SKELETAL SCINTIGRAPHY EXAM (11/04)   Name ________________________________

Check if the statement is correct:

1.  (   ) The uptake of skeletal-seeking radiotracers depicts regional blood flow and osteoclastic activity.
2.  (   ) If oxygen is allowed into a MDP vial during labeling, potential formation of colloidal impurities may result in lung uptake.
3.  (   ) When labeling MDP, oxygen needs to be added to the vial since it contains a stannous ion as a reducing agent.
4.  (   ) By 24 hours, 80-90% of injected Tc-99m-labeled diphosphonate has been excreted in the urine.
5.  (   ) The critical organ with Tc-99m-labeled diphosphonate imaging is the axial skeleton.
6.  (   ) Radiostrontium, radiofluorine and Tc-99m-labeled diphosphonate are all analogues of calcium.
7.  (   ) Relatively intense radiotracer uptake is seen in diaphyseal regions in pediatric patients.
8.  (   ) Thyroid uptake is often seen in adult patients on bone scintigraphy.
9.  (   ) Increased uptake at the costochondral junctions is abnormal in pediatric patients.
10. (   ) Skeletal metastases of epithelial tumors are most often caused by direct extension or via lymphatic flow.
11. (   ) A 30% to 50% change in bone density is required before small lesions can be detected radiographically.
12. (   ) If healing of bony metastasis occurs, the bone scintigram may revert to normal while the radiograph remains abnormal.
13. (   ) Thyroid cancer, multiple myeloma, and renal cell carcinoma are common causes for ‘cold’ bone metastases.
14. (   ) “Flare” phenomenon may be observed after chemotherapy for metastatic breast cancer.
15. (   ) “H” or “Honda” sign may be observed in patients with sacroiliac fracture.
16. (   ) Intense radiotracer uptake involving the entire hemipelvis may be seen in patients with fibrous dysplasia.
17. (   ) Randomly distributed multiple rib uptake is diagnostic for bony metastasis.
18. (   ) Multiple bone infarctions show decreased skeletal seeking radiotracer uptake and can be distinguished from bone metastasis.
19. (   ) The most common cause of solitary benign abnormalities is healing fracture.
20. (   ) Simple bone cyst often shows punctate uptake on bone scan.
21. (   ) Prostatic cancer and breast cancer are the two tumors most frequently associated with “superscan”.
22. (   ) The incidence of bony metastasis in Stage I breast cancer is low, and thus the use of bone scan is controversial.
23. (   ) Following mastectomy, the ipsilateral ribs appear relatively more intense than the contralateral ribs.
24. (   ) Tumor emboli of aggressive lung cancer may involve the distal portions of the extremities.
25. (   ) Direct invasion of lung cancer to ribs may cause a “cold” defect on bone scan.
26. (   ) Hypertrophic osteoarthropathy is caused by diffuse microscopic bone marrow involvement with metastatic lung cancer.
27. ( ) Tc-99m diphosphonate accumulates in 30% to 50% of primary rhabdomyosarcomas.
28. ( ) Osteogenic sarcomas metastasize to bones more often than Ewing sarcoma.
29. ( ) Osteoid osteomas show increased uptake with a central photopenia corresponding to the nidus on bone scan.
30. ( ) Enchondromas often show striking uptake on bone scan which can be differentiated from other benign tumors.
31. ( ) Advanced age and debilitation are factors contributing to nonvisualization or delayed visualization of fractures on bone scan.
32. ( ) The length of time it takes a vertebral fracture to return to normal scintigraphically is longer than that of rib fracture.
33. ( ) Increased uptake in ribs can be seen after rib retraction without rib resection or iatrogenic fracture during thoracotomy.
34. ( ) Skeletal scintigraphy can detect stress fracture before radiographic abnormalities occur.
35. ( ) Shin splints typically involve more than one third of bone length in the middle to distal tibia.
36. ( ) Rhabdomyolysis may show decreased activity in soft tissue on bone scan.
37. ( ) Decreased bone uptake may be seen after radiation with 500 to 1000 rads.
38. ( ) Steroid-induced osteonecrosis of the femoral head is often ‘cold’ throughout the course of healing.
39. ( ) 3 phase bone scan can distinguish accurately bone infarction versus osteomyelitis in patients with sickle cell anemia.
40. ( ) Bone marrow scan can determine the presence of acute bone infarction more specifically than bone scan.
41. ( ) In diabetic patients, 3 phase bone scan may not be able to distinguish neuropathic joints versus osteomyelitis.
42. ( ) Osteomyelitis caused by Staphylococcus aureus in pediatric patients may reveal decreased tracer uptake on bone scan.
43. ( ) In vertebral osteomyelitis, comparison between bone scan and Ga-67 citrate scan may be useful.
44. ( ) Increased uptake near the greater and lesser trochanters and at the tip of the prosthesis is commonly seen in loosening.
45. ( ) A combination of In-111 WBC and Tc-99m sulfur colloid studies improves accuracy in the diagnosis of infected prostheses.
46. ( ) Hyperthyroidism, hypothyroidism, hyperparathyroidism, osteomalacia, and renal osteodystrophy all can cause “superscan”.
47. ( ) Cardiac uptake on bone scan may be caused by inappropriate preparation of a radiopharmaceutical.
48. ( ) The most common cause of liver uptake on bone scan is amyloidosis.
49. ( ) The advantage of dual-photon x-ray bone mineral densitometry is the ability to measure cortical and trabecular bone separately.
50. ( ) Risk factors for osteoporosis include female sex, Caucasian race, smoking, chronic alcohol intake, obesity, and family history.
Answer Key
1. F
2. F
3. F
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5. F
6. F
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11. T.
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Bone

1. Which of the following is true regarding the appearance of “shin splints” on Tc-99 bone scan?
   
   a. hot on first and second phases, normal third phase  
   b. hot on first and second phases, fades on third phase  
   c. normal first and second phases, hot on third  
   d. hot on all three phases

2. Which of the following is a relative contraindication to Sr-89 therapy for bony metastases?
   
   a. thrombocytopenia less than 100,000  
   b. previous radiation therapy  
   c. previous chemotherapy  
   d. life expectancy less than 3 months

3. Which of the following findings on SPECT imaging of a Tc-99m MDP study is most specific for a metastatic deposit to the vertebral body?
   
   a. increased activity in the vertebral body  
   b. increased activity in the vertebral body and pedicle  
   c. increased activity bridging two adjacent vertebral bodies  
   d. increased activity in an expanded vertebral body

4. Which of the following is a cause of superscan?
   
   a. metastatic breast carcinoma  
   b. long standing hypothyroidism  
   c. aggressive phase of osteoporosis  
   d. acute renal failure

5. Which of the following is not hot on all three phases on a bone scan?
   
   a. renal cell mets.  
   b. RSD  
   c. osteomyelitis following 1 week of treatment.  
   d. two weeks following fracture of tibia.

6. Two year old patient with diffuse bone pain had the following bone scan. The abnormality is most likely due to which pathology?
7. Incidental single small focus of high uptake in the posterior aspect of the left 7th rib in a patient with known prostate cancer with increased PSA level is most likely due to which pathology?

a. prostate cancer metastasis  
b. old trauma  
c. multiple myeloma  
d. osteomyelitis

8. Which of the following is true?

a. flare phenomena indicates poor prognosis  
b. MDP uptake is dependent upon blood flow  
c. osteoblastic lesions are usually cold  
d. osteoclastic lesions are usually hot

9. Which of the following has low uptake on bone scan?

a. aggressive tumor  
b. osteomyelitis  
c. RSD  
d. neuropathic joint

10. Two years following a complicated fracture of neck of femur in a patient with known prostate cancer has the following bone scan for evaluation of hip pain. Which of the following is likely the cause?
11. Which of the following is the most common complication of the pathology shown on the image?

a. heterotopic ossification
b. nonunion
c. prostate cancer mets
d. malunion

12. What is the diagnosis of the following condition?

a. osteosarcoma
b. chondrosarcoma
c. malignant finfous histiocytoms
d. rhabdomyosarcoma
13. Which of the following is true?
   a. Loose hip prosthesis is suggested by activity at the tip and near the lesser trochanter
   b. Infected prosthesis usually has activity all along the length of the shaft
   c. Postoperative activity around a cemented prosthesis can normally persist for 6 months to 1 year
   d. Postoperative activity around a non-cemented prosthesis can normally persist for 6 months to 1 year

14. Which of the following is a hot lesion?
   a. Langerhans cell histiocytosis
   b. Metastasis from renal cell cancer
   c. Metastasis from thyroid cancer
   d. Osteoid osteoma

15. Which of the following is not hot on all three phases of bone scan?
   a. Osteomyelitis
   b. Cellulitis
   c. Ewing sarcoma
   d. Acute fracture
16. What is the diagnosis?

- a. normal bone scan
- b. bilateral sacroilitis
- c. horse shoe kidney
- d. eosinophilic granuloma of the right calvarium
Bone Answers

1. C
2. D
3. B
4. A
5. A
6. C
7. B
8. B
9. A
10. A
11. A
12. A
13. C
14. D
15. B
16. D