

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
4. F
5. F
6. F
7. F
8. F
9. F
10. F
11. T.
12. T
13. T
14. T.
15. T
16. T
17. F
18. F
19. F
20. F
21. T
22. T
23. T
24. T
25. T.
26. F
27. F
28. F
29. F
30. F.

- 31. T
- 32. T
- 33. T
- 34. T
- 35. T
- 36. F
- 37. F
- 38. F
- 39. F
- 40. F
- 41. T
- 42. T
- 43. T
- 44. T
- 45. T
- 46. F
- 47. F
- 48. F
- 49. F
- 50. F

## 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?



- a. congenital right PUJ obstruction
  - b. Wilm tumor
  - c. neuroblastoma
  - d. pheochromocytoma
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?



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

11. Which of the following is the most common complication of the pathology shown on the image?



- a. osteosarcoma
- b. chondrosarcoma
- c. malignant fibrous histiocytoma
- d. rhabdomyosarcoma

12. What is the diagnosis of the following condition?

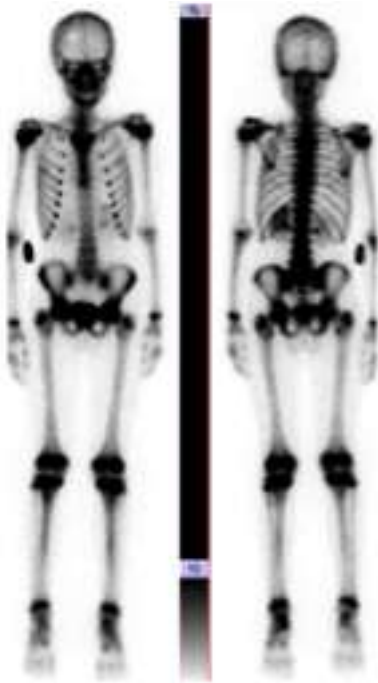


- a. achondroplasia
- b. marfan's syndrome
- c. neurofibromatosis
- d. diastrophic dysplasia

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