
THE JOURNAL OF BONE & JOINT SURGERY

CONTINUING MEDICAL EDUCATION

CME

REVIEW QUESTIONS

JULY, AUGUST, SEPTEMBER
2007

THIS CME EXAM IS ALSO AVAILABLE AT JBJS.ORG AS AN INTERACTIVE ONLINE EXAM.
CREDITS EARNED BY COMPLETING AND SUBMITTING THIS EXAM ONLINE CAN BE
APPLIED TO THE SCORED AND RECORDED SELF-ASSESSMENT REQUIREMENT AS
MANDATED BY THE ABOS MAINTENANCE OF CERTIFICATION (MOC) PROCESS.

THE DEADLINE TO SUBMIT YOUR ANSWERS FOR GRADING THIS SET OF QUESTIONS IS JANUARY 15, 2008.

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 July, August, and September issues of the 2007 American volume of *The Journal of Bone and Joint Surgery* (Vol. 89-A). A careful study of each article should yield the best response to each question.
3. Record your answers and complete all portions of the attached Response Form in the back of this document. Upon successful completion of the examination, you may claim up to ten category-1 CME credits. However, to claim up to ten credits to satisfy self-assessment examination requirements mandated by the Maintenance of Certification process, you must take the *online* JBJS quarterly examination.
4. 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.
5. 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.
6. 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 \$45 per quarter, or \$165 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 January 15, 2008.**

1. Which of the following serological tests provides more diagnostic information as a screening test for the presence of infection at the site of a symptomatic total knee replacement?

- A. erythrocyte sedimentation rate
- B. C-reactive protein level
- C. erythrocyte sedimentation rate and C-reactive protein tests performed together as a test battery, with a positive result of either test considered to be a positive result for the test battery
- D. erythrocyte sedimentation rate and C-reactive protein tests performed together as a test battery, with positive results of both tests considered to be a positive result for the test battery
- E. erythrocyte sedimentation rate and C-reactive protein tests, with each considered as a separate test

2. The most important predictor of complex regional pain syndrome type I after a wrist fracture is:

- A. dominance of the side of the fracture
- B. female gender
- C. older age
- D. early cast-related complaints
- E. fracture type

3. All of the following statements regarding bimalleolar ankle fractures as compared with lateral malleolar fractures with deltoid ligament injury are true, except:

- A. they occur more often in patients over sixty years of age
- B. they are seen more commonly in female patients
- C. they tend to have a poorer outcome at one year after surgery
- D. they occur more commonly in patients with multiple comorbidities
- E. they are more common in diabetics

4. In one study, what was the most common postoperative complication of reverse total shoulder arthroplasty?

- A. infection
- B. glenoid fracture
- C. musculocutaneous nerve palsy
- D. dislocation
- E. glenoid base loosening

5. A seven-year-old boy with known osteogenesis imperfecta has incurred many upper-limb fractures over several years. Pamidronate treatment was commenced two years previously, and it reduced the fracture rate dramatically. A recent knee radiograph showed multiple fine horizontal bands in the metaphyseal areas of the distal part of the femur and the proximal part of the tibia. On the basis of the treatment and the radiographic findings, it appears that:

- A. the action of pamidronate is to inhibit osteoclast activity
- B. zebra lines due to pamidronate treatment are readily distinguishable from Harris growth arrest lines

- C. pamidronate treatment slows the longitudinal growth of long bones
- D. pamidronate treatment of children with osteogenesis imperfecta results in decreased mineralization of new bone
- E. zebra lines occasionally can be seen in the epiphyses of long bones
- 6. The mechanical stability of fracture fixation influences the healing outcome. In a sheep tibial fracture model:**
- A. an increased nail diameter improved healing by reducing interfragmentary movements
- B. placing the locking screws in the anteromedial plane improved healing by increasing the shear and torsional fixation stability
- C. using angle-stable locking screws improved healing by increasing the shear and torsional fixation stability
- D. reducing the number of locking screws improved healing by decreasing the axial fixation stability
- E. using angle-stable locking screws improved healing by increasing the axial fixation stability
- 7. Which of the following is considered ineffective for decreasing the risk of a postoperative wound infection?**
- A. administration of broad-spectrum antibiotics within one hour before the incision time
- B. continuing intravenous antibiotics for forty-eight hours after surgery
- C. using clippers to remove hair in the surgical area
- D. administration of antibiotics within three hours after an open fracture
- E. removing drains within twenty-four hours after surgery
- 8. In comparison with those of cervical fusion, the early results of cervical disc arthroplasty suggest:**
- A. a superior early outcome in the arthroplasty group
- B. deteriorating outcomes at six years postoperatively
- C. a higher complication rate in the arthroplasty group
- D. progression of adjacent segment disease in the absence of preexisting disease
- E. 5° to 10° improvement in the mean range of motion
- 9. Functional outcomes following amputation for the treatment of limb-threatening lower-extremity injury are similar to those following reconstruction. Which of the following statements best describes the comparative lifetime costs of the two treatments?**
- A. there are no differences
- B. costs for rehospitalizations due to complications related to limb reconstruction are more than the additional cost of the prosthesis
- C. lifetime costs for limb reconstruction are substantially less than those for limb amputation
- D. only above-the-knee amputations are more costly, over a lifetime, than limb reconstructions
- E. newer materials are making prostheses less expensive
- 10. Following posterior atlantoaxial arthrodesis, there are limitations in cervical spine motion, particularly in axial rotation. The most likely reason for this finding is that:**
- A. postoperative immobilization is required
- B. this technique is associated with a high rate of technical failure
- C. patients are placed in a prone position during the surgery
- D. 50% of rotation occurs at the atlantoaxial joint
- E. this technique is associated with a high rate of delayed union or nonunion
- 11. In a group of patients with pyogenic flexor tenosynovitis, which factor was not significantly associated with an increased rate of amputation?**
- A. age of more than forty-three years
- B. presence of diabetes mellitus, peripheral vascular disease, or renal failure
- C. presence of subcutaneous purulence
- D. history of penetrating injury
- E. involvement of more than one bacterial type
- 12. Which of the following factors is associated with better survival of patients with metastatic renal cell carcinoma?**
- A. female gender
- B. en bloc resection
- C. metastases only to osseous sites
- D. non-clear-cell histological subtype
- E. metastases to multiple sites
- 13. In a total hip replacement, the proximal design of the femoral component and the position of the stem in the femoral canal will determine the:**
- A. head size
- B. hip offset and length
- C. cup size
- D. choice of articulation surface
- E. time of operation
- 14. Which of the following has been identified as the most important predictor of the clinical outcome of a revision total hip arthroplasty?**
- A. duration from the index total hip arthroplasty
- B. duration of waiting time prior to the revision
- C. type of anesthesia
- D. a good preoperative WOMAC functional score
- E. type of previous implant design and fixation method
- 15. Which of the following factors has the strongest positive correlation with self-assessed outcome after rotator cuff repair?**
- A. gender
- B. preoperative expectations
- C. preoperative range of motion
- D. preoperative strength
- E. tear size

- 16. Acute compartment syndrome in a normal limb during surgery is a known and potentially devastating complication that can lead to permanent neuromuscular damage. During spine surgery, which surgical position and patient characteristic have been shown to increase leg intramuscular pressure in the dependent anterior compartment?**
- prone with chest rolls and elevated patient weight
 - kneeling with the hips and knees flexed 90° (on an Andrews Spinal Surgery Table) and elevated patient weight
 - kneeling with the hips and knees flexed 90° (on an Andrew Spinal Surgery Table) and a taller patient
 - suspended legs with the hips and knees flexed 45° (on a Jackson Spinal Table Top) and a taller patient
 - suspended legs with the hips and knees flexed 45° (on a Jackson Spinal Table Top) and elevated patient body mass index
- 17. The most common alteration in gait following arthrodesis of the first metatarsophalangeal joint is:**
- increased weight-bearing at the second metatarsal head during the loading response
 - hypermobility of the first ray on heel strike
 - decreased step length
 - increased flexion of the first interphalangeal joint on stance
 - increased ankle plantar flexion
- 18. A patient sustains an acute knee dislocation with a tear of the superficial medial collateral ligament off the femur. A primary repair of the superficial medial collateral ligament would result in reattachment closest to what femoral osseous landmark?**
- the gastrocnemius tubercle
 - the adductor tubercle
 - the medial epicondyle
 - the lateral intermuscular septum
 - the trochlear groove
- 19. Which of the following was found in the articular cartilage chondrocytes from animals systemically infected with a retrovirus?**
- infectious retrovirus
 - p27 antigen
 - proviral DNA
 - viral reverse transcriptase
 - none of the above
- 20. Complex or irreducible metacarpophalangeal joint dislocations are due to entrapment of the:**
- flexor tendon
 - extensor tendon
 - central slip
 - volar plate
 - lumbrical
- 21. Which of the molecules listed below has been shown in animal studies to increase bone mass and improve fracture healing?**
- TGF- β
 - PDGF
 - scleraxis
 - IL-10
 - PTH
- 22. In one study, the risk of complex regional pain syndrome type I after a wrist fracture was reduced with:**
- estrogen replacement therapy
 - 50 mg of vitamin C daily
 - multivitamins daily
 - bisphosphonate therapy
 - 500 mg of vitamin C daily
- 23. Perioperative mortality is one of the potential complications of total elbow arthroplasty. Which of the following factors has been shown to increase the risk of this complication?**
- age at the time of surgery
 - gender
 - revision total elbow arthroplasty
 - preoperative diagnosis of distal humeral fracture or nonunion
 - rheumatoid arthritis
- 24. In one study, use of allogenic onlay cortical graft combined with recombinant human osteogenic protein-1 (rhOP-1) was found to enhance fixation of segmental bone-replacement prostheses through extracortical bone-bridging and ingrowth. All of the following are considered to be effects of rhOP-1, except:**
- an increase in periosteal mineralized area
 - an increase in bone ingrowth
 - new bone formation at the prosthesis-host bone junction
 - prevention of allograft resorption
 - allograft integration with the extracortical bone envelope
- 25. There have been several overlapping systematic reviews of anterior cruciate ligament reconstructions comparing bone-patellar tendon-bone autografts to hamstring tendon autografts. According to the best available evidence derived from a methodologically sound meta-analysis, which of the following is most accurate?**
- hamstring tendon autografts are superior for preventing anterior knee pain, and there is little evidence that bone-patellar tendon-bone autografts provide better stability
 - bone-patellar tendon-bone autografts are superior for preventing anterior knee pain, and there is little evidence that hamstring tendon autografts provide better stability
 - hamstring tendon autografts are superior for preventing anterior knee pain and provide better stability
 - bone-patellar tendon-bone autografts are superior for preventing anterior knee pain and provide better stability

- E. there is too little evidence to suggest whether bone-patellar tendon-bone autografts or hamstring tendon autografts are superior for preventing anterior knee pain or provide better stability
- 26. Which statement about povidone-iodine is true?**
- A. its efficacy is equal to that of chlorhexidine gluconate on skin contact
 B. it can be inactivated by blood and serum proteins
 C. it is maximally effective before it is allowed to dry
 D. its antimicrobial activity is longer lasting than that of chlorhexidine gluconate
 E. it is more effective than ChlorPrep (chlorhexidine gluconate and isopropyl alcohol) for decreasing bacterial counts in foot and ankle surgery
- 27. A pin-care protocol developed for use with external fixation devices includes all of the following, except:**
- A. avoidance of thermal damage to bone by preventing transcortical pin placement
 B. placement of each compartment on stretch during pin passage
 C. stabilizing skin with mild compression to prevent pistoning of soft tissue
 D. frequent and early pin care in the hospital and adjunctive chemical cleaning in the outpatient setting
 E. use of safe anatomic windows
- 28. Which of the following factors is most predictive of the risk of recurrent shoulder dislocation?**
- A. age
 B. sex
 C. sports hours per year
 D. participation in contact/collision sports
 E. occupational use of the arm
- 29. In counseling an eighteen-year-old male high-school athlete after his first shoulder dislocation, which of the following statements would be least true?**
- A. the risk of a second dislocation is >50% in your age group
 B. only 50% of patients with an unstable shoulder in your age group voluntarily choose surgery
 C. if your shoulder remains stable, your level of satisfaction is likely to be very high
 D. your shoulder will not do well without surgery
 E. if you do not go back to contact or collision sports or use your arm above your head in your job, the chances of future instability are low
- 30. The biggest disadvantage of ultrasonography for imaging of the shoulder of an infant is:**
- A. the need for sedation and an NPO (nothing by mouth) status
 B. difficulty in interpreting images
 C. lack of interobserver reliability
 D. lack of definition of anterior joint detail
 E. comparative lack of definition in younger patients
- 31. At what time-interval following injury does irrigation of a contaminated wound result in the greatest ability to remove bacteria?**
- A. three hours
 B. six hours
 C. nine hours
 D. twelve hours
 E. twenty-four hours
- 32. What is the most likely source of patellofemoral malalignment in patients with patella alta?**
- A. vastus medialis weakness
 B. reduced femoral trochlear stability
 C. articular cartilage wear
 D. tibial torsion
 E. medial patellofemoral ligament tear
- 33. Regarding the retear rate and structural changes in the rotator cuff after arthroscopic repair of a supraspinatus tear, which of the following statements is correct?**
- A. structural changes in the rotator cuff can be reversed by a successful repair
 B. an intact repair leads to superior scores for pain and activities of daily living
 C. age is not a factor influencing the clinical outcome and structural integrity
 D. a high degree of preoperative fatty infiltration and atrophy of the supraspinatus are predictors of a retear
 E. fatty infiltration of the infraspinatus does not change postoperatively regardless of the repair integrity
- 34. Which of the following radiographic findings correlated best with anterior knee pain after total knee arthroplasty with a resurfaced patella?**
- A. lateral tilt
 B. lateral subluxation
 C. patellar height
 D. major asymmetric patellar resection (≥ 4 mm)
 E. patellar bone-femoral trochlea contact without tilt
- 35. When a cementless stem is implanted in a total hip replacement, the combined anteversion technique requires that:**
- A. the cup be positioned in a safe zone of $15 \pm 10^\circ$ of anteversion
 B. cup anteversion be determined after implantation of a trial femoral stem
 C. a femoral head of ≥ 32 mm be used
 D. the longest femoral neck size be chosen to avoid impingement
 E. cross-linked polyethylene be used
- 36. A fifty-five-year-old construction worker complains of pain in the dominant shoulder. A magnetic resonance arthrogram of that shoulder demonstrates medial subluxation of the biceps tendon from the bicipital groove. During**

- arthroscopy of the shoulder, what other pathological finding is most likely to be observed?**
- complete disruption of the transverse humeral ligament
 - anterior acromial spurring
 - an absent coracohumeral ligament
 - pathological involvement of the rotator cuff
 - hourglass deformity of the biceps tendon
- 37. There are hundreds of reports in the literature about the results of total ankle arthroplasty and ankle fusion. A systematic review of the available literature showed that**
- the studies are well designed with clear objectives and well-stated hypotheses
 - the same outcome-evaluation tools and similar, recognized follow-up protocols were used in most of the studies
 - there are currently no published prospective randomized studies comparing ankle replacements with ankle fusions
 - most of the studies are comparable with regard to design, patient demographics, duration of follow-up, and number of patients enrolled
 - ankle fusion studies had much better designs than ankle replacement studies
- 38. After nonoperative management of massive rotator cuff tears, all of the following changes were observed except:**
- a decrease in the acromiohumeral distance
 - an increase in fatty infiltration of the rotator cuff muscles
 - a decrease in active shoulder abduction
 - progression of glenohumeral osteoarthritis
 - an increase in tear size
- 39. Inferior outcomes after lateral unicompartmental knee replacement can be expected in which situation?**
- use of a medial approach
 - lateral placement of the femoral component
 - removal of distal femoral cartilage prior to femoral resection
 - a diagnosis of posttraumatic arthritis secondary to a tibial plateau fracture
 - maximizing component congruency during placement of the prosthesis
- 40. Osteonecrosis of the femoral head can be a complication following surgical dislocation of the hip. Which of the following factors is the most important to avoid this complication?**
- the patient in a supine position during the operation
 - use of a posterior approach
 - use of a trochanteric flip osteotomy
 - maintenance of the posterior capsule
 - extensive soft-tissue release
- 41. Which of the following is the predominant site of vascular entry into the first metatarsal head?**
- dorsal-medial corner
 - dorsal surface
 - dorsal-lateral corner
 - plantar-lateral corner
 - plantar-medial corner
- 42. When you suspect that a person has an infection that might be related to an allograft, which of the following groups should be notified?**
- Centers for Disease Control and Prevention (CDC)
 - Food and Drug Administration (FDA)
 - state or local health department
 - the tissue bank
 - all of the above
- 43. A sixty-year-old man sustained a distal radial fracture. Which treatment modality yields superior patient-rated outcomes as statistically proven by Level-I evidence?**
- open reduction and internal fixation with a locked plate
 - open reduction and internal fixation with fragment-specific fixation
 - augmented bridging external fixation
 - nonbridging external fixation
 - no method has been proven to be superior
- 44. The differentiation of monocytes into osteoblasts is mediated by a molecule that also has been identified as a potential target to treat, prevent, and monitor osteolysis following total joint replacement. The molecule is:**
- OP-1
 - BMP
 - RANK/RANKL
 - Frizzled
 - Smad 8
- 45. Which characteristic of scoliosis in patients with Charcot-Marie-Tooth disease is similar to a characteristic of idiopathic scoliosis?**
- majority female population
 - left thoracic curve direction
 - sagittal plane kyphosis
 - age of onset
 - response to orthotic management
- 46. Which of the following imaging modalities is viewed as the current gold standard for delineating proximal artery abnormalities when evaluating thoracic outlet syndrome?**
- two-dimensional magnetic resonance angiography
 - three-dimensional magnetic resonance angiography
 - magnetic resonance imaging with contrast
 - arteriography
 - arterial duplex examination
- 47. After adjustment for patient characteristics and hospital procedural volume, the rate of adverse outcomes following total hip and total knee replacements in specialty hospitals, compared with that in general hospitals, was:**
- the same
 - 20% higher
 - 20% lower
 - 40% higher
 - 40% lower

48. On a sonogram, a normal shoulder of an infant should have an SGH or α -angle of less than or equal to:

- A. 30°
- B. 45°
- C. 60°
- D. 75°
- E. 90°

49. Which of the following is regarded as a relevant factor in determining the risk of early postoperative mortality following surgical treatment of dens fractures in elderly patients?

- A. surgical approach
- B. fracture type
- C. concomitant illness
- D. delay in treatment
- E. postoperative immobilization

50. Patients who elect to undergo elective removal of fracture fixation hardware should expect:

- A. a high prevalence of indolent infection at the time of surgery
- B. a >75% reduction in pain at the surgery site by one year postoperatively
- C. 30% higher SMFA scores initially after the explantation and then at one year postoperatively
- D. resolution of depression as measured with the SF-36 score
- E. 50% more improvement if the implant is located in the upper extremity rather than the lower extremity

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 September 2007 CME Review Questions meet these educational objectives*:

1. Provide a broad-based review and update specifically in the areas of orthopaedic research and spine and hip surgery? Yes No
2. Strengthen your problem-solving abilities related to patient care particularly in the areas of spine and hip surgery? 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

ACCREDITATION STATEMENT

This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Academy of Orthopaedic Surgeons (AAOS) and *The Journal of Bone and Joint Surgery* (JBJS). The AAOS is accredited by the ACCME to provide continuing medical education for physicians. The AAOS designates this educational activity for up to 10 hours of category-1 credit toward the AMA Physicians' Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

The deadline to submit your answers for grading this set of questions is January 15, 2008.

QUESTIONS?

For payment questions, contact the Subscription Department at 781-449-9780, x1240. For questions regarding submitted tests, contact Melissa Viola at 781-449-9780, x1224. 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 |
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| 3. A B C D E | 20. A B C D E | 37. A B C D E |
| 4. A B C D E | 21. A B C D E | 38. 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 |
| 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 | |

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