Bone Loss Diseases & Imaging Considerations (2012-2014)

1. According to the National Osteoporosis Foundation (NOF), more than ____ million Americans have osteoporosis.
   a. 15  
   b. 24  
   c. 30  
   d. 44 

2. The World Health Organization (WHO) study group defined osteoporosis as a systemic skeletal disease characterized by all of the following, except:
   a. low bone mass  
   b. increased bone fragility  
   c. microarchitectural deterioration  
   d. decrease in fracture susceptibility 

3. It is estimated that in 2020 one in two Americans over the age of ____ will have or be at risk of developing osteoporosis.
   a. 15  
   b. 21  
   c. 30  
   d. 50 

4. The major organic component of bone is:
   a. calcium salts  
   b. phosphorus  
   c. sodium  
   d. collagen  

5. The skeleton contains ____% of the total calcium.
   a. 60  
   b. 75  
   c. 87  
   d. 99 

6. The collagen protein content in bones is crucial for maintaining:
   a. flexibility  
   b. porosity  
   c. hardness  
   d. growth
7. Nutrients from ingested foods are absorbed through the walls of the:
   a. esophagus
   b. stomach
   c. liver
   d. small intestines

8. The ____ excrete excess calcium that is not absorbed.
   a. small intestines
   b. kidneys
   c. lungs
   d. liver

9. Osteoclasts are sensitive to blood ____ levels and respond by increasing or decreasing activity levels.
   a. phosphorus
   b. magnesium
   c. calcium
   d. sodium

10. All of the following are true regarding cortical bone, except:
    a. is found in locations where bone compresses in a limited number of directions
    b. is more metabolically active than trabecular bone
    c. consists of dense tightly packed and aligned lamellar osteons
    d. is found in the skull and shaft of the femur

11. Trabecular bone is found in all of the following, except:
    a. the head of the femur
    b. vertebral spine
    c. calcaneus
    d. skull

12. Peripheral skeletal sites include all of the following, except:
    a. calcaneus
    b. forearm
    c. tibia
    d. vertebral spine

13. Peak bone mass is achieved between ____ to ____ years of age.
    a. 5 – 10
    b. 15 – 20
    c. 25 – 30
    d. 30 – 35
14. Peak bone mass is approximately ___% higher in men than in women.
   a. 45
   b. 30
   c. 25
   d. 15

15. In bone remodeling, the process of destruction is known as:
   a. reversal
   b. resorption
   c. reduction
   d. restriction

16. The ___ stage starts when osteoclasts become active on the surface of bone and create small cavities.
   a. activation
   b. resorption
   c. reversal
   d. quiescence

17. The ___ stage occurs when bone-building osteoblasts fill cavities with new bone.
   a. activation
   b. resorption
   c. reversal
   d. formation

18. After the formation stage, the bone returns to ___, or a resting state.
   a. quiescence
   b. reversal
   c. resportion
   d. activation

19. About ___% of bone surfaces are normally at rest.
   a. 90
   b. 80
   c. 70
   d. 60

20. All of the following are steps in normal regeneration of bone, except:
   a. osteoclasts attach to bone surface
   b. osteoclasts resorb more bone tissue and leave a deeper resorption cavity
   c. osteoblasts enter a cavity and build new bone
   d. the amount of bone formed is equal to bone resorbed

21. The most important action of calcitriol is to:
   a. increase intestinal absorption of calcium and phosphorus
   b. maintain blood calcium levels
   c. decrease excess testosterone and estrogen levels
   d. control the release of cortisol
22. The best bone design to withstand bending loads is referred to as the:
   a. center of axis rebound
   b. area moment of inertia
   c. dimensional apex of the shaft
   d. none of the above

23. The quantity and quality of the bone matrix content relates directly to ___ and ___ of bone.
   a. length and width
   b. age and length
   c. stiffness and strength
   d. fragility and resistance

24. Transient osteoporosis has been typically documented in:
   a. newborns
   b. adolescents
   c. young men
   d. women in the 3rd trimester of pregnancy

25. Secondary osteoporosis occurs particularly in the ___ decade of life.
   a. fourth
   b. fifth
   c. sixth
   d. seventh

26. According to the WHO and NOF, a bone mineral density (BMD) T-score of minus ___ or below that of a “young” normal adult indicates osteoporosis.
   a. 0.5
   b. 1.5
   c. 2.0
   d. 2.5

27. Researchers estimate that at least ___ million men are considered to have low bone mass and osteoporosis.
   a. 2
   b. 4
   c. 8
   d. 10

28. Doses as small as that equivalent to ___ - ___ milligram(s) (mg) of prednisone per day have been associated with fracture increase.
   a. 0.1 – 0.5
   b. 1.5 – 1.8
   c. 2.5 – 7.5
   d. 2.0 – 8.0
29. Methotrexate osteopathy in children often manifests as:
   a. osteopenia
   b. pathologic fracture
   c. dense provisional zones of calcification
   d. all of the above

30. According to the National Institute of Alcohol Abuse and Alcoholism, in the United States, nearly ___% of the population experience some problem that is associated with their consumption of alcohol.
   a. 2
   b. 7
   c. 11
   d. 15

31. Linkage analysis is a gene-hunting technique that traces patterns of disease in high-risk families in an attempt to locate a disease-causing gene by identifying genetic markers.
   a. True
   b. False

32. Cystic fibrosis is more common among ____, and occurs at a rate of 1 in 3,300 births.
   a. Asians
   b. Hispanics
   c. Caucasians
   d. African-Americans

33. The overall prevalence of all types of Ehlers-Danlos syndrome may be about 1 in ____ births worldwide.
   a. 5
   b. 50
   c. 500
   d. 5,000

34. Gaucher’s disease is considered to be a/an ____ disorder characterized by the accumulation of glucocerebrosides.
   a. infectious
   b. inherited metabolic
   c. inflammatory autoimmune
   d. circulatory and respiratory

35. Hypophosphatasia is characterized by:
   a. excessive urinary excretion
   b. skeletal anomalies
   c. poor bone mineralization
   d. all of the above
36. Osteogenesis imperfecta is caused by a genetic defect that impacts the body's production of:
   a. cortisol
   b. type 1 collagen
   c. insulin
   d. estrogen

37. Cystic fibrosis is a disease resulting from an autosomal recessive genetic defect causing a malfunction of the _____ glands(s).
   a. exocrine
   b. pituitary
   c. adrenal
   d. thyroid

38. Both Klinefelter and Turner syndromes are associated with:
   a. hypotension
   b. hypervascularity
   c. depression and anxiety
   d. hypogonadism and delayed maturation

39. Turner's syndrome occurs in 1 out of every ____ female births.
   a. 500
   b. 1,500
   c. 2,500
   d. 5,000

40. Celiac disease or sprue is an inherited intestinal disorder in which intolerance to _____ alters the body's ability to absorb certain nutrients.
   a. protein
   b. fats
   c. gluten
   d. fruits

41. Sickle cell disease is a group of genetic disorder affecting the:
   a. red blood cells
   b. white blood cells
   c. platelets
   d. bone marrow blastocytes

42. Individuals with sickle cell disease are resistant to:
   a. tuberculosis
   b. cat-scratch fever
   c. tularemia
   d. malaria
43. A fish vertebra deformity is characteristic of:
   a. torticollis
   b. acromegaly
   c. sickle cell disease
   d. Hurler’s syndrome

44. All of the following are true regarding fibrous dysplasia, except:
   a. causes expansion of one or more bones
   b. results from abnormal development of the connective tissue in bone
   c. the most common site of involvement is the vertebrae
   d. the disease process does not spread from one bone to another

45. The combination of fibrous dysplasia, hormonal disturbances, and skin pigmentation is called _____ disease.
   a. McCune-Albright
   b. McBurney
   c. Adkinson
   d. Parkinson

46. When both parents have an abnormal gene for osteopetrosis and pass it on to their offspring, the offspring will have _____ osteopetrosis.
   a. early adulthood
   b. malignant infantile
   c. intermediate
   d. adult onset

47. The _____ gland is often referred to as the master gland because it produces and secretes many hormones that travel throughout the body.
   a. pituitary
   b. thyroid
   c. pineal
   d. adrenal

48. Both Addison’s disease and Cushing’s syndrome are related to the ____ gland.
   a. pituitary
   b. thyroid
   c. pineal
   d. adrenal

49. The function of cortisol is to help the body’s response to stress by:
   a. maintaining blood pressure and cardiovascular function
   b. slowing the immune system’s inflammatory response
   c. regulating the metabolism of proteins, carbohydrates, and fats
   d. all of the above
50. Acromegaly is a chronic metabolic disorder caused by an excess of growth hormone usually resulting from a benign tumor on the ___ gland:
   a. thyroid
   b. pituitary
   c. adrenal
   d. pineal

51. Growth hormone deficiency is believed to interfere with:
   a. acquisition and maintenance of bone mass
   b. a decrease in calcium absorption in the bowel
   c. an alteration in secretion of thyroid hormone
   d. increase in phosphorus uptake by bone

52. Rheumatoid arthritis (RA) is considered to be a/an ___ type disease.
   a. infectious
   b. tropical
   c. hereditary
   d. inflammatory

53. Myeloma of bone primarily occurs in the:
   a. vertebral spine
   b. ribs and pelvis
   c. skull
   d. all of the above

54. According to the results of the Women’s Health Initiative Observational Study, women with breast cancer have a ___% greater risk of fracture than the general population.
   a. 2
   b. 5
   c. 15
   d. 30

55. According to a survey conducted by the WHO, up to ___% of all tuberculosis (TB) cases, worldwide is resistant to more than one anti-tuberculosis drug.
   a. 1
   b. 4
   c. 8
   d. 12

56. The average age of onset of idiopathic juvenile osteoporosis (IJO) is ___ years.
   a. 7
   b. 15
   c. 17
   d. 19
57. Perthe’s disease affects the ____ in children.
   a. vertebral spine  
   b. hip joints  
   c. skull  
   d. ribs

58. Bones affected by Paget's disease have a characteristic radiographic appearance that is sometimes described as:
   a. eggshell calcifications  
   b. dense circular areas  
   c. streaks of light  
   d. cotton wool

59. Chronic obstructive pulmonary disease (COPD) is the ____ leading cause of death in America.
   a. 2nd  
   b. 4th  
   c. 5th  
   d. 6th

60. Fracture incidence in the United States is usually highest for ____:
   a. Caucasians  
   b. African-Americans  
   c. Asians  
   d. Hispanics

61. FRAX® algorithms give a ___ year probability of a major fracture from osteoporosis.
   a. 5  
   b. 10  
   c. 15  
   d. 20

62. A/An ____ fracture occurs when a normal stress breaks a bone that is abnormal and deficient of elasticity.
   a. burst  
   b. greenstick  
   c. insufficiency  
   d. fatigue

63. A symptomatic or asymptomatic vertebral fracture increases the risk of subsequent hip fracture by ____-fold.
   a. 1  
   b. 1.6  
   c. 2.3  
   d. 3.5
64. The greatest number of osteoporotic fractures in America are expected to occur in the:
   a. hip
   b. spine
   c. forearm
   d. proximal humerus

65. Scoliosis is defined as a persistent lateral curvature of the spine of more than ____ degrees in the upright or standing position.
   a. 2
   b. 4
   c. 6
   d. 10

66. The body of the 2\textsuperscript{nd} cervical fuses with the odontoid process by ____ year(s) of age.
   a. 9 months to 1
   b. 3 to 6
   c. 8 to 12
   d. 18 to 20

67. The most prominent point of the thoracic spine corresponds to the spinous process of the ____ thoracic vertebrae.
   a. 2\textsuperscript{nd}
   b. 7\textsuperscript{th}
   c. 9\textsuperscript{th}
   d. 12\textsuperscript{th}

68. The intervertebral foramina in the cervical spine region are best demonstrated by a/an:
   a. anterior-posterior (AP) projection
   b. posterior-anterior (PA) projection
   c. lateral position
   d. oblique position

69. Among the congenital vertebral anomalies, the most likely to cause neurological problems is:
   a. coronal cleft
   b. hemivertebrae
   c. butterfly vertebrae
   d. block vertebrae

70. A ____ vertebra is usually caused by vascular insufficiency during fetal development and may affect one or more vertebrae.
   a. coronal cleft
   b. butterfly
   c. hypoplastic
   d. block
71. A limbus vertebra is a distinct type of:
   a. syndesmophyte
   b. disc herniation
   c. bone spur
   d. fracture

72. Bilateral symmetrical syndesmophytes in the vertebral spine may radiographically appear as:
   a. bamboo
   b. corduroy
   c. Napoleon’s hat
   d. zones of sclerosis

73. The thyroid cartilage corresponds to cervical ____.
   a. 1
   b. 3
   c. 5
   d. 7

74. The frequency of elementary acetabular fractures is greatest at the:
   a. anterior wall
   b. posterior wall
   c. posterior column
   d. transverse anterior column

75. The most sensitive imaging modality for the detection of occult pelvic insufficiency fracture is:
   a. conventional radiography
   b. computed tomography (CT)
   c. magnetic resonance imaging (MRI)
   d. bone scintigraphy

76. Fractures of the ____ bone account for 50-80% of all carpal bone fractures.
   a. lunate
   b. scaphoid
   c. capitate
   d. hamate

77. The least commonly fractured carpal bone is the:
   a. trapezium
   b. trapezoid
   c. scaphoid
   d. lunate
78. The medical record:
   a. documents the diagnosis
   b. is maintained for business purposes
   c. is a legal document
   d. all of the above

79. All of the following are true regarding scatter radiation, except:
   a. occurs during attenuation of the x-ray beam by the object being examined
   b. increases the radiation exposure of both the patient and the staff
   c. contributes to the diagnostic value of the radiographic image
   d. can be minimized by limiting the primary x-ray beam field size to the size of the film, thus reducing the amount of tissue with which the x-rays interact

80. A phenomenon called _____ results in greater radiation intensity being emitted from the cathode side of the x-ray tube.
   a. reciprocity law
   b. anode heel effect
   c. line focus principle
   d. attenuation factor

81. The exposure factors of milliamperage and time are responsible for the radiographic:
   a. density
   b. contrast
   c. resolution
   d. detail

82. The controlling factor of radiographic contrast is:
   a. milliamperage
   b. kilovoltage
   c. exposure time
   d. source to image distance

83. Elongation and foreshortening can be minimized by proper:
   a. central ray alignment
   b. central ray entry and exit points
   c. alignment of the x-ray tube to the part and image receptor
   d. all of the above

84. The greatest advantage of digital imaging is that the steps of image recording, displaying, and archiving are decoupled, providing the technologist and radiologist the opportunity to optimize each task independently.
   a. True
   b. False
85. The American College of Radiology (ACR) suggests that CT evaluation of the cervical spine should have effective slice thickness no greater than ___ mm.

   a. 1.5  
   b. 3.0  
   c. 5.5  
   d. 10

86. MR imaging used to characterize spine infection has a documented sensitivity of ___%.

   a. 96  
   b. 85  
   c. 75  
   d. 50

87. In skeletal scintigraphy, the radioactive uptake is greater in the axial skeleton.

   a. True  
   b. False

88. The FRAX® model accepts individuals between the ages of 40 and ___ years.

   a. 60  
   b. 70  
   c. 80  
   d. 90

89. A family history of ___ fracture is a stronger risk factor than any other bone fracture.

   a. vertebral spine  
   b. hip  
   c. wrist  
   d. ankle

90. The NOF recommends BMD testing of:

   a. women age 65 and older  
   b. men age 70 and older, regardless of clinical risk factors  
   c. younger postmenopausal women and men age 50 to 69 years of age based on their clinical risk factors  
   d. all of the above

91. According to the 1997 Bone Measurement Act, the frequency suggestions for BMD testing state that at least ___ months must have passed since the last BMD was performed, except in certain cases of therapeutic monitoring.

   a. 6  
   b. 15  
   c. 23  
   d. 36
92. According to the ACR’s Appropriateness Criteria®, those procedures considered the most appropriate for a given clinical condition receive a rating of 9 on a scale of 1 to 9.
   a. True
   b. False

93. The first documented use of bone densitometry was in the field of:
   a. aviation
   b. dentistry
   c. obstetrics
   d. surgery

94. Ordinary x-ray techniques cannot detect less than ____% loss in bone mass.
   a. 5
   b. 15
   c. 20
   d. 30

95. A quantitative computed tomography (QCT) study of the vertebral spine requires about 30 minutes with a radiation skin dose of ____ - ____ millirems.
   a. 25 – 50
   b. 75 – 200
   c. 100 –300
   d. 500 – 700

96. Quantitative ultrasonography (QUS) measurements include:
   a. attenuation
   b. velocity
   c. stiffness
   d. all of the above

97. Dual energy x-ray absorptiometry (DXA) precision is usually documented to be 1% for the:
   a. total hip
   b. bilateral hips
   c. vertebral spine
   d. femoral neck

98. A trained technologist should perform DXA quality control procedures at least ______ and always before the first patient measurement on the day performed.
   a. 3 days a week
   b. once every 3 weeks
   c. once a quarter
   d. every 6 months
99. All of the following structural changes or artifacts may detract from either accuracy or precision, or both, of the BMD measurement of the lumbar spine, except:
   a. facet scoliosis
   b. ingested calcium
   c. gas in the bowel
   d. abdominal aortic calcifications

100. All of the following are true regarding DXA examinations, except:
   a. certain examination tables may have maximum weight limitations
   b. the examination should not be performed if there is a possibility of pregnancy
   c. the patient may take their regular calcium supplements on the day of the examination
   d. patients who have undergone diagnostic testing with contrast media must wait at least 7 days before having a DXA examination

101. The preferred method for calculation of BMD is to average the BMD for the lumbar 1 to the lumbar ____ area.
   a. 3
   b. 4
   c. 5
   d. 6

102. In a report released March 3, 2009, the National Council on Radiation Protection (NCRP), noted that in 2006, Americans were exposed to more than ____ times as much ionizing radiation exposure as was the case in the early 1980s.
   a. 10
   b. 7
   c. 5
   d. 2

103. The degree to which a diagnostic study accurately reveals the presence or absence of disease in a patient is diagnostic:
   a. expediency
   b. specificity
   c. efficacy
   d. sensitivity

104. According to the Executive Director of the National Council on Radiation Protection and Measurements (NCRP), self-referral is a primary preventable driver of the dramatic increase in radiation exposure.
   a. True
   b. False

105. The concept of ALARA (as low as reasonably achievable) encompasses all radiation safety measures, which as a whole minimize radiation dose.
   a. True
   b. False
106. Once the decision has been made to perform a diagnostic imaging procedure, the physician, radiologist, and the technologist further accept the responsibility for protecting the patient from unnecessary and excessive radiation exposure.

a. True
b. False

107. One of the most significant recommendations made by the ACR Blue Ribbon Panel concerns:

   a. providing in-service training for medical physicists
   b. recording radiation exposure doses for all imaging procedures
   c. providing oversight for medical residents ordering imaging studies
   d. adding relative radiation level designations to the imaging procedures listed in the ACR Appropriateness Criteria®

108. According to the NCRP Report No. 116, the general public’s annual effective radiation dose, exclusive of any exposure received as the result of medical procedures is limited to ____ rem(s).

   a. 0.1
   b. 0.5
   c. 1.0
   d. 1.5

109. The annual effective radiation dose limit for occupational radiation personnel is ____ rem(s).

   a. 0.5
   b. 5.0
   c. 50
   d. 500

110. According to the reference, NOF recommends that repeating BMD examinations generally agree with Medicare guidelines of ____, but recognizes that testing more frequently may be warranted in certain clinical situations.

   a. every 6 months
   b. once a year
   c. every 18 months
   d. every 2 years

111. During operation of the DXA scanner, those who should be allowed to remain in the examination room includes the patient and the technologist.

   a. True
   b. False

112. Wearing a radiation-monitoring device is voluntary unless the anticipated radiation exposure could be more than ____ of the effective dose limit.

   a. 1/16th
   b. 1/8th
   c. 1/4th
   d. ½
113. Because of the possibility of gastrointestinal disturbance, those taking bisphosphonate drugs should be instructed to stay fully upright for at least ____ after taking the drug.

a. 30 minutes
b. 1 hour
c. 4 hours
d. 6 hours

114. A contraindication to both vertebroplasty and kyphoplasty procedures is:

a. hypertension
b. liver disease
c. diabetes
d. coagulation disorders

115. A major advantage of kyphoplasty is that the injection is able to:

a. eliminate pain
b. restore motion
c. repair disc herniation
d. restore height of the vertebral body

116. The “time out” required by the Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Surgery™ involves:

a. the entire operative team
b. uses active communication
c. verification of required information on a checklist
d. all of the above

117. The largest influx of calcium into the fetal skeleton occurs during the ____ of pregnancy.

a. first 2 weeks
b. first month
c. second trimester
d. last trimester

118. Even when premature infants are fed a formula that provides additional calcium and phosphorus, it can take up to ____ years for their bone mass to catch up with that of full-term newborns.

a. 10
b. 7
c. 5
d. 3
119. The American Academy of Pediatrics has suggested that all infants who are exclusively breastfed receive ___ international units (IU) of vitamin D daily to lessen the likelihood of developing rickets.
   a. 200  
   b. 100  
   c. 75   
   d. 50

120. In rickets and osteomalacia, the radiographic appearance of short, lucent lines that are seen at the lateral margin of the scapula and the medial femoral neck are called ___ zones.
   a. Schatzki’s  
   b. Looser’s  
   c. Bright’s  
   d. Ewald’s