

COLLEGE OF OSTEOPATHIC MEDICINE OF THE PACIFIC

MUSCULOSKELETAL - FINAL EXAM  
May 25, 1995

#2

Choose the ONE BEST answer and darken the appropriate box on the Scantron form. There are 79 questions on this exam.

Dr. Brunden

✓ When an acute attack of gouty arthritis occurs,

- C
- a. colchicine should be administered in high dose since it is a specific anti-inflammatory agent for gout and causes very mild side-effects.
  - b. colchicine should be administered along with a uricosuric agent (e.g. probenecid (Benemid)) to treat the ongoing inflammation and lower uric acid levels as rapidly as possible.
  - c. indomethacin (Indocin) is now often the drug of choice for treating the acute attack because it is effective and less toxic than colchicine.
  - d. indomethacin (Indocin) should be administered in combination with allopurinol (Zyloprim) to rapidly stop the inflammation and lower uric acid levels.
  - e. allopurinol (Zyloprim) is the drug of choice to rapidly lower uric acid levels and terminate the pain associated with hyperuricemia.

✓ Which of the following drugs is preferred for the treatment of chronic tophaceous gout because it lowers total body pool of uric acid, promotes reabsorption of tophi, and decreases uric acid stone formation by decreasing urinary excretion of uric acid?

- B
- a. allopurinol (Zyloprim).
  - b. colchicine.
  - c. indomethacin (Indocin).
  - d. probenecid (Benemid).
  - e. sulfipyrazone (Anturane).

✓ All of the following statements about the use of NSAIDs in the treatment of rheumatoid arthritis (RA) are correct EXCEPT:

- B
- a. Aspirin is a rapid-acting analgesic and anti-inflammatory drug which is relatively well tolerated by many patients.
  - b. Aspirin is an ideal drug for treating RA because it provides immediate anti-inflammatory effects and with continued use, it arrests progression of the underlying disease.
  - c. Ibuprofen (Motrin; Advil) may be better tolerated than aspirin in some individuals.
  - d. Indomethacin (Indocin) is a potent inhibitor of prostaglandin synthesis, but it is associated with a high incidence of GI and CNS side-effects.
  - e. Piroxicam (Feldene) has a very long half-life which allows once-a-day dosing, but at times, it is associated with serious GI side effects.

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4. Hydroxychloroquine (Pacquenil) and aurothioglucose (Solganal) share which of the following characteristics when used to treat rheumatoid arthritis (RA)?

- E
- a. Both drugs act by very selectively inhibiting leukotriene synthesis.
  - b. Both drugs are considered "first-line drugs" for treatment of RA.
  - c. Both drugs cause a high incidence of pruritus, erythema, stomatitis and skin rash.
  - d. Both drugs produce a high incidence of visual disturbances, including retinopathy and possible blindness.
  - e. Both drugs have a slow onset of therapeutic effect, but once an effect occurs, they may slow the progression of RA.

✓ Although methotrexate (Rheumatrex) is a potentially toxic, slow-acting antirheumatic drug (SAARD), it has all of the following advantages EXCEPT:

- D
- a. Methotrexate is effective in treating RA when given orally once a week.
  - b. Clinical benefits from methotrexate when treating RA may occur in as little time as 2 to 6 weeks.
  - c. Low-dose therapy with methotrexate is effective and is associated with fewer serious adverse reactions than gold or penicillamine (Cuprimine).
  - d. Methotrexate can be used safely in pregnant females since it has not been shown to be teratogenic.
  - e. Low-dose therapy with methotrexate may slow the progression of the underlying disease (e.g. RA).

6. Controlled clinical trials have shown that all of the following drugs may slow or prevent progression of joint damage in patients with RA EXCEPT:

- D
- a. aurothioglucose (Solganal).
  - b. methotrexate (Rheumatrex).
  - c. penicillamine (Cuprimine).
  - d. prednisone.
  - e. sulfasalazine (Azulfidine).

7. A major advantage of vecuronium (Norcuron) over tubocurarine ("curare") is that vecuronium

- APL
- a. has a much more rapid onset of action than tubocurarine.
  - b. has a much longer duration of action than tubocurarine because it is excreted unchanged by the kidney.
  - c. does not cause initial depolarization of skeletal muscle whereas tubocurarine does.
  - d. produces a neuromuscular block that can be antagonized by neostigmine.
  - e. produces little or no hypotension or other cardiovascular effects.

✓ Increased intraocular pressure, hyperkalemia, and muscle weakness with which of the following skeletal muscle relaxants?

- C
- a. dantrolene (Dantrium).
  - b. pancuronium (Pavulon).
  - c. succinylcholine (Anectine).
  - d. tubocurarine (curare).
  - e. vecuronium (Norcuron).

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9. Although not a highly selective skeletal muscle relaxant, \_\_\_\_\_ can be effective in the treatment of both spastic states (e.g. in multiple sclerosis) and acute muscle spasm.

- a. baclofen (Lioresal).
- b. carisoprodol (Soma).
- c. cyclobenzaprine (Flexeril).
- d. dantrolene (Dantrium).
- e. diazepam (Valium).

10. Which of the following muscle relaxants is believed to act as a GABA<sub>B</sub> agonist at GABA<sub>B</sub> receptors to relieve primary components of spinal spasticity, i.e. in patients with multiple sclerosis?

- a. baclofen (Lioresal).
- b. carisoprodol (Soma).
- c. cyclobenzaprine (Flexeril).
- d. dantrolene (Dantrium).
- e. diazepam (Valium).

Dr. Madorsky

11. Physiatrists are specialists in physical medicine and rehabilitation

- a. True
- b. False

12. It is malpractice to discuss sexual issues with your disabled patient

- a. True
- b. False

13. Physical medicine and rehabilitation specialists evaluate and treat

- a. physical disability and its residuals
- b. psychological stress
- c. social adjustment
- d. vocational and quality of life issues
- e. all of the above

Dr. Gilbert

14. All of the following are criteria for S.L.E. EXCEPT:

- a. malar or discoid rash.
- b. arthritis.
- c. fatigue.
- d. renal disorders.
- e. hematologic disorders.

15. The pannus in R.A. is composed of all the following EXCEPT:

- a. synoviocyte hyperplasia.
- b. fibrovascular thickening.
- c. lymphocytic and plasma cell infiltrate with lymphocytic nodules.
- d. focal deposits of fibrinoid material.
- e. bone.

16. Limited scleroderma (CREST syndrome) is composed of all the following problems EXCEPT:

- a. calcinosis.
- b. rheumatoid arthritis.
- c. esophageal problems.
- d. sclerodactyly.
- e. telangiectasia.

17. Amyloid fibers are characterized as all of the following EXCEPT:

- a. periodicity.
- b. no organization.
- c. thin fibrils compared to collagen.
- d. deposition as a  $\beta$ -pleated sheet.
- e. apple-green with Congo-red stain.

Dr. Parsa

18. Group atrophy and type grouping is characteristic of which of the following?

- a. myasthenia gravis
- b. metabolic myopathy
- c. reinnervation following axonal degeneration
- d. Duchene muscular dystrophy
- e. myelin loss

19. Thymomas and thymic hyperplasia are characteristically associated with which of the following?

- a. myasthenia gravis
- b. dermatomyositis
- c. Lambert-Eaton syndrome
- d. amyotrophic lateral sclerosis
- e. congenital myopathies

20. A ten-year-old boy hiking with his family developed severe leg pain, fever, cola-colored urine, and significantly elevated serum creatine kinase levels when he was taken to the hospital emergency room. Which of the following is the most appropriate next step?

- a. check serum phosphorylase level
- b. perform muscle biopsy
- c. check for myoglobinuria
- d. refer patient to an oncologist
- e. send patient home on heat pads

21. Which of the following statements about skeletal muscle tumors is TRUE?

- a. Rhabdomyoma is the most common type.
- b. They are rare in infants and children.
- c. Strap cells or rhabdomyoblasts are diagnostic.
- d. They generally have excellent prognosis.
- e. They are associated with scoliosis and high arched palate.

Dr. Oglesby

22. All the following statements about rheumatoid factor (RF) are true EXCEPT:

- a. It is antibody to the Fc of IgG.
- b. The classical rheumatoid factor is IgM.
- c. RF's of all immunoglobulin classes have been found.
- d. RF is found only in cases of rheumatoid arthritis.

23. All the following statements about rheumatoid arthritis (RA) are true EXCEPT:

- a. Certain HLA Class I alleles are more common in people with RA than in the population as a whole.
- b. Antibody synthesis takes place in the rheumatoid synovium.
- c. Immune complexes are present in the joint.
- d. Activated cells secrete soluble factors which activate other cells and ultimately lead to production of enzymes which cause breakdown of tissue in the joint.
- e. Before menopause, women are more likely to get RA than men.

24. All the following statements about Systemic Lupus Erythematosus (SLE) are true EXCEPT:

- a. The tissue injury in SLE is mainly caused by deposition of circulating immune complexes in vulnerable tissue.
- b. A number of different kinds of autoantibodies are produced in SLE.
- c. The autoantibody which is considered a diagnostic marker is antibody to double stranded DNA.
- d. A hereditary deficiency in some of the early components of complement may contribute to the pathogenesis of SLE.
- e. The LE cell seen in SLE is a macrophage that has phagocytized a polymorphonuclear leukocyte.

25. Which of the following autoimmune diseases clearly has a microbial trigger?

- a. Myasthenia Gravis
- b. Reiter's Syndrome
- c. Scleroderma
- d. Ankylosing Spondylitis
- e. Sjogren's Syndrome

26. All the following statements about bacterial arthritis are true EXCEPT:

- a. The most common organism found in most age groups is Staphylococcus aureus.
- b. The most common route of infection is hematogenous.
- c. It is usually polyarticular.
- d. It is diagnosed by laboratory examination of synovial fluid.
- e. If treatment is delayed, there may be permanent functional impairment of the joint.

27. All the following statements about Lyme Disease are true EXCEPT:

- a. The causative organism is a spirochete.
- b. The vector is a tick.
- c. Humans are the only vertebrate host of the organism.
- d. Inflammation due to antigen-antibody complexes occurs in the synovium.
- e. During stages 2 and 3, symptoms may occur in the nervous system or heart as well as in the joints.

28. The causative agent of gas gangrene is:

- a. Clostridium perfringens
- b. Staphylococcus aureus
- c. Group A Streptococcus
- d. Bacteroides sp.
- e. Escherichia coli

29. All the following statements about trichinosis are true EXCEPT:

- a. The organism is a nematode.
- b. It is a disease of carnivorous animals.
- c. Larval Trichinella encyst in muscle.
- d. A human can reinfect himself via fecal-oral transmission.
- e. The incidence has dropped markedly in the U. S. since laws were passed requiring cooking of all garbage fed to swine.

Dr. Cundari

30. Which of the following relationships is incorrect?

- a. Chief Complaint (CC): Fever and limping
- b. Social History: Father is a mechanic
- c. Review of Systems (ROS)-GEN: Well with no developmental delays
- d. Physical Exam (PE)-CHEST: RRR without murmur, gallop, or click
- e. Physical Exam (PE)-MSK: No history of trauma or fractures

31. The differential diagnosis of arthritis in a single joint would include all of the following EXCEPT:

- a. trauma
- b. rheumatoid
- c. pseudogout
- d. staphylococcal sepsis
- e. gonococcal sepsis

32. To present a case for discussion, which one of the following elements is not necessary?

- a. a focus to prioritize data and reduce its size
- b. an order to allow the presentation to flow smoothly and be condensed
- c. a content that contains a recorded gathered data base
- d. exceptions that necessitate altering the presentation of some key information
- e. all information gathered in a history and physical examination

33. Which of the following is incorrect regarding the SOAP format in case presentations?

- a. subjective data includes the radius of thigh and calf muscles
- b. objective data includes descriptions of skin warmth
- c. assessment includes diagnosis of the chief complaint
- d. plan includes ordering a diagnostic radiograph
- e. plan includes directions for using a medication

34. Which of the following relationships is incorrect?

- a. Chief Complaint (CC): Right leg pain
- b. Social History (SH): Married, hair stylist, 15 packs of cigarettes per year
- c. Review of Systems (ROS) Neurosensory (NS): Denies chronic headache
- d. Physical Examination (PE) MSK: Right medial and posterior leg warm and red
- e. Physical Examination (PE) Skin: Denies rashes or lesions

35. Which of the following is LEAST likely to be the etiology of an inflammation of a leg?

- a. osteomyelitis
- b. cellulitis
- c. polymyalgia rheumatica
- d. thrombophlebitis
- e. Baker's cyst

Dr. Li

36. All of the following serum levels for osteoporosis are true EXCEPT:

- a. decrease calcium.
- b. normal phosphorous.
- c. normal alkaline phosphatase.
- d. normal parathyroid hormone.

37. Characteristics of achondroplasia include all of the following EXCEPT:

- a. autosomal recessive pattern of inheritance.
- b. impaired proliferation of cartilage cells.
- c. long bones are short.
- d. bones of skull and jaw not diminished in size.
- e. thinning of epiphyseal plate.

38. Serum alkaline phosphatase elevation is often a feature of all the following conditions EXCEPT:

- a. rickets.
- b. osteosarcoma.
- c. Paget's disease of the bone.
- d. osteoporosis.
- e. osteitis fibrosa cystica.

39. A 12-year-old girl was seen in the clinic because of a recent fracture of the left femur. Pertinent findings during physical examination included precocious puberty and serpiginous skin pigmentation. The most likely diagnosis of this patient is:

- a. osteoporosis.
- b. fibrous dysplasia.
- c. enchondromatosis.
- d. osteosarcoma.
- e. achondroplasia.

variant is Albright's Syndrome

Dr. Docherty

40. The initial step in the management of a trauma patient in the emergency department is referred to as

- a. resuscitation.
- b. secondary survey.
- c. primary survey.
- d. definitive care.
- e. re-evaluation.

41. The most common type of shoulder dislocation is which one of the following?

- a. subclavicular
- b. subglenoid
- c. intrathoracic
- d. subcoracoid
- e. posterior

42. A fracture of the ulna with associated dislocation of the radial head is referred to as

- a. Galeazzi fracture.
- b. Colles fracture.
- c. Smith's fracture.
- d. Barton's fracture.
- e. Monteggia fracture.

MV PD

43. A fracture of the distal radius with dorsal angulation causing a silver fork deformity is referred to as

- a. Smith's fracture.
- b. Colles fracture.
- c. Monteggia fracture.
- d. Galeazzi fracture.
- e. Barton's fracture.

44. A patient falls on an extended arm with the wrist dorsiflexed and presents to the emergency department with severe wrist pain. Physical examination shows significant tenderness over the anatomic snuff box. Your initial X-ray evaluation of the patient's wrist is normal. Based on the above information, which one of the following fractures should be clinically suspected and treated?

- a. Colles fracture.
- b. radial head fracture.
- c. navicular fracture.
- d. ulnar styloid fracture.
- e. Smith's fracture.

45. A 40-year-old male patient presents to your emergency department after a fall on his outstretched left hand. Your patient is complaining of severe pain to his left elbow. There is an increase in his discomfort with a rotation of his forearm. His X-ray evaluation of the left elbow shows no obvious fracture, but on the lateral view shows positive anterior and posterior fat pad signs. Your clinical diagnosis in this patient would be:

- a. Monteggia fracture.
- b. Galeazzi fracture.
- c. supracondylar fracture.
- d. radial head fracture.
- e. Colles fracture.

46. All of the following are true regarding supracondylar fractures of the humerus EXCEPT:

- a. usually occurs in pediatric patients.
- b. place the patient in a posterior elbow splint while awaiting orthopedic consultation.
- c. is an orthopedic emergency because fracture fragments may injure the brachial artery and median nerve.
- d. Volkmann's ischemic contracture is not considered a serious complication of a supracondylar fracture.
- e. keep the patient NPO (nothing by mouth) for possible surgery while awaiting orthopedic consultation in the emergency department

47. All of the following statements are true regarding orthopedic emergencies EXCEPT:

- a. Orthopedic complaints/injuries are rarely life threatening, but must be diagnosed and treated accurately to avoid long-term complications.
- b. If X-rays are negative but a fracture is clinically suspected, the patient should be treated as if a fracture is present with appropriate orthopedic referral.
- c. In a severely traumatized patient with multiple injuries, orthopedic injuries should always be treated first before other injuries.
- d. Most orthopedic injuries can be anticipated by knowing the age of the patient and the mechanism of injury.
- e. Always X-ray all dislocations before and after reduction unless a delay would cause further harm to the patient.

48. All of the following statements regarding orthopedic injuries are true EXCEPT:

- a. Splints should be applied in such a way as to immobilize the joints above and below the fracture site to avoid motion of the involved bone.
- b. A splint should never be applied in a constricting fashion.
- c. Fracture of the scapula occurs secondary to a high energy impact.
- d. In a patient with a fractured scapula, one should be concerned about other associated injuries.
- e. The most common location for a clavicular fracture is the proximal 1/3 of the clavicle.

49. A Hill-Sachs deformity is seen with which one of the following orthopedic injuries?

- a. recurrent shoulder dislocation
- b. radial head subluxation
- c. knee dislocation
- d. elbow dislocation
- e. hip dislocation

50. All of the following statements are true regarding orthopedic injuries EXCEPT:

- a. The most common type of hip dislocation is anterior.
- b. Avascular necrosis is a possible complication of a hip dislocation.
- c. Motor vehicle accidents is the most common cause of hip dislocations.
- d. femoral neck fracture causes leg shortening and exterior rotation.
- e. pelvic fracture can be a life-threatening injury.

51. Which of the following types of fractures is only seen in pediatric patients.

- a. Colles fracture.
- b. femur fracture.
- c. Salter-Harris fracture.
- d. Smith's fracture.
- e. cervical spine fractures.

Dr. Faerber

52. Stress fractures in the hip are most concerning when they involve the:

- a. acetabulum.
- b. femoral neck.
- c. greater trochanter.
- d. lesser trochanter.

53. A Salter Harris type 2 fracture involves:

- a. a fracture through the physis and out through the metaphysical area.
- b. a fracture directly through the physis.
- c. a fracture through the shaft.
- d. an incomplete fracture of the skeletally immature bone.

54. Which of the following can cause an acute bloody effusion within the knee?

- a. ruptured anterior cruciate ligament
- b. dislocated patella
- c. peripheral meniscal tear
- d. all of the above

55. The cause of a lateral ligamentous ankle sprain is due to:

- a. an eversion injury.
- b. an inversion injury.
- c. a dorsiflexion injury.
- d. a plantar flexion injury.

Dr. Musser

56. The "10-step Musculoskeletal Screening Exam" is best described as a clinical tool for:

- a. completely and accurately evaluating a patient who has a specific musculoskeletal complaint.
- b. completely and accurately evaluating a patient who has only vague musculoskeletal complaints.
- c. defining the difference between the osteopathic and allopathic approach to patient assessment.
- d. the quick assessment of normal function as well as identification of any structural problems.

57. Through the appropriate use of the "10-step Musculoskeletal Screening Exam", you discover that your patient has no subjective complaints and no objective evidence of significant asymmetry or restricted motion. Your next step should be to:

- a. continue to search (through a more thorough history taking/physical examination) until you find a problem you can work up.
- b. draw some blood for lab work.
- c. discuss and reinforce the patient's effective strategies for health maintenance.
- d. abandon this fruitless history/physical for the more accurate radiographic studies.

58. During the "10-step Musculoskeletal Screening Exam", you find that your patient has no subjective complaint, but discover that he does have evidence of significant asymmetry or restricted motion. Your next step should be to:

- a. refer the patient to a specialist.
- b. progress to a more focused, problem-specific evaluation (history/physical).
- c. order X-rays.
- d. perform an osteopathic manipulative treatment.

59. True story... One morning last week, four of your classmates came into the urgent care ("walk-in") side of Mission Clinic. Regarding the following chief complaints, which one of the students made appropriate use of the "walk-in" (as opposed to the "appointment") side of the clinic?

- a. acute onset of a rip-roaring sore throat with fever/chills
- b. "athlete's foot" (present for three months)
- c. long-standing depression (started at puberty)
- d. yearly gynecological exam/birth control pills refill

Dr. Rice

60. Examples of overuse injury include all of the following EXCEPT:

- a. patellar tendonitis.
- b. iliotibial band friction syndrome.
- c. shoulder impingement syndrome.
- d. medial epicondylitis.
- e. medial meniscus syndrome.

61. Phase III rehabilitation involves which of the following?

- a. compression
- b. progressive range of motion increase
- c. sports-specific exercise
- d. isokinetics
- e. PNF stretching

62. A concussion is:

- a. head trauma resulting in an altered state of consciousness.
- b. head trauma resulting in loss of consciousness.
- c. head trauma generally resulting in retrograde amnesia.
- d. not diagnosable without post traumatic amnesia.
- e. all of the above.

63. Second Impact Syndrome:

- a. is a dangerous entity often resulting in rapid loss of consciousness and death.
- b. results from failure of the mechanisms that regulate intra-cranial pressure.
- c. may occur when an athlete returns to play before the symptoms of a prior concussion have totally resolves.
- d. often results from a relatively minor blow.
- e. all of the above.

64. The essential behaviors which are determinates of wellness include all of the following EXCEPT:

- a. aerobic exercise at least three times each week.
- b. a vitamin/mineral supplement.
- c. 7-8 hours sleep per night for most people.
- d. eating three meals/day primarily from "basic" foods.
- e. stress management skills.

65. Patients (and doctors) are best motivated to adopt healthy lifestyles when:

- a. they are threatened by their physician with premature death due to high-risk factors.
- b. their cholesterol levels are too high.
- c. they are overweight.
- d. they feel chronically stressed and/or depressed.
- e. they have a major life-threatening catastrophic event such as a myocardial infarction.

13

Dr. Saperstein

66. Which of the following best describes degenerative osteoarthritis?

- a. asymmetric involvement of the joint space, narrowing and commonly associated with non-weight bearing bones
- b. polyarticular, associated with Heberden's nodes and associated with hypertrophic bone
- c. often destroys the joint, usually involves weight bearing bones and associated with sclerosis
- d. periarticular soft tissue swelling, irregular involvement of the skeleton and hypertrophic bone formation
- e. asymmetric distribution, joint space narrowing and associated with hypertrophic bone

67. Malignant bone tumors are best described by:

- a. associated with unilaminar periosteal reaction, fast growing with irregular borders.
- b. expanding periosteal reaction, violates cartilaginous borders and rapid growth.
- c. well-defined margins, multilaminar periosteal reaction and rapid growth.
- d. irregular margins, multilaminar periosteal reaction and halted by cartilaginous borders.
- e. aggressive, irregular borders and unilaminar periosteal reaction

Dr. Scott

68. Taking an articular history is very important when forming a differential diagnosis. A monoarticular presentation suggests:

- a. rheumatoid arthritis
- b. gout
- c. Reiter's syndrome
- d. osteoarthritis
- e. all of the above

69. Radiographic characteristics of rheumatoid arthritis include:

- a. calcifications
- b. ankylosis
- c. marginal erosions
- d. no soft tissue swelling
- e. none of the above

70. Typical laboratory findings in rheumatoid arthritis include:

- a. elevated sedimentation rate
- b. positive c-reactive protein in 90-95%
- c. thrombocytosis
- d. normal or increased complement levels
- e. all of the above

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71. The seronegative spondyloarthropathies include all of the following EXCEPT:

- a. Reiter's syndrome
- b. psoriatic arthritis
- c. colitic arthropathy
- d. pseudogout
- e. ankylosing spondylitis

72. Reiter's syndrome is diagnosed by finding:

- a. asymmetric arthropathy
- b. inflammatory eye disease
- c. urethritis
- d. oral ulcerations
- e. all of the above

73. Psoriatic arthritis can present as all of the following EXCEPT:

- a. asymmetric oligoarticular
- b. symmetric polyarthritis
- c. distal interphalangeal only
- d. spondylitis only
- e. skin involvement only

74. Rheumatic fever presents with a classic distribution of:

- a. one joint only
- b. migratory (moves from joint to joint)
- c. back pain only
- d. polyarticular (more than five at once)
- e. none of the above

75. Synovial cysts can affect:

- a. wrists
- b. knees
- c. back
- d. a & b
- e. a, b, & c

76. Felty's syndrome is an advanced manifestation of

- a. ankylosing spondylitis
- b. rheumatoid arthritis
- c. Reiter's syndrome
- d. Popo's disease
- e. none of the above

77. HLA B27 genetic testing may be helpful in making a diagnosis of:

- a. ankylosing spondylitis
- b. Reiter's syndrome
- c. psoriatic arthritis
- d. arthritis associated with Crohn's disease
- e. all of the above

#### Radiology Questions

78. Identify the pathology on this X-ray.

- a. degenerative disk disease
- b. degenerative facet arthritis
- c. subluxation
- d. rheumatoid arthritis
- e. osteoarthritis

79. Identify the radiographic pathology.

- a. giant cell tumor
- b. enchondroma
- c. osteochondroma
- d. osteoblastoma
- e. chondrosarcoma

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