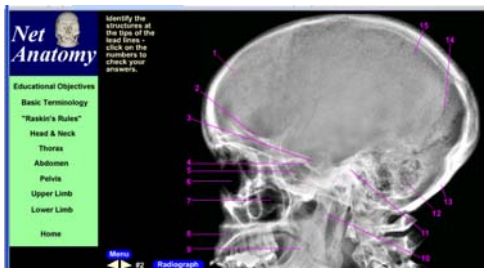
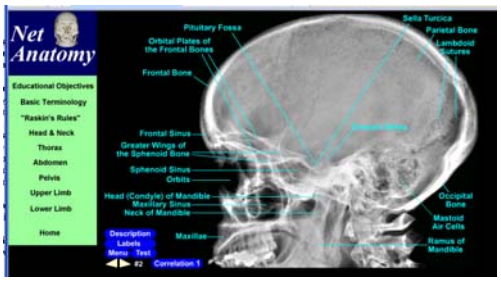
Problems & Questions

## Where is the maxillary sinus?




## Where is the maxillary sinus?




•http://netanatomy.com/

Anatomy question: given transverse section, with different options: R Atrium, L Atrium, R Ventricle, L Ventricle, and Esophagus. Where is the R Ventricle?

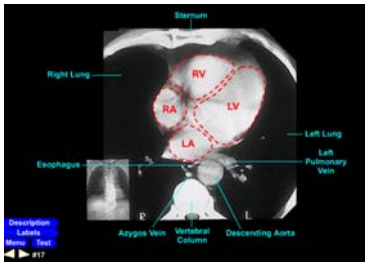



**TABLE A.11.1. 10-MV X-RAY PERCENT DEPTH DOSES**

| Depth | *A/P* and Field Size (cm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (cm) | 0 × 0 | 1.00<br>4 × 4 | 1.50<br>6 × 6 | 2.00<br>8 × 8 | 2.50<br>10 × 10 | 3.00<br>12 × 12 | 3.75<br>15 × 15 | 5.00<br>20 × 20 | 6.25<br>25 × 25 | 7.50<br>30 × 30 |
| 0 | 5.0 | 6.5 | 8.5 | 10.7 | 12.5 | 14.5 | 17.0 | 21.0 | 24.5 | 28.0 |
| 0.2 | 37.0 | 40.0 | 43.0 | 45.0 | 46.5 | 48.0 | 50.0 | 52.5 | 54.0 | 56.0 |
| 0.5 | 65.0 | 67.0 | 69.0 | 70.5 | 72.0 | 73.0 | 74.0 | 76.0 | 77.0 | 79.0 |
| 1.0 | 86.0 | 88.0 | 89.0 | 90.0 | 91.0 | 91.5 | 92.0 | 93.0 | 94.0 | 95.0 |
| 1.5 | 94.5 | 95.5 | 96.0 | 96.5 | 97.0 | 97.0 | 97.5 | 98.0 | 98.0 | 98.5 |
| 2.0 | 96.5 | 97.5 | 98.0 | 98.0 | 98.0 | 98.5 | 99.0 | 99.0 | 99.5 | 99.5 |
| 2.5 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 3.0 | 97.4 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| 4.0 | 92.3 | 96.4 | 96.4 | 96.4 | 96.4 | 96.5 | 96.5 | 96.5 | 96.5 | 96.5 |
| 5.0 | 87.5 | 91.6 | 91.8 | 91.9 | 92.1 | 92.2 | 92.3 | 92.5 | 92.6 | 92.7 |
| 6.0 | 83.0 | 87.0 | 87.4 | 87.7 | 87.9 | 88.1 | 88.3 | 88.6 | 88.8 | 89.0 |
| 7.0 | 78.7 | 82.6 | 83.2 | 83.6 | 83.9 | 84.2 | 84.5 | 84.9 | 85.2 | 85.5 |
| 8.0 | 74.7 | 78.5 | 79.2 | 79.7 | 80.1 | 80.4 | 80.8 | 81.4 | 81.8 | 82.1 |
| 9.0 | 70.8 | 74.6 | 75.4 | 76.0 | 76.5 | 76.9 | 77.3 | 78.0 | 78.4 | 78.8 |
| 10.0 | 67.2 | 70.8 | 71.8 | 72.5 | 73.0 | 73.5 | 74.0 | 74.7 | 75.3 | 75.7 |
| 11.0 | 63.8 | 67.3 | 68.4 | 69.1 | 69.7 | 70.2 | 70.8 | 71.6 | 72.2 | 72.7 |
| 12.0 | 60.6 | 63.9 | 65.1 | 65.9 | 66.6 | 67.1 | 67.7 | 68.6 | 69.3 | 69.8 |
| 13.0 | 57.5 | 60.7 | 62.0 | 62.8 | 63.5 | 64.1 | 64.8 | 65.7 | 66.5 | 67.1 |
| 14.0 | 54.6 | 57.7 | 59.0 | 59.9 | 60.7 | 61.3 | 62.0 | 63.0 | 63.8 | 64.4 |
| 15.0 | 51.9 | 54.8 | 56.2 | 57.1 | 57.9 | 58.5 | 59.3 | 60.4 | 61.2 | 61.8 |
| 16.0 | 49.3 | 52.1 | 53.5 | 54.5 | 55.3 | 55.9 | 56.8 | 57.8 | 58.7 | 59.4 |
| 17.0 | 46.8 | 49.5 | 50.9 | 52.0 | 52.8 | 53.5 | 54.3 | 55.4 | 56.3 | 57.0 |
| 18.0 | 44.5 | 47.0 | 48.5 | 49.5 | 50.4 | 51.1 | 52.0 | 53.1 | 54.0 | 54.8 |
| 19.0 | 42.3 | 44.7 | 46.1 | 47.2 | 48.1 | 48.8 | 49.7 | 50.9 | 51.8 | 52.6 |
| 20.0 | 40.2 | 42.4 | 43.9 | 45.0 | 45.9 | 46.7 | 47.6 | 48.8 | 49.7 | 50.5 |
| 22.0 | 36.3 | 38.3 | 39.8 | 41.0 | 41.9 | 42.6 | 43.5 | 44.8 | 45.8 | 46.6 |
| 24.0 | 32.8 | 34.6 | 36.1 | 37.2 | 38.2 | 38.9 | 39.9 | 41.1 | 42.1 | 43.0 |
| 26.0 | 29.7 | 31.2 | 32.7 | 33.9 | 34.8 | 35.5 | 36.5 | 37.8 | 38.8 | 39.6 |
| 28.0 | 26.9 | 28.1 | 29.7 | 30.8 | 31.7 | 32.5 | 33.4 | 34.7 | 35.7 | 36.5 |
| 30.0 | 24.3 | 25.4 | 26.9 | 28.0 | 28.9 | 29.6 | 30.6 | 31.8 | 32.9 | 33.7 |

**TABLE A.11.2. 10-MV X-RAY TISSUE-MAXIMUM RATIOS**

| Depth | *A/P* and Field Size (cm)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (cm) | 0 × 0 | 1.00<br>4 × 4 | 1.50<br>6 × 6 | 2.00<br>8 × 8 | 2.50<br>10 × 10 | 3.00<br>12 × 12 | 3.75<br>15 × 15 | 5.00<br>20 × 20 | 6.25<br>25 × 25 | 7.50<br>30 × 30 |
| 0 | 0.048 | 0.062 | 0.081 | 0.102 | 0.119 | 0.138 | 0.162 | 0.200 | 0.233 | 0.267 |
| 0.2 | 0.354 | 0.382 | 0.411 | 0.430 | 0.444 | 0.459 | 0.478 | 0.502 | 0.516 | 0.535 |
| 0.5 | 0.625 | 0.644 | 0.663 | 0.678 | 0.692 | 0.702 | 0.711 | 0.731 | 0.740 | 0.759 |
| 1.0 | 0.835 | 0.854 | 0.864 | 0.874 | 0.884 | 0.888 | 0.893 | 0.903 | 0.913 | 0.922 |
| 1.5 | 0.927 | 0.936 | 0.941 | 0.946 | 0.951 | 0.951 | 0.956 | 0.961 | 0.961 | 0.966 |
| 2.0 | 0.956 | 0.966 | 0.970 | 0.970 | 0.970 | 0.975 | 0.980 | 0.980 | 0.985 | 0.985 |
| 2.5 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 3.0 | 0.983 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 4.0 | 0.950 | 0.992 | 0.992 | 0.993 | 0.993 | 0.993 | 0.993 | 0.993 | 0.993 | 0.994 |
| 5.0 | 0.918 | 0.960 | 0.963 | 0.965 | 0.966 | 0.967 | 0.968 | 0.970 | 0.971 | 0.972 |
| 6.0 | 0.887 | 0.930 | 0.934 | 0.937 | 0.939 | 0.941 | 0.944 | 0.947 | 0.949 | 0.951 |
| 7.0 | 0.858 | 0.899 | 0.906 | 0.910 | 0.913 | 0.916 | 0.920 | 0.924 | 0.928 | 0.931 |
| 8.0 | 0.829 | 0.870 | 0.878 | 0.884 | 0.888 | 0.892 | 0.896 | 0.902 | 0.906 | 0.910 |
| 9.0 | 0.801 | 0.841 | 0.851 | 0.858 | 0.863 | 0.867 | 0.873 | 0.880 | 0.885 | 0.889 |
| 10.0 | 0.774 | 0.813 | 0.824 | 0.832 | 0.838 | 0.843 | 0.850 | 0.858 | 0.864 | 0.869 |
| 11.0 | 0.748 | 0.786 | 0.798 | 0.807 | 0.814 | 0.820 | 0.827 | 0.836 | 0.843 | 0.849 |
| 12.0 | 0.723 | 0.760 | 0.773 | 0.783 | 0.791 | 0.797 | 0.805 | 0.815 | 0.823 | 0.830 |
| 13.0 | 0.699 | 0.734 | 0.749 | 0.759 | 0.768 | 0.774 | 0.783 | 0.794 | 0.803 | 0.810 |
| 14.0 | 0.676 | 0.709 | 0.725 | 0.736 | 0.745 | 0.752 | 0.762 | 0.774 | 0.783 | 0.791 |
| 15.0 | 0.653 | 0.684 | 0.701 | 0.713 | 0.723 | 0.731 | 0.741 | 0.753 | 0.764 | 0.772 |
| 16.0 | 0.631 | 0.661 | 0.678 | 0.691 | 0.701 | 0.710 | 0.720 | 0.734 | 0.744 | 0.753 |
| 17.0 | 0.610 | 0.638 | 0.656 | 0.669 | 0.680 | 0.689 | 0.700 | 0.714 | 0.726 | 0.735 |
| 18.0 | 0.589 | 0.615 | 0.634 | 0.648 | 0.659 | 0.669 | 0.680 | 0.695 | 0.707 | 0.717 |
| 19.0 | 0.570 | 0.593 | 0.613 | 0.628 | 0.639 | 0.649 | 0.661 | 0.676 | 0.689 | 0.699 |
| 20.0 | 0.551 | 0.572 | 0.593 | 0.608 | 0.620 | 0.629 | 0.642 | 0.658 | 0.671 | 0.681 |
| 22.0 | 0.514 | 0.532 | 0.553 | 0.569 | 0.582 | 0.592 | 0.605 | 0.622 | 0.636 | 0.647 |
| 24.0 | 0.480 | 0.494 | 0.516 | 0.533 | 0.546 | 0.556 | 0.570 | 0.588 | 0.602 | 0.614 |
| 26.0 | 0.449 | 0.458 | 0.481 | 0.498 | 0.511 | 0.522 | 0.536 | 0.555 | 0.570 | 0.583 |
| 28.0 | 0.419 | 0.425 | 0.448 | 0.465 | 0.479 | 0.490 | 0.505 | 0.524 | 0.539 | 0.552 |
| 30.0 | 0.392 | 0.394 | 0.417 | 0.434 | 0.448 | 0.459 | 0.474 | 0.494 | 0.509 | 0.523 |

## Dose at a depth, d

Given table of TMR values and the dose to the tumor 150 cGy at depth = 10 cm. What is the dose at depth d = 5 cm. (10x10 FS)

## Dose at dmax

Given PDD table, and the dose to the tumor. What is the dose at d max?

Example: What is the dose at dmax when 200 cGy is prescribed to a depth of 10 cm for an 18 MV beam? For a 6 MV beam?

## Corrected Rdg for Temp & Press

Given the reading of an ion chamber, the temperature and the pressure. What is the corrected reading?

Reading from chamber is 103 nC.

Temperature is 20.5 deg C

Pressure is 745 mm Hg

What is the corrected reading?

## What is GTV?

***A.1. Gross Tumor Volume***

The gross tumor volume (GTV) is the gross demonstrable extent and location of the tumor. It may consist of primary tumor, metastatic lymphadenopathy, or other metastases. Delineation of GTV is possible if the tumor is visible, palpable or demonstrable through imaging. A GTV cannot be defined if the tumor has been surgically removed, although an outline of the tumor bed may be substituted by examining preoperative and postoperative images.

***A.2. Clinical Target Volume***

The CTV consists of the demonstrated tumor(s) if present and any other tissue with presumed tumor. It represents, therefore, the true extent and location of the tumor. Delineation of CTV assumes that there are no tumor cells outside this volume. The CTV must receive adequate dose to achieve the therapeutic aim.

***A.3. Internal Target Volume***

ICRU Report no. 62 (25) recommends that an internal margin (IM) be added to CTV to compensate for internal physiological movements and variation in size, shape, and position of the CTV during therapy in relation to an internal reference point and its corresponding

P.22

coordinate system. The volume that includes CTV with these margins is called the *internal target volume* (ITV).

***A.4. Planning Target Volume***

The volume that includes CTV with an IM as well as a set-up margin (SM) for patient movement and set-up uncertainties is called the *planning target volume* (PTV). To delineate the PTV, the IM and SM are not added linearly but are combined rather subjectively. The margin around CTV in any direction must be large enough to compensate for internal movements as well as patient-motion and set-up uncertainties.

***A.5. Planning Organ at Risk Volume***

The organ(s) at risk (OR) needs adequate protection just as CTV needs adequate treatment. Once the OR is identified, margins need to be added to compensate for its movements, internal as well as set-up. Thus, in analogy to the PTV, one needs to outline planning organ at risk volume (PRV) to protect OR effectively.

## GTV?

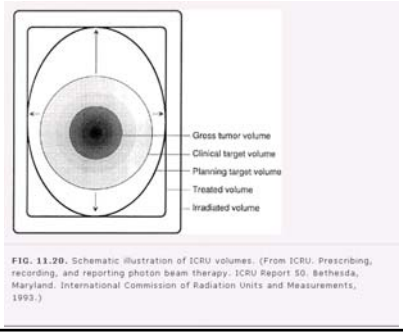



**FIG. 11.20.** Schematic illustration of ICRU volumes. (From ICRU. Prescribing, recording, and reporting photon beam therapy. ICRU Report 50. Bethesda, Maryland. International Commission of Radiation Units and Measurements, 1993.)

After changing the bending magnet in the linear accelerator . What factors could be changed?
Options: flattering filter, ……

- Change beam energy
- Affect flatness and symmetry

Question about penumbra. Physical penumbra, Geometrical penumbra.

- The term penumbra, in a general sense, means the region, at the edge of a radiation beam, over which the dose rate changes rapidly as a function of distance from the beam axis
- Geometric penumbra the penumbra width increases with increase in source diameter, SSD, and depth but decreases with an increase in SDD (see example S/P)
- Dosimetrically, the term physical penumbra width has been defined as the lateral distance between two specified isodose curves4 at a specified depth

Penumbra is measured between which 2 percent lines at dmax?

## Geometric Penumbra example

For a Cobalt unit with a source of 2 cm diameter, with the diaphragm distance at 45 cm, the geometrical penumbra on the skin for a treatment at 100cm SSD is ?

a) 1.1cm
b) 1.6cm
c) 2.0cm
d) 2.4cm

## Penumbra Example

The size of the Co-60 radiation source is 1cm. The film on the patient table is located at the distance of 100 cm from the radiation source. The collimator is located at the distance of 40 cm from the radiation source. What is the penumbra length on the film?

a) 1.0 cm
b) 1.5 cm
c) 2.0 cm
d) 2.5 cm

## What is the difference between Magnetron and Klystron?

- The magnetron is a device that produces microwaves.
- The klystron is not a generator of microwaves but rather a microwave amplifier. It needs to be driven by a low-power microwave oscillator.
- Magnetrons operate at 2 MW peak power output to power low-energy linacs (6 MV or less).
- Higher-energy linacs use klystrons
- Power for e-gun and accelerating guide

## What data is needed to calculate the dose by hand calc?

- Fractional Dose (cGy)
- Output of the machine (1 cGy per MU)
  - (in what setup?)
- Sc(Field size)
- Sp (blkd FS)
- ISF = (SCD/STD)^2
- WF
- TF
- OAF
- Attenuation
  - SSD use PDD (FS, d, SSD)
  - SAD use TMR (FS, d)

## Scattered photon energy; what is the maximum energy and at what angle?

If the energy of the incident photon is high, we have the following important generalizations:

(a) the radiation scattered at right angles is independent of incident energy and has a maximum value of 0.511 MeV;

(b) the radiation scattered backwards is independent of incident energy and has a maximum value of 0.255 MeV

## Compton Interactions

- Interaction of a low-energy photon. If the incident photon energy is much less than the rest energy of the electron, only a small part of its energy is imparted to the electron, resulting in a scattered photon of almost the same energy as the incident photon.
- Interaction of a high energy photon. If the incident photon has a very high energy (much greater than the rest energy of the electron), the photon loses most of its energy to the Compton electron and the scattered photon has much less energy.

## Compton interactions

- Scattered photons produced by high-energy photons carry away only a small fraction of the initial energy.
- Thus, at high photon energy, the Compton effect causes a large amount of energy absorption compared with the Compton interactions involving low-energy photons.

## MU Chambers?

What is the purpose of the ion chamber that is located at the head of the linear accelerator?

Dose, Dose Rate, Symmetry (radial and transverse)

## For 2 opposed parallel beams, what factors affect dm/dp (options: energy, patient thickness,……)

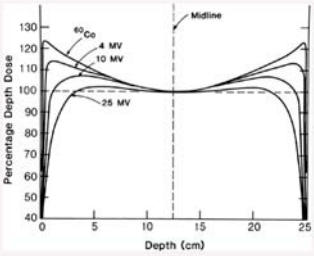



FIG. 11.11. Depth dose curves for parallel opposed field normalized to midpoint value. Patient thickness = 25 cm. field size = 10 Â— 10 cm. SSD = 100 cm.

## For 2 opposed parallel beams, what factors affect dm/dp (options: energy, patient thickness,……)

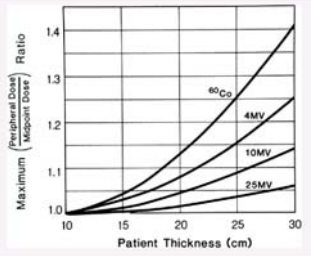



FIG. 11.12. Ratio of maximum peripheral dose to the midpoint dose plotted as a function of patient thickness for different beam qualities. Parallel opposed fields, field size = 10 Â— 10 cm SSD = 100 cm.

## Conversion

Given the value of 50 R, is it equal to:

- 50 Bq,
- 50 rad,
- 50 Gy,
- 50 Kerma

What is $f_{air}$? $f_{med}$?

## Question on the reason of unclear image produced by MV modality.

- High energy
- Dominated by compton scatter
- How do we compensate with Portal films? With EPIDs?

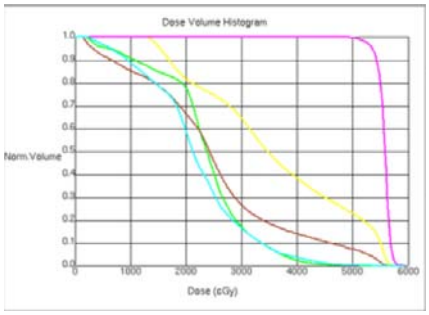
## SRS vs SRT?

- Stereotactic Radiosurgery
  - Single fxn
  - Dose relatively low compared to large fraction regimes (16-24 Gy)
- Stereotactic Radiotherapy
  - Few fractions
  - Higher dose than SRS
  - 3 fxns, 16-20Gy per fxn

## DVH

- Question on the DVH graph, what is the vertical axis, the horizontal axis.
- Is it useful to determine dose distribution?
- Different graphs are given and the question is to point to the DVH graph.

## DVH




## H&D curve

- Different graphs are given and the question is to point to the H&D graph.
- What is it?

What is the difference between x-rays and gamma rays?

- Based on origination

What is the difference between Bremmstrahlung & Characteristic x-ray ?

What are the advantages of the pocket dosimeter?

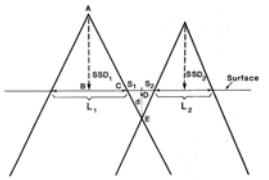
What is the reason of the tail on the electron beam PDD graph?

## Geometric Separation

- Gap calculation

$$S_1 = \frac{1}{2} L_1 \left( \frac{d}{SSD_1} \right)$$

$$S_2 = \frac{1}{2} L_2 \left( \frac{d}{SSD_2} \right)$$




- Geometric boundary defined by 50% decrement line
- gap=$S_1$+$S_2$

## Skin Gap Calc

Assume you wish to match the geometric edge of two 20 cm x 20 cm. 4 MV, 80 cm SSD treatment fields at 10 cm tumor depth. The correct gap on the skin would be?

a) 1.0 cm
b) 1.25cm
c) 2.0 cm
d) 2.5cm
e) 3.0 cm

## Magnification

A cross-table lateral radiograph is taken to determine the spinal cord depth. A 5 cm diameter ring placed on the patient's skin posterior to the cord measures 6.75 cm on the radiograph, if the cord depth below the skin measures 7.4 cm, what is the cord depth within the patient?

a) 5.0 cm
b) 5.5 cm
c) 6.0 cm
d) 9.0 cm

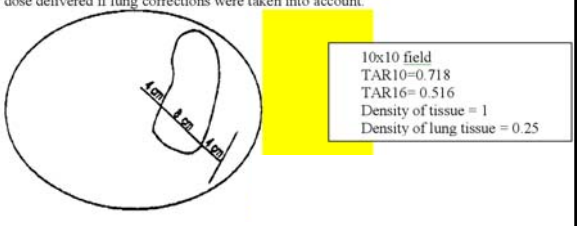
## Magnification

A film taken on the simulator has a source to film distance of 160 cm. The technologist forgets to note the field size at the treatment distance of 80 cm. The field measures 10 cm x 20 cm on the film. The field size at 80 cm is:

a) 8 cm x 16 cm
b) 12.5 cm x 25 cm
c) 10cm x 20cm
d) 5 cm x 10 cm
e) 20 cm x 40 cm

## Effective Depth

In the diagram below a patient is treated with a single posterior oblique field. The prescription dose is 200 cGy to the isocenter. (without lung correction). Calculate the dose delivered if lung corrections were taken into account.




10x10 field
TAR10=0.718
TAR16= 0.516
Density of tissue = 1
Density of lung tissue = 0.25

## Inverse Square Law

The output of a 6 MV accelerator is measured at dmax using an SSD of 104 cm rather than 100 cm SSD. What is the percentage error?

a) 7.44 %
b) 7.0 %
c) 8.0 %
d) 8.5 %

## Field size?

Parallel opposed fields are setup on a 4 MV linear accelerator at 80 cm SAD. The patient's anterior-posterior diameter Is 24 cm. The field size at midline is 15 cm x 15 cm. The field size on the skin surface is _____?

a) 10.8cm
b) 12.8cm
c) 13.8 cm
d) 15.0 cm
e) 17.6 cm

## New Dose Rate

The dose rate for a 10 x 10 cm Cobalt-60 field is 100 cGy/min measured in air, at 80 cm SAD. The BSF is 1.035. The dose rate in tissue at depth = dmax, 80 SSD is:

a) 108.5 cGy/min
b) l02.2 cGy/min
c) l00.0 cGy/min
d) 98.8 cGy/min
e) 96.6 cGy/min

## Effective Path Length

What is the effective path length through 3 cm of tissue, 10 cm of an inhomogeneity of 0.25 density, and 3 cm more of tissue?

a) 7.5 cm
b) 8.5 cm
c) 13 cm
d) 6 cm
e) none of the above

## Treatment Time

The dose rate in air for a 15 cm x 15 cm field at 80 cm is 120 cGy/min for an isocentric Cobalt-60 treatment. The TAR for a 15 cm x 15 cm field at 12 cm depth is 0.686, A small comer block is used and the tray factor is 0.96. The time needed to deliver 90 cGy is _____ ?

a) 0.54
b) 1.05
c) 1.09
d) 1.14

## MU calc

A 6 MV accelerator is calibrated for 1 cGy = 1 mu at 101.5 cm in water at a10 cm x 10 cm field size. A 100 SAD parallel opposed treatment is planned for the lung to 10 cm depth using a 12 cm x 12 cm open field.

Output factor = 1.02.

TMR = 0.782,

Tray factor = 0.97.

Calculate the mu settings required to deliver 90 cGy.

a) 110
b) 113
c) 115
d) 119

## Field Size?

The collimator setting to treat a 40 cm field at 130 cm SSD on an 80 cm SAD Cobalt unit is ____cm.

a) 15.1 cm
b) 24.6 cm
c) 40.0 cm
d) 50.4 cm

## Given the wedge angle, what is the hinge angle?

- Wedge angle — Hinge angle

$$\theta = 90^\circ - \phi/2$$

## Wedge angle/Hinge angle

There are certain combinations of hinge angle and wedge angle that will produce a relatively uniform dose distribution. Circle on the list below the combinations which are correct i.e. that will give a relatively uniform dose distribution.

| | Hinge Angle | Wedge Angle |
|---|---|---|
| a) | 90° | 45º |
| b) | 120° | 30° |
| c) | 60° | 60° |
| d) | 60° | 45° |
| e) | 90° | 60° |

## Wedge Angle

When treating a patient with 2 oblique ports, 120° apart, the optimum wedge angle is:

a) 15°
b) 30°
c) 45°
d) 60°

## Mayneord's F Factor

Question to calculate PDD at extended PDD @ 6 Mv.

- The Mayneord F factor method works reasonably well for small fields since the scattering is minimal under these conditions.
- However, the method can give rise to significant errors under extreme conditions such as lower energy, large field, large depth, and large SSD change.

## Mayneord's F-factor

The percentage depth dose for a 10 cm x 10 cm Cobalt field, 80 cm SSD, at 5 cm depth, is 78.5%. The appropriate percentage depth dose at 100 cm SSD for this same beam is probably _____?

a) 79.2 %
b) 75.0 %
c) 80.2 %
d) 83.0 %
e) 85.2 %

## What is the energy used for treating with protons?

- 150 to 250 MeV

## What are the diseases that requires to treat the craniospinal?

- medulloblastoma

## Photon beam algorithms

Question on the PHOTON treatment planning ways: options: convolution, or pencil beam, monte carlo

## HVL

- There were different questions to calculate HVL.
- There was a question to calculate TVL.
- Given the TVL, and the output intensity, what is the input intensity?
- A Question with the relation between HVL and TVL.

## Best method of measuring Cobalt-60 head leakage

## Probability of Photoelectric effect

Calculate the ratio of the photoelectric attenuation for 80 keV photon in a material with z=50 and a 40 keV photon in a material with z=20.

Explain a 3:2 weighting AP:PA using 180 cGy per fraction.

## DICOM

- Question on DICOM. Is it suitable to store treatment planning?
- Digital Imaging and Communications in Medicine