1. **Digital Reconstructed Radiograph (DRR)** – Is based on acquired CT information, these are images that render a beam’s eye view display of the treatment field anatomy and areas of treatment interest. These images resemble conventional radiographs.

2. **Attenuation** – Is the removal of photons and electrons from a radiation beam by scatter or absorption as it travels through a medium, typically tissue or tissue equivalent material.

3. **Beam Hardening** – Increases the effective energy of an x-ray beam by filtering out low energy photons.

4. **CT Window** – A technique that allows the radiation therapist to change the appearance of the image after it has been acquired by the CT scanner. There are two characteristics of the window are window level and window width.

   **Window Level** – Represents the central Hounsfield unit (HU) of all the CT numbers within the window width. *(Density and Brightness)*

   **Window Width** – Range of numbers displayed or the contrast on a CT image. *(Image Contrast)*

5. **D\text{max}** – Occurs at the point at which the energy of the electrons coming to rest equals the energy of electrons being set into motion by new photon interactions. Depth of 100% dose. The depth at which electronic equilibrium occurs for photon beams; the point where dose reaches its maximum value. Mainly depends on the energy of the beam. The depth of maximum ionization increases as the energy of the beam increases.

<table>
<thead>
<tr>
<th>Photon Energy</th>
<th>D \text{MAX} (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial</td>
<td>0.0</td>
</tr>
<tr>
<td>Orthovoltage</td>
<td>0.0</td>
</tr>
<tr>
<td>Cesium-137</td>
<td>0.1</td>
</tr>
<tr>
<td>Radium-226</td>
<td>0.1</td>
</tr>
<tr>
<td>Cobalt-60</td>
<td>0.5</td>
</tr>
<tr>
<td>4MV</td>
<td>1.0</td>
</tr>
<tr>
<td>6 MV</td>
<td>1.5</td>
</tr>
<tr>
<td>10 MV</td>
<td>2.5</td>
</tr>
<tr>
<td>15 MV</td>
<td>3.0</td>
</tr>
<tr>
<td>20 MV</td>
<td>3.5</td>
</tr>
<tr>
<td>25 MV</td>
<td>5.0</td>
</tr>
</tbody>
</table>
6. **Tomotherapy** – The beam is collimated to a narrow slit with modulation of the beam intensity as the gantry rotates. Treatment may consist of a continuous spiral beam covering the treatment volume or may be sequential.

7. **Effective Field Size (EFS)** – Another term for **Blocked Field Size (BFS)**. Effective field size is the equivalent rectangular field dimensions of the open or treated area within the collimator field dimensions. Effective field size is the actual area treated.

8. **Equivalent Square** – Rectangular field size that demonstrate the same measurable scattering and attenuation characteristics of a square field size. Used to find the output, output factor, and tissue absorption factors. **Formula is** $\text{EqSq} = \frac{2(W \times L)}{W + L}$, or $4 \left( \frac{A}{P} \right)$

9. **Given Dose** – The dose delivered at the depth of Maximum Equilibrium ($D_{\text{max}}$) through a single treatment field. Also known as Applied Dose, $D_{\text{max}}$ Dose.

   **Given Dose** = $\left( \frac{TD}{PDD} \right) \times 100$

10. **Gray (Gy)** – SI unit for absorbed dose. $1 \text{Gy} = 1 \text{J/Kg}$, or $= 100 \text{Rad}$

11. **Hinge Angle ($H_\perp$)** – Measure of the angle between central rays of two intersecting treatment beams. If a lateral and anteroposterior beam intersect at the Isocenter, the hinge angle would be $90^\circ$ degree.

    $H_\perp = 180^\circ - (2 \times W_\perp)$

12. **Heterogeneity Correction** – Corrections that account for the presence of irradiated media other than water.

13. **CT Simulation** – Computer Tomography scanner equipped with software that can provide information needed to design the patient’s treatment parameters.

CT Imaging - Cross-sectional information provided by CT scanning contributes considerable information to the radiation oncologist in four major areas: Diagnosis, Tumor and normal tissue localization, tissue density, data for dose calculations, and follow-up treatment monitoring

14. **Hot Spots** – An area outside the target that receives a higher dose than the specified target dose. Like the maximum target dose, a hot spot is considered clinically meaningful only if it covers an area of at least $2 \text{cm}^2$

15. **Half Value Layer (HVL)** – The thickness of a given material necessary to reduce the intensity of a photon beam to 50% of its initial value.

    $\text{HVL} = \frac{0.693}{\mu}$

16. **Bolus** – Is a tissue equivalent material placed on the surface of a patient to adjust the dose distribution at tissues beneath it. Usually it is used to bring the surface dose up to 100% with high energy photons or to adjust the penetration of electron beams.

17. **Isodose Curve** – Plotted percentage depth does at various points in the beam along the central axis and elsewhere.
18. **Magnification Factor** – Is directly proportional to the distance of the object (patient) from the target or source and is dependent on the distance of the object from the film. A ratio of image size to object size.

\[
\text{Magnification Factor} = \frac{\text{image size}}{\text{object size}}
\]

19. **Minification Factor** – The size of the object on film is smaller than actual object size. A ratio of object size to image size.

\[
\text{Minification Factor} = \frac{\text{object size}}{\text{image size}}
\]

20. **Maximum Target Dose** – The maximum target dose a specific organ or target will receive. A maximum target dose is set for specific organ/tissues of interest so there isn’t an intolerance cause by tissue overdose.

21. **Minimum Target Dose** – The minimum dose an organ or target will receive.

22. **Output Factor** – The ratio of the dose rate of a given field size to the dose rate of the reference field size. Allows for the change in scatter as the collimator setting changes. Relates the dose rate of a given collimator setting to the dose rate of the reference field size. Allows for change in scatter with changing field sizes. AKA: Collimator Scatter Factor, Phantom Scatter Factor, Field Size Correction Factor, and Total Scatter Factor.

23. **Orthogonal Films** – Are (2) images take 90° apart. They are required for treatment planning purposes to define the location and relationship of various anatomic structures relative to the fields of Isocenter.

24. **Percent Depth Dose (PDD, %DD)** – The ratio of absorbed dose at depth to the absorbed dose at a fixed reference point (usually Dmax). PDD increases with increased energy, filed size, and SSD, but decreases as depth increases. 

\[
PDD = \frac{\text{Dose @ depth}}{\text{Dose @ Dmax}}
\]

25. **Penumbra** – Area or region at the beam’s edge where the radiation intensity fall to 0.

\[
P = \left(\frac{s}{ssD + ssD}\right)
\]

26. **Prescribed Dose (Total Dose; TD)** – Is the treatment prescription of the total dose to be delivered to the patient. Depends on the goal of treatment: curative; palliation; or prophylaxis. Is written in Gy or cGy and be delivered in fractionation, Hyperfractionation, and accelerated fractionation schedules.

27. **Primary Radiation** – Is the useful radiation beam before it intercepts an object.

28. **Rad** – Energy absorbed per unit mass of any material.

**Units:**
- Rad (1 rad = 100 erg/g)
- Gray (1 Gy = 1 J/Kg)

**Conversions:**
- 1 rad = 0.01 Gy
- 1 Gy = 100 rad
- 100 cGy = 1 Gy
- 1 cGy = 1 rad
29. **Scatter Radiation** – When the primary beam interacts with matter, the result is scatter radiation made up of photons or electrons.

30. **Skin Sparing** – Property of megavoltage irradiation where the maximum dose occurs at some depth beneath the skin surface.

31. **Source to Axis Distance (SAD) Technique** – The distance from the source of photons to the Isocenter. The source of radiation to the axis of rotation of the treatment unit. The filed size is defined at the Isocenter, the patient doesn’t have to move between fields.

32. **Source to Skin Distance (SSD) Technique** – The distance from the source of radiation to the skin surface of the patient. When the gantry rotates around the patient, the SSD will continually change. The field size is defined at the skins surface.

33. **High Dose Rate (HDR)** – Delivery of brachytherapy on an outpatient basis using a remote after loading. HDR delivers a dose rate above 1200cGy/hour

34. **Low Dose Rate (LDR)** - Is the delivery of brachytherapy in a conventional low dose rate regimen that lasts several days and requires a hospital stay and will give dose to personnel.

35. **Coplanar** – Geometrical principle describing (2) radiation fields configured in such a way that the beams edges lie in the same plane. (Central ray is no parallel opposed.

36. **Non-coplanar** – Are radiation fields that are not configured in the same plane.

37. **Three Dimensional (3-D) Conformal Radiation Therapy (3DCRT) Planning** – Is three dimensional image visualization and treatment planning tools are used to conform Isodose distribution to only target volumes while excluding normal tissues as much as possible.

38. **Four Dimensional (4-D) Planning** – Uses three dimensional treatment planning with added respiratory Gating and time=4D

39. **Absorbed Dose (Dose)** – Is the energy absorbed per unit mass of any material; Units are the cGy or rad. Measured at a specific point in a medium and refers to the energy deposited at that point. Measured in gray (Gy), which is defined so that 1 Gy = 1J/kg = 100Rad.

40. **Activity** – The rate at which a radioactive isotope undergoes nuclear decay. Units are the Curie (Ci) or Becquerel (Bq). Bq= 1 disintegrations per second 1 Ci= 3.7x10(16) Bq

41. **Linear Attenuation Coefficient** – Represented by the symbol µ. This describes the probability that each photon in the beam will interact with the medium and lose its energy, per centimeter of material that the photons pass through, and has units of cm\(^{-1}\). Depends greatly on the energy of the photon beam and the medium in which the interaction is taking place.

42. **Linear Attenuation Coefficient** = \(I_x = I_0e^{-\mu x}\)

43. **Buildup Region** – The region between the skin surface and the depth of \(D_{max}\). Build up is a characteristic of megavoltage irradiation. In this region, the dose increases with depth until it reaches a maximum at the depth of \(D_{max}\).
40. **Calibration** – The process of determining the output factors and other radiation parameters for a radiation beam. This is performed by a radiological physicist.

41. **Decay Constant** - Is expressed as the total number of atoms that decay per unit time. The change in the number of atoms per change in unit time is proportional to the number of atoms present.

\[
\text{Decay Constant} \frac{dN}{dt} = -bN
\]

42. **Dynamic Wedge** – Is used for computerized shaping of the treatment field. Is able to modify and shape the desired Isodose distribution using the large field defining collimator or jaw. Used in place of 15°, 30°, 45°, 60° hard wedges.

43. **Entrance Dose** – The point on the patient where the x-ray beam enters the body, the absorbed dose is at the skin surface where the beam enters.

44. **Gap Calculation** – The distance between the borders of two adjacent fields. Gap is usually measured on the patient’s skin. Skin gap is usually calculated to verify the depth at which the two adjacent fields abut.

\[
\text{Gap Calc} = \left( \frac{\text{length}_1}{2} \times \frac{\text{Depth}}{\text{SSD}_2} \right) + \left( \frac{\text{length}_2}{2} \times \frac{\text{Depth}}{\text{SSD}_2} \right)
\]

45. **GM Meter** – Is a gas ionization detector used for finding lost seeds monitoring deliveries of radioactive materials, searching for holes in the liner accelerator room walls.

46. **Normalization** – The mathematical process of relating a series of numbers to a specific value. This relates to a specific value, central axis dose values are normalized or divided by the maximum value to calculated Depth Dose (DD).

47. **Heterogeneity** – AKA: Polyenergetic radiation- When all photons in a beam have different energies.

48. **Independent Jaw** – Pairs of x-ray collimators that can move independently from each other. This allows for one jaw to be moved to midline or even across it while the other jaw is still open.

49. **ICRU** – Makes recommendations internationally on quantities and units of radiation and radioactivity and procedures for their measurements.

50. **Intensity** – Radiation intensity is the amount of beam energy passing through a given point that is perpendicular to the radiation direction of travel in a given unit of time. Measure in units of milliroentgens per milliampere seconds (mR/mAs).

51. **Inverse Square Law** – A mathematical relationship that describes the decrease in radiation intensity due to beam divergence. The intensity is inversely proportional to the square of the distance from the point source of radiation.

\[
\frac{I_1}{I_2} = \left( \frac{d_2}{d_1} \right)^2
\]

52. **Irregular Field** – Any field that is not a rectangle, square, or circular field. Shielding of critical structures from the primary beam is why irregular field like Mantle or Inverted Y are utilized.

53. **Dose Volume Histogram (DVH)** – A plot of target or normal structure volume as a function of dose in a 3D format.
54. **Mass Attenuation Coefficient** – The linear attenuation coefficient divided by the mass density of the material and describes the probability of interaction per unit mass length.

\[
\text{Mass attenuation coefficient} = \frac{\mu}{\rho}
\]

55. **Monitor Unit (MU)** – A unit of output measure used for linear accelerators. Accelerators are calibrated so that 1 MU delivers 1cGy for a standard, reference filed size at a standard reference depth at a standard source to calibration point.

56. **Multi-leaf Collimator (MLC)** – Distinct pair of the linear accelerator that allows treatment field shaping and blocking through the use of motorized leaves in the head of the machine. MLC systems shield an area by using approximately 52 to 160 leaves. The heavy metal collimator rods slide into place to form a desired field shape by projecting 0.5cm to 2cm beam width per rod.

57. **Monte Carlo Method** – Takes into account particle interactions on cross section data for electromagnetic and nuclear interactions. This method considers tissue inhomogeneity’s by using specific material properties like elemental composition, electron density, mass density, and ionization potential.

58. **Non-Conformal** – When there is 2-4 treatment beams, field shape and depth are able to be manipulated but is limited on the ability to conform the radiation beams.

59. **Natural Background Radiation** – Ionizing radiation from natural sources including cosmic rays from outer space and sun, terrestrial radiation from radioactive materials in the earth, and internal radiation from radioactive materials normally present in the body.

60. **Inverse Planning** – Treatment planning in which the clinical objectives are specified mathematically and computer software is used to determine the best beam parameters that will lead to the desired dose distribution (IMRT).

**Forward Planning** – The process of entering dose altering parameters and beam modifiers into the treatment plan by the planner (3D).

61. **Peak Scatter Factor** – Backscatter factor sometimes normalized to a referenced field size, usually 10cm X 10cm, for energies 4MV and above.

62. **Patterson-Parker Method** – Establishes a set of guidelines that will provide a dose of +/- 10% within the implanted area. Rules have been established for both planar and volume implants, the system uses a non-uniform distribution of radioactive material to produce a uniform distribution of dose.

63. **Dose Optimization** – Attempts to establish the best dose that provides the best results most efficiently.

64. **Quimby Method** – Provides a set of tables used to calculate dose given a number of implant parameters like area, volume, or total activity. The implant is assumed to be made up of a uniform distribution of activity within the implant, giving a non-uniform distribution of dose.

65. **Quality Factor** – The factor by which the absorbed dose (rad or Gray) must be multiplied to obtain dose equivalent (rem or Sievert). (QF) compared the biological effectiveness of a particulate radiation to a standard x-ray radiation.

\[
\text{(QF) for } \frac{x}{y} - \text{rays} = 1
\]
Electrons = 1, Neutrons and Protons <10MeV =10, Natural alpha particles =20, and heavy recoil nuclei=20

66. Scatter Air Ratio (SAR) – The ratio of the scattered dose at a given point to the dose in free space at the same point.

67. Collimator Scatter (Sc) – Used to determine the scatter measure in air from the collimator.

68. Phantom Scatter (Sp) – Used to determine the scatter measured from the patient/tissue.

69. Tissue Maximum Ratio (TMR) – The ratio of absorbed dose at a given depth in a phantom to the absorbed dose at the same point of Dmax in a phantom.

70. Thermo luminescent Dosimeter (TLD) – A solid state radiation detector used for measuring dose. When heated (annealed) will subsequently give off light. The amount of light emitted is proportional to the dose delivered to the crystal. Are made of lithium fluoride crystals.

71. Tissue Tolerances – The total dose delivered by a standard fractionation schedule that causes a minimal (5%) or a maximal (50%) complication rate within 5 years (see chart).

<table>
<thead>
<tr>
<th>Organ</th>
<th>TD 5/5 Whole</th>
<th>2/3</th>
<th>1/3</th>
<th>TD 50/5 Whole</th>
<th>2/3</th>
<th>1/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder</td>
<td>6500</td>
<td>8000</td>
<td>N/A</td>
<td>8000</td>
<td>8500</td>
<td>N/A</td>
</tr>
<tr>
<td>Brachial plexus</td>
<td>6000</td>
<td>6100</td>
<td>6200</td>
<td>7500</td>
<td>7600</td>
<td>7700</td>
</tr>
<tr>
<td>Brain</td>
<td>4500</td>
<td>5000</td>
<td>6000</td>
<td>6000</td>
<td>6500</td>
<td>7500</td>
</tr>
<tr>
<td>Brainstem</td>
<td>5000</td>
<td>5300</td>
<td>6000</td>
<td>6500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cauda equine</td>
<td>6000</td>
<td></td>
<td></td>
<td>7500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colon (obstruction, perforation, ulceration)</td>
<td>4500</td>
<td></td>
<td>5500</td>
<td>5500</td>
<td></td>
<td>6500</td>
</tr>
<tr>
<td>Ear (acute serousotitis)</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>Ear (chronic serousotitis)</td>
<td>5500</td>
<td>5500</td>
<td>5500</td>
<td>6500</td>
<td>6500</td>
<td>6500</td>
</tr>
<tr>
<td>Esophagus (stricture, perforation)</td>
<td>5500</td>
<td>5800</td>
<td>6000</td>
<td>6800</td>
<td>7000</td>
<td>7200</td>
</tr>
<tr>
<td>Femoral head</td>
<td>5200</td>
<td></td>
<td></td>
<td>6500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart (pericarditi)</td>
<td>4000</td>
<td>4500</td>
<td>6000</td>
<td>5000</td>
<td>5500</td>
<td>7000</td>
</tr>
<tr>
<td>Kidney</td>
<td>2300</td>
<td>3000</td>
<td>5000</td>
<td>2800</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>Larynx (necrosis)</td>
<td>7000</td>
<td>7000</td>
<td>7900</td>
<td>8000</td>
<td>8000</td>
<td>9000</td>
</tr>
<tr>
<td>Larynx (edema)</td>
<td>4500</td>
<td>4500</td>
<td></td>
<td>8000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lens</td>
<td>1000</td>
<td></td>
<td></td>
<td>1800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>3000</td>
<td>3500</td>
<td>5000</td>
<td>4000</td>
<td>4500</td>
<td>5500</td>
</tr>
<tr>
<td>Lung</td>
<td>1750</td>
<td>3000</td>
<td>4500</td>
<td>2450</td>
<td>4000</td>
<td>6500</td>
</tr>
<tr>
<td>Optic chiasm</td>
<td>5000</td>
<td></td>
<td></td>
<td>6500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optic nerve</td>
<td>5000</td>
<td></td>
<td></td>
<td>6500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parotid gland</td>
<td>3200</td>
<td></td>
<td></td>
<td>4600</td>
<td></td>
<td>4600</td>
</tr>
<tr>
<td>Rectum (severe proctitis, necrosis, fistula, stenosis)</td>
<td>6000</td>
<td></td>
<td></td>
<td>8000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retina</td>
<td>4500</td>
<td></td>
<td></td>
<td>6500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rib cage</td>
<td></td>
<td></td>
<td>5000</td>
<td></td>
<td></td>
<td>6500</td>
</tr>
<tr>
<td></td>
<td>(100cm²)</td>
<td>(30cm²)</td>
<td>(10cm²)</td>
<td>(100cm²)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>----------------</td>
<td>----------</td>
<td>---------</td>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Skin</td>
<td>5000</td>
<td>6000</td>
<td>7000</td>
<td>6500</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Spinal cord</td>
<td>(20cm) 4700</td>
<td>(10cm) 5000</td>
<td>(5cm) 5000</td>
<td>–</td>
<td>(10cm) 7000</td>
<td>(5cm) 7000</td>
</tr>
<tr>
<td>Small intestine (obstruction, perforation)</td>
<td>4000</td>
<td>–</td>
<td>5000</td>
<td>5500</td>
<td>–</td>
<td>6000</td>
</tr>
<tr>
<td>Stomach (ulceration, perforation)</td>
<td>5000</td>
<td>5500</td>
<td>6000</td>
<td>6500</td>
<td>6700</td>
<td>7000</td>
</tr>
<tr>
<td>TMJ mandible</td>
<td>6000</td>
<td>6000</td>
<td>6500</td>
<td>7200</td>
<td>7200</td>
<td>7700</td>
</tr>
<tr>
<td>Thyroid</td>
<td>6500</td>
<td>6500</td>
<td>7200</td>
<td>7200</td>
<td>7700</td>
<td>7700</td>
</tr>
</tbody>
</table>

72. **Wedge Angle** – Angle between the slanted Isodose line and a line perpendicular to the central axis (CA) of the beam.

\[
\text{Wedge Angle} = 90° - \left( \frac{HL}{z} \right)
\]

73. **Intensity Modulated Radiation Therapy (IMRT)** – Therapy that delivers non-uniform exposure across the beam’s eye view (BEV) using a variety of techniques and equipment.

**Static Multileaf Collimator Intensity Modulated Radiation Therapy (SMLC-IMRT)** - Use of conventional MLC’s where the leaves are not moved while the beam is on.

**Static Step & Shoot (SLMC)** – Uses conventional MLC’s where the leaves are not moved while the beam is on.

**Dynamic MLC** – Continuously moving MLC’s during active treatment while the beam is on, this changes the beams shape as the individual leaves move.

74. **Equivalent Dose** – The amount of a standard x-ray radiation that has the same biological effect as another non-standard radiation.

75. **Exit Dose** – The dose at the exit surface of the patient or to a depth that is the equivalent of the depth of Dmax.

76. **Bremsstrahlung** – AKA: White Radiation, braking Radiation. A radiative interaction in which high-speed electrons interact with the electrostatic field of the nucleus producing x-rays.

77. **Fluence** – The intensity pattern of the IMRT beam. This is a sequence and progression of dose delivered per beam, as a product of several segments each beam angle consists of many different MLC shapes.

78. **Past Pointing** – A technique used in partial rotational therapy where the Isocenter is placed beyond the target volume in order to give a more uniform distribution to the target volume.

79. **Isocenter** – The intersection of 3 axis of rotation (gantry, collimator, and base of couch) of the treatment unit. **Cobalt 60: SAD of 80 cm, Linear Accelerators: SAD of 100 cm**

80. **Electron Therapeutic Range** – The therapeutic prescription point most often used is the 90% dose line. When using electrons field treatment the point in which the tumor dose is prescribed is usually the deepest portion of the tumor.
90% Therapeutic Range = \(\left(\frac{MeV}{4}\right)\)

81. Off Axis Ratio (OAR) – The ratio of the dose at any point on a dose profile to the dose at the central ray on that profile. The deeper you go in the phantom, the more uniform and symmetric the beam becomes due to increased scatter in the phantom. The beam edge is the point where the (OAR) is 50% or (0.50).

82. Backscatter – Radiation that is deflected back toward the surface of the patient.

Back Scatter Factor (BSF), or Peak/Phantom Scatter Factor (PSF) – The ratio of the dose rate with a scattering medium (water or phantom) to the dose rate at the same point without a scattering medium (air) at the depth (level) of maximum equilibrium.

\[
BSF = \frac{\text{dose in tissue}}{\text{dose in air}}
\]

\[
TAR = \frac{\text{dose in tissue}}{\text{dose in air}}
\]

83. Planning Target Volume (PTV) - The (GTV) plus (CTV) as a geometric volume, taking into account all possible uncertainties. Such as setup and patient motion and/or patient organ motion.

Gross Tumor Volume (GTV) - The gross palpable, visible, and/or demonstrable extent and location of malignant growth (tumor).

Clinical Target Volume (CTV) - Is the (GTV) plus any possible microscopic extensions of disease that may not be visible or palpable.

Treatment Volume (TV) - The treatment volume encompasses the additional margin around the target volume to allow for limitations of the treatment technique.

Irradiated Volume (IR) - A volume of tissue receiving a significant dose (>50%) of the specified target dose.

84. Cone Beam CT – An area detector that at certain degree intervals during the rotation of the gantry, single projection images are acquired. This results in a 3D reconstruction data set, which can project images in 3 orthogonal planes (axil, sagittal, and coronal).

85. Stereotactic Radiation Therapy (SRT) – One large treatment fraction.

Stereotactic Radiation Therapy (SRT), or Stereotactic Body Radiation Therapy (SBRT) = 2 or more large treatment fractions.

86. Image Guided Radiation Therapy (IGRT) – Image the patient just before treatment and compare the position of external setup markers and internal anatomy to the treatment plan. This helps identify positional errors before delivery of the daily prescribed dose of radiation therapy. The utilization of daily or even continuous imaging during treatment to assure the target is an appropriately irradiated.

87. Electronic Portal Imaging Device (EPID) – System producing near real-time portal images on a computer screen for evaluation. Most EPID systems are light weight and come with retracted arm along the gantry’s axis. The arm may be equipped with Amorphous Silicon (aSi) imaging technology, which provides a quick and accurate comparison of its images with reference images.
88. Computerized Tomography (CT) – Provides cross-sectional information contributes considerable treatment parameters to the radiation oncologist in four major areas: diagnosis, tumor and normal tissue localization, tissue density data for dose calculations, and follow-up treatment parameters.

Positron Emission Tomography (PET) – Works by creating computerized images of chemical changes that take place in tissue. The patient is injected with a combination of sugar (glucose) and small amount of radioactive material. This modality makes possible the viewing of physiology of function and blood flow, because cancer cells take up or absorb sugar faster than other tissues in the body. If a tumor is present the radioactive sugar will accumulate in the tumor.

Magnetic Resonance Imaging (MRI) – The method of creating diagnostic images of the body by using a combination of radiofrequency waves and a strong magnetic field based on the magnetic properties of the hydrogen nuclei in water. This technology does not use ionizing radiation to produce and image.

B-mode Acquisition Technology (BAT), or Trans abdominal Sonography) – This is completed just before treatment each day ensuring accurate radiation field alignment and delivery of dose to the prostate on a daily basis.

89. Maynard-Factor – Conversion of the percentage of depth dose (PDD) at a reference distance to the PDD at a non-reference distance. Does not account for changes in scatter because there is a change in beam divergence. Used for extended distance set ups.

\[
\text{Maynard's Factor} = (\text{Old PDD}) \times \left( \left( \frac{\text{SSD}_1 + \text{Depth}}{\text{SSD}_1 + D_{\text{max}}} \right)^2 \times \left( \frac{\text{SSD}_2 + D_{\text{max}}}{\text{SSD}_2 + \text{Depth}} \right)^2 \right) = (\text{New PDD})
\]