Electron Beam Therapy

Chapter 9

1. The dose uniformity of an electron beam is dependent upon: 9:83

   1. *Field size* 2. *Beam energy* 3. *Beam collimation*

   A. 1 & 2 only
   B. 1 & 3 only
   C. 2 & 3 only
   D. 1, 2, & 3

2. A characteristic of an electron beam isodose curve is a/an _____ width of the 90% isodose curve with _____ depth. 9:83

   A. Increasing, increasing
   B. Increasing, decreasing
   C. Decreasing, increasing
   D. Decreasing, decreasing

3. The advantages to the use of electron beam include: 3:152

   1. *Better uniformity within large volumes*
   2. *Sparing of underlying tissue*
   3. *Improved dose profiles in shallow lesions*

   A. 1 & 2 only
   B. 1 & 3 only
   C. 2 & 3 only
   D. 1, 2, & 3

4. When a bolus is used with electron beam therapy, the depth of the tumor is effectively displaced:

   A. Distally
   B. Proximally
   C. Neither of the above 3:153

5. The inhomogeneity of tissues can significantly alter attenuation. One method to correct for this involves the use of: 3:153

   A. Oblique corrective factors
   B. Long air gaps
   C. Internal bolus injections
   D. Coefficient of equivalent thicknesses

6. The electron density of lung has a value of about _____ relative to that of water.

   A. .25
   B. .67
   C. 1.1 3:158
   D. 1.65

7. In general, because of the isodose distribution of an electron beam a _____ field size is often required than is employed for photon beams. 9:83

   A. Larger
   B. Smaller

8. An electron beam directed at a water phantom with sharp irregularities will tend to produce: 9:85

   A. Hot spots on airside of the interface
   B. Cold spots on the air side of the interface
   C. Uniform hot spots across the interface
   D. Uniform cold spots across the interface

9. When internal shielding is used electron backscatter can be reduced by 9:84

   A. Cerrobend cover
   B. Increased shield thickness
   C. Low atomic number coating
   D. Increased shield depth

10. An increased air gap with electron treatments will result in: 9:85

1. Decreased dose *2. Rounder dose profile* *3. Increased percent of depth dose*

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

11. Calculate the monitor units to deliver 200 cGy to the 90% isodose line for a 10cm x 10cm 12 MeV electron beam if the cGy/MU = .787. 3:37

A. 255 MU
B. 282 MU
C. 308 MU
D. 334 MU

12. The principal advantage to the use of an electron beam is a: 3:37

A. Rapid fall of the % dd with increasing depth
B. Rapid build up of dose at the skin surface
C. Lateral position of the isodose curve
D. Better dose uniformity for small lesions

13. The amount of Bremsstrahlung radiaiton associated with a 20 meV electron beam is approximately _____ of the D max. 9:82

A. .1%
B. 1%
C. 2%
D. 5%

14. The electron density of compact bone will have a value of about _____ when compared to that of water.

A. .83
B. 1.1
C. 1.65 3:153
D. 2.12

15. Lead cut-outs which are sometimes used in the field shaping of an electron beam are coated with wax to reduce: 3:154

A. Neutron contamination
B. Secondary scatter
C. Electron penumbra
D. Surface irregularities

16. Which of the following is a common region in which an electron therapy will provide more desireable treatment characteristics? 3:225

A. Cervical tumors
B. Chest wall tumors
C. Bone tumors
D. Liver tumors

17. Which of the following most accurately indicates the relationship of electron energy and the depth of Dmax. The depth of Dmax: 9:81

A. Increases continuously with increases in electron energy
B. First decreases and then increases as the energy exceeds 6 MeV
C. First increases with energy up to about 12 MeV and then decreases
D. Decreases continuously with an increase in electron energy

18. The skin dose associated with elecron therapy: 9:81

A. Is constant at a level of about 70% of Dmax
B. Is constant at a level of about 100% of Dmax
C. Is highest at higher energies
D. Is lower at higher energies

19. The skin dose from a linac, microtron, and a betatron will be _____ at the same energy. 9:82

A. Same for all units
B. Different for all units
C. Same for the linac and microtron
D. Same for the betatron and linac

20. The amount of Bremsstrahlung x-rays produced during electron therapies tends to: 9:82

A. Increase with increasing electron energies
B. Be minimal at normal treatment energies
C. Decrease with increasing electron energies
D. Not be effected by electron energy

21. The electron energy selected on the accelerator console most closely indicates: 9:80

A. The probable energy on the skin surface
B. The energy of the secondary photon producers
C. The peak energy of the electrons at Dmax
D. The energy of the average brems x-ray photons

22. The most useful range for therapeutic electrons is given by a depth dose of about: 9:81

A. 60%
B. 75%
C. 90%
D. 97%

23. During electron beam treatments, a more uniformly useful beam may be accomplished by the use of a:

A. Skin blocking technique
B. Dual foil technique
C. Direct contact technique 8:317
D. Air gap technique

24. During electron beam therapies for superficial tumors, the custom made masks used for field shaping should be placed:

A. On the skin surface
B. On the source head
C. On the collimator
D. On the shadow tray

25. Electron beam irradiation techniques for the mammary nodes will usually require a total delivered dose of about: 9:236

A. 500 rads
B. 1500 rads
C. 2500 rads
D. 5000 rads

26. In electron beam therapy treatment of the breast, the energy most often chosen will correspond to a/an _____ depth dose at the chest wall-lung interface. 8:323

A. 100%
B. 80%
C. 60%
D. 40%

27. In electron beam therapies, the collimation of the beam must be achieved as close to the _____ as possible. 8:56

A. Source
B. Skin surface
C. Scattering foil
D. Collimator head

28. During electron beam therapies, a reduction in scattering can be achieved by employing 9:90

1. Open primary collimators 2. Auxiliary collimators 3. Attachable cones

A. 1 & 2 only
B. 1 & 3 only
C. 2 & 3 only
D. 1, 2, & 3

29. When treating with an electron beam, internal shielding would be useful to protect the normal structures beyond the target volume in which of the following? 8:337

1. Lip 2. Buccal mucous 3. Chest wall

A. 1 & 2 only
B. 1 & 3 only
C. 2, & 3 only
D. 1, 2, & 3

30. A bolus is commonly employed during electron therapies for all of the following except: 8:332

A. Increasing skin dose
B. Filling in for missing tissues
C. Reducing electron penetration
D. Reducing the effect of photons in the beam

31. For electrons less than 10 MeV, what is the thickness of lead required to obtain less than a 5% transmission? 8:335

A. 3 mm
B. 5 mm
C. 6 mm
D. 7 mm

32. Superficial tumors of the chest wall possessing large, curved surfaces are well suited for: 8:341

A. Teletherapies
B. Isocentric therapies
C. Brachytherapies
D. Electron arc therapies

33. Electron beams are used in preference to high energy X-ray beams: 8:299

A. For greater skin sparing
B. To reduce tissue inhomogeneities
C. For total nodal irradiation
D. For superficial lesions

34. As a general guideline the appropriate electron energy should be about _____ the maximum depth of the tumor. 3:36

A. Same as
B. One half of
C. Two times
D. Three times

35. For patients receiving electron beam therapy after a mastectomy it may be necessary to position the patient in a _____ position to avoid air gaps between the electron cone and the chest wall. 8:318

A. Supine
B. Prone
C. Semi-erect
D. Trendelenburg