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THE JOURNAL OF BONE & JOINT SURGERY

CONTINUING MEDICAL EDUCATION

CME

REVIEW QUESTIONS

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JANUARY, FEBRUARY, MARCH  
2007

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THE DEADLINE TO SUBMIT YOUR ANSWERS FOR GRADING THIS SET OF QUESTIONS IS JULY 15, 2007.

## 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 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-I 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 July 15, 2007.**

**1. Improvement in the identification of a concomitant nondisplaced femoral neck fracture associated with an ipsilateral femoral shaft fracture was found after development of a best-practice protocol that included all of the following examinations except:**

- A. fluoroscopic evaluation of the hip in the operating room
- B. preoperative internal rotation radiograph of the hip
- C. magnetic resonance imaging of the hip
- D. computed tomography scanning through the femoral neck
- E. postoperative anteroposterior radiograph of the hip in the operating room

**2. In addition to an anteroposterior and lateral radiograph, which of the following images should be made to evaluate the displacement and stability of a lateral condyle fracture of the humerus in children?**

- A. internal oblique radiograph
- B. ultrasonogram
- C. arthrogram
- D. three-dimensional computed tomography scan
- E. magnetic resonance imaging scan

**3. In a rabbit model, bone-marrow-derived stem cells reduced the morbidity associated with tendon injuries by which of the following mechanisms?**

- A. increasing the rate of collagen formation and maturation
- B. increasing the rate of healing in tendons
- C. reducing adhesion formation in healing tendons
- D. increasing the cross-sectional area of healing tendons
- E. reducing the inflammatory response after suture repair

**4. Osteoporotic patients who sustained a pertrochanteric fracture of the hip were treated with external fixation and then randomized to a group that received alendronate for three months or to a group that did not. The alendronate-treated group was found to have:**

- A. increased screw fixation in cancellous bone
- B. a reduced prevalence of secondary wrist fractures
- C. a reduced prevalence of secondary vertebral fractures
- D. faster patient rehabilitation
- E. an improved range of motion of the hip

**5. The successful clinical treatment of which of the following conditions suggests that platelet-rich plasma might have value in treating fractures or bone loss:**

- A. AIDS
- B. intestinal anastomosis
- C. dermal ulcerations
- D. blood clots
- E. heart valve calcification

- 6. Which of the following types of posterior shoulder instability is associated with a higher failure rate following arthroscopic stabilization?**
- traumatic posterior instability
  - posterior instability following failed previous surgery
  - voluntary posterior instability
  - A and C
  - B and C
- 7. An aim of navigated total knee arthroplasty is to help the surgeon to implant components in optimal position. According to current best evidence from comparative studies, which benefit over conventional implant positioning can be inferred?**
- improved functional outcomes
  - shortening of the operation time
  - reduction of the relative risk of malalignment of  $>3^\circ$
  - reduction of postoperative complication rates
  - cost-effectiveness
- 8. Osteoporosis is a widespread clinical problem in our society, and the medical community has become more focused on prevention. With regard to the role of the orthopaedic surgeon, what has been shown to be the minimal amount of resources needed to promote a clinically relevant improvement in patients' understanding of bone health?**
- a focused office visit with the surgeon or ancillary staff
  - a written educational handout
  - a written educational handout with a follow-up clinical visit
  - a written educational handout with a follow-up telephone call by office staff
  - referral back to a primary-care physician specifically to address osteoporosis
- 9. Children with fibrodysplasia ossificans progressiva have congenital malformations of the great toes and inflammatory soft-tissue lesions that progress to form disabling heterotopic ossification. Failure of a bone marrow transplantation to prevent or correct fibrodysplasia ossificans progressiva suggests that:**
- hematopoietic cells do not contribute to expression of the disease
  - there was incompatibility between the donor and the recipient
  - new hematopoietic cells alone are not sufficient to prevent expression of the disease
  - bone marrow transplantation is successful only for certain phenotypes
  - immunosuppression was not effective following bone marrow transplantation
- 10. The prevalence of cervical stenosis in the general population is likely:**
- $<5\%$
  - between  $5\%$  and  $20\%$
  - between  $20\%$  and  $40\%$
  - between  $40\%$  and  $60\%$
  - $>60\%$
- 11. A thirty-year-old laborer sustains a crush injury to the right long finger. On evaluation six months later, he is unable to actively flex the finger and it cannot be passively extended. It can, however, be passively flexed. This suggests the following anatomic findings:**
- there are no important extensor adhesions
  - there is no dorsal capsular tightness of the proximal interphalangeal joint
  - there is a likelihood of either adhesions or discontinuity of the flexor tendons
  - all of the above
  - none of the above
- 12. Which of the following factors was significantly associated with the occurrence of heterotopic ossification following trauma-related amputation?**
- number of procedures required to achieve definitive closure
  - associated head injury
  - need for split-thickness skin-grafting
  - final amputation level within the initial zone of injury
  - associated extremity injuries
- 13. Animal experiments indicate that COX-2-selective non-steroidal anti-inflammatory drug therapy impairs fracture-healing. During which phase of fracture-healing should non-steroidal anti-inflammatory drug therapy be avoided?**
- prior to the fracture
  - during the inflammatory phase
  - after the regenerative phase
  - during the remodeling phase
  - after the remodeling phase
- 14. Blinded outcome assessment in orthopaedic trials:**
- may not make a difference with regard to the treatment effect size
  - is never possible
  - is always performed by investigators
  - may result in a lower treatment effect size
  - is clearly reported in orthopaedic manuscripts
- 15. Inferior scapular notching after Delta III reverse shoulder arthroplasties was found to be closely correlated with:**
- the length of time elapsed after the surgery
  - the craniocaudal positioning of the glenoid component (metaglene and glenosphere) and the angle between the glenoid component and the scapular neck
  - the preoperative diagnosis
  - the surgical approach utilized for exposure of the glenohumeral joint
  - the size of the glenosphere ( $36$  or  $42$  mm) implanted on the glenoid
- 16. What effect does extracellular matrix scaffold degradation have on the wound-healing process?**
- it may recruit bone-marrow-derived cells to the site of remodeling

- B. it releases antibacterial peptides into the site of remodeling
- C. it leads to a decrease in mechanical strength prior to the formation of new host tissue
- D. it facilitates the penetration of the scaffold by an abundance of mononuclear cells
- E. all of the above
- 17. While there are multiple graft options for reconstruction of the anterior cruciate ligament following injury, use of hamstrings and other soft-tissue grafts has increased recently largely as a result of:**
- A. improvements in fixation of the grafts on the femoral and tibial sides
- B. consistently superior outcomes compared with those of patellar tendon autografting
- C. a lack of documented flexor weakness at all flexion angles
- D. patient preference
- E. the recommendations of the International Committee for ACL Reconstruction
- 18. In comparison with nonoperative treatment, primary plate fixation was found to be superior for which of the following?**
- A. all clavicle fractures
- B. medial-third clavicle fractures
- C. lateral-third clavicle fractures
- D. minimally displaced midshaft clavicle fractures
- E. completely displaced midshaft clavicle fractures in healthy, active adults
- 19. Which of the following factors was shown to be associated with early prolonged postoperative wound drainage following a primary total hip arthroplasty?**
- A. patient age
- B. low-molecular-weight heparin
- C. rheumatoid arthritis
- D. surgical time
- E. intraoperative blood loss
- 20. Which of the following maturity assessment measurements are most closely associated with the scoliotic curve acceleration phase?**
- A. peak height velocity
- B. levels of serum insulin-like growth factor-1 (IGF-1)
- C. Risser sign
- D. radiographic appearance of the metacarpals and phalanges
- E. Tanner stage
- 21. Application of stromal cell-derived factor-1 to rabbit proximal tibial growth plates causes:**
- A. delayed growth plate closure and growth plate narrowing
- B. accelerated growth plate closure and growth plate narrowing
- C. accelerated growth plate closure and growth plate widening
- D. delayed growth plate closure and growth plate widening
- E. accelerated growth plate closure but no change in growth plate width
- 22. Which of the following lists the aseptic fracture nonunions with the highest to lowest expected rates of successful osseous union following exchange nailing?**
- A. noncomminuted femoral diaphyseal, noncomminuted humeral diaphyseal, noncomminuted tibial diaphyseal, noncomminuted distal femoral
- B. noncomminuted distal femoral, noncomminuted femoral diaphyseal, noncomminuted tibial diaphyseal, noncomminuted humeral diaphyseal
- C. comminuted femoral diaphyseal, noncomminuted femoral diaphyseal, noncomminuted tibial diaphyseal, noncomminuted humeral diaphyseal
- D. noncomminuted tibial diaphyseal, comminuted femoral diaphyseal, noncomminuted humeral diaphyseal
- E. none of the above
- 23. Total knee components were found to have been implanted more precisely with computer-assisted navigation than with conventional total knee arthroplasty:**
- A. in all planes
- B. in the frontal plane
- C. in terms of the rotational alignment of the femoral component
- D. in terms of the rotational alignment of the tibial component
- E. in terms of the patellar component
- 24. A sixty-five-year-old woman is scheduled to have a total knee arthroplasty. The optimal strategy for administration of antibiotic prophylaxis to prevent infection is:**
- A. oral antibiotics for three days before the incision
- B. oral antibiotics on the day of the surgery and during the incision
- C. intravenous antibiotics within five hours before the incision
- D. intravenous antibiotics within one hour before the incision
- E. intramuscular antibiotics within one hour before the incision
- 25. What treatment of long-bone defects in an ovine model resulted in superior bone density in bone regenerated within the critical-sized defect?**
- A. retention of the periosteal sleeve
- B. retention of adherent vascularized bone chips on the periosteal sleeve
- C. filling of the defect with autologous bone graft
- D. retention of the periosteal sleeve and retention of adherent vascularized bone chips on the periosteal sleeve
- E. all of the above
- 26. Ceramic-on-ceramic articulation is generally believed to be a low-friction arthroplasty. What biomechanical and tribological factors were found to be responsible for high frictional torque found in a retrieval analysis?**
- A. deep flexion activities and subluxation leading to wear damage, which in turn can cause high friction between the rim of the ceramic liner and the femoral head

- B. mixed boundary film lubrication  
 C. high-impact physical activity  
 D. normal physiological wear and dimensional change to the ceramic liner and femoral head  
 E. in the early postoperative period, hip bearings experience higher wear during the "run-in" phase
- 27. In comparison with silicone implant arthroplasty, use of a pyrolytic carbon implant to replace the proximal interphalangeal joint is associated with:**
- A. better motion and a lower reoperation rate  
 B. similar motion and a similar reoperation rate  
 C. better motion and a higher reoperation rate  
 D. worse motion and a lower reoperation rate  
 E. similar motion and a higher reoperation rate
- 28. The use of a computer navigation system for cup positioning in total hip arthroplasty was shown to:**
- A. significantly improve the average anteversion and abduction angles when compared with those associated with freehand positioning  
 B. not be affected in the registration process by the body mass index of the patient  
 C. reduce the percentage of outliers (values outside the defined safe zones for abduction and anteversion angles)  
 D. not increase the operating time  
 E. increase the rate of postoperative complications
- 29. The revision rate following unicompartmental knee replacement was found to be approximately twice that following total knee replacement in all age groups. The major reason for the high failure rate was:**
- A. instability of the knee  
 B. tibial and femoral loosening, pain, and periprosthetic fracture  
 C. a younger and more active patient cohort  
 D. wear of the tibial insert  
 E. degenerative changes in the patella and opposite compartment
- 30. Previously validated outcome instruments:**
- A. can easily be modified without consequences  
 B. are rarely modified and used without revalidation  
 C. are not open to bias when modified  
 D. are not as objective as physical examination  
 E. are often used in a modified version without revalidation
- 31. Which of the following substances is considered osteoinductive?**
- A. calcium sulfate  
 B. tricalcium phosphate  
 C. rhBMP-2  
 D. tantalum  
 E. hydroxyapatite
- 32. Preoperative walking capacity has been shown to have an influence on postoperative walking capacity after total hip arthroplasty. What percentage of patients with a preoperative walking capacity of more than sixty minutes maintained that level of activity at three years postoperatively?**
- A. 100%  
 B. 90%  
 C. 75%  
 D. 50%  
 E. 30%
- 33. A thirty-five-year-old man injured the right buttock while getting up on water skis. He had pain, swelling, and ecchymosis in the right buttock. A magnetic resonance image showed a complete avulsion of the proximal origin of the hamstrings from the ischial tuberosity. During a repair through a transverse incision in the gluteal crease, a retractor is placed under the gluteus maximus. Which of the following structures is most at risk for damage by the retractor?**
- A. sciatic nerve  
 B. semitendinosus tendon  
 C. inferior gluteal nerve  
 D. lateral femoral cutaneous nerve  
 E. obturator artery
- 34. Which of the following signs on a hand skeletal age radiograph correspond with the scoliotic curve acceleration phase?**
- A. the epiphyses cover their respective metaphyses  
 B. the epiphyses are capping their respective metaphyses  
 C. the distal phalanges are fusing  
 D. the thumb sesamoid appears  
 E. the proximal and middle phalangeal physes are fusing
- 35. A thirty-two-year-old man sustained a mid-shaft fracture of the tibia and underwent open reduction and internal fixation with a locked intramedullary nail. He has moderate postoperative pain and his surgeon would like to use a nonsteroidal anti-inflammatory drug or a coxib but is concerned about findings of inhibition of fracture-healing in a recent animal study. Which of the following would be the most appropriate advice to this surgeon?**
- A. under no circumstances should nonsteroidal anti-inflammatory drugs or coxibs be used after fracture, as any exposure may impair the healing process  
 B. nonsteroidal anti-inflammatory drugs and coxibs may be used after fracture but only at very low doses  
 C. it is safe to use nonsteroidal anti-inflammatory drugs or coxibs for relatively short periods of time (e.g., up to two weeks)  
 D. high doses of nonsteroidal anti-inflammatory drugs and coxibs may be used throughout the period of fracture-healing  
 E. nonsteroidal anti-inflammatory drugs and coxibs are not indicated after a fracture is sustained because they do not provide a sufficient analgesic effect

- 36. In a mouse model, the immune reaction noted to Synvisc appeared to be a response to:**
- hyaluronic acid
  - carrier/cross-linking molecules
  - injection technique
  - avian albumin
  - crystalline deposits
- 37. The side effect most likely to persist in the short term following treatment of chronic radial epicondylitis with botulinum toxin A is:**
- a decrease in wrist extension strength
  - pain in the first two weeks after injection
  - a decrease in fist closure strength
  - a decrease in the extension strength of the third finger
  - a decrease in the esthesia in the area of the injection
- 38. Revision hip arthroplasty may be associated with substantial blood loss. Intraoperative red blood-cell salvage has been shown to be:**
- ineffective in these patients
  - not cost-effective
  - only of use in acetabular exchange
  - effective in reducing allogeneic transfusion by >50%
  - associated with a higher prevalence of hepatitis-C infection
- 39. Spinal arthrodesis is performed to stabilize cervical spine fractures:**
- more commonly for patients with associated spinal cord injury than for those without spinal cord injury
  - at equal rates for patients with and without spinal cord injury
  - more commonly for patients without associated spinal cord injury than for those with spinal cord injury
  - in <5% of patients
  - in >95% of patients
- 40. Institutional review boards consist of scientists, lay community members, physicians, and lawyers. Which of the following medical specialties is least represented on institutional review boards:**
- general surgery
  - orthopaedic surgery
  - psychiatry
  - internal medicine
  - pediatrics
- 41. The main independent risk factor for the necessity of a reoperation after an intertrochanteric femoral fracture operated on with a sliding compression hip screw fixed to a four-hole side-plate is:**
- postoperative fracture reduction
  - implant position (measured by tip-apex distance)
  - postoperative integrity of the greater trochanter
  - postoperative integrity of the lesser trochanter
  - postoperative integrity of the lateral femoral wall
- 42. In a study of outcomes following hip replacement, which factor was least likely to affect rates of complications and mortality?**
- advanced age
  - insurance status
  - comorbid diseases
  - planned admission
  - hospital volume
- 43. On the basis of the findings of a study, which of the following is a plausible explanation for the observed association between financial conflict of interest and the reporting of positive findings?**
- for-profit companies may preferentially fund studies that are likely to succeed
  - investigators with certain conflicts may be unintentionally biased in their assessments
  - investigators with conflicts involving personal gain may be intentionally biased in their assessments
  - industry funding allows research that might otherwise not be possible
  - for-profit companies may suppress studies that arrive at negative conclusions
- 44. A conventional shoulder arthroplasty is not effective in managing:**
- osteonecrosis with collapse of the head from steroid use
  - cuff tear arthropathy with anterosuperior escape
  - secondary degenerative joint disease after previous shoulder injury
  - rheumatoid arthritis with an intact rotator cuff
  - arthropathy after instability surgery and thermal treatment of the capsule
- 45. All of the following have been implicated as prolonging postoperative wound drainage after a total joint arthroplasty except:**
- morbid obesity
  - Increased drain output
  - type of prophylaxis against deep venous thrombosis
  - wound hematoma
  - diabetes
- 46. Heterotopic ossification is an infrequent complication following lumbar disc replacement with the CHARITÉ artificial disc. Heterotopic ossification affected the clinical outcome in which of the following ways when compared with the outcome in patients without heterotopic ossification?**
- it reduced the range of motion, increased pain, and reduced function
  - it reduced the range of motion, increased pain, and made no difference in function
  - it reduced the range of motion, reduced pain, and reduced function
  - it made no difference in the range of motion, reduced pain, and reduced function
  - it made no difference in the range of motion, pain, or function

**47. In a cadaver model, insertion of medial malleolar screws into which of the following anatomic zones was associated with the least chance of posterior tibial tendon injury or abutment?**

- A. anterior colliculus
- B. intercollicular groove
- C. anterior colliculus and intercollicular groove
- D. intercollicular groove and posterior colliculus
- E. posterior colliculus

**48. Which of the following subscapularis repair techniques results in the greatest ultimate strength?**

- A. tendon-to-tendon repair
- B. tendon-to-tendon repair following tendon lengthening
- C. tendon-to-bone repair (medial advancement)
- D. single-row bone-to-bone repair (tuberosity osteotomy)
- E. single-row bone-to-bone repair (tuberosity osteotomy)

**49. Which of the following treatment choices was**

**found to be best for a displaced femoral neck fracture in a patient with end-stage renal disease being managed with long-term dialysis?**

- A. osteosynthesis with cannulated screws
- B. hemiarthroplasty
- C. Girdlestone resection arthroplasty
- D. osteosynthesis with a dynamic hip screw
- E. nonoperative

**50. Resident or fellow participation during hip and knee replacement procedures results in which one of the following outcomes?**

- A. increased infection rate
- B. longer surgical time
- C. less patient satisfaction
- D. lower attending-surgeon stress levels
- E. significantly longer surgical stay

**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 2007 CME Review Questions meet these educational objectives\*:

1. Provide a broad-based review and update specifically in the areas of upper extremity surgery and sports medicine?  Yes  No
2. Strengthen your problem-solving abilities related to patient care particularly in the areas of sports medicine and upper extremity 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

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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, 2007.

**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](mailto: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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| 4. A B C D E  | 21. A B C D E | 38. A B C D E |
| 5. A B C D E  | 22. A B C D E | 39. A B C D E |
| 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 |               |

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