
THE JOURNAL OF BONE & JOINT SURGERY
CONTINUING MEDICAL EDUCATION

CME

REVIEW QUESTIONS

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2005

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THE DEADLINE TO SUBMIT YOUR ANSWERS FOR GRADING THIS SET OF QUESTIONS IS JULY 15, 2005.

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 January, February, and March issues of the American volume of *The Journal of Bone and Joint Surgery* (Volume 87-A, Numbers 1, 2, and 3). 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 July 15, 2005.**

1. **A seventy-two-year-old woman slips and falls in her kitchen and sustains a hip fracture. The best strategy for maximizing the likelihood that this patient will receive appropriate osteoporosis treatment includes:**
 - A. directly involving the patient in her own health care through education and self-advocacy
 - B. mailing guidelines to local primary care physicians
 - C. obtaining a DEXA scan on an in-patient basis
 - D. immediately initiating bisphosphonate therapy
 - E. scheduling an appointment at the fracture clinic within one week postoperatively
2. **In the periarticular soft tissues retrieved during revision of failed metal-on-metal total hip prostheses:**
 - A. plasma cells were seen in all tissues from metal-on-metal prostheses
 - B. plasma cells were seen only in association with perivascular lymphocytic cuffs
 - C. plasma cells were seen only in association with macrophages laden with metallic debris from metal-on-metal prostheses
 - D. plasma cells were found in tissues from cobalt chromium-on-polyethylene prostheses
 - E. the condition of the tissue surface was closely related to the extent of the plasma cell infiltrate
3. **Which of the following molecules is a marker of chondrocyte dedifferentiation following human autologous chondrocyte transplantation?**
 - A. cathepsin B
 - B. collagen II
 - C. collagen X
 - D. Egr-1
 - E. Sox-9
4. **Which of the following factors is the main reason for loss of elbow and forearm strength following radial head resection because of a comminuted fracture of the radial head?**
 - A. wrist and forearm pain with resultant ulnar abutment
 - B. valgus elbow deformity
 - C. osteoarthritis of the elbow
 - D. lack of proximal support of the radiocapitellar articulation
 - E. restricted elbow joint mobility
5. **Which of the following combinations of bone-graft substitutes has been shown to be effective as prophylaxis against infection in a goat fracture model that was contaminated with *Staphylococcus aureus*?**
 - A. calcium sulfate and demineralized bone matrix
 - B. calcium sulfate
 - C. tobramycin-impregnated polymethylmethacrylate

- D. tobramycin-impregnated calcium sulfate and demineralized bone matrix
E. demineralized bone matrix
- 6. Which of the following medications, when given intra-articularly, has been shown to be most effective in reducing postoperative pain following anterior cruciate ligament reconstruction?**
- A. methadone
B. morphine
C. hyalogen
D. corticosteroid
E. saline solution
- 7. A sixty-three-year-old woman was treated with humeral head replacement for a head-splitting proximal humeral fracture six months ago. During a recent evaluation, she reported increasing pain, loss of strength, and loss of active motion of the operatively treated shoulder. She can actively flex and externally rotate the shoulder to 40° and 20°, respectively. Passively, shoulder flexion and external rotation are 140° and 40°, respectively. Radiographs are unremarkable. The next step in the management may include:**
- A. electromyographic and nerve-conduction-velocity examination
B. arthrography
C. additional physical therapy focusing on stretching exercises
D. laboratory evaluation including a complete blood-cell count, measurement of the C-reactive protein level, and measurement of the erythrocyte sedimentation rate
E. arthroscopic lysis of adhesions and scar tissue
- 8. Which of the following restrictions was found to be the most important in preventing early dislocation following total hip arthroplasty?**
- A. abduction pillow
B. no side-sleeping
C. no driving
D. limitation of hip flexion
E. use of elevated chairs/toilet seats
- 9. When the twenty-year results of total hip arthroplasty performed with filling of the superolateral defect of the acetabulum with cement in patients with congenital hip dislocation were compared with the twenty-year results of total hip arthroplasty performed for hip arthritis with other causes, it was found that:**
- A. the results were comparable
B. the results were better in the former group
C. the results depended on the amount of cement coverage
D. the results depended on the femoral deformity
- E. the results were markedly worse in the former group
- 10. When patients with lower-extremity sarcoma were treated with limb-salvage surgery combined with high-dose postoperative external beam radiation therapy, they were noted to have:**
- A. an increased rate of pulmonary metastases
B. an increased rate of perioperative wound complications
C. an increased rate of local recurrence
D. a decreased rate of fractures
E. an increased rate of fractures
- 11. In a review of the records at an academic medical center, inadequate documentation was found for at least 70% of patients with compartment syndrome. The most common undocumented finding (excluding the category of pallor) was:**
- A. weakness
B. pain
C. compartment pressure
D. diastolic blood pressure
E. pulses
- 12. Which is the most common fatal complication of neurofibromatosis?**
- A. nonossifying fibroma
B. schwannoma
C. malignant peripheral nerve sheath tumor
D. malignant fibrous histiocytoma
E. plexiform neurofibroma
- 13. Surgical options for restoration of stability in a patient with recurrent anterior glenohumeral instability due to a large (>30%) osseous Bankart lesion that involves the anteroinferior aspect of the glenoid include all of the following except:**
- A. Bristow procedure
B. Latarjet procedure
C. arthroscopic Bankart repair
D. iliac crest bone-graft reconstruction
E. primary fixation of the fragment and capsulorrhaphy
- 14. Patients who sustain a fracture of the femoral neck and have a correctable acute medical comorbidity:**
- A. should nevertheless undergo immediate operative intervention
B. should undergo surgery within twenty-four hours to prevent progression of the acute medical condition
C. should be maximally optimized before being operated on
D. should have surgery within four days after the fracture because mortality rates rise after the fifth day

- E. should have surgery within four days after optimization of the medical condition
- 15. In a randomized study of the results three months after injection of botulinum toxin for the treatment of tennis elbow, the authors found that, compared with controls, patients who had received the botulinum injection had:**
- better grip strength
 - a persistent extensor lag
 - less pain
 - a lower Short Form-12 score for physical function
 - no significant differences
- 16. On the average, an extended trochanteric osteotomy decreases the torsional strength of a femur by about:**
- 10%
 - 20%
 - 50%
 - 70%
 - 90%
- 17. A thirteen-year-old Amish boy presents with a five-month history of groin pain. A diagnosis of slipped capital femoral epiphysis is made. You inform the parents that, compared with non-Amish white children with slipped capital femoral epiphysis, Amish children with the disorder have:**
- a higher prevalence of bilaterality and a higher prevalence of positive family history
 - a higher prevalence of bilaterality and a lower prevalence of positive family history
 - a lower prevalence of bilaterality and a higher prevalence of positive family history
 - a lower prevalence of bilaterality and a lower prevalence of positive family history
 - the same prevalence of bilaterality and the same prevalence of positive family history
- 18. Which of the following distal femoral fracture patterns is most likely to be associated with an open traumatic wound?**
- supracondylar distal femoral fracture (AO/OTA 33-A)
 - supracondylar-intercondylar distal femoral fracture without comminution (AO/OTA 33-C1)
 - supracondylar-intercondylar distal femoral fracture with supracondylar comminution (AO/OTA 33-C2)
 - supracondylar-intercondylar distal femoral fracture with a lateral coronal plane fracture (AO/OTA 33-C3)
 - supracondylar-intercondylar distal femoral fracture with medial and lateral coronal plane fractures (AO/OTA 33-C3)
- 19. Which of the following factors may decrease the risk of thermal injury during ultrasonic cement removal?**
- use of short bursts of energy
 - constant motion of the ultrasonic device within the cement mantle
 - frequent irrigation between passes of the ultrasonic probe
 - deflation of the tourniquet
 - all of the above
- 20. In HIV-positive patients with spinal infection, which of the following best predicts severity of illness?**
- white blood-cell count of $>15 \times 10^9/L$ on initial presentation
 - Duration of HIV infection
 - CD4 count of $<50/mm^3$
 - infection with *Staphylococcus aureus*
 - presence of osteomyelitis
- 21. You make a diagnosis of posterior dislocation of the shoulder in a male patient within twenty-four hours after the injury. Radiographs show a small humeral head defect. All of the following statements are true, except:**
- a good functional outcome is anticipated following relocation
 - an osteochondral fracture of the anterior part of the humeral head is likely
 - spontaneous relocation is unlikely
 - closed reduction should not be attempted
 - restriction of external rotation of the shoulder is a useful diagnostic sign
- 22. Which of the following is considered to be the gold-standard suturing technique for meniscal repair?**
- all-inside absorbable implant
 - second-generation flexible all-inside tensioned absorbable implant
 - horizontal mattress suture
 - vertical mattress suture
 - fibrin glue
- 23. To avoid substantial radiation exposure while operating a miniature c-arm device, a surgeon should maintain at least what distance from the beam?**
- 5 cm
 - 10 cm
 - 20 cm
 - 30 cm
 - 40 cm
- 24. Following total hip arthroplasty with a metal-on-metal articulation, hypersensitivity reactions to wear and repassivation products may develop in some patients. If hypersensitivity is established as the cause of bursa formation, pain, or bone resorption, a surgeon should consider:**

- A. reassuring the patient and waiting for relief of symptoms
 B. suppressing the reactions with drug therapy
 C. replacing the articulation with a different articulation device that does not liberate nickel, cobalt, or chromium ions
 D. advising the patient to limit activity in order to reduce the rate of wear
 E. treating the osteolytic lesions (resecting the granuloma, refreshing the bone surfaces until bleeding occurs, bone-grafting, and using cementing techniques) so that implant stability is not jeopardized
- 25. The amount of pain and functional impairment, as measured with the Short Form-36, in patients about to undergo bunion surgery:**
- A. correlated with the severity of the hallux valgus angle
 B. correlated with the intermetatarsal 1-2 angle
 C. inversely correlated with the hallux valgus angle
 D. inversely correlated with the intermetatarsal 1-2 angle
 E. did not correlate with the severity of the hallux valgus or intermetatarsal 1-2 angle
- 26. Of the following determinants of glenoid capacity, which is the most important in providing containment of the glenohumeral joint in patients with atraumatic posteroinferior multidirectional instability?**
- A. height of the posteroinferior aspect of the labrum
 B. depth of the osseous glenoid
 C. height of the anteroinferior aspect of the labrum
 D. width of the osseous glenoid
 E. thickness of the articular cartilage of the glenoid
- 27. Which factor is least associated with patient satisfaction following surgical repair of the rotator cuff?**
- A. tear size
 B. age
 C. forward elevation at the time of follow-up
 D. ASES (American Shoulder and Elbow Surgeons) score
 E. work disability
- 28. High NADH (nicotinamide adenine dinucleotide) autofluorescence in skeletal muscle indicating soft-tissue trauma-induced tissue hypoxia is negatively correlated with:**
- A. inflammatory cell response
 B. functional capillary density
 C. location of soft-tissue trauma
 D. parecoxib blood concentration
 E. mean arterial blood pressure
- 29. Different suture constructs were studied in a cadaveric model of rotator cuff repair. Which of the following had the greatest influence on the security of the repair?**
- A. suture size
 B. suture material (braided or monofilament)
 C. suture material (permanent or resorbable)
 D. number of knots across the repair site
 E. suture construct (simple or mattress)
- 30. When liquid gentamicin is added to cement, all but one of the following statements are true:**
- A. it maintains bacteriocidal activity
 B. it is eluted effectively from cement
 C. it can be used in cement spacers
 D. it is cost-effective when compared with tobramycin
 E. it can be used to reimplant prosthetic components
- 31. The effect of bisphosphonates in patients undergoing total hip and knee arthroplasty is best described as follows:**
- A. bisphosphonates lead to significant decreases in bone mineral density when compared with control values
 B. bisphosphonates have no effect on bone mineral density in patients undergoing hip and knee arthroplasty
 C. patients taking bisphosphonates will have significantly greater bone mineral density values at one year after surgery compared with the bone mineral density at the time of surgery
 D. bisphosphonates lead to significantly less periprosthetic bone loss (bone mineral density) than that in controls
 E. bisphosphonates are contraindicated in any patient undergoing joint arthroplasty
- 32. Which of the following findings would be inconsistent with protrusions of polyethylene from the backside of tibial inserts through screw-holes in the tibial base-plate being caused by wear of the insert?**
- A. distinct, eroded transition between the backside surface in contact with the tibial tray and the backside surface opposite screw-holes
 B. the height of the protrusions does not increase with thinner tibial inserts
 C. the protrusions have an oblong shape, while the screw-holes are round
 D. the height of the protrusions increases under areas of higher compressive loads
 E. an increased prevalence of osteolysis along fixation screws
- 33. An analysis of chondrocyte death following harvest of a human femoral osteochondral graft showed:**
- A. less cell death with "power-harvesting" techniques
 B. cell death occurring only near the tidemark

- C. cell death associated with the wound edge
 D. no increase in the rate of marginal cell death between fifteen and 120 minutes post-harvest
 E. uniform distribution of cell death across the cartilage surface
- 34. When compared with patients with discrete arm pain, patients with vague, diffuse idiopathic (nonspecific) arm pain were found to be more likely to:**
- A. have increased attention to internal physical sensations (private body consciousness)
 B. believe that their health was dependent on external forces or other people (such as doctors)
 C. complain of substantially greater pain when lifting a heavy object
 D. demonstrate poor coping mechanisms (increased catastrophizing)
 E. have substantially fewer somatic symptoms
- 35. What combination of metabolic abnormalities constitutes the triad of death?**
- A. hyperthermia, acidosis, coagulopathy
 B. hypothermia, alkalosis, coagulopathy
 C. hypothermia, acidosis, coagulopathy
 D. hyperthermia, alkalosis, coagulopathy
 E. normothermia, acidosis, coagulopathy
- 36. In one study, the diagnosis made by the examining orthopaedic surgeon was more accurate than that made by a radiologist interpreting a magnetic resonance image for all of the following knee injuries in children except:**
- A. anterior cruciate ligament tears
 B. lateral meniscal tears
 C. osteochondritis dissecans
 D. discoid lateral meniscus
 E. medial meniscal tears
- 37. In a study comparing complication rates among patients who had undergone bilateral knee replacement in one stage (sequential), in two stages during one hospitalization (staggered), or in two stages at a minimum of six weeks apart (staged), it was found that:**
- A. the overall rate was lowest in the group treated in two stages during one hospitalization (staggered)
 B. the overall rate was lowest in the group treated in one stage (sequential)
 C. the overall rate was lowest in the group treated in two stages during two hospitalizations (staged)
 D. the rate of major complications was highest in the group treated in two stages during one hospitalization (staggered)
 E. the rate of major complications was highest in the group treated in two stages during two hospitalizations (staged)
- 38. Perioperative administration of nonsteroidal anti-inflammatory drugs to patients undergoing spinal fusion surgery was found to be associated with which of the following?**
- A. increased postoperative opioid use
 B. increased hospitalization rates
 C. reduction in postoperative pain
 D. increased frequency of postoperative nausea and vomiting
 E. reduction in chronic pain syndromes
- 39. Bisphosphonates may prevent femoral head deformity following ischemic necrosis in pigs through which mechanism?**
- A. stimulating revascularization and appositional new bone formation
 B. decreasing pain and mechanical fragmentation of the femoral head
 C. strengthening necrotic bone through a physiochemical mechanism
 D. preserving the trabecular framework of the femoral head by inhibiting bone resorption
 E. stimulating recruitment of osteoblast precursors to the site of repair
- 40. Of the following hospital cost centers, which one is associated with the highest amount of resource utilization for primary and revision total hip arthroplasty?**
- A. blood bank
 B. rehabilitative services
 C. radiology
 D. operating room equipment and implants
 E. operating room time and staff
- 41. In a study examining ultrasonic cement removal from human cadaveric humeri, the magnitude and rate of temperature elevation in surrounding tissue from greatest to least was:**
- A. bone, radial nerve, triceps muscle
 B. radial nerve, bone, triceps muscle
 C. radial nerve, triceps muscle, bone
 D. triceps muscle, bone, radial nerve
 E. bone, median nerve, biceps muscle
- 42. Which of the following complications of anterior cervical spine surgery is likely to occur more frequently when ossification of the posterior longitudinal ligament is encountered?**
- A. Brown-Séquard syndrome
 B. spinal fluid leakage
 C. vertebral artery injury
 D. postoperative kyphosis
 E. esophageal perforation
- 43. What is the most common deficiency of orthopaedic surgeons with regard to communicating with their patients?**
- A. expressing confidence
 B. educating patients

- C. orienting patients
- D. empathetic response
- E. enlisting patients

44. Knee dislocations are devastating injuries that typically require multiple ligament reconstruction. Which of the following factors is the most important in optimizing functional outcome?

- A. use of allograft tissue rather than autograft tissue
- B. use of the tibial inlay method of posterior cruciate ligament reconstruction
- C. early operative intervention
- D. delaying surgery until a maximum range of motion is achieved
- E. postoperative rehabilitation protocol

45. When compared with radiation levels from the large c-arm device, radiation levels from the miniature c-arm have been shown to be more than:

- A. 15% less at comparable distances
- B. 25% less at comparable distances
- C. 50% less at comparable distances
- D. 75% less at comparable distances
- E. 95% less at comparable distances

46. Radiographic assessment of displacement of greater tuberosity fractures of the shoulder can be difficult. When four surgeons were asked to assess which view best determined the magnitude of greater tuberosity displacement, they reached the greatest consensus on a decision to perform open reduction and internal fixation after requiring:

- A. a true anteroposterior radiograph of the scapula in internal rotation
- B. a true anteroposterior radiograph of the scapula in external rotation
- C. an axillary view
- D. an outlet view
- E. all four views

47. In a study of patients with traumatic anterior dislocation that compared immobilization of the shoulder in internal rotation with immobilization in external rotation, 30% of the shoulders subsequently dislocated after being immobilized in internal rotation. What was the rate of recurrent

dislocation of the shoulders immobilized in external rotation?

- A. 10%
- B. 20%
- C. 30%
- D. 40%
- E. 50%

48. When a young patient with "cam-type" femoroacetabular impingement is treated with surgical resection of the head-neck junction, how much bone can be safely resected without significantly weakening the femoral neck?

- A. 5% of the neck diameter
- B. 10% of the neck diameter
- C. 30% of the neck diameter
- D. 50% of the neck diameter
- E. 75% of the neck diameter

49. In a rabbit model, the greatest reduction in both the prevalence and the severity of heterotopic ossification was observed when preoperative irradiation of the hip was performed:

- A. three weeks before the operation
- B. within forty-eight hours before the operation
- C. twenty-four hours before the operation
- D. seventy-two hours before the operation
- E. at any time before the operation; the specific timing of the irradiation was not important

50. In a comparison of computed tomography and plain radiography for the assessment of periacetabular osteolysis following total hip arthroplasty, it was found that computed tomography has:

- A. an average relative error of volume measurements of 63.4%
- B. a detection rate that is the same as that of plain radiography
- C. a 100% detection rate
- D. a better detection rate than plain radiography
- E. a worse detection rate than multiple plain radiographic views

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 April 2005 CME Review Questions meet these educational objectives*:

1. Provide a broad-based review and update specifically in the areas of hip and trauma surgery and orthopaedic rehabilitation? Yes No
2. Strengthen your problem-solving abilities related to patient care particularly in the areas of the hip and trauma? 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 July 15, 2005.

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 |
| 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 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 | CME Credits Claimed* _____ |

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