TEMPLE UNIVERSITY
School of Dentistry

Department of Restorative Dentistry

corrected

RESTORATIVE DENTISTRY V
D553

Mid-Term Examination
October 31, 2002

TEST CODE NUMBER: 01

INSTRUCTIONS:

- Verify that you have a question booklet with nine pages and fifty questions.
- Write your name on the computer answer sheet as well as a nine-digit personal identification number of your choosing (in the field labeled "Social Security Number") and blacken the appropriate circles with a #2 pencil. *Note: Test scores will be posted using PINs.*
- ***IMPORTANT!!***
  Write the Test Code Number (above) on the computer answer sheet in the "Test Code" field under "Optional Codes", and blacken the appropriate circles.
- For each question answered, blacken the appropriate circle on the computer answer sheet corresponding to the letter of your choice.
- Students are not permitted to ask questions of the proctors during the examination. Do your best to answer each question with the information provided.
- When you have completed the examination, turn in your computer answer sheet. You may keep the question booklet.

Use the following description to answer the following six questions:
Patient A -- a 25 year old resident of Philadelphia -- has a mandibular first molar with obvious fissures, but the fissures and the surrounding enamel appear outwardly healthy (no staining or cavitation). There is a small caries lesion that has progressed slightly into the dentin at the base of one of those fissures, but this fact is not evident from a visual examination alone.

1. You decide to use three different tests to predict the presence of a dentin lesion in this occlusal surface:
(1) a sharp #23 explorer (tug-back = lesion, no tug-back = no lesion)
(2) digital readout using a DiagnoDent™ (value of 16 or above = lesion, 15 or below = no lesion)
(3) flipping a coin (heads = lesion, tails = no lesion).

Assuming you don't know anything else about Patient A's history or oral conditions, which one of these three tests is MOST likely and which test is LEAST likely to correctly predict the presence of the dentin lesion (true positive test result)?

C

a. MOST = DiagnoDent, LEAST = coin
b. MOST =explorer, LEAST = coin
c. MOST = DiagnoDent, LEAST = explorer
d. MOST = explorer, LEAST = DiagnoDent
e. MOST = coin, LEAST = explorer

X For this application, a disadvantage of the DiagnoDent™ is that it

D

a. cannot provide a meaningful quantitative readout that relates to lesion progression
b. is less accurate for predicting lesions in molars than in premolars
c. can only detect carious changes in enamel, not in dentin
d. none of the above

3. Assuming the diagnostic process for patient A is 100% accurate, which one of the following treatments represents the present standard of care for this mandibular molar ?

C

a. amalgam restoration that extends into all pits and fissures with a pulpal wall uniformly into dentin
b. composite resin restoration that extends into all pits and fissures with a pulpal wall uniformly into dentin
c. preventive resin restoration that fully eliminates the lesion in dentin and conservatively seals all contiguous fissures
d. conventional resin sealant that extends into all pits and fissures, but involves no removal of enamel

X If resin materials are used to treat this mandibular molar, the primary source of retention to the enamel is

C

a. a "hybrid layer" of polymerized resin intertwined with loosened collagen filaments
b. prepared cavity walls that converge slightly in an occlusal direction
c. resin tags in pores created in or between enamel rods
d. ionic and covalent bonds between the resin and the enamel

5. Which one of the following may be a benefit of using a glass ionomer or resin-modified glass ionomer for this mandibular molar?

D

a. glass ionomer materials offer greater retention to enamel than resin restorative systems
b. glass ionomer materials are more resistant to fracture than resin materials when used to restore occlusal surfaces or seal occlusal fissures
c. using a glass ionomer material instead of a resin restorative material allows for greater conservation of tooth structure
d. glass ionomer materials provide a degree of cariostasis when used as a liner under composite resin or amalgam restorations

6. If the findings of the clinical trial conducted by Mertz-Fairhurst and others were to be embraced as scientific fact (Ultraconservative and cariostatic sealed restorations: results at year 10, J.A.D.A., 1998), how would the treatment of this mandibular molar be different?

B
a. amalgam would be used to restore the tooth, but the amalgam would be sealed with a resin
b. a preventive resin restoration would be placed, but the dentin lesion would not be removed
c. the tooth would be treated with a chlorhexidine varnish to arrest the caries process in the fissures
d. the tooth would not be treated at all if the overall mutans streptococci infection could be reduced to 10,000 cfu/ml of saliva or less

Use the following description to answer the following nine questions:
Patient B -- a 15 year old resident of Bucks County, Pennsylvania -- presents with ten Class II caries lesions at various stages of progression. Radiographs reveal that one lesion has resulted in pulp necrosis (stage D3), two lesions are stage D2, two are stage D1 and five are stage E1 or E2.

$D_3 = 1$ $D_2 = 2$ $D_1 = 2$ $5 = E_1$ or E_2

7. After the pulp infection and irreversible lesions have been addressed, the first consideration and primary focus of a minimally invasive management approach for this patient would be to

C
a. use composite resin instead of amalgam wherever possible
b. preserve healthy tooth structure during cavity preparation
c. alter the microenvironment in order to promote remineralization
d. choose an instrumentation approach that permits controlled fissurotomy

8. Assuming modern principles of clinical cariology and minimally invasive dentistry are practiced, which of Patient B's Class II lesions require immediate surgical intervention (*i.e.*, no conservative options exist)?

D
a. all ten lesions
b. all EXCEPT the E1 lesions
c. all EXCEPT the E1 and E2 lesions
d. only the D3 and D2 lesions
e. only the D3 lesion

9. Delaying surgical intervention for some of Patient B's Class II caries lesions may be justified because

E
a. a dental radiograph does not reveal whether a lesion is active or not ✓
b. an active caries lesion may progress at a very slow rate ✓
c. medical management may be effective in arresting and remineralizing some of these lesions ✓
d. *two* of the above
e. a, b and c above

10. All of the following factors may provide a legitimate basis for ruling out or abandoning a medical approach for managing Patient B's Class II lesions and using a surgical approach instead EXCEPT which one?

A
a. the patient's age
b. presence of cavitation of the proximal enamel surfaces
c. progression of the lesions observed on subsequent bitewing radiographs
d. patient non-compliance with prescribed pharmacotherapeutic and preventive measures

11. The medical approach for managing Patient B's disease includes an attempt to promote remineralization of lesions with fluoride. What is the mechanism of this action?

D
a. fluoride reacts directly with hydrogen ions, neutralizing them
b. fluoride ions inhibit bacterial enzymes, including dextran sucrase
c. fluoridated apatite (FAP) has a lower critical pH than dental apatite (HAP)
d. fluoride acts as a catalyst in the formation of FAP precursors from free calcium and phosphate

12. Which of the following factors may contribute to Patient B's high caries rate?

E

a. low level of fluoride ions stored in oral reservoirs
b. high plaque proportion of mutans streptococci
c. dental apatite high in carbonate
d. *two* of the above
e. a, b and c above

13. If a decision is made to restore Patient B's tooth #18, which has a D1 caries lesion in the mesial surface and a beginning dentin lesion at the base of the distal occlusal pit, what is the most appropriate treatment plan?

D

a. Class II amalgam restoration with traditional extension for prevention (after G.V. Black)
b. Class II composite resin restoration with traditional extension for prevention (after G.V. Black)
c. Class II amalgam restoration with traditional extension for prevention, sealed with a flowable resin
d. Class II proximal slot (occlusal access) restored with amalgam or composite resin, and a Class I PRR

14. The periodontal conditions that one is likely to find in the area of Patient B's non-vital tooth #18 are

Thinson out A

a. narrow band of attached gingiva and deep probing depths
b. narrow band of attached gingiva and shallow probing depths
c. broad band of attached gingival and deep probing depths
d. broad band of attached gingiva and shallow probing depths

15. Should Patient B's non-vital tooth #18 be restored with a crown?

Thinson out C

a. yes; all endodontically treated posterior teeth must be crowned
b. probably; even if one cusp is unsupported, a crown should be recommended for maximum protection
c. maybe; depends on the amount of damage, but a more conservative direct restoration would be preferable at this age
d. no; the limited clinical crown height would make an indirect restoration impossible

16. Occlusal surfaces of posterior teeth are more problematic compared to the smooth axial surfaces when it comes to caries management because

E

a. fissures harbor cariogenic organisms beneath the outer healthy surface of the tooth and they cannot be easily cleaned or disinfected
b. caries lesions in fissures -- even those that have progressed into dentin -- are often difficult to detect
c. there is presently no reliable way to remineralize progressive fissure lesions
d. *two* of the above
e. a, b and c above

17. Caries risk assessment is based on which one of the following fundamental principles?

B

a. dental patients benefit equally from most preventive technologies
b. the disease is present long before caries lesions appear in the mouth
c. without professional intervention, every person living in an industrialized society (such as the U.S.) will develop caries lesions in his/her lifetime
d. treatment of the disease begins when "white-spot" lesions are first detected by visual, tactile and radiographic examination

B

18. In a recently published paper by Ouellet and others (Detection of occlusal carious lesions, General Dentistry, 2002) the sensitivity and specificity of KaVo's DiagnoDent™ was compared to conventional diagnostic techniques for Class I caries lesions. Which one of the following factors represents a potential weakness in the experimental design of that study that may affect the applicability of the findings?

a. the investigators failed to calibrate the DiagnoDent instrument as recommended by the manufacturer, which may have lead to spurious readouts
b. the diagnostic procedures were carried out on extracted teeth, not under actual clinical conditions
c. only one clinician produced data using the conventional exploration method of lesion detection, so the study failed to account for differences in "clinical judgment"
d. no histological methods were used to confirm actual presence or absence of disease

D

19. The results of the study by Ouellet and others cited above suggest that the DiagnoDent™

a. has little practical value in caries lesion detection
b. may help reduce false positive diagnoses compared to conventional diagnostic techniques alone
c. has much greater specificity than conventional diagnostic techniques
d. may help reduce false negative diagnoses compared to conventional diagnostic techniques alone

C

20. When using a caries risk model to help manage a population of dental patients, a likely consequence of a false positive result is

a. failure to adequately treat the patient for disease
b. failure to diagnose the presence of caries lesions
c. costs incurred for unnecessary preventive therapy
d. failure to control the etiologic factors of disease

B

21. What characteristic of a proximal caries lesion in enamel is most closely associated with its potential for doing harm to the patient?

a. location relative to the contact area
b. rate of progression
c. depth in enamel
d. faciolingual dimension of the lesion

C

22. The medical model for the treatment of dental caries is based on which one of the following principles?

a. failure to control the disease is primarily a function of poor oral hygiene
b. all patients have plaque; therefore all patients are at risk for the disease
c. the odontopathic potential of plaque can be modified by certain host and diet factors
d. every caries lesion should be treated conservatively in an attempt to arrest and remineralize

E

23. Suppression of oral mutans streptococci can be prolonged after chlorhexidine therapy by

a. chewing xylitol gum three times daily —
b. eliminating favored colonization sites in the oral cavity —
c. substituting non-cariogenic sweeteners for sucrose —
d. *two* of the above
e. a, b and c above

A

24. Fluoride is believed to inhibit which one of the following bacterial enzymes?

a. enolase
b. pyruvate kinase
c. dextran sucrase
d. phosphoglyceryl lactase

25. The most important way that dental apatite is converted to fluorapatite, thereby improving caries resistance, is

B
a. "physiologic maturation" of enamel prior to eruption
b. remineralization in the presence of free fluoride ion following an acid challenge
c. replacement of hydroxyl ions during tooth formation
d. "metabolic conversion" after a systemic dose of fluoride

26. When fluoride is ingested, approximately how much of the oral dose is eliminated in the feces?

A
a. 20%
b. 50%
c. 80%
d. 95%

27. Which one of the following statements about community water fluoridation-- in the context of the current understanding of fluoride chemistry and disease epidemiology -- is most accurate?

B
a. fluorosis occurs only when the concentration of F in drinking water exceeds 0.7 ppm
b. an important cariostatic benefit of F is physiologic maturation (acquired resistance) of enamel
c. tap water is the only effective means of administering a daily topical dose of fluoride
d. children who grow up with fluoridated drinking water exhibit life-long immunity to dental caries

28. A line graph that plots the number of failed dental restorations against elapsed time (time to failure) in a longitudinal clinical study is commonly used to illustrate

B
a. comparative fracture resistance
b. technique sensitivity
c. susceptibility to secondary caries
d. diagnostic validity

29. When deciding whether or not to recommend the removal of an amalgam restoration exhibiting surface corrosion and marginal ditching but no other visible defects or lesions, the most important determinant is

C
a. the patient's age
b. the age of the restoration
c. the patient's caries risk status
d. the width of the restoration

30. Think about a diagnostic test that yields a range of possible results, where a higher test value suggests a higher degree of suspicion. Lowering the threshold value for which one decides the test is positive, and therefore that patients require treatment for the disease or condition tested, is likely to result in

A
a. a less aggressive treatment approach
b. treatment of more patients who don't truly require it
c. a greater proportion of false positive and false negative diagnoses
d. a lower proportion of false positive diagnoses, but a greater proportion of false negatives

31. Which one of the following -- in and of itself -- is a sound reason for replacing an existing restoration?

B
a. a fracture through the occlusal isthmus without loss of any portion of the restoration
b. narrow marginal ditching of an amalgam restoration
c. noticeable surface corrosion or roughness
d. a positive result when a dentin caries indicator dye is applied to the restoration's margins

32. Replacement of restorations due to a diagnosis of secondary caries should decrease if

E
a. better adhesives are developed that enhance the marginal seal of restorations
b. fluoride or antimicrobials are added to dental materials
c. better diagnostic methods are developed that reduce false positive diagnoses
d. *two* of the above
e. a, b and c above

33. After etching enamel and dentin in preparation for the use of a "total etch" adhesive system, the operator must allow the dentin to remain slightly moist before applying the primer or single-step adhesive. This statement is

B
a. false, because all dentin primers are extremely hydrophobic
b. true, because excessive drying may reduce the wettability of the dentin and lower the bond strength
c. true, because excessive drying usually causes irreversible pulp inflammation
d. false, because even the slightest amount of moisture will dilute the dentin primer and render it ineffective

34. All of the following are characteristics of the resin modified glass ionomers EXCEPT which one?

B
a. set, in part, by visible light initiated polymerization
b. adhesion to tooth structure requires the use of a separate resin adhesive
c. capable of taking up fluoride from exogenous sources and re-releasing it ("rechargeable")
d. set, in part, by an acid-base reaction

35. Conventional glass ionomers fail as an ideal biomimetic material because of their poor

B
a. bacteriostatic effect
b. mechanical strengths
c. remineralizing potential
d. adhesion to mineralized tissue

36. Resin modified glass ionomers are suitable for all of the following applications EXCEPT which one?

A
a. Class II restorations in the permanent dentition
b. blocking out small undercuts in teeth prepared for indirect restorations
c. Class I restorations in the primary dentition
d. liners under resin, ceramic and metal restorations
e. Class V restorations in the permanent dentition

37. After many previous uneventful applications, a dental patient complains of redness and soreness at the labial commissures following rubber dam use. The most likely diagnosis is

B
a. Type IV hypersensitivity reaction
b. irritant dermatitis
c. Type I hypersensitivity reaction
d. allergic contact dermatitis

38. An allergy to thiurams or other chemicals added to latex gloves during manufacturing is manifested as a

B
a. Type I hypersensitivity reaction
b. Type IV hypersensitivity reaction
c. immediate hypersensitivity reaction
d. irritant dermatitis

39. The most reliable method for diagnosing hypersensitivity to natural rubber latex protein is the

A
a. skin prick test
b. skin patch test
c. radioallergosorbent tests
d. mucosal rapid reagent test

40. Which one of the following expressions is correct?

B
a. epithelial attachment = gingival attachment + connective tissue attachment
b. gingival attachment = connective tissue attachment + epithelial attachment
c. periodontal attachment = epithelial attachment + connective tissue attachment
d. periodontal attachment = epithelial attachment + gingival attachment
e. biologic width = gingival attachment + epithelial attachment

41. The ideal total occlusal convergence (TOC) of the axial walls of a crown preparation has been cited by some authors as 2-5°, yet Goodacre and others (J. Prosth. Dent., 2001) propose 10-20° as the ideal. Why?

C
a. there is no significant difference in resistance and retention between crowns that have 5° TOC and those with 20° TOC
b. TOC has nothing to do with resistance to dislodgment of the restoration
c. 2-5° is not routinely achievable, even by experienced dentists
d. it is easy to compensate for higher TOC by using coarse diamonds that produce rough surfaces

42. According to Goodacre and others (J. Prosth. Dent., 2001), the axial walls of molars prepared for crowns with total occlusal convergence of 10-20° should be at least X mm long occlusogingivally, and premolars and anterior teeth should be at least Y mm long.

C
a. X = 3, Y = 4
b. X = 5, Y = 6
c. X = 4, Y = 3
d. X = 6, Y = 5

43. The best way to compensate for molar crown preparations that are short occlusogingivally, and therefore offer little resistance to dislodgment of the restoration, is to

D
a. increase the total occlusal convergence
b. use resin modified glass ionomer luting cement
c. use a beveled shoulder finish line instead of a chamfer
d. prepare vertical grooves in opposing axial surfaces

44. The optimal occlusal reduction for a posterior tooth prepared for a PFM crown that is to have a ceramic occlusal surface is ___ mm.

B
a. 2.5
b. 2.0
c. 1.5
d. 1.0

45. Viscostat™ hemostatic agent is a solution of

C
a. aluminum chloride
b. racemic epinephrine
c. ferric sulfate
d. aluminum potassium sulfate

46. The optimal position for the facial margins of esthetic maxillary anterior crowns is

C
a. 1.0 mm incisal to the free gingival margin
b. 0.5 mm incisal to the free gingival margin
c. 0.5 to 0.75 mm into the gingival crevice
d. 1.0 to 2.0 mm into the gingival crevice

47. All of the following are likely results of routinely placing margins deeply into the gingival crevice during crown preparation EXCEPT which one?

C
a. gingival recession
b. traumatic impression-making
c. lower incidence of secondary caries
d. chronic gingival inflammation

48. Which of the following rotary instruments may be used to create satisfactory finish lines for cast metal margins?

E
a. round-end tapered diamond
b. torpedo diamond
c. flame-shaped diamond
d. *two* of the above
e. a, b and c above

49. Which of the following are possible consequences of *not* replacing tooth #19 in an otherwise intact dentition?

B
a. extrusion of one or more opposing teeth in the maxillary left quadrant
b. mesial tipping of the remaining mandibular left molars
c. distal migration of the premolars in the mandibular left quadrant
d. *two* of the above
e. a, b and c above

50. Considering all factors involved in the fabrication of PFM crowns for anterior teeth, which one of the following statements concerning the timing of impression-making is most reasonable?

E
a. impressions may be made routinely at the same appointment as tooth preparation
b. impressions should never be made at the same appointment as tooth preparation
c. timing of impression-making is dependent mainly on the availability of chair-time after the provisional restoration has been fabricated
d. if the gingival attachment is injured during tooth preparation, it is best to delay impression-making by 3-4 days
e. in cases where existing crowns have caused severe chronic inflammation, final impressions for replacement crowns may have to be delayed by as much as 3 months