

## PERIO

1). Which of the following statements concerning the classification of periodontal disease and conditions are true:

1. Gingival diseases are classified into either dental plaque induced or non-plaque induced.
2. The plaque-induced diseases can be modified by systemic factors, medications and malnutrition.
3. Periodontic-Endodontic lesions are not in the new classification system.
4. Characteristics common to all gingival diseases include non-reversibility of the disease by removing the etiology and precursor to attachment loss around teeth.
5. Non-plaque induced disease may be affected by specific microorganisms, genetic origin, systemic diseases, and traumatic lesions.

- a) 1, 2, 3, 4, 5
- b) 1, 2, 4, 5
- c) 2, 3, 4, 5
- d) 1, 2, 4, 5
- e) 1, 2, 5

**Answer is e. 1, 2 & 5 are correct.** Previous classification (1989) did not include a section on gingival diseases. In this classification, gingival diseases are classified into either dental plaque induced or non-plaque induced. Non-plaque induced includes a wide range of disorder that effect the gingiva.

3 is false: Periodontic-Endodontic lesions are an additional category in the new classification system.

4 is false: Characteristics common to all gingival diseases include reversibility of the disease by removing the etiology and precursor to attachment loss around teeth.

REF: Armitage, G.: Development of a Classification System for Periodontal diseases and Conditions. Ann Periodontal 4: 1-6, 1999

2). What perio procedures are SBE prophylaxis required for?

1. Periodontal procedures including surgery, scaling and root planning, probing and recall maintenance.
2. Dental implant placement.
3. Sub gingival placement of antibiotic fibers or strips.
4. Prophylactic cleaning of teeth or implants where bleeding is anticipated.

- a) 1
- b) 1, 2
- c) 1, 2, 3
- d) 1, 2, 3, 4

**Answer: d.** All perio procedures require SBE prophylaxis except when bleeding is not anticipated, or suture removal.

REF: Dajani AS, Taubert KA, Wilson W, et al "Prevention of bacterial Endocarditis. Recommendations by the AHA," JAMA, 1997, 277(22): 1794-801

**3). If the color band of the PSR probe completely disappears in the periodontal pocket:**

- a) Indicates that PD is less than 5.5mm.**
- b) PSR Code for this sextant is 3.**
- c) Comprehensive periodontal examination and charting of the effected sextant to determine the necessary treatment plan.**
- d) Comprehensive full mouth periodontal examination, charting and treatment planning are needed.**

The color band of the PSR probe is 3.5 to 5.5 mm. If the color band of the PSR probe completely disappears in the periodontal pocket indicates that PD is more than 5.5mm. PSR Code for this sextant is 4.

Comprehensive periodontal examination and charting of the effected sextant to determine the necessary treatment plan is indicated for code 3 (color band of the PSR probe is partially submerged).

**The correct answer is (d):** Comprehensive full mouth periodontal examination, charting and treatment planning are needed for code 4 patient and two or more quadrant with code 3 patient.

REF: Carranza, Newman: Clinical Periodontology, 8<sup>th</sup> Edition. Saunders. Pp: 360-1.

4). PSR (Periodontal Screening and Recording System) is recorded by which of the following?

1. Code 0 indicates there is no bleeding, no calculus, no defective margins, and the colored band remains completely visible. Gingival tissue is healthy and only preventive care is required.
  2. Code 1 indicates the color band is completely visible with minor bleeding detected but no calculus is present and there are no defective margins. Subgingival plaque removal and oral hygiene instructions are indicated.
  3. Code 2 the color band is partially submerged with bleeding, supra or sub gingival calculus and/or defective margins are present. Treatment includes the removal of plaque and calculus, defective margins, and oral hygiene instructions.
  4. Code 3 The colored band is partially submerged. This indicates that the sextant needs a comprehensive periodontal evaluation. If two or more sextants are code 3 than a complete comprehensive evaluation and charting is necessary.
  5. Code 4 The colored band is completely covered indicating a depth greater than 6.5 mm. Full mouth charting and treatment planning are required.
- a) All of the above are accurate statements.
  - b) 1, 2, 3, and 4.
  - c) 1, 2, and 4.
  - d) 1 and 5

**The correct answer is c.**

The PSR system uses especially designed probe that has a 0.5 mm ball tip and is colored coded from 3.5 to 5.5 mm. The patient's mouth is divided into six sextants. At least six areas are examined around each tooth. The deepest finding in each sextant is recorded.

Code 2 is incorrect only because the colored band is still fully visible.

Code 4 is not correct since the colored band indicates a depth greater than 5.5 mm.

Code \* : An \* after a number indicates that there is one of the following conditions: furcation involvement, tooth mobility, mucogingival problem, or gingival recession extending to the colored band (3.5 mm or greater).

Clinical Periodontology. Eight Edition. Pages 360-361

**5). Which of the following pairs are incorrect?**

- 1. Actisite contains tetracycline**
- 2. Periostat contains doxycycline**
- 3. Periochip contains minocycline HCl**
- 4. Arsestin contains chlorhexidine**
- 5. Atridox is a doxycycline gel.**

- a. 2,3,5**
- b. 3,4**
- c. 2,3,4**
- d. 1,4**

**Answer: (b).** Statement 1 is true. Actisite is a 23cm monofilament of ethylene vinyl acetate impregnated with 12.7mg (0.5mg/cm) of tetracycline. When placed in the pocket for ten days it reaches 100 times the peak levels achieved with systemic oral administration. Indications are sites that fail to respond to conventional therapy.

Statement 2 is true. It is a prescription capsule used in conjunction with scaling and root planning. It is a unique form of doxycycline (20 mg caps). It uses the collagenolytic (collagenase inhibitors) properties of tetracycline while limiting bacterial resistance.

Statement 3 is not accurate. The Periochip is a 4X5 mm firm gelatin strip impregnated with chlorhexidine. It is inserted into pockets 5mm or greater. It is used as a supplement to scaling and root planning.

Statement 4 is not accurate. Arestin contains minocycline HCL (1mg). Microspheres containing the drug are inserted into the pocket. It is used as an adjunct to scaling and root planning. The microspheres are a polymer material that is bioadhesive, bioresorbable. Once inserted it adheres to the periodontal pocket. The drug is slowly released by diffusion from the spheres to the pocket. Arestin maintains therapeutic drug levels for at least 14 days.

Statement 5 is correct. It is a gel that solidifies in the pocket and releases tetracycline over a seven day period

Information from a lecture by LT Micheal Cabassa, The Role of Pharmacotherapeutics in Periodontal Therapy, October 2002, Naval Postgraduate Dental School

6). Which of the following statements are correct?

- 1 **Supra gingival plaques contain mainly coccoid and filamentous forms of bacteria.**
- 2 **“Corncob” which is filamentous forms of bacteria covered with coccal organisms are present in supragingival plaque.**
- 3 **Bacterial cells are densely packed the tooth surface in supragingival plaque**
- 4 **Subgingival plaque is less organized than supragingival plaque.**
- 5 **Numerous spirochetes, gram negative bacteria, and bacteria grouped in “bottle brush” formations are present in subgingival plaque.**

- a) **1,2, and 3**
- b) **1,2,3, and 4**
- c) **1 and 3**
- d) **All of the above**

**All of the above are correct.** Supragingival plaque is densely packed on the tooth surface about 0.5mm thick or more. Flagellated forms and spirochetes are observed apically and on the outer surface of the supragingival plaque.

Subgingival plaque has an outer and inner layer. The inner layer is tightly adherent but is thinner than and not as organized as supragingival plaque. The outer layer adjacent to the soft tissue is loosely adherent layer. It is composed of the organisms in answer 5.

Formation of the dental pellicle is the initial stage of plaque formation. All surfaces of the oral cavity are covered with a glycoprotein. The mechanisms of pellicle formation are electrostatic, Van der Waals forces and hydrophobic forces. Within a few hours bacteria is found on the dental pellicle. The initial bacteria are gram-positive facultative bacteria such as *Actinomyces viscosus* and *Streptococcus sanguis*. The initial bacteria adhere to the pellicle by adhesions and fimbriae on the surface of the bacteria. As the plaque matures the bacteria become more gram-negative anaerobic organisms. Secondary colonization of bacteria that do not initially colonize clean tooth surfaces occurs. Coaggregation is the term to describe different species of bacteria adhering to one another in mature plaque.

**7). Which feature is not found in the implant – soft tissue interface?**

- a) Sulcular epithelium**
- b) Hemidesmosomes**
- c) Sharpey's fibers**
- d) Basal Lamina**
- e) Glycoprotein insertion**

**Answer: (c)**

No Sharpey's fibers attachment to implant abutment.

How do fibers form at implant interface?

Architecture:

- Peri-implant free gingiva corresponds to teeth.
- Sulcular epithelium forms peri-implant gingival crevice.
- Implant junctional epithelium.
- Basal cell layer with hemidesmosomal attachment to the abutment.
- Hemidesmosomes have lamina densa (at abutment surface) and lamina lucida.
- Surface oxide layer and hemidesmosomal glycoprotein may form a chemical bond attachment.
- Not chemically strong, separated with 20-25 grams of pulling force.
- Deep within the sulcus, collagen fibers form a tight cuff around the abutment. Some of these fibers run perpendicular to the abutment, others circumferentially. Thus mature collagen "seal" at the bone level may provide contact inhibition to prevent epithelial down growth.

Ref: Bauman G, Rapley J, Hallmon W, Mills M. The Peri-Implant Sulcus. Int J Oral Maxillofacial Implants 1993;8:273-280.

**8). What is the order of expected prognosis for treated furcation involved molar teeth from worst to best?**

- a) Mn 1<sup>st</sup>, Mn 2<sup>nd</sup>, Max 1<sup>st</sup>, Max 2<sup>nd</sup>
- b) Max 2<sup>nd</sup>, Max 1<sup>st</sup>, Mn 2<sup>nd</sup>, Mn 1<sup>st</sup>
- c) Max 1<sup>st</sup>, Mn 2<sup>nd</sup>, Max 2<sup>nd</sup>, Mn 1<sup>st</sup>
- d) None of the above

**Answer: (b) Max 2<sup>nd</sup>, Max 1<sup>st</sup>, Mn 2<sup>nd</sup>, Mn 1<sup>st</sup>**

Maxillary molars have worse prognosis than mandibular. Second molars have worse prognosis than first molars.

Glickman I – feel fluting, not roof

Glickman II – engage roof

Glickman III – Probe goes through furcation

Glickman IV – Can see through furcation

Furcation treatment options:

- Non surgical
- Regenerative
- Resective
- Extraction

Under regenerative option:

- Flap curettage
- Osseous grafts
- Guided tissue regeneration for I and II

Max 2,3<sup>rd</sup> molars lost most frequently.

Maxillary premolars with furcation involvement have a poor to hopeless prognosis.

The diagnosis and treatment of molar furcation invasions. Newell, D.H., Dental Clinics of North America Vol 42 (2) 1998

A long-term survey of tooth loss in 600 treated periodontal patients. Hirschfeld, L. and Wasserman, B. J Perio 49: 225, 1978

## **9. WHAT MAKES A PERSON SUSCEPTIBLE (IMMUNOLOGICALLY) TO RAPIDLY PROGRESSING PERIODONTAL DISEASE?**

**Rapidly Progressing Periodontal Disease is characterized by which of the following?**

- 1. progresses 3-4 times faster than adult periodontitis**
  - 2. affects lower incisors and first molars with vertical osseous defects**
  - 3. bone loss is inconsistent with the amount of local factors present**
  - 4. a gram negative obligate anaerobic cocci is considered a primary etiologic microorganism**
- a. 1,2,4**
  - b. 2,3,4**
  - c. 1,2,3**
  - d. 1,3,4**
  - e. all of the above**

**The correct answer is C- 1,2 3 are true**

Definition of RPP: a disease of the periodontium that occurs in an otherwise healthy adolescent, characterized by rapid loss of alveolar bone, lack of severe clinical signs of inflammation, and sparse plaque accumulation. Destruction is not commensurate with local factors.

Characteristics of RPP:

- Onset around puberty (11-15 years of age)
  - Isolated areas of attachment loss and bone loss  
(greater at permanent incisors and 1<sup>st</sup> molars)
  - Evidence of local, specific bacterial causes
    - Actinobacillus actinomycetemcomitans, Capnocytophaga*
    - Rod gram - negative obligate anaerobe, found at the base of pocket
  - Neutrophil dysfunction is a common feature
  - Familial distribution of the disease, and there is no identified systemic disease.
- PF Fedi et al The Periodontic Syllabus, 4<sup>th</sup> Ed pp 34-35.

- 10). Several factors predispose diabetics to periodontitis. Which are correct?**
- 1. elevated glucose levels in oral fluids can influence microbial flora**
  - 2. impaired erythrocyte function, including phagocytosis may reduce resistance to periodontitis**
  - 3. altered collagen metabolites and vascular changes including stasis**
  - 4. impaired chemotactic and phagocytic activity of polymorphonuclear leukocytes**
    - a. 1,2,3**
    - b. 1,3,4**
    - c. 2,3,4**
    - d. 3,4**
    - e. all the above**

**Answer: (b)** The glucose content of gingival fluid and blood was found to be higher in diabetics. Thickening of the basement membrane of capillaries may hamper the transport of nutrients. The increased susceptibility of diabetics to infection has been hypothesized as being due to PMN deficiencies resulting in impaired chemotaxis, defective phagocytosis, or impaired adherence.

Glickman's *Clinical Periodontology* 6th ed. pp. 464-465

**11). All of the following have shown some clinical correlation with periodontitis except:**

- a. Cardiovascular disease**
- b. Stroke**
- c. Pernicious anemia**
- d. Low birth weight babies**
- e. Respiratory disease.**

**Answer: (c).** Ample evidence has shown a relationship of periodontal health as an important component in management of some systemic diseases. A relationship is suggested between acute systemic infections and the occurrence of cardiovascular disease that includes myocardial infarction and stroke. Low birth weight babies- believed to occur because accumulation of gram(-) micro organisms such as those found in periodontitis results in increased release of prostaglandin and cytokines which may act on distant sites such as the placenta. Severe Periodontitis is associated with upper and lower respiratory disease such as hospital acquired pneumonia.

REFERENCE: Fedi Perio Syllabus 4<sup>th</sup> edition 2000 pg.29 and 90.

12). Concerning grafts which of the following are TRUE.

1. Osteoinductive is where the graft acts as a template for bone formation.
2. Osteogenesis is where the graft stimulates new bone formation.
3. Small particle size of 300 to 500 microns is advantageous.
4. Osteoconductive is where the cells of the graft actually produce new bone.
5. Cortical bone is the best source of pluripotential osteogenic cells.
5. Adequate vascularity is needed (intramarrow penetration with a 1/2 round bur).
6. A mechanically stable wound site-primary flap closure and circumferential seal is necessary.
8. Emdogain is enamel matrix proteins obtained from pigs.

- a) all are true
- b) 1,3,6,7 are true
- c) 1,2,3,4 are true
- d) 3,6,7,8 are true
- e) 4,5,6,8 are true

Answer: (d) OSTEOCONDUCTIVE- the graft acts as a template or trellis to assist in bone formation and deposition.

OSTEOINDUCTIVE- The graft acts to stimulate or induce new bone formation by undifferentiated cells.

OSTEOGENESIS- The cells of the graft actually produce new bone.

The smaller size of particles are easier for the body to resorb and more actively induce regeneration in osseous defects. Cancellous bone is the best source of pluripotential osteogenic cells. Adequate vascularity is needed and intramarrow penetration with a 1/2 round bur can be used to aid in a bleeding bed. A mechanically stable wound site with primary flap closure and circumferential seal is important to keep bacterial contaminants from the wound site and to aid in the bone graft material to not wash out. Emdogain is enamel matrix proteins obtained from pigs- it seems to encourage the formation of acellular cementum that is then followed by associated bone deposition.

REFERENCE: Perio Syllabus 4<sup>th</sup> edition p. 168-172.

**13). The hemiseptal defect is:**

- a) A one-wall defect with one proximal wall**
- b) A one-wall defect with one linguopalatal wall**
- c) A one wall defect with one buccolabial wall**
- d) A two walled defect with two proximal walls**

**Answer: (a)** A one-wall defect presents with either one proximal wall (hemiseptal) or one linguopalatal or buccolabial wall. These defects are generally not amenable to regenerative therapeutic approaches. Resective therapy, with the goal of creating a physiologic osseous architecture, will provide a more predictable and stable long-term result.

Two-wall defects are bordered by either two proximal walls, a buccal/labial and proximal wall or a buccal/labial and a lingual wall. A two-wall defect consisting of a buccal/labial and a lingual/palatal wall is commonly referred to as an interdental or osseous crater. The adjacent teeth are the other two walls of the defect. According to a study by Manson and Nickolson, the interdental crater constitutes approximately one third of all intrabony defects and as many as two thirds of all mandibular defects.

Three-wall intrabony defects are characterized as having three osseous walls; the tooth surface constitutes the fourth wall. These defects may be localized to one proximal or midradicular surface, or may be circumferential, involving two or more root surfaces.

The typical clinical encounter is with a combination defect which combines two or more of the above.

Periodontal Therapy, Nevins and Mellonig, pp175,176

**14). Which of the following statements are true regarding attachment levels and uprighting molars?**

- a. Pockets mesial to uprighted molars are shallower than pockets mesial to control teeth that have not been uprighted.**
- b. Gingival inflammation does not differ from that around control teeth.**
- c. Trauma from occlusion with subsequent bone loss will occur with uprighted molars if selective equilibration is not performed.**
- d. All of the above**

**Answer: d**

- a. This is due to a reduction in soft tissue height while the bone height remains Unchanged.
- b. Same bugs, etiology
- c. Vertical loading results from moving the tooth's occlusal surface toward the hinge. Selective equilibration and possible coronal restorations should be included in every treatment plan with a molar uprighting component.

Clinical Periodontology, Carraza, Newman pp562, Periodontal Therapy, Nevins, Mellonig pp157

15). What is the most significant challenge regarding anterior implants?

- a. **Difficulty in being able to use a fixture with adequately large enough diameter due to lack of bone.**
- b. **Securing the proper angulation of the fixture**
- c. **Getting an esthetically acceptable shade with a single tooth anterior implant.**
- d. **Avoiding the “black triangle” in the papilla area due to lack of bony support to the gingival contours.**

**Answer: (d)** Although a, b, and c are considerable challenges, the most challenging periodontal aspect is acceptable esthetic gingival contours due to a difference in crestal bone height between the implant and the adjacent natural tooth. GBR and connective tissue grafts are two treatments to correct this.

CAPT John Mumford, USN, DC

- 16). Which of the following statements regarding Guided Tissue Regenerations are true?
1. Many teeth previously regarded as hopeless are salvageable via GTR using ePTFE
  2. Class II furcation involvements, large three-walled infrabony defects, and osseous craters are predictably treatable with Gore Tex GTR
  3. Routine uses of Gore Tex include two-walled defects and horizontal bone loss that may have been previously considered not salvageable
  4. EPTFE titanium is used in wide deep infrabony defects and are best treated with a prerequisite adequate band of attached gingiva
  5. Teeth that are amenable to Gore Tex membrane GTR include multirooted teeth with root proximity of greater than 1 mm
  6. Gore-Tex regenerative membranes can be placed in transgingival and submerged configurations
    - a. 4 only
    - b. 4 and 5 only
    - c. 4, 5, 6
    - d. 2, 3, 4, 5, 6
    - e. 1, 2, 4, 6
- 

**Answer: (e)** Today, many teeth previously regarded as hopeless are treatable via GTR. This includes the Class II furcations, large three walled infrabony defects and osseous craters. Therefore, 1 and 2 are both true. 3 The first statement is true and the second statement is false. Horizontal bone loss is not amenable to GTR. If the interdental space is wide, the surgical procedure of choice is the modified papilla preservation technique. The interdental papilla is horizontally dissected at its base on the buccal side and elevated with a palatal full-thickness flap. After membranes positioning, the papilla is repositioned though the interdental space to cover the barrier and possibly sutured to the buccal flap to obtain primary closure. If the interdental space is narrow, the simplified papilla preservations technique should be used. The interdental papilla is obliquely dissected to augment the connectible tissue surface for the subsequent primary closure of the lap over the barrier membrane. Anatomic prerequisites for an uneventful procedure include the presence of adequate band of attached gingiva and absence of frena in the area of treatment. 5 is false; the root proximity must be greater than 2 mm to be successful; in shallow defects (<2mm) between the roots of the adjacent teeth, little to no regeneration may be obtained; analysis of the local site must be done to determine if a tooth is treatable; positive findings include:

1. adequate separation (>2mm) for access and to maintain collar.
2. an anatomy of the affected dental surface that allows good adaptation of the membrane and closure of the defect,
3. a good quantity of healthy periodontium remaining close to the defect and a thick periodontium and adulated vestibulum to allow for flap stability

6 is true-titanium reinforced Gore-Tex regenerative membranes can be placed in transgingival and submerged configurations allowing extension through the gingiva or where the defect can be completely isolated.

Nobel Biocare Gore Regenerative Materials Product Configuration Information; Critical Decisions in Periodontology by Hall, 4<sup>th</sup> Ed. Chapters 37, 86, 87, 88, 89; Manual of Clinical Periodontics-Reference manual by Lexi-Comp

17). Page and Schroeder described several phases in the pathogenesis of periodontology; which one the statements is true?

1. The initial lesion is described as a classic chronic exudative vasculitis.
  2. Within 4 to 10 days, the early lesion develops. It is characterized by a dense infiltrate of PMNs, pathologic alteration of fibroblasts, and an increase of the connective tissue substance
  3. The established lesion develops within 2 to 3 months and is distinguished by a predominance of plasma cells and early horizontal bone loss.
  4. In the advanced lesion, plasma cells continue to predominate although loss of the alveolar bone and periodontal ligament, and disruption of the tissue architecture with fibrosis are also important characteristics.
- 
- a. 1 is correct
  - b. 2 is correct
  - c. 3 is correct
  - d. 4 is correct

**Answer: (d)**

1. False. The gingival tissues respond within 2 to 4 days to a beginning accumulation of microbial plaque with a classic acute exudative vasculitis which we have termed the initial lesion.
2. False. Within 4 to 10 days, the early lesion develops. This stage is characterized by a dense infiltrate of lymphocytes and other mononuclear cells, pathologic alteration of fibroblasts, and continuing loss of the connective tissue substance. The structural features of the early lesion are consistent with those expected in some form of cellular hypersensitivity, and a mechanism of this kind may be important in the pathogenesis.
3. False. The early lesion is followed by the established lesion which develops within 2 to 3 weeks and is distinguished by a predominance of plasma cells in the absence of significant bone loss. The established lesion, which is extremely widespread in humans and in animals, may remain stable for years or decades, or it may become converted into a progressive destructive lesion. Factors causing this conversion are not understood.
4. True. In the advanced lesion, plasma cells continue to predominate although loss of the alveolar bone and periodontal ligament, and disruption of the tissue architecture with fibrosis are also important characteristics. The initial, early, and established lesions are sequential stages in gingivitis and they, rather than the advanced lesion which is manifest clinically as periodontitis, make up the major portion of inflammatory gingival and periodontal disease in humans.

Lab Invest. 1976 Mar;34(3):235-49.

Pathogenesis of inflammatory periodontal disease. A summary of current work. Page RC, Schroeder HE.

**18). Surgical management of implant repair includes all but which of the following?**

- 1. Retreatment of ailing and failing implants depends on an accurate diagnosis and effective nonsurgical intervention to stabilize or arrest progression of an active perimplant lesion**
  - 2. If mucogingival defects exist only around the ailing or failing implant, subsequent osseous surgery may not be needed if soft tissue augmentation is successfully performed**
  - 3. The goals of perimplant surgical therapies are to reestablish a healthy perimucosal seal and regenerate a soft or hard tissue attachment to the implant.**
  - 4. Regenerative procedures, including bone grafting with mandatory GTR, are most appropriate when the adjacent osseous crest is close to the rim of the implant in one-walled defects**
  - 5. Detoxification procedures are recommended to treat the infected implant surfaces before regenerative modalities. This may include removal of rough or pitted HA coatings on the surface of the implant fixture.**
- a. 1 is false**
  - b. 2 is false**
  - c. 3 is false**
  - d. 4 is false**
  - e. 5 is false**

**Answer: (d)**

1. is true
2. is true; if indicated, osseous repair surgery on keratinized tissues is less technically demanding.
3. is true; this requires a definitive diagnosis, comprehensive therapy, and effective maintenance.
4. false; bone grafting may include GTR for the ailing or failing implant; regenerative procedures, including bone grafting with or without GTR are most appropriate when the adjacent osseous crest is close to the rim of the implant in narrow two- or three- walled moat, dehiscence or fenestration defects.
5. true; a 30 second to 1 minute application of a supersaturated solution of citric acid (pH1) burnished with a cotton pledget may be beneficial in detoxifying the infected hydroxyapatite-coated implant surface. If the coating is rough or pitted, ultrasonic or air/powder abrasives is necessary to remove the HA. Then a short application of the air/powder abrasive detoxifies the surface of the Ti implant

**19). Callous formation forms during the fibroplasia stage of extraction site wound healing.**

- a. True**
- b. False**

**Answer: (b)** Four stages of wound healing: inflammation, epithelialization, fibroplasia, and remodeling.

Immediately the socket fills with blood, which coagulates and seals bone from air.

Inflammatory - week 1: WBCs remove bacteria and break down debris

Fibroplasia occurs along with Epithelialization – week 1 to 3:

Fibroplasia consists of the ingrowth of fibroblasts and capillaries. Osteoclasts accumulate along the lamina dura. Granulation tissue develops and an osteoid material is laid down starting at the socket wall.

Epithelialization consists of the migration of gingival/mucosa from the borders of the wound into the socket and over the granulation tissue. The duration is dependent on how large the secondary healing site is, but usually complete by week 3 or 4

Remodeling starts from week 5 to 6 months. Osteoclasts resorb the cortical bone lining the socket, and together with osteoblasts reorganize the haphazard pattern laid down earlier into regular bone with the reestablishment of Haversian canal systems. As bone fills the socket, the epithelial covering is raised to a level that roughly equates to the surrounding tissues.

Callous formation only occurs when medullary bone is forced to heal by secondary intention as in a fractured long bone where the ends are not approximated. Fibroblasts and osteoblasts quickly produce so much fibrous matrix, the healing tissue extends circumferentially beyond the free ends of bone.

Peterson, Ellis, Hupp, Tucker, Contemporary Oral and Maxillofacial Surgery. Mosby 1998, pages 163-166

Myron Nevins, James Mellonig, Periodontal Therapy: Clinical Approaches and Evidence of Success. Quintessence Books. Page 242

20). Read both parts, choose the best answer for each and make your selection below.

**PART A: What is the most common antitarter ingredient in toothpaste?**

1. Triclosan with PVM/MA (polyvinyl methyl ether malic acid)
2. Pentasodium Triphosphate
3. Tetrapotassium Pyrophosphate
4. Sodium hexametaphosphate

**Part B: In regards to the above, what is the mode of action?**

1. Affects polyglycans of bacteria which prevents plaque formation thus reducing tartar
  2. Inhibits crystalline matrix formation preventing mineralization
  3. Forms a coating on the tooth surface that inhibits calcification build-up
  4. Prevents minerals from precipitating out of the saliva
- 
- a) 1/4
  - b) 2/1
  - c) 3/2
  - d) 4/3

**Answers: (b)**

**Anti-Tartar Products:** One of the first products to venture beyond fluoride was tartar control toothpaste. The major anti-calculus strategy developed by researchers in the 1970s was to inhibit crystal growth, thus preventing the mineralization of developing plaque and the transition of the plaque into calculus. The most effective agents in vitro were the pyrophosphates, but in the oral cavity these were rapidly broken down by bacterial and salivary pyrophosphatase enzymes. In the 1980s, formulations were created using high concentrations of pyrophosphates (and other polyphosphate salts) that could be combined with sodium fluoride to both reduce tartar buildup (not preformed tartar) and retain anti-caries potency. The concentration of sodium fluoride was high enough to serve as an *anti-enzyme* and help inhibit the limiting pyrophosphatase enzymes in the mouth.

(Other anti-tartar formulations have not applied for nor received the ADA Seal. One such product, a toothpaste containing Citroxain -- a mixture of the enzyme papain, sodium citrate and alumina -- has some supporting published data and is marketed primarily as a whitening toothpaste.)

*Mandel ID, Calculus update: Prevalence, pathogenicity and prevention. J Am Dent Assoc 126:573-80, 1995.*

Tetrapotassium Pyrophosphate, Inhibits crystalline matrix

The addition of 1 percent of a copolymer of methoxy-ethylene and maleic acid (Gantrez, GAF Corp.) appears to improve the effectiveness of some anti-tartar products.

*Schiff TG, Comparative clinical study of two anti-calculus dentifrices. Compend Cont Educ Dent (Suppl 8):S275-7, 1987.*

The tartar control products that have received the ADA Seal have been shown in appropriately designed clinical studies to be effective decay preventives as well as to significantly reduce the formation of tartar above the gum line. A caveat is included on the label that such products have not been shown to have a therapeutic effect on periodontal disease. The anti-tartar ingredients are considered by both the ADA and FDA to be primarily cosmetic, not therapeutic. They do not affect the already hardened deposits.

Tartar control dentifrice containing 7.0% sodium **hexametaphosphate** (5% hexametaphosphate anion) Has been shown to demonstrate anti-tartar properties, but it is new, not approved and only one dentifrice lists it in its ingredients

A 0.5 percent zinc citrate combined with 0.2 percent **triclosan** – is an effective anti-bacterial agent;<sup>5</sup> triclosan and the polymer Gantrez;<sup>7</sup> and pyrophosphate and triclosan.<sup>8</sup> The triclosan/Gantrez combination is part of a multibenefit product that has been approved by the ADA and FDA and is awaiting marketing in the United States.

Total brand toothpaste is essentially a sodium fluoride dentifrice containing the broad-spectrum antibacterial agent **triclosan** (0.3 percent) and the copolymer PVM/MA (polyvinyl methyl ether malic acid), also marketed under the trade name Gantrez (2 percent). Triclosan has been used in soaps and deodorants for more than 20 years. Its broad spectrum of activity encompasses a large range of oral bacteria, and it is compatible with other ingredients in oral products. The combination of triclosan and PVM/MA inhibits crystal growth and is effective as an antitartar agent, but not the most common.

*Fairbrother KJ, Kowolik MJ et al, The comparative clinical efficacy of pyrophosphate/triclosan, copolymer/triclosan and zinc citrate triclosan dentifrices for the reduction of supragingival calculus formation. J Clin Dent 8 (Special Issue):62-6, 1997.*

**Common Active Ingredients:** contains: Sodium Monofluorophosphate (0.14%), Zinc Citrate Trihydrate, Sodium Fluoride 0.243% (Anticavity Toothpaste)

**Common Inactive Ingredients:** , Tetrasodium Pyrophosphate, Sodium Lauroyl Sarcosinate, Flavor, Sodium Saccharin, Cellulose Gum, Sodium Lauryl Sulfate, Titanium Dioxide, FD&C Blue #1, FD&C Yellow #5 Sorbitol, Water, Hydrated Silica, Sodium Gluconate, Stannous Chloride, Flavor, Sodium Carrageenan, Hydroxyethylcellulose, Sodium Saccharin, Sodium Hydroxide, Glycerin, Sorbitol, Hydrated Silica, Sodium Bicarbonate, Propylene Glycol, Water, **Pentasodium Triphosphate**, Tetrapotassium Pyrophosphate, Sodium Hydroxide, Calcium Peroxide, FD&C Green #3

**Pentasodium triphosphate** acts as a preservative and an unproven remineralization aid.