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THE JOURNAL OF BONE & JOINT SURGERY

CONTINUING MEDICAL EDUCATION

CME

REVIEW QUESTIONS

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APRIL, MAY, JUNE  
2006

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THE DEADLINE TO SUBMIT YOUR ANSWERS FOR GRADING THIS SET OF QUESTIONS IS OCTOBER 15, 2006.

## PURPOSE

The purposes of this CME program are:

- To provide the general orthopaedic surgeon with an ability to assess his or her continuing competence in orthopaedics through the acquisition of contemporary scientific information.
- To provide a broad-based review and update of the major subspecialty areas in orthopaedics.
- To make *The Journal* reader aware of new advances in orthopaedic surgical techniques and technology.

## INSTRUCTIONS

In order to benefit most from this educational experience and qualify for Continuing Medical Education credit, please observe the following instructions:

1. Read the learning objectives listed on the Response Form and be certain that they meet your individual learning needs.
2. These CME questions have been derived from the information presented in the April, May, and June issues of the American volume of *The Journal of Bone and Joint Surgery* (Volume 88-A, Numbers 4, 5, and 6). A careful study of each article should yield the best response to each question.
3. Read each question carefully, identify the best answer, and record that answer on the CME Response Form in the back of this document.
4. To receive CME credit, it is absolutely essential that you complete all portions of the attached Response Form and answer each question.
5. In order for the American Academy of Orthopaedic Surgeons to document your participation in the CME activity, Academy Fellows must provide their AAOS membership number in the designated area on the Response Form.
6. In addition to providing the answers to the CME questions, you must complete the examination evaluation questions. These questions are found on the Response Form. The way you answer these evaluation questions will not in any way affect the score that you achieve.
7. All completed answer sheets will be graded, and you will be advised of the results of this examination within four weeks after it is received. In order to qualify for CME credit, a score of more than 50% correct must be achieved on the examination. A charge of \$30 per quarter, or \$110 per year, must be paid at the time that the answer sheet is submitted. **The deadline to submit your answers for grading this set of questions is October 15, 2006.**

### 1. Following revision hip arthroplasty, WOMAC pain and function scores:

- A. continually improved for one year postoperatively
- B. continually improved for two years postoperatively
- C. improved for six months postoperatively and then plateaued
- D. improved, but the improvement was not statistically significant
- E. did not improve

### 2. The vastus-splitting approach for total knee arthroplasty may result in injury to the innervation of the distalmost aspect of the vastus medialis obliquus muscle. Which of the following strategies has been shown to reduce the likelihood of permanent damage to the muscle?

- A. selective use of the approach in patients weighing <100 kg
- B. avoidance of tourniquet use with the vastus-splitting approach
- C. use of only blunt dissection in the interval of the vastus muscle split
- D. microdissection of the nerve to the vastus medialis obliquus
- E. avoidance of the approach in patients with valgus deformity of the knee

### 3. In a rat model, a traumatic brain injury was associated with the release of systemic factors that influenced which of the following processes of fracture-healing?

- A. mesenchymal stem cell recruitment
- B. callus formation
- C. osteoblast differentiation
- D. chondrocyte apoptosis
- E. calcified cartilage remodeling

### 4. Which of the following methods is the most useful for detecting the early phase of apoptosis?

- A. in situ cell death detection (TUNEL)
- B. positive stain for annexin V-FITC and negative stain for propidium iodide
- C. positive stain for both annexin V-FITC and propidium iodide
- D. mitochondrial membrane potential
- E. DNA ladder

### 5. In a study of children with polyostotic fibrous dysplasia, which of the following correlated best with the Pediatric Outcomes Data Collection Instrument (PODCI) scores for sports?

- A. degree of scoliosis
- B. neck-shaft angle and the amount of disease burden in the lower extremities
- C. angular deformity in the long bones
- D. use of bisphosphonates
- E. endocrinopathies including phosphate wasting

- 6. In a patient with acute symptomatic distal radioulnar joint instability, the preferred first option of therapeutic intervention is:**
- arthroscopy of the distal radioulnar joint
  - repair of deep fibers of the triangular fibrocartilage complex to the fovea
  - tenodeses of the flexor carpi ulnaris and extensor carpi ulnaris to the distal aspect of the ulna
  - reconstruction of the dorsal and palmar ligaments with tendon graft
  - resection of the distal part of the ulna or a Sauvé-Kapandji procedure
- 7. A long-term follow-up of acute repair/reconstruction of the anterior cruciate ligament following injury showed the best results in patients who had undergone:**
- open primary repair of the ligament
  - open primary repair augmented by a ligament-augmentation device
  - open primary repair augmented by a bone-patellar tendon-bone graft
  - delayed use of a bone-patellar tendon-bone graft
  - acute arthroscopic débridement
- 8. Which of the following was the best predictor of a  $\geq 90\%$  return to baseline functional status at one year following surgical repair of an unstable ankle fracture?**
- ASA classification III or IV
  - older age
  - presence of diabetes
  - male gender
  - fracture-dislocation
- 9. Which factor is most likely to lead to a poor long-term functional outcome in patients treated with extensive soft-tissue releases for clubfoot deformity as infants?**
- extent and number of operations on the affected clubfoot
  - degree of initial clubfoot deformity
  - amount of corrective cast treatment performed preoperatively
  - treatment with corrective casts only
  - sex of the patient
- 10. Deep vein thrombosis after total hip replacement in patients with cancer:**
- occurs as often as it does in patients who do not have cancer
  - requires a vena cava filter for treatment
  - is most common after cancer surgery that required intervention in the pelvis
  - is correlated with surgical duration
  - warrants lifetime anticoagulation
- 11. A hamstring tendon graft that has been preconditioned on a graft board is reimplanted while at the temperature of the operating room to reconstruct the anterior cruciate ligament. If the tension in the graft is 50 N immediately following the reconstruction, what will be the final graft tension after stress relaxation and equilibration of the graft temperature with bone temperature?**
- 5 N
  - 10 N
  - 15 N
  - 20 N
  - 45 N
- 12. Many classification systems are used to devise treatment plans for a patient with osteonecrosis of the femoral head. The vast majority evaluate all of the following except:**
- whether the lesion is precollapse or postcollapse
  - the size of the necrotic fragment
  - the amount of depression of the femoral head
  - the presence or absence of degenerative arthritis
  - the presence or absence of developmental dysplasia of the acetabulum
- 13. Which of the following bacterial infecting organisms is most likely to be associated with development of a glycocalyx biofilm slime?**
- Staphylococcus aureus*
  - Staphylococcus epidermidis*
  - Streptococcus species*
  - Escherichia coli*
  - Serratia
- 14. Compared with no augmentation, augmentation with porcine small-intestine submucosa of open repairs of supraspinatus and infraspinatus rotator-cuff tears with moderate-to-severe atrophy:**
- improves the healing rate according to one-year postoperative magnetic resonance imaging
  - increases patient satisfaction scores
  - increases patient-reported function scores
  - increases patient pain scores
  - results in more subacromial inflammatory reactions
- 15. In comparison with patients treated with standard intramedullary nailing for a Gustilo-Anderson type-3A or 3B open tibial fracture, patients treated with standard intramedullary nailing and an rhBMP-2 collagen sponge implant were found to have:**
- a higher rate of deep infection
  - a greater risk of undergoing exchange nailing to promote union
  - a greater risk of requiring bone-grafting to promote union
  - a faster return to full weight-bearing without pain
  - a higher rate of implant failure

- 16. Which of the following factors was found to be associated with the need for early revision of a total knee arthroplasty with a megaprosthesis done after bone tumor resection?**
- resection length
  - body weight
  - tumor location
  - use of an allograft sleeve
  - age
- 17. Posterior glenoid wear has been well described in patients with primary osteoarthritis of the shoulder. In one study, the authors also found a high prevalence of:**
- anterior glenoid wear
  - posterior glenoid wear
  - inferior glenoid wear
  - superior glenoid wear
  - global glenoid wear
- 18. Improving bone mineral density in children with osteogenesis imperfecta resulted in all of the following except:**
- improved sports participation
  - fewer fractures
  - fewer surgical interventions
  - improved parental and patient perceptions of comfort and happiness
  - improved transfers and walking capability
- 19. A forty-five-year-old healthy man sustained an inversion sprain resulting in a displaced fracture of the fifth metatarsal shaft. The proposed surgical plan was open reduction and internal fixation of the fracture. Ankle block and general anesthesia were used for the surgery. The surgeon performed a subcutaneous infiltration of 1 mL (4 mg/mL) of dexamethasone with 10 mL of 1.0% plain bupivacaine hydrochloride around the surgical site prior to the incision. In addition, the anesthesiologist administered 8 mg of dexamethasone intravenously for prevention of postoperative nausea and vomiting. Which of the following is most likely to occur with the administration of dexamethasone?**
- delayed or impaired wound-healing
  - masking of the clinical signs of a postoperative infection should one occur
  - no adverse effects on healing
  - increased risk of infection, necessitating administration of prophylactic antibiotics
  - induction of bone loss and impairment of fracture-healing
- 20. The presence of which of the following conditions is a contraindication to the use of fresh osteochondral allografting for articular cartilage lesions in the knee?**
- osteoarthritis dissecans
  - patellofemoral disease
  - a failed prior cartilage repair
  - aseptic necrosis
  - inflammatory arthritis
- 21. The primary goal of revision hip arthroplasty is to improve patients' quality of life. Which of the following was found to be the most important predictor of WOMAC pain scores at twenty-four months postoperatively?**
- time waiting for surgery
  - revision severity classification
  - use of cemented components
  - presurgery pain level
  - younger female patient
- 22. Following arthrodesis with multisegmental instrumentation to treat adult spinal deformity, the highest prevalence of pseudarthrosis was found at which level?**
- T4-T5
  - T11-T12
  - L3-L4
  - L4-L5
  - L5-S1
- 23. Which of the following is a major limitation of gene therapy for articular cartilage defects based on currently available gene-delivery technology?**
- the absence of a vector that does not cause DNA mutations in the host genome
  - the absence of a vector that does not stimulate a host inflammatory response
  - the absence of a vector that can deliver the gene specifically to the chondrocytes at the edge of the defect
  - the absence of a vector that can deliver genes only to chondrocytes
  - the absence of a vector that can be delivered during arthroscopy
- 24. Osteochondral allografts were found to be sufficiently viable for transplantation after cold storage for time-periods not longer than:**
- five to nine days
  - ten to thirteen days
  - fourteen to twenty days
  - twenty-one to twenty-eight days
  - twenty-nine to forty days
- 25. Compared with that of unaffected individuals, the subsynovial connective tissue of patients with carpal tunnel syndrome shows evidence of:**
- disorganized collagen fibrils
  - absence of Type-I collagen
  - smaller-diameter collagen fibrils in a bimodal distribution
  - lysis of collagen fibrils
  - larger-diameter collagen fibrils

- 26. A fourteen-year-old girl fell on her outstretched hand and presents with a tender prominent dorsally displaced distal part of the ulna and limited forearm supination. Routine radiographs are nondiagnostic. Your next step would be to recommend:**
- bilateral ulnar variance radiographs
  - triple-injection wrist arthrography
  - computed tomographic examination of both wrists in both pronation and supination
  - diagnostic wrist arthroscopy
  - closed reduction and pinning of the distal radioulnar joint
- 27. Arthroscopic débridement of osteoarthritic cartilage of the knee results in substantial relief of symptoms in which group of patients?**
- those with mechanical symptoms and a meniscal tear
  - those with a joint space width of  $\geq 3$ mm
  - those with a Kellgren-Lawrence grade of 4
  - those with crystal synovitis
  - those with valgus angulation
- 28. Augmentation of patient-controlled analgesia with periarticular multimodal drug injection following a total knee arthroplasty resulted in:**
- an increased rate of superficial knee infection
  - a reduction in the inpatient hospital stay
  - a reduction in the patient-controlled analgesia required in the first twenty-four hours postoperatively
  - an improved range of movement of the knee prosthesis
  - increased side effects such as nausea, vomiting, urinary retention, and respiratory depression
- 29. A modified Gartland type-IV supracondylar humeral fracture in children is characterized as:**
- an extension-type fracture
  - an extension-type fracture with a periosteal hinge
  - a flexion-type fracture
  - a distal fragment that has rotational deformity
  - a distal fragment that can fall into both flexion and extension
- 30. An advantage of performing thoracoscopic spinal fusion rather than posterior spinal fusion for thoracic adolescent idiopathic scoliosis is:**
- shorter operative time
  - less impact on pulmonary function
  - fewer motion segments fused
  - more rapid return to full activities
  - fewer implant-related complications
- 31. Preconditioning a hamstring tendon graft helps to limit the loss of tension. How long must hamstring grafts be preconditioned to essentially eliminate stress relaxation?**
- fifteen minutes
  - thirty minutes
  - one hour
  - two hours
  - three hours
- 32. The hindfoot should be placed in which of the following positions before application of the final corrective plaster cast for treatment of congenital vertical talus deformity?**
- mild hindfoot valgus
  - mild hindfoot varus
  - maximum hindfoot valgus
  - maximum plantar flexion and inversion
  - neutral
- 33. In a study that evaluated the relationship between preoperative expectations and WOMAC pain and fracture scores at twelve months postoperatively, patients with expectations of no pain and no need for a walking aid had:**
- significantly higher WOMAC pain and function scores
  - no difference in either WOMAC pain or WOMAC function scores
  - significantly higher WOMAC pain scores but no difference in WOMAC function scores
  - significantly lower WOMAC function scores but no difference in WOMAC pain scores
  - results that could not be ascertained from the data presented
- 34. What preoperative variable is most predictive of the need for postoperative transfusion following total shoulder arthroplasty?**
- age
  - weight
  - hemoglobin level
  - predonation of autologous blood
  - anticoagulant usage
- 35. In distinguishing transient synovitis from septic arthritis of the hip in children, clinical judgment is critical. In addition, which of the following combinations of factors is most predictive of a diagnosis of septic arthritis?**
- refusal to bear weight on the lower limb and an erythrocyte sedimentation rate of  $>40$  mm/hr
  - an erythrocyte sedimentation rate of  $>40$  mm/hr and a C-reactive protein level of  $>20$  mg/L
  - a C-reactive protein level of  $>20$  mg/L and an oral temperature of  $>38.5^\circ\text{C}$
  - a serum white blood-cell count of  $>12.0 \times 10^9/\text{L}$  and refusal to bear weight on the lower limb
  - an oral temperature of  $>38.5^\circ\text{C}$  and an erythrocyte sedimentation rate of  $>40$  mm/hr
- 36. Inferior glenoid wear:**
- is associated with anterior glenoid wear

- B. is associated with posterior glenoid wear  
 C. is associated with anterior as well as posterior glenoid wear  
 D. has no association with glenoid wear in the transverse plane  
 E. is associated with central glenoid wear
- 37. Children with unilateral congenital below-the-elbow deficiency are best fit with a prosthesis:**
- A. at birth  
 B. at six months of age  
 C. when they begin to walk  
 D. at any time before the age of three years  
 E. at any time after the age of three years
- 38. In comparison with the use of two-dimensional computed tomography to evaluate fractures of the distal part of the radius, the use of three-dimensional computed tomography resulted in:**
- A. A better determination of articular comminution  
 B. better outcomes  
 C. less time to perform the imaging  
 D. decreased cost  
 E. no additional software
- 39. A single subacromial corticosteroid injection may have which of the following effects on the rotator cuff?**
- A. chronic change in tendon collagen composition  
 B. acute change in tendon collagen expression ratio  
 C. suppression of the rotator cuff's injury response  
 D. amplification of the rotator cuff's injury response  
 E. no appreciable effects with only a single corticosteroid dose
- 40. In fresh osteochondral allografting, which of the following is considered the most important factor for attaining an acceptable host-graft match?**
- A. histocompatibility  
 B. blood type  
 C. immunosuppression  
 D. donor sex  
 E. graft size
- 41. A twenty-six-year-old man has pain with weight-bearing ten months after open reduction and internal fixation of a tibial shaft fracture. A computed tomography scan is interpreted as showing a nonunion. The sensitivity of computed tomography for detecting nonunion of a tibial shaft fracture was found to be:**
- A. 40%  
 B. 55%  
 C. 75%  
 D. 80%  
 E. 100%
- 42. Which of the following is NOT an advantage of long wavelength ultraviolet light (ultraviolet A) compared with short wavelength ultraviolet light (ultraviolet C) as an adjuvant to stimulate recombinant adeno-associated viral vector gene transduction?**
- A. ultraviolet A is not absorbed by DNA and thus does not induce pyrimidine dimer formation like ultraviolet C does  
 B. ultraviolet A can be easily transmitted through a fiber-optic cable, whereas ultraviolet C cannot  
 C. ultraviolet A can be delivered from a 325-nm helium-cadmium laser, whereas ultraviolet C cannot  
 D. ultraviolet C generates toxic levels of reactive oxygen species, whereas ultraviolet A does not  
 E. ultraviolet C has very poor tissue penetration compared with ultraviolet A
- 43. Prosthetic wear debris leads to inflammation and uncontrolled osteoclast-mediated periprosthetic osteolysis by which pathway?**
- A. induction of pro-inflammatory cytokines  
 B. activation of MAP kinases  
 C. induction of suppressors of cytokine signaling  
 D. inhibition of anti-osteoclastogenic cytokines  
 E. all of the above
- 44. In a canine model, which of the following was as effective as autogenous bone graft for enhancing implant fixation strength?**
- A. allograft  
 B. transforming growth factor- $\beta$   
 C. bone morphogenetic protein-2  
 D. transforming growth factor- $\beta$  combined with bone morphogenetic protein-2  
 E. hydroxyapatite/tricalcium phosphate coating of the implant
- 45. Treatment alternatives for an ambulatory adult with lower-extremity spasticity and a flexion contracture of the knee include all the following except:**
- A. postural exercises  
 B. serial casts  
 C. proximal hamstring release  
 D. distal hamstring release  
 E. supracondylar knee osteotomy
- 46. Family members who refuse to allow a doctor to inform a patient about a serious diagnosis have probably focused their attention on all of the following except:**
- A. the negative emotional reactions of the patient  
 B. the exaggerated likelihood of the response  
 C. the exaggerated duration of the response

- D. the inability of the patient to come to grips with the future
- E. the need for the patient to come to terms emotionally with the diagnosis

**47. Posterior malleolar fractures are classified into three types: posterolateral-oblique, medial-extension, and small-shell. Fracture fixation may be considered for the medial-extension type because of its large fragment area. The prevalence of this type of fracture among patients with a trimalleolar fracture is:**

- A. 50%
- B. 20%
- C. 40%
- D. 60%
- E. 80%

**48. The Vancouver classification system is frequently used to evaluate periprosthetic femoral fractures. What was the most difficult assessment in a recent study of 321 periprosthetic fractures?**

- A. categorizing the fracture pattern
- B. deciding the stability of the stem in the B category
- C. identifying the type of stem
- D. detecting type-C fractures
- E. defining proximal fractures

**49. Intraoperative malleolar fracture is one of many osseous complications of total ankle arthroplasty performed for inflammatory**

**joint disease. Which of the following was the only complication that adversely affected clinical outcomes?**

- A. an anterolateral fracture of the distal part of the tibia
- B. a bimalleolar fracture
- C. a fracture that had not been treated with osteosynthesis
- D. valgus deformity of the ankle-hindfoot complex
- E. weight-bearing in the early postoperative phase

**50. The best prosthetic design for children with unilateral congenital below-the-elbow deficiency is:**

- A. a below-the-elbow prosthesis with a passive hand
- B. a below-the-elbow prosthesis with a voluntary opening body-powered terminal device
- C. a below-the-elbow prosthesis with a voluntary closing body-powered terminal device
- D. a below-the-elbow prosthesis with a myoelectric terminal device
- E. variable and is based on the individual child's changing needs and desires as they grow and develop

**Conflict of Interest**

The author of these CME questions does not have any financial conflict of interest with regard to the subject matter discussed in these review questions.

**RESPONSE FORM**

**EXAMINATION EVALUATION**

Did the July 2006 CME Review Questions meet these educational objectives\*:

1. Provide a broad-based review and update specifically in the areas of pediatric orthopaedics and foot and ankle surgery?  Yes  No
2. Strengthen your problem-solving abilities related to patient care particularly in the areas of foot and ankle surgery and pediatric orthopaedics?  Yes  No
3. Make you aware of new advances in orthopaedic surgical techniques and technology?  Yes  No

Comments (please comment on the quality of the questions and their relationship to your practice): \_\_\_\_\_

\*Note: These objectives will change every quarter.

**SURVEY (optional)**

1. Which of the following best describes your practice type?
  - General orthopaedics
  - General orthopaedics with subspecialty interest
  - Exclusively subspecialty
  - Resident or student
  - Researcher
  - Other: \_\_\_\_\_
2. What are your specialty interests? Please rank in order of importance (1 = highest importance).
 

___ Adult	___ Spine
___ Geriatric	___ Hand
___ Pediatric	___ Rheumatology
___ Rehabilitation	___ Foot and Ankle
___ Sports	___ Other: _____
___ Trauma	
3. Which is your number-one priority to read when you receive *The Journal* (American volume only) each month?
  - Commercial advertising
  - Current Concepts
  - Classified advertising
  - Letters to The Editor
  - Clinical scientific articles
  - Basic scientific articles
  - Orthopaedic Forum
  - Instructional Course Lectures

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The deadline to submit your answers for grading this set of questions is October 15, 2006.

**QUESTIONS?**

For payment questions, contact the Subscription Department at 781-449-9780, x140. For questions regarding submitted tests, contact Melissa Viola at 781-449-9780, x124. E-mail all other questions to cme@jbjs.org.

**ANSWER KEY**

**Black out the correct answers**

- |               |               |                                   |
|---------------|---------------|-----------------------------------|
| 1. A B C D E  | 18. A B C D E | 35. A B C D E                     |
| 2. A B C D E  | 19. A B C D E | 36. A B C D E                     |
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| 6. A B C D E  | 23. A B C D E | 40. A B C D E                     |
| 7. A B C D E  | 24. A B C D E | 41. A B C D E                     |
| 8. A B C D E  | 25. A B C D E | 42. A B C D E                     |
| 9. A B C D E  | 26. A B C D E | 43. A B C D E                     |
| 10. A B C D E | 27. A B C D E | 44. A B C D E                     |
| 11. A B C D E | 28. A B C D E | 45. A B C D E                     |
| 12. A B C D E | 29. A B C D E | 46. A B C D E                     |
| 13. A B C D E | 30. A B C D E | 47. A B C D E                     |
| 14. A B C D E | 31. A B C D E | 48. A B C D E                     |
| 15. A B C D E | 32. A B C D E | 49. A B C D E                     |
| 16. A B C D E | 33. A B C D E | 50. A B C D E                     |
| 17. A B C D E | 34. A B C D E | <b>CME Credits Claimed*</b> _____ |

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