique of cleaning and shaping the root canal system that allows opposing physical forces to guide each preparation instrument; uses clockwise rotation to engage dentin and counterclockwise rotation to cut dentin.

barodontalgia (aerodontalgia) — Tooth pain caused by an increase or decrease in ambient pressure, usually reported by aircraft personnel and divers.

bicuspidization (premolarization) — A hemisection of a mandibular molar where both sections are retained, and each is restored as a premolar.

bifurcation — The anatomic area where the roots of a two-rooted tooth divide.

biofilm — Aggregate of bacteria held together by a matrix of carbohydrate that adheres to a surface and solution interface.

bioceramic – group of bioactive ceramic materials that are biocompatible by nature with good physical and chemical properties used in endodontics as pulp capping or root end filling materials;

biologic width — Combined width of connective tissue and epithelial attachment superior to adjacent crestal bone.

biomechanical preparation — *See preparation, canal—biomechanical preparation*.

biopsy — The removal of tissue for histologic examination and diagnosis.

aspiration biopsy — Removal of fluid by suction through a needle for the purpose of establishing a diagnosis.

excisional biopsy — Removal of an entire lesion including a margin of contiguous, normal-appearing tissue for microscopic examination and diagnosis.

exfoliative biopsy — Removal of superficial layer of cells by scraping followed by fixation.

incisional biopsy — Removal of selected portion of a lesion for microscopic examination and diagnosis.

Bisphosphonate Related Osteonecrosis of the Jaw (BRONJ) – *see Medication Related Osteonecrosis of the Jaw (MRONJ)*

[Move under “M”]:

Medication Related Osteonecrosis of the Jaw (MRONJ) — Chronic ulceration of mucosa exposing underlying bone with infection, secondary to bisphosphonate or other drug therapy.

bite test — Diagnostic procedure in which a tooth suspected of being cracked is subjected to differential occlusal forces on individual cusps in an attempt to replicate the reported discomfort; usually accomplished by having the patient bite on various plastic, wood or rubber objects.

bleaching — The use of a chemical agent, sometimes in combination with heat, to remove tooth discolorations.

extracoronary bleaching (external bleaching) — The use of a chemical agent on the outside of a tooth to remove discoloration from tooth structures; most frequently used agents are hydrogen peroxide and urea (carbamide) peroxide.

intracoronary bleaching (internal bleaching) — The use of chemical oxidizing agents within the coronal portion of an endodontically treated tooth to remove tooth discoloration; most frequently used agents are sodium perborate and hydrogen peroxide, or sodium perborate and saline.

walking bleach — A form of intracoronary bleaching in which oxidizing agents are sealed into the pulp chamber for a limited period of time, usually a few days to one week.

blunderbuss canal — *See canal, pulp-blunderbuss canal.*

bonding — Procedure of using an adhesive, cementing material or fusible ingredient to combine, unite or strengthen.

bone regeneration — Complex physiologic process of bone formation, which can be seen in continuous remodeling throughout adult life or in healing.

bony crypt — Osseous cavity made or modified in bone during periradicular surgery.

braiding technique — Placement and subsequent wrapping of multiple files around an object in the root canal to aid in its removal.

broach, endodontic — A thin, flexible, fragile, usually tapered and pointed metal hand instrument with sharp projections curving backward and obliquely; primarily used to remove pulp tissue or other easily engaged materials from the canal.

bruxism — An oral habit consisting of rhythmic or spasmodic nonfunctional grinding or clenching of teeth.

buccal object rule — A method for determining the relative location of objects that are superimposed on the traditional radiograph. Rule: When two different radiographs are made of a pair of objects, the image of the buccal object moves, relative to the image of the lingual object, in the opposite direction from which the x-ray beam is directed.

buttressing bone — A marginal linear deposition of bone that may be formed in response to heavy occlusal forces.

C

calcific metamorphosis — A pulpal response to trauma characterized by rapid deposition of hard tissue within the canal space; entire space may appear obliterated radiographically due to extensive deposition, even though some portion of the pulp space remains in histological sections.

calcium hydroxide [Ca(OH)₂] — An odorless, strongly basic, white powder frequently used as an intracanal medicament in nonsurgical endodontic procedures and also secondary to traumatic injuries; preparations appear to encourage calcification; different preparations may be used in pulp capping, pulpotomy, apexogenesis and apexification procedures in the secondary dentition; appears to inhibit inflammatory resorption and demonstrates anti-microbial activity.

calcium sulfate [CaSO₄] (plaster of Paris medical grade) — An absorbable material used in surgery as a barrier or bone graft volume expander in guided tissue regeneration procedures; can be used dry or mixed as a hemostatic material.

calcospherites — Small globules of hydroxyapatite seen in predentin; these coalesce or fuse to form dentin.

callus — A meshwork of fibrous tissue, cartilage and bone that unites the fractured ends of a bone; a similar process may occur in horizontal root fractures with dentin, osteodentin or cementum uniting the segments.

canal, pulp (root canal) — A passage or channel in the root of the tooth extending from the pulp chamber to the apical foramen; may be narrow, have lateral branches and/or exhibit irregular morphology.

accessory canal — Any branch of the main pulp canal or chamber that communicates with the external surface of the root.

blunderbuss canal — Term denoting an incompletely formed root in which the apical diameter of the pulp canal is greater than the coronal diameter.

c-shaped canal — A pulp canal anatomy having the cross-sectional shape of the letter “C”; found in mandibular second molar teeth in which mesio-buccal and distal canals communicate due to fusion of the mesial and distal roots.

furcation canal — An accessory canal located in the furcation.

lateral canal — An accessory canal located in the coronal or middle third of the root, usually extending horizontally from the main canal space.

canal transportation — *See transportation.*

carbamide peroxide [CH₆N₂O₃] (urea peroxide) — Hydrogen peroxide coupled to urea; frequently marketed in an acidified, anhydrous glycerine base as a patient-applied extracoronary tooth-bleach system; also combined with glycerine and EDTA and used as an adjunct in canal preparation; breaks down into urea, ammonia, carbon dioxide (carbonic acid in saliva) and hydrogen peroxide.

caries, dental — A localized and progressive bacterial infection that results in the disintegration of a tooth, usually beginning with the dissolution of enamel and followed by bacterial invasion.

carious pulp exposure — *See pulp exposure—carious pulp exposure.*

carrier-based gutta-percha technique — *See obturation technique—carrier-based gutta-percha technique.*

case-control studies — Observational study in which patients who already have a certain condition are compared with people who do not; are less reliable than either randomized controlled trials or cohort studies.

causalgia — A constant, hot, burning pain following injury to a peripheral nerve; thought to be of sympathetic origin and may follow a traumatic molar extraction and alveolar osteitis (dry socket).

cavernous sinus thrombosis — Condition in which a blood clot is formed in the cavernous sinus of the brain that may arise from a maxillary apical infection.

cavitation — The formation of submicroscopic voids as a result of shearing a fluid medium by the alternating high frequency movement of an instrument tip; creates shock waves that propagate throughout the medium when voids implode.

cellulitis — A symptomatic edematous inflammatory process that spreads diffusely through connective tissue and fascial planes; frequently associated with an infection by invasive microorganisms with subsequent breakdown of connective tissue.

cement — *See sealer, root canal.*

cementodentinal junction (CDJ, dentinocemental junction) — The region at which the dentin and cementum are united; commonly used to denote the point at which the cemental surface terminates at or near the apex of a tooth; position can range from 0.5 to 3.0 mm from the anatomic apex.

cementoenamel junction (CEJ, cervical line) — The region at which the enamel and cementum meet in the cervical region of the tooth; cementum may overlap the enamel; cementum and enamel may meet abruptly, or a gap may exist.

cementoma — *See dysplasia, periradicular cemental.*

cementum — A mineralized avascular connective tissue covering the roots of teeth that provides a medium for the attachment of the periodontal fibers that connect the tooth to the alveolar bone and gingival tissues; composed of approximately 45–50 percent inorganic substances and 50–55 percent organic material and water; histologically differentiated as cellular or acellular.

cemental tear — A complete or incomplete separation along the cementodentinal interface; a type of root surface fracture typically seen in single-rooted teeth; may present itself as a periapical or periodontal lesion.

cementoblastoma — A benign neoplasm of cementoblasts; radiographically continuous with the roots of teeth.

cementum hyperplasia — *See hypercementosis.*

central sensitization — *See sensitization*

cervical line — *See cementoenamel junction.*

chelation — The removal of inorganic ions from tooth structure by a chemical agent, usually the disodium salt of ethylenediaminetetraacetic acid (EDTA); chelating agents are sometimes used in attempt to enlarge narrow canals or remove the smear layer after canal preparation.

chemical autoclave sterilization — *See sterilization—chemical autoclave sterilization.*

chemokines — A group of cytokines that stimulate leukocyte movement and attraction.

chemomechanical preparation — *See preparation, canal—chemomechanical preparation.*

chloroform (trichloromethane CHCl₃) — A clear, colorless, nonflammable, very volatile liquid used in root canal treatment as a solvent for gutta-percha and zinc oxide-eugenol cements.

chlorhexidine — A bis-biguanide antiseptic agent used to prevent colonization of microbes and to kill or inhibit microorganisms on surfaces; known for its substantivity.

chloropercha — A paste made by dissolving gutta-percha in chloroform; historically used as a sealer in obturating root canals.

circumferential filing — Peripheral planning of all root canal walls equally during preparation.

citric acid — A tricarboxylic acid used to detoxify diseased root surfaces and expose intrinsic collagen fibers in new attachment therapy and to help remove smear layer during biomechanical preparation.

coagulation necrosis — The death of a tissue in which cells are converted to an acidophilic opaque mass with loss of cellular detail.

Cochrane reviews — Systematic summaries of best evidence on the effects of healthcare interventions.

cohort study — A prospective study involving patients who presently have a certain condition or receive a particular treatment, or both, and who are tracked over time and compared with another group not affected by the condition under investigation.

collagen — A genetically distinct family of structural macromolecules of the extracellular matrix that

contains one or more domains assembled in a triple helix; these proteins form a wide variety of structures.

complement — Aspect of the immune system with activation of series of proteins resulting in cell lysis.

compomer — A polyacid modified composite resin composed of glass filler, a resin and a photoinitiator.

composite — An organic, polymerizable resin mix that typically contains inorganic particles treated with a bonding or coupling agent polymerized by light or chemical mechanisms.

concrecence — Cemental fusion of two roots.

concussion — A traumatic tooth injury characterized by tenderness to percussion and no mobility or displacement.

condensing osteitis — Diffuse radiopaque lesion representing a localized bony reaction to a low-grade inflammatory stimulus, usually seen at apex of tooth.

cone beam-computed tomography (CBCT) — Three-dimensional radiographic image from a cone shaped beam for evaluating teeth and supporting structures.

cone beam-computed tomography (CBCT) reference planes:

Axial – plane parallel to the ground, which separates the head from the feet.

Sagittal – plane from front to back, which divides the body into right and left.

Coronal – plane from side to side, which divides the body into front and back.

convergence — Theory used to describe perceived pain in one site that originates from a difference source; this theory has been used to explain referred pain.

core buildup — A restoration used to replace missing coronal tooth structure in a root-filled tooth.

corrosion — Physicochemical interaction between a metallic element or an alloy and its environment that can result in significant degradation of the metal surfaces and unfavorably affect properties of the metal.

cracked tooth — A thin surface disruption of enamel and dentin, and possibly cementum, of unknown depth or extension.

craze line — *See infraction*

crepitus — The crackling or grating sound produced by the rubbing together of fragments of fractured bone or by air moving in soft tissues, as in subcutaneous emphysema; also, the grating sensation caused by the rubbing together of dry synovial surfaces of joints.

cross-sectional study — An observational study that examines a characteristic (or set of characteristics) and a health outcome in a sample of people at one point in time.

crown-down preparation (step-down preparation) — A technique of canal preparation involving early flaring with rotary instruments followed by incremental removal of canal debris and dentin from the orifice to the apical foramen; involves files used in a larger to smaller sequence with a reaming motion and with no apical pressure once binding occurs; variations have also been advocated, all of which emphasize cleaning and shaping of the coronal portion of the canal prior to the apical portion.

crown-lengthening — A surgical procedure designed to increase the extent of supragingival tooth structure for restorative or esthetic purposes by apically positioning the gingival margin, removing supporting bone, or both; may be accomplished by orthodontic or surgical extrusion.

crown-root ratio — The relationship between the extra-alveolar portion of the tooth and the intra-alveolar portion of the tooth.

c - shaped canal — *See canal, pulp-c-shaped canal*

culture, microbial — Aseptic technique to obtain and propagate a sample of microbes usually from the pulp
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cavity or from a soft tissue swelling.

curettage — A surgical procedure to remove diseased or reactive tissue and/or foreign material around the root.

Cvek pulpotomy — See *pulpotomy-partial pulpotomy*.

cyclic fatigue — Instrument failure due to repetitive stress caused by work hardening and metal fatigue. Divided into two stages, starting with crack initiation in which microcracks form and ~~start to grow preferentially along specific crystallographic planes or grain boundaries followed by crack propagation continuing~~ until final fracture. Also known as flexural fatigue.

cyst — An epithelium-lined pathologic cavity that may contain fluid, semi-solid material or cellular debris; oral and perioral cysts frequently classified as odontogenic, nonodontogenic, soft tissue and pseudocysts.

dentigerous (follicular) cyst — An odontogenic cyst that develops between the enamel organ and the subjacent tooth crown of an unerupted or developing tooth.

lateral periodontal cyst — A small odontogenic cyst of the periodontal ligament found most often in the mandibular canine and premolar areas; associated with a vital pulp and postulated to originate from the rests of Malassez, the rests of the dental lamina or a supernumerary tooth bud.

nasopalatine duct cyst (incisive canal cyst or median anterior maxillary cyst) — A well-defined, radiolucent area positioned interradiarily or apically to the maxillary central incisors; may demonstrate a “heart-shaped” appearance due to the superimposition of the anterior nasal spine; typically asymptomatic; may result in root divergence; usually associated with teeth with vital pulps.

nonodontogenic cyst (fissural cyst, inclusion cyst) — A cyst derived from non-odontogenic epithelium, such as epithelial remnants of the primitive processes that participate in the embryonic formation of the face and jaws; includes nasopalatine, nasolabial and median mandibular cysts.

odontogenic cyst — A cyst derived from the odontogenic epithelium, such as the remnants of the dental lamina or enamel organs of teeth; includes periradicular cysts, dentigerous cysts, primordial cysts, odontogenic keratocysts, lateral periodontal cysts, glandular odontogenic cysts and calcifying odontogenic cysts.

odontogenic keratocyst (OKC)/ keratocystic odontogenic tumor (KCOT) — Considered a developmental non-inflammatory cyst by some (OKC) and a neoplasm by others (KCOT) and characterized by a thin uniform 6-8 cell thick cystic epithelial lining with active basal cells and corrugated surface parakeratin and prone to recur following surgical removal.

periapical pocket cyst (bay cyst) — An apical inflammatory cyst containing a sac-like, epithelium-lined cavity that is open to and continuous with the root canal.

periradicular cyst (apical cyst, periapical cyst, radicular cyst) — An odontogenic cyst associated with a tooth with a necrotic pulp that develops within a periradicular inflammatory lesion; derives its epithelium from the cell rests of Malassez.

primordial cyst — An odontogenic cyst that develops in place of a tooth through cystic degeneration and liquefaction of the stellate reticulum prior to formation of any calcified enamel or dentin; epithelial lining derived from the inner and outer enamel epithelium; often exhibits histologically the characteristics of odontogenic keratocyst.

pseudocyst — A pathologic space that resembles a cyst but lacks an epithelial lining; includes aneurysmal, traumatic (hemorrhagic, solitary, simple) and static (Staphne’s) bone cysts.

soft tissue cyst — A heterogeneous group of cysts occurring in the soft tissue of the neck, oral floor and salivary glands. Examples include branchial, dermoid and thyroglossal duct cysts.

traumatic bone cyst (hemorrhagic bone cyst) — A radiolucent lesion in bone without a radiopaque border; a cavity of disputed cause, lined by no tissue or extremely thin tissue that may contain fluid (blood or serum); assumed to have been caused by trauma; teeth, if present, have vital pulps; not a true

cyst.

true cyst — An apical inflammatory cyst with a distinct pathologic cavity; completely enclosed in an epithelial lining so that no communication to the root canal exists.

cytokines — A large group of proteins that are capable of regulating a wide variety of cellular functions involved in controlling the immune response.

cytotoxicity — The ability to kill cells.

D

dead tracts — Dentinal tubules seen in histologic sections to be devoid of cellular processes indicating odontoblastic destruction; may contain debris and microorganisms.

debridement — Removal of foreign matter, devitalized tissue and microorganisms from an area of injury.

root canal debridement — Elimination of organic and inorganic substances as well as microorganisms from the root canal by mechanical and/or chemical means.

decalcification — Removal of calcium salts from bone or teeth; a form of demineralization yielding a pliable collagenous matrix that may be digested with enzymes or inorganic chemicals such as sodium hypochlorite.

decompression — *Reduction of the size of a large cyst during healing using two primary techniques: (1) the surgical incision through a wall and insertion of a tube or other type of drain; (2) the penetration of the cyst in two locations with two large gauge needles and flushing with sterile saline.*

decoronation — The intentional removal of the coronal portion of a tooth, with retention of its root(s) crown of a root in order to preserve the width and vertical height of the alveolar bone.

defalcation — Sickle-shaped root form.

dehiscence — A narrow, vertical defect in the alveolar plate of bone over a root extending from the crestal area apically; usually located on the facial aspect of the alveolar process.

demineralization — The process of removing mineral salts from calcified tissues.

dens evaginatus — An anomalous outgrowth of tooth structure resulting from the folding of the inner enamel epithelium into the stellate reticulum with the projection of structure exhibiting enamel, dentin and pulp tissue.

dens invaginatus (dens in dente) — A developmental defect resulting from infolding of the crown before calcification has occurred; may appear clinically as an accentuation of the lingual pit in anterior teeth; in its more severe form, gives a radiographic appearance of a tooth within a tooth, hence the term “dens in dente”; most common in the maxillary lateral incisors but may occur in any tooth of the dental arch.

dental dam (rubber dam) — A small latex or non-latex sheet used to isolate a tooth or teeth from the oral environment and to prevent migration of fluids or foreign objects into or out of the operative field; single or multiple holes punched through barrier allow placement around the tooth or allow teeth to be isolated; provides a dry, visible and clean operative field.

dental (rubber) dam clamp (retainer) — A spring metal or plastic device that is placed around a tooth at the level of the gingival to secure a rubber dam in position; available in varying configurations to fit differing tooth shapes.

dental (rubber) dam forceps — An instrument used to spread a rubber dam clamp (retainer) allowing it to be placed around or removed from a tooth.

dental (rubber) dam frame — A plastic or metal device used to stretch the rubber dam, hold it and secure its edges away from the operative site.

dental (rubber) dam punch — A special device used to punch holes in rubber dam sheeting.

dental follicle (sac) — Layer of concentrated ectomesenchymal cells that gives rise to the supporting periodontal structures of the tooth.

dental granuloma (granuloma) — A histologic term used to describe tissue formed adjacent to the apex of a tooth with pulp pathosis; characterized by chronic inflammatory cells such as macrophages, plasma cells and lymphocytes and sometimes a cluster of multinucleated giant cells; capillaries, fibroblasts and collagen fibers also present.

dental lamina — A developmental structure derived from the primary epithelial band; localized proliferation of this structure results in a series of epithelial ingrowths into the ectomesenchyme at sites corresponding to the positions of the developing teeth; dental lamina gives rise to the enamel organ.

dental organ — *See enamel organ.*

dental papilla — A concentration of ectomesenchymal cells under the dental lamina that eventually becomes the dental pulp.

denticle — *See pulp stone.*

dentigerous cyst — *See cyst–dentigerous cyst.*

dentin — A mineralized tissue that forms the bulk of the crown and root of the tooth, giving the root its characteristic form; surrounds coronal and radicular pulp, forming the walls of the pulp chamber and root canals; composition is approximately 67 percent inorganic, 20 percent organic and 13 percent water.

globular dentin — Areas of mineralized dentin (calcospherites) that have not fused into a homogenous mass.

interglobular dentin — Areas of unmineralized or hypomineralized dentin that persist within mature dentin and are usually found in the circumpulpal dentin just below the mantle dentin.

intertubular dentin — The calcified dentinal matrix found external to the peritubular dentin and comprising the main body of dentin; consists of large numbers of fine collagen fibrils enveloped in an amorphous ground substance; not as highly calcified as peritubular dentin.

mantle dentin — The first portion of dentin formed beneath both the enamel and the cementum; contains variable amounts of coarse fibril bundles (Von Korff's fibrils) that are arranged at right angles to the dentinal surface.

peritubular dentin (intratubular dentin) — A highly calcified, narrow strip of dentin surrounding the lumen of each dentinal tubule.

predentin — A circumpulpal, collagenous, mucopolysaccharide matrix adjacent to dentin; secreted by odontoblasts prior to mineralization. This layer is less mineralized than dentin and appears to act as a 'barrier' to osteoclasts during cases of resorption.

primary dentin — Dentin formed during tooth development; exhibits well-organized pattern of tubules and cell processes.

reactionary dentin — Tertiary dentin matrix secreted by surviving odontoblast cells in response to an appropriate stimulus.

reparative dentin — Tertiary dentin matrix secreted by odontoblast-like cells in response to an appropriate stimulus after the death of odontoblasts; stimuli tend to be much stronger than those causing reactionary dentin formation.

sclerotic dentin (transparent dentin) — Dentin characterized by calcification of the dentinal tubules as a result of injury or normal aging; it appears translucent in ground sections due to the difference in refractive indices of calcified dentinal tubules and adjacent normal tubules when examined by transmitted light.

secondary dentin — Circumpulpal dentin formed by normal pulp function after tooth formation is complete; tubular pattern is regular, but number of tubules is less than that found in primary dentin; secondary dentin is separated from primary dentin histologically by a hyperchromatic line or demarcation zone.

tertiary dentin (irritation dentin) — Dentin formed by external influences, including caries and attrition, and can range from regular tubular dentin that differs little from primary and secondary dentin (reactionary dentin), but can be very dysplastic and/or irregular, and atubular when there is odontoblast loss depending on the differentiation status of the formative cell.

tubular dentin — Dentin or predentin with tubules arranged in an orderly pattern. The term is used to differentiate regular dentin from the amorphous calcified tissue seen in irritation dentin.

dentin blush — Red to pink discoloration of dentin due to pulpal hemorrhage, usually a result of trauma or operative procedures.

dentin bridge — Tertiary (reparative) dentin formation that provides closure of a previously exposed pulp or forms across the excised surface of a pulp after pulpotomy; can be irregular in structure, contains tunnel defects and is less calcified than secondary dentin; may be facilitated by chemical agents such as calcium hydroxide, mineral trioxide aggregate (MTA), or other bioceramic materials.

dentin sialoprotein — An extra cellular matrix protein that plays a role in odontoblast differentiation.

dentinal fluid — An intratubular and extracellular fluid that is thought to be an ultrafiltrate of blood from the terminal pulpal capillaries. It diffuses through the space around the odontoblastic process and possibly through the intracellular structure of the odontoblast itself prior to entering the dentinal tubule and continuing a slow outward movement under a pressure gradient and eventually leaving the tooth through dentinal tubules.

dentinal plug — Dentin particles, remnants of vital or necrotic pulp tissue, microbial components and retained irrigant forced into dentinal tubules for several microns during canal preparation.

dentinal tubule — A circular duct in the dentin matrix that contains an odontoblastic process and fluid. A typical dentinal tubule has a diameter of 3-4 μm at its pulpal end and about 1 μm at the dentinoenamel or dentinocemental junction. The number of dentinal tubules ranges from 20,000 to 75,000 per square millimeter of dentin.

dentinoenamel junction — *See cementodentinal junction.*

dentinogenesis — The formation of dentin.

desensitize — To eliminate or reduce painful dentinal response to irritating agents.

diagnosis — The art and science of detecting and distinguishing deviations from health and the cause and nature thereof.

differential diagnosis — The process of identifying a condition by comparing the symptoms of all pathologic processes that may produce similar signs and symptoms.

digital radiography — Use of receptors to produce electronic radiographic images that can be viewed on a monitor and that allow for a reduction in radiation exposure.

dilaceration — A deformity characterized by displacement of the root of a tooth from its normal alignment with the crown; may be a consequence of injury during tooth development. Common usage has extended the term to include sharply angular or deformed roots.

direct pulp cap — *See pulp cap—direct pulp cap.*

disinfection — A nonspecific term implying the destruction of pathogenic microorganisms, but not necessarily of spores; usually by chemical agents.

double-blind study — A study in which neither the patient nor the investigator knows whether the patient

is receiving the treatment of interest or the control treatment; it is the most rigorous clinical research design because, in addition to the randomization of subjects that reduces risk of bias, it can eliminate placebo effects, which is a further challenge to the validity of a study.

double antibiotic paste — Combination of two antibiotics (metronidazole and ciprofloxacin) used to disinfect canals; typically for regenerative endodontics.

dowel — *See post.*

downpacking — The compaction of incremental segments of heat-softened gutta-percha to create an apical plug.

drain — A tube, wick or other material placed into a wound, sore, abscess or body cavity to provide an avenue of escape for pus, inflammatory products and tissue exudates.

dry heat sterilization — *See sterilization–dry heat sterilization.*

dysesthesia - An unpleasant abnormal sensation, whether spontaneous or evoked. Special cases of dysesthesia include hyperalgesia and allodynia. A dysesthesia should always be unpleasant and a paresthesia should not be unpleasant.

dysplasia, periradicular cemental (cementoma) (periradicular fibrous dysplasia, periradicular osteofibrosis) — A benign, reactive non-neoplastic, fibro-osseous lesion of unknown etiology in which bone around the apices of teeth with vital pulps is initially replaced with fibrous connective tissue and subsequently by a mixture of tissue, cementum and bone. Radiographically, three phases are recognized: radiolucent, mixed and radiopaque. This condition is common in African-American middle-aged females, usually occurs in the anterior mandible and may take years to reach the final stage of development.

dystrophic calcification — Diffuse foci of calcification frequently found in the aging pulp; usually described as being perivascular or perineural.

E

ecchymosis — An extravasation of blood into subcutaneous tissue or mucosa.

ectopic eruption — A tooth erupting in a site other than its normal position.

edema — An accumulation of fluid in a tissue.

EDTA (ethylenediaminetetraacetic acid) — An odorless, white, crystalline solid whose various salts are soluble in water; disodium salt of ethylenediaminetetraacetic acid in a buffered aqueous solution is used as a chelating agent in root canal preparation; used to remove calcium, demineralize and soften dentin, and remove the smear layer.

elastic limit — That point at which internal structure changes to prevent return to original form.

elasticity — The quality that allows a structure or material to return to its original form upon removal of an external force.

elbow — The narrow portion of a curved canal immediately coronal to a transportation or zip.

electric pulp test — *See pulp test–electric pulp test.*

electronic apex locator — *See apex locator.*

electrosurgery — Removal, division or coagulation of tissue by use of a radio-frequency electric current applied locally with a metal instrument or needle; can be used to expose coronal tooth structure for isolation; may also be used in controlling hemorrhage during surgical procedures, pulpotomy and pulpectomy.

emergence profile — Contour of a tooth or restoration such as a crown on a natural tooth or dental implant

as it relates to the adjacent soft tissues.

eminence — A prominence or projection, especially one on the surface of a bone.

emphysema, subcutaneous — An accumulation of air or other gas in tissue spaces; in endodontics, usually results from injection of air through the root canal into surrounding soft tissues or from air-driven dental handpieces used in surgical procedures.

enamel — A mineralized tissue that forms a protective covering of variable thickness over the entire surface of the crown of the tooth. The hardest tissue in the human body, enamel provides a resistant covering suitable for mastication. Its composition is approximately 96 percent inorganic and 4 percent organic substance and water.

enamel microabrasion — A method of removing certain superficial enamel demineralization and decalcification coloration defects.

enamel organ (dental organ) — Structure of ectodermal origin composed of four layers: inner enamel epithelium, stratum intermedium, stellate reticulum and outer enamel epithelium. During tooth development this structure is responsible for determining the shape of the crown, initiating dentin formation, establishing the dentogingival junction and forming enamel.

enamel pearl — A focal mass of enamel located apical to the cemento-enamel junction.

enamel projection — An apical extension of enamel usually toward a molar furcation.

endocarditis — Inflammation of the endocardial surface of the heart.

infective endocarditis — A microbial infection of the endocardial surface of the heart, usually involving the heart valves. May be acute or subacute.

endodontic access — *See access, surgical*

endodontic implant — *See implant–endodontic implant.*

endodontic outcomes — *See outcomes, endodontics*

endodontic/periodontic lesion — A process involving interaction of diseases of the pulp and periodontium. These interactions or lesions are classified by etiology, diagnosis and prognosis as follows: 1) primary pulpal lesions with extension to the periradicular tissues; 2) primary pulpal lesions with extension to the periradicular tissues with secondary imposition of periodontal disease; 3) primary periodontal lesions; 4) primary periodontal lesions with extension to the pulpal tissues; 5) combined pulpal-periodontal lesions in which independent disease processes in both tissues have joined or coalesced in the periradicular tissues; 6) concomitant pulpal-periodontal lesions in which disease processes exist independently in both tissues and are not apparently interrelated.

endodontics — The branch of dentistry concerned with the morphology, physiology and pathology of the human dental pulp and periradicular tissues. Its study and practice encompass the basic and clinical sciences including the biology of the normal pulp and the etiology, diagnosis, prevention and treatment of diseases and injuries of the pulp and associated periradicular conditions.

endodontist — A dentist with two or more years of advanced training in the scope of endodontics who has received a certificate in endodontics from an advanced education program accredited by the ADA Commission on Dental Accreditation and who limits his or her practice to endodontics. (Dentists who limited their practice to endodontics prior to recognition of the specialty in 1963 are also recognized as endodontists.) The endodontic specialist is responsible for the advancement of endodontic knowledge through research, the transmission of information concerning the most recent advances in biologically acceptable procedures and materials and the education of the public as to the importance of endodontics in keeping the dentition in a physiologically functional state for the maintenance of oral and systemic health.

Board-certified endodontist — As defined by the American Board of Endodontics, an endodontist who has satisfied all requirements of the certification process of the ABE, has been declared Board-certified by

the directors of the ABE and maintains Board certification. This individual is a Diplomate of the ABE.

Board-eligible endodontist — As defined by the American Board of Endodontics, an educationally qualified endodontist whose application has the approval of the Board.

educationally-qualified endodontist — As defined by the American Board of Endodontics to identify those eligible to take the exam, an endodontist who successfully completed an advanced educational program accredited by the ADA and is eligible to apply for examination by the American Board of Endodontics.

prospective Board candidate — A student, enrolled in the final year of an advanced education program in endodontics accredited by the Commission on Dental Accreditation of the ADA whose application and payment of the Written Examination fee have been accepted and approved by the American Board of Endodontics.

endodontology — The study of endodontics.

endorphin — Endogenous antinociceptive morphine-like substance in the cerebral spinal fluid that acts as an inhibiting neurotransmitter on nociceptive pathways.

endoscopy — The use of a flexible, fiberoptic probe to view and magnify anatomical structures.

endosseous implant — *See implant–endodontic implant.*

endotoxin — *See lipopolysaccharide.*

enostosis — A condensation of normal bone within a bony cavity or extending centrally from the cortical plate.

enucleation — The removal of an organ or tissue lesion in its entirety; in endodontics, the term usually refers to the surgical removal of periradicular lesions.

envelope flap — A horizontal intrasulcular surgical flap with no vertical releasing incisions.

epidemiology — The science dealing with the incidence, distribution and control of disease in a population.

epithelial rests of Malassez — Cellular remnants of Hertwig's epithelial root sheath that persist as a fenestrated network around the tooth within the periodontal ligament.

erosion — A loss of tooth substance by a chemical process without bacteria.

essential oils — A group of volatile, nongreasy, nonsaponifying oils with characteristic odors and tastes obtained from plants and other sources or prepared synthetically. They have varying degrees of antiseptic, anodynic and toxic properties, and are used by the public and the profession for the treatment of pain. In endodontics, they have been used primarily as intracanal medicaments such as eugenol and eucalyptol, components of sealers and provisional or sedative restorations.

etching agents — Acidic agents used to demineralize enamel or dentin to enhance adhesion of some filling materials to tooth structure, to remove the smear layer and plugs from canal walls prior to root canal obturation and to expose collagen fibers on the surface of a diseased root structure to facilitate reattachment of the periodontal ligament.

ethoxybenzoic acid — An ingredient added to zinc oxide eugenol formulations used for root-end fillings.

ethyl chloride (chloroethane) — A colorless, extremely volatile, flammable liquid used in endodontics to apply cold as a pulp test; also has been used topically as an anesthetic and for treatment of myofascial pain; alternative is dichlorodifluoromethane (DDM).

ethylene oxide gas sterilization — *See sterilization–ethylene oxide gas sterilization.*

ethylenediaminetetraacetic acid — *See EDTA.*

etiology — Factors implicated in the causation of disease; may be local or systemic.

eucalyptus oil, N.F. — An essential oil containing approximately 74 percent eucalyptol; used in some root canal sealer liquids and as a gutta-percha solvent.

eucapercha — A paste of gutta-percha dissolved in oil of eucalyptus; sometimes used as a root canal sealer or cementing medium in obturating root canals.

eugenol, U.S.P. — A phenolic compound with anodynic and antiseptic properties that occurs as a colorless or pale yellow liquid and is the essential constituent of oil of cloves; often combined with zinc-oxide or zinc-oxide base preparations to form various pastes and cements; sometimes used as an anodyne or as an intracanal medicament after removal of a vital pulp.

evidence-based dentistry — An approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences.

evidence-based endodontics (EBE) — The integration of the best research evidence with clinician expertise and patient values.

- Best research evidence refers to relevant research from basic and applied sciences including Clinical, in vivo animal or in vitro laboratory trials.
- Clinician expertise refers to the clinical skills and past experience that allows efficient and accurate assessment of the risks and benefits of potential interventions.
- Patient values refer to the unique preferences, concerns and expectations of each patient, which must be integrated into clinical decisions.

expert opinion — *See levels of evidence*—Summary of one well-versed, experienced individual's opinion. This has a low-level statistical validity.

exostosis — A benign bony growth projecting outward from the surface of a bone.

exotoxin — A highly potent soluble toxin produced by a bacterium and released into its environment.

external enamel epithelium — *See outer enamel epithelium*.

external oblique ridge — A smooth ridge on the buccal surface of the body of the mandible that extends from the anterior border of the ramus with diminishing prominence downward and forward to the region of the mental foramen; changes very little in size and direction throughout life.

external resorption — *See resorption—external resorption*.

extracoronary bleaching — *See bleaching, extracoronary*.

extrusion — Movement of a tooth in an incisal or occlusal direction; can be intentional, physiologic or traumatic; also extension of obturating materials beyond the apical foramen.

root extrusion (forced eruption) — Orthodontic movement of a tooth or root in a coronal direction to expose a carious, resorptive or traumatic defect for restoration.

extrusive luxation — *See luxation—extrusive luxation*.

exudate — Fluid, cells and plasma proteins that have escaped from the vascular system and accumulated in a tissue or tissues; usually the result of inflammation.

fibrinous exudate — An exudate characterized by an abundance of fibrinogen that results in deposition of fibrin at the site of injury.

hemorrhagic exudate — An exudate characterized by an abundance of red blood cells.

purulent exudate — An exudate characterized by an abundance of polymorphonuclear leukocytes resulting in pus formation at the site of injury.

serous exudate — An exudate characterized by an abundance of proteinaceous fluid at the site of injury.

ex vivo — Experimentation or measurements done in or on tissue in an artificial environment outside the organism with the minimum alteration of natural conditions.

F

fascial space infection — Microbes and their products expanding into potential anatomic spaces between structures.

fatigue — Transitional weakening of a material due to cyclic loading and unloading characterized by fracture below its ultimate tensile strength (fatigue fracture).

fenestration — A window-like opening or defect in the alveolar plate of bone frequently exposing a portion of the root; usually located on the facial aspect of the alveolar process.

ferric sulfate [Fe₂(SO₄)₃] — An acidic hemostatic agent.

ferrule — A band or ring of restorative material surrounding the crown or root of a tooth to provide strength.

fiberoptics — Glass or plastic fibers that conduct light; used to transilluminate teeth and tissues, and to detect cracks, canal orifices and fractured roots.

fibrinous exudate — *See exudate–fibrinous exudate.*

fibroblast — Most common cell type in the pulp, producing and maintaining the collagen and ground substance.

file — *See also reciprocating file; rotary file*—A tapered and pointed metal instrument with cutting edges used to enlarge the root canal by rotation or filing action; classified principally on activation method, alloy, cross-sectional shapes, taper, tip design and length of cutting flutes.

D-type file — A file made from a rhomboid cross-sectional blank that results in alternating large and small flutes along its length.

H-type file (Hedström file) — A file with spiral edges arranged as a buttress-threaded screw so that cutting occurs only on a pulling stroke.

K-type file — A file with tightly spiraled cutting edges that cut when pushed, pulled or rotated; cross-sectional configurations include diamond, square and triangular.

NiTi file — A hand or rotary file manufactured with superelastic nickel-titanium alloy that is available in a variety of different designs.

filing — A dynamic movement of a hand file to optimally effect canal debridement; predominantly a push-pull (rasping), rotational (reaming) movement or a combination of the two. Engine-driven filing motions can be rotary, reciprocating or oscillating.

fissural cyst — *See cyst–nonodontogenic cyst.*

fistula — An abnormal communication pathway between two internal organs or from one epithelial lined surface to another epithelial lined surface; not a sinus tract.

flap, surgical — A section of tissue, such as gingival mucosa, that has been partially detached from the underlying tissue but retains uninterrupted blood supply through an intact base; classified by position—apically positioned, lateral or vertical sliding; by geometric shape—curved (semilunar), rectangular, scalloped, trapezoidal or triangular; or by location of the incision—intrasulcular, submarginal or vertical.

flexural fatigue – *see cyclic fatigue*

full mucoperiosteal flap — A flap involving an intrasulcular horizontal incision and including epithelium,

attached gingiva, alveolar mucosa and periosteum; triangular and rectangular flaps are examples.

triangular — An intrasulcular incision with one vertical releasing incision.

rectangular — An intrasulcular incision with two vertical releasing incisions.

limited mucoperiosteal flap — A flap involving a submarginal horizontal incision that includes epithelium, attached gingiva, alveolar mucosa and periosteum; submarginal and semilunar flaps are examples.

submarginal flap — A flap with the horizontal incision in attached gingiva; may have two vertical releasing incisions; generally rectangular or trapezoidal in shape; indicated when crowns are present on anterior teeth and an adequate zone of healthy attached gingiva is present.

flare-up — An acute exacerbation of an asymptomatic pulpal and/or periradicular pathosis after the initiation or continuation of root canal treatment.

fluctuant — A tactile sensation of fluid motion noted during palpation of a mass or swelling such as an abscess.

fluorosis, dental — A form of enamel hypoplasia. Mottling and discoloration of enamel results from ingestion of excessive amounts of fluoride during the apposition phase of tooth development.

focal infection theory — A hypothesis that bacteria existing in a primary site—the focus—may gain entry into the circulatory system and cause diseases elsewhere in the body.

focus of infection — Chronic infected site typically leading to spread of infectious microbes systemic.

foramen (pl. foramina) — A natural opening or passage, especially into or through a bone; also describes openings in the root structure that communicate with the dental pulp and generally contain neural, vascular and connective elements.

accessory foramen — An orifice on the surface of a root communicating with a lateral or accessory canal.

apical foramen — The main apical opening of the root canal.

foreign body reaction — A chronic inflammatory reaction to a foreign material within a tissue; often characterized by giant cells.

formaldehyde — A disinfectant gas or solution (HCHO) used as an antiseptic, disinfectant and histologic fixative.

formalin — An aqueous solution of formaldehyde.

formocresol — A toxic mixture of 19 percent formaldehyde and 35 percent cresol in an aqueous glycerin vehicle; formaldehyde is regulated by OSHA as a carcinogen or potential carcinogen has been used for pulpotomy of deciduous teeth and as an intracanal medicament for permanent teeth during root canal treatment (29 CFR Part 1910, subpart Z).

fracture — A split or break in bone, cartilage or tooth structure. When involving tooth structure, it is a disruption of the enamel and/or dentin and/or cementum that is assumed to be of greater depth than a crack, of unknown depth or extension, visible or not visible clinically or radiographically, and with separated or unseparated segments.

traumatic fracture — Fracture of tooth structure from injury.

crown-root fracture with pulp exposure — A complicated fracture of enamel, dentin and cementum with loss of tooth structure, exposing the pulp.

crown-root fracture without pulp exposure — An uncomplicated fracture of enamel, dentin and cementum with loss of tooth structure but not exposing the pulp.

enamel-dentin-fracture (uncomplicated crown fracture) — A fracture involving enamel and dentin, but no pulp exposure, with loss of tooth structure.

enamel-dentin-pulp-fracture (complicated crown fracture) — A fracture involving enamel, dentin and exposure of the pulp with loss of tooth structure.

enamel fracture — A complete fracture of the enamel only.

infracture (craze line) — A crack of the enamel without loss of tooth structure.

root fracture — A fracture that exists or extends into the root, to include dentin, cementum, and possibly pulpal space, which may progress to or from the enamel.

longitudinal fracture — A root fracture extending in the axial plane within the tooth.

split root — A continuation of a crack or vertical root fracture whereby the fractured segments are completely separated longitudinally; it may occur buccal-lingually or mesial-distally; it may cause an isolated periodontal defect(s) or sinus tract; it may be radiographically evident.

vertical root fracture — A fracture in the root whereby the fractured segments are incompletely separated; it may occur buccal-lingually or mesial-distally; it may cause an isolated periodontal defect(s) or sinus tract; it may be radiographically evident.

horizontal root fracture (oblique root fracture) — Fracture due to traumatic injury confined to the root in a transverse plane separating the root into coronal and apical segments, with the fracture being confined either partially or completely within bone. The fracture can be buccal-lingually or obliquely oriented.

fremitus — A palpable movement of a tooth when subjected to occlusal forces.

furcation (furca) — The anatomic area of a multi-rooted tooth where the roots diverge.

furcation canal — *See canal, pulp–furcation canal.*

fusion — A “double” tooth resulting from the union of two adjacent tooth germs.

G

galvanism (electrogalvanism) — The flow of direct electric current between two or more dissimilar metals; may occur in the oral cavity when metallic restorations of differing compositions contact, resulting in varying degrees of sensation.

Gates-Glidden drill — A rotary, power-driven, flame-shaped bur with spiral-inclined cutting edges mounted on a slender noncutting shaft and tipped with a guiding pilot point.

gemination — A disturbance during odontogenesis in which partial cleavage of the tooth germ occurs and results in a tooth that has a double or “twin” crown; usually not completely separated; common root and pulp space shared.

glass ionomer — Restorative material with high fluoride and dentin bonding properties; used for dentin hypersensitivity, bases, barriers, cores, cements, including root canal sealer.

globular dentin — *See dentin–globular dentin.*

glucocorticoids — A group of steroid hormones that affect carbohydrate, fat and protein metabolism; these typically possess anti-inflammatory properties.

glutaraldehyde — A colorless, toxic oil (C₅H₈O₂) that is soluble in water, commonly used in a 2 percent solution for disinfection, sterilization and tissue fixation.

glycosaminoglycans (mucopolysaccharides) — Large unbranched polysaccharides with side-chains that comprise the ground substance of the pulp.

chondroitin sulfate — Major proteoglycan present in teeth with active dentinogenesis.

hyaluronic acid — A proteoglycan that is a major constituent of the ground substance of connective tissue

such as the dental pulp.

Gow-gates mandibular nerve block – Technique to administer local anesthetic to the mandibular branch of the trigeminal nerve before it branches into the inferior alveolar nerve. The technique utilizes extraoral landmarks whereby the needle is directed at a higher puncture point, aiming for the vicinity of the mandibular condyle.

graft — A piece of living tissue or synthetic material placed in contact with injured tissue to repair a defect or supply a deficiency in that tissue.

allograft — A graft between genetically dissimilar members of the same species; examples include freeze-dried or fresh bone.

alloplast — A synthetic graft or inert foreign body implanted into tissue; examples include bioactive glasses and bioceramics.

autograft (autogenous graft) — A graft from one's own body.

xenograft — A tissue graft obtained from another species; examples include bovine bone and natural coral.

granulation tissue — Healing tissue that consists of fibroblasts, capillary buds, inflammatory cells and edema.

granuloma — *See dental granuloma.*

granulomatous tissue — A pathologic tissue response characterized by a distinctive morphologic pattern of inflammation consisting of macrophages that have been transformed into epithelioid cells surrounded by mononuclear cells, usually lymphocytes.

growth factors — A diverse group of polypeptides that have important roles in regulation of regeneration, growth and development of a variety of tissues.

guided endodontic repair - Biologically-based procedures designed to physiologically repair damaged tissue that promotes the resolution of disease and reestablishment of some or all of the original tissue functions.

Guided Endodontic Access - The utilization of cone beam computed tomography ,specialized software and a digital impression 3-D scan to virtually plan the canal access preparation and produce a 3D-printed guide/ template. This provides minimally invasive endodontic access preparations especially in calcified cases.

Guided Endodontic Surgery- The utilization of cone beam computed tomography, specialized software and a digital impression 3-D scan to virtually plan endodontic surgeries and produce 3D-printed guides/ templates to aid in endodontic (root end) surgical procedures.

guided tissue (bone) regeneration — Barrier technique using materials such as dense PTFE or collagen to regenerate lost periodontal structures by excluding epithelium and the gingival corium from the root surface in the belief that they interfere with regeneration.

gutta-percha — The purified coagulated exudate from the Palaquium gutta tree, commonly called the “mazer wood” tree, of the Burma and Malay archipelago. Both gutta-percha and natural rubber are high molecular weight stereo-isomers of polyisoprene. Natural rubber, cis-polyisoprene, exists with its—CH₂ groups (the chain-forming links between the individual isoprene units) on the same side of the double bond; while gutta-percha, 1-4 trans-polyisoprene, exists with its—CH₂ groups on opposite sides of the double bond. Gutta-percha exists in two crystalline forms, the naturally occurring alpha form and the beta form found in most commercial formulations. Dental gutta-percha points are reported to contain approximately 19–22 percent gutta-percha, 1–4 percent plasticizing waxes and resins, 59–75 percent zinc oxide, 1–17 percent metal sulfates for radiopacity and trace amounts of organic dyes for coloration. Since the late 1950s, material compounded in the United States for “gutta-percha” points has been made from balata, a nearly identical latex derived from the Mimosa tree of South America.

gutta-percha point (gutta-percha cone) — A pliable, radiopaque cone available in various sizes used to obturate root canals in conjunction with sealers.

H

halothane — An inhalation general anesthetic agent that may be used to dissolve gutta-percha; chemical name is 2-bromo-2-chloro-1,1,1-trifluoroethane.

Hank’s balanced salt solution — A balanced electrolyte solution commonly used for cell and tissue culture; has been shown to prolong the viability of periodontal ligament cells in cases of tooth avulsion.

haptin — A substance that by itself is not antigenic, but, when combined with a body protein, may induce an immune response.

hardness — The mechanical property of resistance to surface indentation.

heat, applied — The application of heat to increase circulation or bring about the localization of infection or relief of muscle spasm.

heat test (hot test) — The use of hot gutta-percha, hot water, a rotating rubber cup or commercial heating device to identify and reproduce a chief complaint of pain to heat upon application.

Hedström file — *See file–H-type file.*

hematoma — A localized collection of extravasated blood, usually clotted, that forms in a tissue, organ or space.

hemisection (bicuspidization) — The surgical separation of a multirooted tooth, usually a mandibular molar, through the furcation in such a way that a root and the associated portion of the crown may be removed or retained.

hemolysis — The breakdown of red blood cells and the release of hemoglobin that may be metabolized into the blood pigments hemosiderin and bilirubin, which are brown in color; may contribute to tooth discoloration following pulp necrosis when the process occurs in the pulp.

hemorrhagic exudate — *See exudate–hemorrhagic exudate.*

hemostasis (hemostatic agent) — The process (or agent) whereby bleeding is controlled.

Hertwig's epithelial root sheath (HERS) — A double layer of cells, the inner and outer enamel epithelium, that proliferates and grows around the dental papilla, inducing differentiation of odontoblasts from cells at the periphery of the dental papilla and defining the shape of the root; root sheath fragments form a fenestrated network around the tooth with growth; cells in this residual network are known as epithelial rests of Malassez.

HIPAA (Health Insurance Portability and Accountability Act) — A law, effective April 2003, that implemented standards intended to streamline the flow of information integral to the operation of the health care system while protecting confidential health information from inappropriate access, disclosure and use.

histamine — A compound found in all cells that results from breakdown of the amino acid histidine; responsible for vasodilatation that may affect the pulp during an acute inflammatory process. Mast cells are rich in histamine.

histiocyte — Large phagocytic cell; member of the mononuclear-phagocyte system also known as macrophage.

hollow tube theory — A hypothesis that tissue fluids can diffuse into an empty space in a root canal system, breakdown and subsequently cause inflammation in tissues circulation surrounding the canal orifice; research supports the premise of tissue fluid circulation in a pulpless tooth, but, unless the tubular contents are contaminated with bacteria or other antigenic material, significant inflammation does not occur.

horn, pulp — Extension of pulp tissue into occlusal or incisal projections following the cusp tips or developmental lobes.

H-type file — *See file–H-type file.*

Hydraulic condensation - *See obturation technique–hydraulic condensation.*

hydrocodone — A semisynthetic narcotic analgesic and antitussive agent that is similar to, but more potent than, codeine.

hydrogen peroxide (H2O2) — A clear, colorless, unstable liquid with disinfectant and bleaching properties commonly marketed in solutions of 3–35 percent that exhibits variable levels of tissue irritation; used as an irrigant, a bleaching agent and to prepare the tooth surface for restoration.

hydrodynamic theory — A hypothesis that maintains that the inward or outward movement of fluid through the dentinal tubules activates sensory nerve fibers in the dentin or the pulp to produce pain; fluid movement can be in response to dehydration, osmotic changes, mechanical probing or thermal changes.

hydroxyapatite — An inorganic compound [Ca₁₀(PO₄)₆(OH)₂] found in bone and teeth; there are synthetic forms used in bone grafting and for coating dental implants.

hyperalgesia — Increased pain sensation or lowered pain threshold that accompany an inflammatory

reaction.

hypercementosis (cementum hyperplasia) — An excessive deposition of cementum on the root surface; commonly found in Paget's disease.

hyperemia — An increased volume of blood within dilated vessels in an organ or tissue; used as a histophysiological term to describe increased blood flow in the pulp.

hyperplastic pulpitis, chronic (pulp polyp) — A form of chronic pulpal inflammation usually following carious or traumatic exposure; characterized by proliferation of dental pulp tissue from the exposed pulp chamber, filling the cavity with a pedunculated or sessile, pinkish-red, fleshy mass; usually covered with epithelium.

hypersensitivity, dentinal — The short, exaggerated, sharp painful response elicited when exposed dentin is subjected to thermal, mechanical or chemical stimuli.

hypersensitivity reaction — Response by body to foreign agent.

Type I—immediate hypersensitivity (anaphylaxis) — Characterized by rapid histamine release, mediated by IgE.

Type II—immune cytotoxic reactions — Reactions between IgG or IgM antibodies fixed to cells or tissues and antigens.

Type III—immune complex hypersensitivity (Arthus type) (Serum sickness type) — Circulating complement-fixing IgG or IgM reaction with antigens.

Type IV—delayed hypersensitivity — Tissue injury resulting from a cellular immune response mediated by T-cells.

hypocalcification — Reduced or deficient calcification of mineralized tissue, such as bone, dentin, enamel or cementum.

hypochlorite accident — Extrusion of sodium hypochlorite into the periradicular area during root canal irrigation, causing severe pain, swelling, ecchymosis and potential paresthesia.

I

Idiopathic osteosclerosis (enostosis or dense bone island) - A radiopacity of unknown cause. Corresponds to an asymptomatic and benign growth of bone that cannot be attributed to inflammation, dysplasia, or other disorders. (Differentiated from condensing osteitis).-

immunoglobulins — Serum proteins (gamma globulins), also known as antibodies, secreted by plasma cells; play an important role in immunity against microbial irritants. They belong to one of the following main isotypes: IgG, IgA, IgM, IgE and IgD.

immunohistochemistry — A histologic technique used to demonstrate the presence of specific molecules (usually proteins) in tissue sections or cell smears by binding the molecule to a specific antibody. The antigen-antibody complex is attached to an enzyme that further binds with a fluorescent or a visible light dye for visualization.

implant — Material inserted or grafted into the tissues of a host.

endodontic implant (endosseous implant) — A rod placed in the canal of the root of a tooth and extending into osseous tissues to stabilize the tooth in the dental arch.

osseointegrated implant (osteointegrated implant) — A direct structural and functional connection between bone and the surface of an immobile, load-bearing implant.

incision and drainage (I&D) — A surgical opening created in soft tissue for the purpose of releasing purulent or hemorrhagic exudate.

inclusion cyst — *See cyst–nonodontogenic cyst.*

indirect pulp cap — *See pulp cap–indirect pulp cap.*

indurated — Firm or hard; term usually used in reference to soft tissues that have become hardened from edema associated with inflammation, infection or neoplastic changes.

infarction — Sudden insufficiency of blood circulation leading to ischemia and necrosis; pulp infarction might occur following traumatic injuries.

infection — Invasion and proliferation of pathogenic microorganisms in body tissues and the reaction of the tissues to their presence.

infection, focal — *See focal infection theory.*

inflammation — The cellular and vascular response of tissues to injury.

acute inflammation — A response that is abrupt in onset and short in duration characterized by the exudation of fluid, serum proteins, inflammatory mediators and cells, mainly polymorphonuclear leukocytes into the area of injury; may become chronic if the injurious agent persists.

chronic inflammation — A response that is slow in onset and of long-standing duration characterized by proliferation of fibroblasts and vascular endothelium and an influx of lymphocytes, plasma cells, macrophages and inflammatory mediators. It may be primary or preceded by acute inflammatory response.

inflammatory resorption — *See resorption–inflammatory resorption.*

informed consent — An agreement by the patient to have treatment rendered by the provider after the risks of the treatment, the results of no treatment, the alternatives to treatment and prognoses have been explained.

infraction (craze line) — A crack of the enamel without loss of tooth structure.

injection, intra-osseous — A technique in which the anesthetic solution is injected directly into the cancellous bone.

injection, intrapulpal — A technique in which the anesthetic solution is injected directly into the pulp under pressure.

injection, periodontal ligament (intra-ligamentary injection, ligamentary injection, PDL injection) — An injection of local anesthetic through the gingival sulcus into the periodontal ligament. The anesthetic solution is actually forced into the alveolar bone and therefore the PDL injection is an intra-osseous injection.

inner enamel epithelium (internal enamel epithelium) — A layer of cells in the enamel organ between the dental papilla and the stratum intermedium. Under the influence of the dental papilla, these cells differentiate into ameloblasts.

instrumentation — Cleaning and shaping of the root canal space using hand- or engine-driven instruments.

intentional replantation — *See replantation, tooth–intentional replantation.*

interferons — A group of glycoproteins that have important antiviral or immune mediating properties.

interglobular dentin — *See dentin–interglobular dentin.*

interleukins — A group of cytokines produced by a wide variety of inflammatory or noninflammatory cells, but mainly lymphocytes and macrophages; important in mediating or suppressing the immune response; may aid or modulate bone resorption.

internal matrix technique — Intracanal placement of a barrier extraradicularly during obturation or

perforation repair to prevent extrusion of obturation or restorative materials.

internal resorption — *See resorption–internal resorption.*

intertubular dentin — *See dentin–intertubular dentin.*

intracanal medicament — A chemical agent sealed within the root canal system; used between appointments as an anodyne and/or antimicrobial agent.

intracoronal bleaching — *See bleaching–intracoronal bleaching.*

intranasal anesthesia – anesthetic delivered by nasal spray. ~~possible teeth that could be anesthetized are #4-13~~

intrusive luxation — *See luxation–intrusive luxation.*

iodine potassium iodide — An intracanal medicament/irrigant composed of iodine 2 percent (w/w), potassium iodide 4 percent and distilled water 94 percent, that exhibits antimicrobial action with minimal host toxicity and tissue irritation.

iodine, tincture of — 5 percent iodine in alcohol; used to disinfect tooth surfaces prior to access preparation.

iodoform — CHI₃ triiodomethane; a topical antimicrobial agent.

iodophor — Typically, 1 percent iodine combination with a surfactant carrier, such as polyvinylpyrrolidone, that is applied as a slow release antimicrobial agent.

irregular dentin — *See dentin–tertiary dentin.*

irrigants — Liquids used for intracanal irrigation; examples include sodium hypochlorite, saline, chlorhexidine, hydrogen peroxide and EDTA.

irrigation — Washing by a stream of fluid; intracanal irrigation facilitates physical removal of materials from the canal and introduction of chemicals for antimicrobial activity, demineralization, tissue dissolution, bleaching, deodorizing and hemorrhage control.

active irrigation — use of mechanical or manual agitation to enhance physical and chemical debridement of canal contents.

passive irrigation — gentle flushing of the canal to enhance chemical debridement, without application of energy.

irritation dentin — *See dentin–tertiary dentin.*

ISO (International Standards Organization) — An international nongovernmental organization whose objective is the development of international standards; a committee, TC106-Dentistry, is responsible for the standardization of terminology, test methods and specifications for dental materials, instruments, appliances and equipment.

isotonic — Relates to an equal osmotic pressure to interstitial or intracellular fluids; an important requirement for media used to transport traumatically avulsed teeth.

isthmus — A thin communication between two or more canals in the same root or between vascular elements in tissues.

K

kinins — Inflammatory mediators that are produced when plasma or tissue kallikreins contact kininogen; bradykinin and neurokinin A are examples of the kinins that may reduce the pain threshold in pulpal inflammation.

kloroperka — A paste made by dissolving a powder consisting of zinc oxide, gutta-percha and rosin in

chloroform and used as a cementing medium for gutta-percha points during the obturation procedure.

L

lamina dura — The layer of compact bone forming the wall of a tooth alveolus seen in dental radiographs as a thin radiopaque line surrounding the roots of teeth; loss of continuity and changes in its width and radiopacity may indicate pathosis.

Langerhans cells — Dendritic, clear cells that participate in antigen processing and presentation in apical inflammation.

laser (light amplification by stimulated emission of radiation) — A device that concentrates high energies into an intense narrow beam of nondivergent monochromatic electromagnetic radiation; used in surgery, cauterization and for a variety of diagnostic purposes; various types available depending on the laser wavelength, probe characteristics and the laser energy; types include the carbon dioxide, Nd:YAG, argon and xenon chloride excimer lasers.

laser Doppler flowmetry — *See pulp test.*

lateral canal — *See canal, pulp–lateral canal.*

lateral compaction (condensation) — *See obturation technique–lateral compaction.*

lateral luxation — *See luxation–lateral luxation.*

lateral periodontal cyst — *See cyst–lateral periodontal cyst.*

ledge — An artificial irregularity created on the surface of the root canal wall that impedes the placement of instruments to the apex of an otherwise patent canal.

lentulo — A flexible, loosely spiraled, wire instrument that can be mounted in the dental handpiece or used by hand; this rotating instrument carries paste materials, such as root canal sealers or medicaments, into the root canal.

levels of evidence — A ranking system used in evidence-based practice to describe the strength of the results in a clinical trial or research study. From strongest to weakest, the levels are generally described as follows:

- Systematic reviews of randomized control trials
- Single well-formulated randomized controlled trials
- Cohort studies (prospective)
- Case controlled studies (retrospective)
- Case series
- Expert opinion, in vitro/ex vivo bench-top studies, or case reports

lingual (palatal) groove defect — A developmental groove occasionally present on the lingual surface of maxillary incisors; may be deep enough to communicate with the pulp, causing pulp necrosis due to the invasion of bacteria; may contribute to isolated periodontal defects due to loss of attachment in the area.

lipopolysaccharide (endotoxin) — Large molecule within outer layer of cell from gram-negative bacteria that consists of a variable polysaccharide and a conserved lipid; induces an intense inflammatory response, and, if absorbed systemically in large quantities, can cause septic shock.

liquefaction necrosis — Death of a tissue in which cells and tissue elements become partly or completely liquefied.

lubricants — Used during root canal instrumentation, particularly with rotary instruments, to enhance negotiation of the canal and to minimize friction and the risk of file separation.

Ludwig's angina — Severe, life-threatening infection, usually of odontogenic origin; arises if there is bilateral involvement of the submental, sublingual and submandibular spaces; is characterized by painful swelling of the floor of the mouth, tongue elevation, dysphagia, dysphonia and (at times) compromises the airway.

luxation — Displacement of a tooth from its original position in the alveolus, without total avulsion, resulting from acute trauma.

extrusive luxation — A partial axial displacement of the tooth from its socket.

intrusive luxation — An axial displacement of the tooth into the alveolus often accompanied by comminuted apical fracture of the alveolar socket.

lateral luxation — A displacement of the tooth in a direction other than axially, usually accompanied by fracture of the alveolar socket.

subluxation — An abnormal loosening of the tooth in the alveolar socket without displacement.

lymphocyte — Immunocompetent cell with large circular nucleus that mediates a variety of specific and nonspecific immune reactions.

B-cell — Lymphocytes that are primarily responsible for the mediation of humoral immunity through production of antibodies.

NK-cell — Natural killer cells are a type of lymphocyte involved in innate immunity against viruses and cancer cells. They kill target cells directly and can mediate antibody-dependent cellular cytotoxicity.

T-helper cell (CD4 cell) — Lymphocytes that mediate specific immune responses by stimulation of B-cells, other T cells and activation of macrophages. Two main variants are currently recognized: TH1 and TH2. The former has a cytokine profile that produces a pro-inflammatory response, whereas the latter produces cytokines that activate B-cells and may contribute to the reduction of the inflammatory response and the inhibition of TH1 cells.

T-suppressor/cytotoxic cell (CD8 cell) — Cells that mediate lysis of virus infected cells, tumor cells and graft rejection, and other forms of cell-mediated hypersensitivity.

lymphokine — A cytokine produced by a lymphocyte, such as IL-2.

M

macrophage — Large phagocytic cells that mediate the innate immune responses by producing cytokines, bactericidal enzymes, oxygen-reactive molecules and growth factors; participate in antigen presentation to lymphocytes; arise from circulating monocytes and constitute a group of heterogenous cells in various tissues of the body known as the mononuclear-phagocyte system.

major apical diameter — The area of the apical foramen where the walls are farthest apart; usually located in the cementum.

malar — Related to the cheek or the zygomatic bone.

mantle dentin — *See dentin–mantle dentin.*

marsupialization — The conversion of a closed cavity to a pouch by making an incision and suturing the edges of the wall to adjacent tissue..

martensitic phase — *See austenitic phase*—A crystalline form of metal. In nickel titanium alloy, this more flexible form occurs as the result of thermal changes or the application of stress.

master apical file — The largest file used to the full working length of the completely prepared root canal.

master apical rotary file — The largest rotary instrument used to the full length of the completely

prepared canal in some rotary preparation systems.

master point (master cone) — The largest gutta-percha point that can be placed either to full working length or to within a short distance of working length (usually 0.5 mm or less), of the completely prepared root canal prior to obturation by either lateral or vertical compaction.

mast cell — A connective tissue cell that is involved in anaphylactic reactions by releasing histamine.

maxillary sinusitis of dental origin (MSDO) — Maxillary sinusitis induced by dental etiology. The pathological extension of dental infection into the maxillary sinus causing symptomatic inflammation of the mucosal tissues of the maxillary sinus. (*See odontogenic sinusitis*).

maxillary sinusitis of endodontic origin (MSEO) — Maxillary sinusitis induced by endodontic etiology. The pathological extension of endodontic disease into the maxillary sinus causing symptomatic inflammation of the mucosal tissues of the maxillary sinus. Presentation of MSEO may include periapical mucositis, periapical osteoperiostitis, or partial to full occlusion of the maxillary sinus.

mechanical pulp exposure — *See pulp exposure—mechanical pulp exposure.*

mechanical pulp test — *See pulp test - test cavity.*

medicament (medication) — An agent used for medicinal value; commonly refers to intracanal, interappointment agents used for palliative or antimicrobial purposes.

meta-analysis — Statistical process commonly used with systematic reviews; involves combining the statistical analyses and summarizing the results of several individual studies into one analysis. When data from multiple studies are pooled, the sample size and power usually increase.

microbial culture — *See culture, microbial.*

microleakage — The ingress of oral fluids along any interface between a tooth surface, restoration, cement or root canal filling material; concept of microleakage also applicable to the passage of apical tissue fluids coronally along any interface between a root canal surface and its obturating materials.

microneuroma — A neuroma seen on the light microscope level; typically a mushrooming growth from the proximal end of a nerve injured by surgery or trauma.

mineral trioxide aggregate (MTA) — A cement-like material used as a root-end filling material, for perforation repair and pulp capping and as a root-end barrier in teeth with an open apex.

minor apical diameter — *See apical constriction.*

mobility — Movement of tooth in its socket resulting from an applied force, usually measured on an increasing scale of 1–3 or measured by the amount of horizontal and/or vertical mobility in millimeters.

modulus of elasticity (Young's modulus) — Measure of stiffness of an object, defined as the amount of strain resulting from applying a given stress.

morbidity — A diseased state; a ratio of sick to well in a community or the frequency of the appearance of complications following a surgical procedure or other treatment.

mucocoele — A cyst or cyst-like structure that contains mucous glycoproteins typically found in the lining of paranasal sinuses and salivary glands.

multivariate analysis — An analysis that takes into account multiple dependent variables simultaneously, to control for confounding factors and determine the interrelationship of variables.

myelin — A lipoproteinaceous sheath surrounding certain types of nerve fibers; thought to be related to the speed of transmission of an action potential.

myofascial pain dysfunction — A syndrome characterized by deep, dull, aching, regionally referred pain

associated with focally tender “trigger points” (TPs), in muscle and fascia; most prevalent cause of painful symptoms in temporomandibular disease (TMD); referred pain may be interpreted as headache, toothache, TMD or sinus pain.

N

nanoparticles — Particles smaller than 100 nanometers.

necrobiosis – *see pulp necrobiosis*

negative pressure irrigation — A technique that uses a narrow vacuum tip placed apically into the canal to draw irrigant into the canal system.

neuralgia — Pain that extends along the course of one or more nerves; many varieties are distinguished according to the body part affected or to the cause.

neuralgia-inducing cavitation osteonecrosis (NICO) — A controversial pathologic designation used to refer to osseous cavitation defects secondary to chronic inflammation or necrosis from bacterial osteomyelitis or vascular/coagulation pathosis following tooth extraction; such defects are proposed as etiologic factors in certain types of chronic orofacial pain; proposed diagnosis of NICO is based on the presence of palpation sensitivity over an edentulous area that is otherwise normal clinically and conventional radiographs; rapid pain reduction with the administration of infiltration anesthesia in the area is a diagnostic feature.

neurogenic inflammation — Stimulation and persistence of inflammation by the vasoactive properties of neuropeptides.

neuroma — A proliferation of neural tissue that may form in healing soft or hard tissues; implicated in atypical facial pain and atypical odontalgia.

neuropeptides — A class of proteins produced by neurons which have inflammatory, sensory and vasoactive properties; examples of neuropeptides identified in the dental pulp include substance P, calcitonin gene-related peptide (CGRP), neuropeptide Y, vasoactive intestinal peptide and neurokinin A. Neuropeptides are potent mediators of pain, inflammation and vascular dynamics.

nickel-titanium — An alloy of nickel and titanium, also known as “NiTi” or “nitinol,” with unique properties of flexibility and shape memory; nitinol is used in dentistry for orthodontic wire and endodontic files.

nociceptor — A peripheral pain receptor; afferent nerve receptors that respond to multiple types of stimuli are termed “polymodal,” while those responding to temperature change are termed “thermoceptors” and those responding to mechanical change are termed “mechanoreceptors.”

node — The point of minimum oscillation or displacement amplitude of an object vibrating in a sinusoidal wave pattern, such as an ultrasonically activated endodontic file.

non-odontogenic cyst — *See cyst–non-odontogenic cyst.*

non-standardized instrument — An endodontic reamer, file or finger spreader that does not correspond to the appropriate ANSI/ADA or ISO/FDI specifications.

non-standardized point (non-standardized cone) — A gutta-percha or paper point that does not conform to size and taper of standardized endodontic instruments; more tapered than standardized points, with fine apical diameters gradually increasing to larger coronal diameters than standardized points; taper and diameter specifications corresponding to size nomenclature—extra-fine, fine-fine, fine, medium-fine, fine-medium, medium, coarse and extra-coarse—have not been defined and may vary among manufacturers.

normal apical tissues — Teeth with normal periradicular tissues that are not sensitive to percussion or palpation testing. The lamina dura surrounding the root is intact, and the periodontal ligament space in

uniform.

normal pulp — A clinical diagnostic category in which the pulp is symptom-free and normally responsive to pulp testing.

O

obtundent — An agent having the power to dull sensibility or to alleviate pain.

obturate — To fill the shaped and debrided canal space with a temporary or permanent filling material.

obturation technique — The method used to fill and seal a cleaned and shaped root canal using a root canal sealer and core filling material:

carrier-based obturation — Sealer is placed in the canal followed by a core carrier of metal, plastic or gutta-percha, which is coated with gutta-percha or other materials; the carrier device is heated prior to placement.

continuous wave compaction technique — A variation of warm vertical compaction in which a master point is placed in a sealer-lined canal and compacted by a prefitted, tip-heated electrical plugger. The softened point is vertically compacted, the plugger withdrawn and canal backfilled with thermoplasticized material.

hydraulic condensation — Sealer is placed into the canal (usually with a syringe), and the master gutta-percha cone is used to agitate and move sealer apically and laterally within the canal. The master cone is seared at the level of the pulpal floor with compaction only to adapt gutta-percha to the orifice (not apically). Also known as the single cone technique.

lateral compaction — Sealer is placed in the canal followed by a fitted gutta-percha (or other material) master point compacted apically and laterally by a tapering spreader to make room for additional points.

plasticized technique — Sealer is placed in the canal followed by a filling material that has been softened with heat or chemicals for compaction in the canals.

silver point (cone) technique — Sealer is placed in the canal followed by a fitted silver point.

warm vertical compaction — Sealer is placed in the canal followed by a fitted master cone, which is warmed and compacted vertically by a plugger to make room for additional warmed segments of filling.

Occupational Safety and Health Administration (OSHA) — A federal governmental agency assigned the responsibility to provide a safe working environment for employees by providing guidelines for the workplace. <http://www.osha.gov>

odontalgia — Pain originating from a tooth.

odontoblast — A highly-differentiated connective tissue cell found on the periphery of the dental pulp adjacent to the predentin; main function is the formation of dentin.

odontoclast — A multinucleated giant cell responsible for resorption of tooth structure; functionally and morphologically analogous to the osteoclast.

odontogenesis — Tooth formation; the origin and histogenesis of teeth; involves initiation, histodifferentiation, morphodifferentiation and apposition.

odontogenic cyst — *See cyst–odontogenic cyst.*

odontogenic keratocyst — *See keratocystic odontogenic tumor (KCOT).*

odontogenic maxillary sinusitis (OMS) — Maxillary sinusitis induced by dental etiology. The pathological extension of dental infection into the maxillary sinus causing symptomatic inflammation of the mucosal tissues of the maxillary sinus. (*See odontogenic sinusitis.*)

odontogenic sinusitis — Sinusitis induced by dental etiology. The pathological extension of any dental infection into the maxillary sinus causing symptomatic inflammation of the mucosal tissues of the maxillary sinus and potential involvement of other paranasal sinuses and nasal cavity. Potential dental etiologies include oro-antral fistulae, endodontic pathogens, periodontal disease, root fractures, or iatrogenic causes such as extruded dental materials, displaced teeth or foreign bodies into the maxillary sinus. Symptoms from odontogenic sinusitis may include congestion, rhinorrhea, retrorhinorrhea, facial pain, and/or foul odor.

oil of cloves — A natural analgesic, antiseptic derived from the essential oil of the clove. Eugenol is the main ingredient.

orifice — The opening leading from the pulp chamber into a root canal, especially in a tooth with multiple canals.

orifice barrier — A material placed to provide a coronal seal to prevent re-contamination of the canal system. The orifice barrier does not take the place of the final restoration.

orifice opener (shaper) — A variety of hand- or power-driven pointed instruments used to widen the canal orifice for easier introduction of cleaning and shaping instruments.

oro-antral fistula — An abnormal opening between the maxillary sinus and the oral cavity.

ossifying fibroma (cementifying fibroma) — A benign, neoplastic, fibro-osseous lesion thought to originate from remnants of the PDL; early stage osteolytic lesions present radiographically as a radiolucent area in the periradicular area; it may become radiopaque over time; tends to occur in younger patients in the premolar/molar region; associated with teeth with vital pulps.

osteitis — Inflammation of bone.

osteoconduction — In bone regeneration procedures, material acts as a template to allow new bone formation.

osteodentin — *See dentin–tertiary dentin.*

osteogenesis — In bone regeneration procedures, the material actually produces new bone.

osteoiduction — In bone regeneration procedures, material actively stimulates new bone formation.

osteomyelitis — Inflammation of bone due to an infection. Bones may become infected by an infection in another part of the body that spreads through the bloodstream or an open fracture or surgery that exposes the bone to infection. Chronic osteomyelitis may follow acute osteomyelitis and usually necessitates treatment with surgical and chemotherapeutic (antibiotics) intervention.

osteoporosis — A metabolic bone disease of variable etiologies that results in a net decrease in bone mass; characterized by disproportionate osteoclastic activity in cells.

osteotomy (ostectomy) — Surgical procedure involving the removal of bone, typically used to access the root-end.

outcomes —

healed — Functional, asymptomatic teeth with no or minimal radiographic periradicular (apical) pathosis (radiolucency).

nonhealed — Nonfunctional, symptomatic teeth with or without radiographic periradicular (apical) pathosis (radiolucency).

healing — Teeth with periradicular (apical) pathosis (radiolucency), which are asymptomatic and functional, or teeth with or without radiographic periradicular (apical) pathosis (radiolucency), which are symptomatic but whose intended function is not altered.

functional — A treated tooth or root that is serving its intended purpose in the dentition.

outer enamel epithelium (external enamel epithelium) — Cuboid shaped cells that form the outer border of the enamel organ and join with the inner enamel epithelium at the future cemento-enamel junction to form

Hertwig's epithelial root sheath.

over-extension — A solid or semi-solid core root canal filling extending beyond the apical foramen, often the result of failure to create an apical stop during instrumentation; commonly used to imply that the root canal space is not completely obturated.

over-filling — A solid or semi-solid core root canal filling extending beyond the apical foramen; commonly used to imply that the root canal space is completely obturated.

over-instrumentation — Instrumentation beyond the apical foramen resulting in the loss of an apical constriction.

P

PAI — *See periapical index.*

pain — A multifactorial noxious experience that involves not only the sensory response but also modification by cognitive, emotional and motivational influences related to past experience.

referred pain — Pain that is interpreted to originate in a part of the body other than the actual site of origin.

palatal groove — A developmental groove in a root that, when present, is usually found on the lingual aspect of maxillary incisor teeth.

palpation — The use of the sense of touch to examine tissue for diagnostic reasons, such as to determine texture, rigidity and tenderness.

paper point (cone) — A tapered cylinder of paper used to dry root canals.

paraformaldehyde — A toxic polymer of formaldehyde occurring as a white, amorphous solid that is slowly soluble in water; historically used in pulp mummification; formaldehyde is regulated by OSHA as a carcinogen or potential carcinogen at body temperature, gradually depolymerizes and releases formaldehyde.

paresthesia — A sensation such as burning, prickling or partial numbness caused by neural injury; sometimes follows acute traumatic injuries or infection to the teeth and jaws, root-end resection or overfilling of the root canal with impingement upon a nerve.

parulis — A nodule at the site where a draining sinus tract reaches the surface.

pathfinder — A small diameter instrument used to initially negotiate a canal.

peesoo reamer — A latch-type slow speed instrument for widening and paralleling root canals.

percussion — A diagnostic procedure used to assess the condition of a body part by means of tapping; painful response may indicate periradicular inflammation; variations in sound may indicate other periodontal ligament conditions.

perforation — The mechanical or pathologic communication between the root canal system and the external tooth surface.

Apical perforation — A perforation in the apical one-third of the root.

Furcation perforation — A perforation in the furcal area of the tooth.

Strip perforation — A complete penetration of a root canal wall due to excessive lateral tooth structure removal during canal preparation; usually occurs in curved roots or roots with surface invaginations.

periapex — The anatomic site situated at and around the apical portion of a root.

periapical index – A scoring system for registration of apical periodontitis in radiographs.

periapical mucositis — Inflammation of the periapical tissues and maxillary sinus mucosa that is of pulpal origin, characterized by a localized edema of the adjacent mucosal tissues of the maxillary sinus. It may or may not be associated with clinical dental or sinus symptoms.

periapical osteoperiostitis — An inflammatory reaction of the periosteum of the maxillary sinus caused by pulpal and periapical infection of adjacent maxillary posterior teeth. This reactive osteogenesis is characterized by the displacement and expansion of the maxillary sinus floor and the deposition of a thin layer of new bone, which presents on radiographs and CT images as a radiopaque “halo” appearance over the infected root apex. It may or may not be associated with dental or sinus symptoms.

pericementitis — *See periodontitis.*

periodontal abscess — *See abscess–periodontal abscess.*

periodontal ligament (PDL) — The highly vascular and highly cellular connective tissue that surrounds the roots of teeth and attaches them to the alveolar bone.

periodontal ligament injection — *See injection, periodontal ligament.*

periodontitis (pericementitis) — Inflammation of the periodontium.

asymptomatic apical periodontitis — Inflammation and destruction of apical periodontium that is of pulpal origin, appears as an apical radiolucent area, and does not produce clinical symptoms.

symptomatic apical periodontitis — Inflammation usually of the apical periodontium, producing clinical symptoms including a painful response to biting and/or percussion or palpation. It might or might not be associated with an apical radiolucent area.

periodontium — The tissues that surround and support teeth, attaching them to the alveolar bone; includes bone, connective tissue, vascular and neuronal elements.

periradicular — Surrounding the root.

periradicular cemental dysplasia — *See dysplasia, periradicular cemental.*

apical curettage — *See curettage, apical.*

periradicular fibrous dysplasia — *See dysplasia, periradicular cemental.*

periradicular osteofibrosis — *See dysplasia, periradicular cemental.*

periradicular osteosclerosis — *See condensing osteitis.*

peritubular dentin — *See dentin–peritubular dentin.*

phantom tooth pain — Regional pain that continues in an area after tooth extraction, similar to phantom limb pain; pathophysiology includes deafferentation, nerve sprouting, neuroma formation and sympathetic efferent activity.

photodynamic therapy — an antimicrobial strategy that uses a photosensitizer with light source to produce highly reactive oxygen radicals designed to kill microorganisms within the root canal system.

pink tooth — Reddish discoloration of the crown of a tooth.

plasticized technique — *See obturation technique–plasticized technique.*

platelet-rich plasma (PRP) — The use of centrifuged whole blood to concentrate growth factors in plasma for enhancement of healing.

plugger — A smooth, flat-ended and slightly tapered metal instrument designed to compact materials vertically within a prepared root canal.

polymerase chain reaction (PCR) — An enzymatic method for repeated copying of the two strands of specific DNA sequences in a particular gene of interest; widely used to amplify minute quantities of biological material so as to provide adequate specimens for laboratory studies or identification.

post (dowel) — A custom or preformed rod that is fitted and cemented into the root canal of an endodontically treated tooth for core retention.

postherpetic neuralgia/neuropathy (PHN) — Induced by the reactivation of latent herpes zoster virus in infected ganglion of sensory nerve endings; typically occurs in immune-compromised or elderly individuals; manifested by continuous pain along the dermatome of the affected nerve, which can include the dental pulp; root canal treatment may relieve pulpal pain.

potassium nitrate (KNO₃) — A desensitizing agent for dentin hypersensitivity; a common constituent of over-the-counter treatments.

potassium oxalate (K₂C₂O₄) — A desensitizing agent developed for dentin hypersensitivity; when applied to exposed dentin, produces calcium oxalate crystals that occlude the dentinal tubules, prolonging the therapeutic effects.

predentin — *See dentin–predentin.*

premolarization — *See bicuspidization.*

preparation, canal — Procedures involved in cleaning and shaping the canal system prior to obturation.

biomechanical preparation — Use of rotary/reciprocating and/or hand instruments to expose, clean, enlarge and shape the pulp canal space, usually in conjunction with irrigants.

chemomechanical preparation — Use of chemicals for irrigation of the root canal, demineralization of dentin, dissolution of pulp tissue and neutralization of bacterial products and toxins; used in conjunction with biomechanical preparation.

previously initiated therapy — A clinical diagnostic category indicating that the tooth has been previously treated by partial endodontic therapy (eg, pulpotomy, pulpectomy).

previously treated — A clinical diagnostic category indicating that the tooth has been endodontically treated and the canals are obturated with various filling materials other than intracanal medicaments.

primary dentin — *See dentin–primary dentin.*

primordial cyst — *See cyst–primordial cyst.*

prion — Infectious transmissible proteinaceous particles that lack nucleic acid; thought to be responsible for neurodegenerative diseases known as spongiform encephalopathies (e.g. Creutzfeldt-Jakob disease); resistant to current sterilization procedures.

prognosis — the prospect of recovery as anticipated from the usual course of disease or peculiarities of the case. This is typically classified in endodontics as unfavorable, questionable or favorable.

prospective study — A study design that follows patients from a beginning point into the future.

proteoglycan — Glycosaminoglycans are ground substance components that are bound to protein chains in covalent complexes.

pseudocyst — *See cyst–pseudocyst.*

pulp, dental (tooth) — A richly vascularized and innervated specialized connective tissue of ectomesenchymal origin; contained in the central space of a tooth, surrounded by the dentin, with inductive, formative, nutritive, sensory and protective functions.

pulp amputation — *See pulpotomy.*

pulp canal — *See canal, pulp.*

pulp canal obliteration (PCO) – Radiographic evidence of increased dentin production primarily in response to trauma. The end result of this process is a calcified canal and is not necessarily indicative of a diseased pulp. The term pulp canal calcification (PCC) may also be used to reference this condition.

pulp cap — Treatment of an exposed vital pulp by sealing the pulpal wound with a dental material such as calcium hydroxide or mineral trioxide aggregate to facilitate the formation of reparative dentin and maintenance of a vital pulp. *See also vital pulp therapy.*

direct pulp cap — A dental material placed directly on a mechanical or traumatic vital pulp exposure.

indirect pulp cap — A procedure in which a material is placed on a thin partition of remaining carious dentin that, if removed, might expose the pulp in immature permanent teeth.

pulp chamber — The portion of the pulp space within the anatomic crown of the tooth.

pulp exposure — An opening in dentin that uncovers pulp.

carious pulp exposure — A pulp exposure resulting from the progressive destruction of tooth structure by acids and proteolytic enzymes elaborated through microbial activity; underlying pulp is inflamed to a varying and unknown extent, due to the progression of dental caries.

mechanical pulp exposure — An accidental exposure of the pulp by hand- or engine-driven dental instruments in the absence of dental caries; if aseptic conditions are maintained, the underlying pulp is usually not inflamed.

traumatic pulp exposure — A pulp exposure due to a fracture of the tooth.

pulp extirpation — *See pulpectomy.*

pulp fibrosis — An increase in the number and size of fibrous elements of the pulp with a concomitant decrease in the number of cells; believed to occur as part of a normal aging process but may also be accelerated by traumatic injuries or pathologic degenerative changes in the pulp.

pulp necrobiosis – the condition when a portion of the pulp has become infected and necrosed and the remaining pulp is inflamed(hence vital tissue remains).

pulp necrosis — A clinical diagnostic category indicating death of the dental pulp. The pulp is usually nonresponsive to pulp testing.

pulp polyp — *See hyperplastic pulpitis, chronic.*

pulp regeneration — the ability to recreate lost or damaged pulp tissue.

pulp space — The cavity within the tooth that houses the dental pulp system.

pulp stone (denticle) — A calcified mass occurring within the pulp or attached to pulp space walls; classified as true or false denticles, according to composition and morphology, and free, adherent or interstitial denticles, according to their location in relation to the pulp space walls.

pulp test (pulp sensibility test) — A diagnostic procedure to determine pulpal status; can be performed with electrical, mechanical or thermal methodologies to assess the pulp's response to the stimulus.

electric pulp test (EPT) — A pulp test that utilizes an electrical current to stimulate sensory nerves of the dental pulp; modes of testers include both bipolar and monopolar.

test cavity — A diagnostic procedure in which a small cavity is prepared without anesthesia into the dentin to test for pulpal responsiveness.

thermal pulp test — A pulp test using a hot or cold stimulus to induce dentinal tubule fluid movement and resultant stimulation of sensory receptor elements within the pulp.

cold test — Usually conducted with a frozen stick of carbon dioxide or a cotton pellet sprayed with 1,1,1,2 tetrafluoroethane.

heat test — Usually conducted with hot liquid, heated temporary stopping material or electronic devices specifically designed to administer heat of a specified temperature.

pulp test (vitality test) - A diagnostic procedure to determine pulpal status by the assessment of blood supply to the tooth.

laser Doppler flowmetry — A pulp test that assesses pulpal blood flow by the detection of light scatter generated by moving erythrocytes; effective in young traumatized pulps and large pulps that do not respond dependably to other forms of sensibility testing.

pulse oximetry — A pulp test to assess vascular integrity by measuring the oxygenation of blood.

pulpal abscess — *See abscess–pulp abscess.*

pulpalgia — Pain arising from the dental pulp.

pulpectomy (pulp extirpation) — The complete removal of the vital dental pulp.

pulpitis — A clinical and histologic term denoting inflammation of the dental pulp; clinically described as reversible or irreversible and histologically described as acute, chronic or hyperplastic.

asymptomatic irreversible pulpitis — A clinical diagnosis based on subjective and objective findings indicating that the vital inflamed pulp is incapable of healing. Additional descriptors: no clinical symptoms but inflammation produced by caries, caries excavation, trauma.

chronic hyperplastic pulpitis (pulp polyp) — *See hyperplastic pulpitis, chronic.*

reversible pulpitis — A clinical diagnosis based on subjective and objective findings indicating that the inflammation should resolve and the pulp return to normal.

symptomatic irreversible pulpitis — A clinical diagnosis based on subjective and objective findings indicating that the vital inflamed pulp is incapable of healing. Additional descriptors: lingering thermal pain, spontaneous pain, referred pain.

pulpotomy (pulp amputation) — The removal of the coronal portion of a vital pulp as a means of preserving the vitality of the remaining radicular portion; may be performed as emergency procedure for temporary relief of symptoms or therapeutic measure, as in the instance of a Cvek pulpotomy (trauma).

partial pulpotomy (shallow pulpotomy; Cvek pulpotomy) — The removal of a small portion of the vital coronal pulp as a means of preserving the remaining coronal and radicular pulp tissues.

purulent exudate — *See exudate–purulent exudate.*

pus — An inflammatory exudate fluid product of inflammation containing leukocytes and the debris of dead cells and tissue elements liquified by enzymes elaborated by polymorphonuclear leukocytes.

pyrogen — Gram negative bacterial byproduct that induces fever.

R

radicular — Pertaining to the root of a tooth.

radicular cyst — *See cyst–periradicular cyst.*

radial land — Peripheral portion of a rotary instrument that is flat and smooth designed to center the instrument in the canal space.

radiograph — An image produced by the action of x-rays.

radiographic apex — *See apex–radiographic apex.*

radiographic techniques — Methods for making radiographic images using film and an x-ray source.

bisecting angle technique — The x-ray beam is directed at a right angle to an imaginary plane that bisects the angle formed by the film and the central axis of the tooth; the film is placed as close as possible to the tooth.

paralleling technique (long cone technique) — The x-ray film is supported parallel to the long axis of the teeth and the central ray of the x-ray beam is directed at right angles to the teeth and film; to reduce geometric distortions, it is important that the x-ray source be located relatively distant from the teeth, hence the use of a long cone.

radiolucency (rarefaction) — An area of darkness on a radiograph indicating that an object of low density is allowing complete or partial penetration by x-rays.

radiopacity — An area of lightness on a radiograph indicating that the density of an object is preventing penetration by x-rays.

radix entomolares — A supernumerary root on a mandibular molar, located distolingually.

radix paramolares — A supernumerary root on a mandibular molar, located mesiobuccally.

ramification — 1) A small gap resulting from a localized fragmentation of the epithelial root sheath that includes furcation canals, lateral canals, and apical accessory canals; 2) unusual or inconsistent intracanal anatomy.

randomized controlled trial — An experimental study in which subjects are randomized to receive an experimental or a control treatment or intervention. The relative effectiveness of the interventions is assessed by comparing event rates and outcomes in the two groups.

rarefaction — *See radiolucency.*

reactive dentin — *See dentin–tertiary dentin.*

reamer — A tapered metal instrument with spiral cutting edges used to enlarge root canals by rotary action; differs from a file primarily in having fewer spirals or twists (flutes) per unit length of cutting blade; is not effective in a push-pull motion.

reaming — Typically a continuous clockwise rotation of a reamer for canal debridement.

recapitulation — Reintroduction of small files during canal preparation to keep the apical area clean and patent.

receptor activator of nuclear factor- κ B ligand (RANKL)- a cytokine essential for the differentiation of osteoclast precursors into mature osteoclasts

reciprocation- a file working motion consisting of a counterclockwise (cutting direction) and a clockwise motion (release of the instrument) whereby the angle of the counter-clockwise direction is greater than the angle of the reverse direction.

reduced enamel epithelium — The structure comprised of the stratified epithelial layer and ameloblasts that protects the crown of a tooth until eruption.

referred pain — *See pain–referred pain.*

regenerative endodontics — Biologically-based procedures designed to physiologically replace damaged tooth structures, including dentin and root structures, as well as cells of the pulp-dentin complex.

regression analysis — Statistical method of finding the best mathematical model to describe one variable as a function of another.

reliability — The degree of stability that exists when a measurement is repeatedly made under different conditions or by different observers.

reparative dentin — *See dentin–tertiary dentin.*

replacement resorption — *See resorption–replacement resorption.*

replantation, tooth — The return of a tooth to its alveolus.

intentional replantation (extraction/replantation) — Insertion of a tooth into its alveolus after the tooth has been extracted for the purpose of performing treatment, such as root-end filling(s) or perforation repair.

resorption — A condition associated with either a physiologic or a pathologic process resulting in a loss of dentin, cementum and/or bone.

cervical resorption — A type of external resorption that occurs in the coronal third of the root.

external resorption — Resorption initiated in the periodontium and initially affecting the external surfaces of a tooth; may be further classified as surface, inflammatory or replacement, or by location as cervical, lateral or apical; may or may not invade the dental pulp space.

inflammatory resorption — An internal or external pathologic loss of tooth structure and possibly bone, resulting in a defect; occurs as the result of microbial infection; characterized radiographically by radiolucent areas along the root.

internal resorption — An inflammatory process initiated within the pulp space with loss of dentin and possible invasion of the cementum.

replacement resorption (ankylosis) — A pathologic loss of cementum, dentin and periodontal ligament with subsequent replacement of such structures by bone, resulting in fusion of bone and tooth.

surface resorption — A physiologic process causing small superficial defects in the cementum and underlying dentin that undergo repair by deposition of new cementum.

transient apical breakdown — A response to tooth luxation consisting of radiographic apical bone and root resorption that resolves spontaneously without intervening treatment.

retreatment (revision) — A procedure to remove root canal filling materials from the tooth, followed by cleaning, shaping and obturating the canals.

retrospective study — A statistical term to describe observation of study populations over a previous time period.

revascularization — The restoration of blood supply.

reversible pulpitis — *See pulpitis-reversible.*

root amputation — Surgical removal of all of the root and adherent soft tissues leaving the crown of the tooth intact and supported by remaining root(s).

root canal — *See canal, pulp.*

root canal access — *See access cavity.*

root canal filling — Any material or combination of materials placed inside a root canal for the purpose of obturating and sealing the canal space.

root canal system — The space containing the dental pulp inside the crown and root of a tooth.

root extrusion — *See extrusion–root extrusion.*

root-end resection — The surgical removal of the apical portion of a root and adherent soft tissues; may be performed in advance of root-end preparation for a root-end filling or as a definitive treatment.

root submergence — A surgical procedure to cover a retained root with soft tissue and possibly bone; often advocated for alveolar bone preservation.

root-end filling (restoration) — A restorative material placed in the root-end preparation during periradicular surgery or intentional replantation; designed to enhance the seal of the root canal where orthograde obturation has been less than optimal.

root-end preparation — A cavity created to receive a root-end filling during periradicular surgery or intentional replantation; may be accomplished using rotary or ultrasonic instrumentation.

rubber dam — *See dental dam.*

S

scaffold — A lattice that provides a framework for stem cells to grow for pulpal regeneration.

SCAP (stem cells from apical papilla) — Pluripotent cells from the apical papilla used in regeneration.

sclerosing osteitis — *See condensing osteitis*

sclerotic bone — *See condensing osteitis.*

sclerotic dentin — *See dentin–sclerotic dentin.*

sealer, root canal (cement) — A radiopaque dental cement used, usually in combination with a solid or semi-solid core material, to fill voids and to seal root canals during obturation; included are bioceramics, resins, calcium hydroxide, zinc oxide-eugenol, glass ionomer and others.

secondary dentin — *See dentin–secondary dentin.*

selective caries removal – Excavation of peripheral carious tissues in teeth with vital, asymptomatic pulps. Carious tissues in close proximity to the pulp are left in place, and a restoration is placed.

sensibility test — *See pulp test*

sensitivity — A statistical term describing the accuracy of a positive test result to determine whether a disease exists [True Positives/(TP+ False Negatives)].

sensitization — Heightened sense of perception to noxious stimulation.

central sensitization — Increased synaptic efficacy established in somatosensory neurons in the dorsal horn of the spinal cord following intense peripheral noxious stimuli, tissue injury or nerve damage. This heightened synaptic transmission leads to a reduction in pain threshold, an amplification of pain responses and a spread of pain sensitivity to non-injured areas.

peripheral sensitization — Sensitization from a primary hyperalgesia where the presence of algogenic substances cause a lowered pain threshold. This lowering of pain thresholds is related to a lowering of the stimulus needed to excite an action potential.

serous exudate — *See exudate–serous exudate.*

SHED (stem cells from human exfoliated deciduous teeth) — Pluripotent cells from exfoliating deciduous teeth used in regeneration.

silver point (silver cone) — A rigid radiopaque cone produced from almost pure silver in a variety of sizes, usually corresponding to the diameters and tapers of root canal files; historically used to obturate root canals in conjunction with a sealer.

silver point technique — *See obturation technique–silver point technique.*

signaling molecules — Growth factors and other compounds that are capable of stimulating cellular proliferation and directing cellular differentiation.

sinus tract — A pathway from an enclosed area of infection to an epithelial surface; opening or stoma may

be intraoral or extraoral and represents an orifice through which pressure is discharged; usually disappears spontaneously with elimination of the causative factor by endodontic treatment. The term fistula is often inappropriately used.

SLOB rule — When two different radiographic angles are compared, the more lingual structure moves in the same direction as the x-ray tube head, while the more buccal object moves opposite.

slot preparation — During root end surgery, a channel created in the buccal wall of the root that extends into the apical root end preparation; historically used in endodontic surgery for the placement of a root-end restoration.

smear layer — A surface film of debris retained on dentin and other surfaces after instrumentation with either rotary instruments or endodontic files; consists of dentin particles, remnants of vital or necrotic pulp tissue, bacterial components and retained irrigant.

sodium hypochlorite solution (NaOCl) — A clear, pale, greenish-yellow, strongly alkaline liquid with a strong chlorine odor; has a solvent action on organic tissue and is a potent antimicrobial agent; used for irrigating root canals either in full strength or diluted solutions.

sodium perborate (NaBO₃) — An odorless, white, crystalline solid that liberates oxygen in the presence of moisture; used either with water or hydrogen peroxide for intracoronal bleaching of discolored teeth.

soft tissue cyst — *See cyst—soft tissue cyst.*

sonic instrumentation — Preparation of the root canal system with a transversely oscillating file at a frequency within the audible range of perception vibration created by means of compressed air activating a rotor-shaft assembly in a handpiece.

specificity — A statistical term defining accuracy of negative test results for measuring absence of disease [$\text{True Negatives}/(\text{True Negatives} + \text{False Positives})$].

splint — An apparatus used to support, protect or immobilize teeth that have been loosened, replanted, fractured or subjected to certain endodontic surgical procedures.

spreader — A smooth, pointed, slightly-tapered metal instrument designed to compact materials within a prepared root canal; available in a variety of designs that include hand held, finger held or rotary driven.

standardized instrument — An endodontic instrument that conforms to the applicable ANSI/ADA or ISO/FDI specifications, for diameter, length, taper, torsional properties, tip design, and other related factors.

standardized point (standardized cone) — A gutta-percha, silver or paper point manufactured to conform to the size and taper of a standardized endodontic instrument.

steam autoclave sterilization — *See sterilization—steam autoclave sterilization.*

stellate reticulum — Cells comprising the center of the enamel organ, lying between the stratum intermedium and the outer enamel epithelium that secrete hydrophilic glycosaminoglycans into the extracellular compartment.

stem cells — Undifferentiated cells, capable of proliferation and differentiation into specialized cells.

step back technique (telescopic technique) — A method of canal preparation using smaller, more flexible files in the apical one-third, followed by files sequentially larger than the master apical file at incremental lengths of 0.5 to 1 mm short of working length.

sterilization — The complete destruction of microorganisms.

chemical autoclave sterilization — A method of sterilization using the action of a vapor consisting of formaldehyde, alcohols, ketones and water heated to 126°C (260°F) at 20–25 pounds pressure for 20 minutes.

dry heat sterilization — A method of sterilization using the action of air heated to 170°C (340°F) in an

oven for sixty minutes after instruments reach temperature.

steam autoclave sterilization — A method of sterilization using the action of water vapor heated to 121°C (250°F) at 15 pounds pressure for 10–30 minutes.

stratum intermedium — A layer of flattened cells between the inner enamel epithelium and the stellate reticulum characterized by exceptionally high alkaline phosphatase activity; these cells do not produce enamel but are essential for deposition of enamel.

subcutaneous emphysema — *See emphysema, subcutaneous.*

subluxation — Injury to supporting tissues resulting in abnormal loosening of a tooth or teeth without displacement.

substantivity — The binding of disinfectant to dentin and soft tissues with prolonged release. Chlorhexidine possesses this characteristic.

super EBA- a reinforced zinc oxide cement based on a mixture of 32% eugenol and 68% ethoxy benzoic acid (EBA) typically utilized as a root end filling material.

surface resorption — *See resorption–surface resorption.*

surgical access — *See access, surgical.*

surgical flap — *See flap, surgical.*

surgical repair of root resorption (resorption repair) - the treatment of resorptive defects, which may include exposure of the affected resorptive area, debridement of the area affected by the resorption, and placement of a biological and esthetic restoration on the root surface. Does not include placement of a permanent restoration.

surgical repositioning — Intentional loosening and realignment of a tooth in its alveolar socket; performed to manage coronal-third fractures, perforations or deeply placed tooth margins when extrusion or crown lengthening are contraindicated.

syndrome — A complex of signs and symptoms that together are pathognomonic of a particular disorder.

systematic review — A process of systematically locating, appraising and synthesizing evidence from scientific studies in order to obtain a reliable overview; findings from systematic reviews may be used for decision-making about research and the provision of health care.

T

taurodontism — A dental morphologic variation in which the body of the tooth is enlarged, and the roots are reduced in size; results in taurodont teeth with large pulp chambers and apically positioned furcations.

tertiary dentin — *See dentin–tertiary dentin.*

test cavity — *See pulp test, test cavity*

tetrodotoxin resistant sodium channels (TTX-R) — Genetic characteristic of some difficult to anesthetize patients.

thermal pulp test — *See pulp test–thermal pulp test.*

thermography — Sensing and recording the thermal map of the body.

thermomechanical — A term used to describe the plasticity generated within a material by heat from mechanical activity or friction.

thermoplastic — Softening under heat and capable of being molded with pressure, then solidifying on cooling without undergoing chemical change.

tic douloureux — See *trigeminal neuralgia*.

titanium — See *nickel-titanium*.

toothbrush abrasion — See *abrasion*.

torque — Force that produces or tends to produce twisting or rotation within a structure such as a rotary file.

torsional fatigue — Fracture of a file due to binding of the tip or another part of the instrument within the canal while the handpiece keeps turning; the elastic limit of the file is exceeded.

transillumination — The passage of a beam of light through a tooth or other tissue for diagnostic purposes especially in defining fractures. Also used to help locate canal orifices.

transition angle — An angle formed by termination of the cutting edges of K-type files; must be $75^\circ \pm 15^\circ$ to meet ISO specifications; recently altered designs increase or eliminate this angle.

transparent dentin — See *dentin–sclerotic dentin*.

transplantation — The transfer of a tooth from one alveolar socket to another socket or area either in the same or another person.

transportation — Removal of canal wall structure on the outside curve in the apical half of the canal due to the tendency of files to restore themselves to their original linear shape during canal preparation; may lead to ledge formation and possible perforation.

transudate — Noninflammatory edema fluid.

traumatic pulp exposure — See *pulp exposure–traumatic pulp exposure*.

trephination — The surgical perforation of the alveolar cortical plate or apical foramen to release accumulated tissue exudate.

trichloromethane — See *chloroform*.

trichloroacetic acid (TCA) – a 90% aqueous solution used topically to treat active and invasive resorptive tissue by causing coagulation necrosis of that tissue.

trifurcation — The area where a tooth divides into three distinct roots.

trigeminal neuralgia (tic douloureux) — A neurologic disorder in which the dominant symptom is a severe, paroxysmal stabbing pain provoked by stimuli to trigger zones; follows the distribution of any branch of the trigeminal nerve; unilateral in any one paroxysm; patients present with no objective sensory deficits.

triple antibiotic paste — Combination of three antibiotics (metronidazole, minocycline and ciprofloxacin) used to disinfect canals; typically for regenerative endodontics.

trismus, dental — Spasm of the muscles of mastication resulting in difficulty in opening the mouth; etiology may be infection, stress or injury.

tubular dentin — See *dentin–tubular dentin*.

tugback — Slight frictional resistance of a master point to withdrawal when seated; indicates a relative degree of adaptation, at least in two dimensions.

U

ultrasonic instrumentation — Preparation of the root canal system with a transversely oscillating diamond or file at a frequency above the audible range of perception (18,000 to 40,000 Hz); instruments activated by electrical current passing through arrangement of lamellar metal plates, creating alternating attractive and repulsive forces transformed into mechanical vibratory movement.

ultrasonic irrigation — *See irrigation.*

underfilling — An incomplete obturation of the root canal space with resultant voids.

universal precautions — Methods designed for infection control to prevent transmission of blood borne diseases, such as AIDS and Hepatitis B, in health care settings. These include engineering and work control practices, use of personal protective equipment, proper barrier techniques, blood-borne pathogen exposure control, sharps disposal system, hazard communication and others.

urea peroxide — *See carbamide peroxide.*

V

validity — Degree to which data or results of a study truly measure what they purport to measure.

vascular endothelial growth factor (VEGF) — *See neuropeptides.*

vasointestinal peptide (VIP) — *See neuropeptides.*

vertical compaction — *See obturation technique—vertical compaction.*

vital bleaching — *See bleaching—extracoronary bleaching.*

vital pulp therapy - treatment aimed at preserving and maintaining pulp tissue that has been compromised by trauma, caries or restorative procedures in a healthy state. *See also pulp cap.*

W

walking bleach — *See bleaching—walking bleach.*

wear facet — A worn spot on a masticatory surface produced by chewing or grinding.

WHO — World Health Organization.

working length — The distance from a coronal reference point to the point at which canal preparation and obturation should terminate.

X

xenograft — *See graft, xenograft.*

xerostomia — Dryness of the mouth.

x-ray — Electromagnetic radiation emitted from bombardment of a target anode with a stream of electrons from a heated cathode; passes through solid bodies, can cause destructive changes in living tissues and affects a photographic emulsion.

Z

zinc oxide (ZnO) — A fine, odorless, amorphous, white or yellowish powder used in combination with eugenol in various sealers and temporary cements; the principal component by weight in gutta-percha.

zip — A tear-drop shape that may be formed in the apical foramen during preparation of a curved canal when a file extends through the apical foramen and subsequently transports that outer wall; a procedural error that complicates cleaning and obturation.



180 N. Stetson Ave.
Suite 1500
Chicago, IL 60601

Phone: 800-872-3636
(U.S., Canada, Mexico)
or 312-266-7255

Fax: 866-451-9020
(U.S., Canada, Mexico)
or 312-266-9867

Email: info@aae.org

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