~~Absorbed Dose~~

~~A measure of the energy deposited in a medium by ionizing radiation. It is equal to the energy deposited per unit mass of medium, and so has the unit J/kg, which is given the special name gray (Gy). You will also hear the term rad used. 1 Gy = 100 cGy = 100 rad.~~

1. ~~Accelerated Fractionation  
   The technique in which the overall treatment time is shortened with doses per fraction less than conventional doses two to three times a day.~~
2. ~~Accelerated Hyperfractionation  
   The technique in which there are more treatment days than accelerated fractionation. The total dose (cGy) of primary radiation is more than conventional fractionation, hyperfractionation, or accelerated fractionation~~.
3. ~~Active Length  
   In Brachytherapy, the length of the area in which the radioactivity lies in the source. This is usually a little shorter than the physical length of the source.~~
4. Afterloader  
   A system in Brachytherapy that allows the applicators to be placed at the treatment site, then loaded remotely without personnel in the room. This reduces dose to the staff and since done via computers, should ensure a more accurate placement provided the applicators are correctly placed. Usually associated with High Dose Rate Brachytherapy (HDR).
5. ALARA  
   ~~Radiation Safety term that stands for As Low As Reasonably Achievable. It states that radiation exposure should be kept to a minimum within reasonable effort.~~
6. Alpha Particle  
   Particulate radiation, positively charged, which consists of two protons and two neutrons (effectively a He nucleus). It has a high Radiobiological Effectiveness (RBE) compared to photons, and thus will cause significant damage to tissue, but it has a short track length (a piece of paper will shield most of it).
7. ~~Anaplastic  
   A pathological description of cells, describing a loss of differentiation and more primitive appearance.~~
8. Aquaplast  
    Trade name for a thermoplastic frequently used as an immobilization device.
9. Aria  
   (Varian Medical Systems, Inc.) Record and verify product (also EMR) produced by the vendor Varian.
10. Astrocytoma  
    A central nervous system tumor originating from the nonneuronal supporting cells. It can be low grade or anaplastic.
11. Attenuation  
    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 materials.

Beam Spoilers  
A beam spoiler is a piece of material, such as a 1-cm-thick lucite or polystyrene plate, placed into the path of the photon beam. As the primary photon beam passes through the plate, secondary electrons are generated. The beam which exits the spoiler is a combination of the spoiler-attenuated photons and the spoiler-generated electrons. The electron component of a spoiled photon beam alters the depth dose in the buildup region in a way that depends on the photon beam energy, the field size, and the distance of the spoiler from the treatment surface.

1. Bending Magnet  
   Used in the gantry head of high-energy linear accelerators to bend the electrons that will either be used directly for electron radiation treatments or will hit a target and produce photons for photon radiation treatment. Bending magnets are used along with an energy slit that physically limits the energy of the electron beam to within a desired range. Two models are in primary use 270degree (Varian), slolom method (Seimens) 3 magnets used to do slights bends.
2. Bequerel  
   (Bq) An SI unit of radioactivity that equals one disintegration per second. It takes 3.7 x 1010 Bq = 1 Curie.
3. Beta Particle  
   Electrons (B-, negatively charged) or Positrons (B+, positively charged).
4. Bite Block  
   An object placed between the patient's teeth to assist in immobilization and to position the tongue.
5. Blocked Field Size  
   The equivalent rectangular field dimensions of the open treated area. The blocked field size is the actual area treated. Therefore, the blocked field size is normally smaller than the collimator field size. Blocked field size dimensions are used when determining TMRs and PDDs. Collimator field size dimensions are used to determine Output Factors.
6. Bolus  
    Tissue equivalent material that is usually placed on the patient to increase the skin dose and/or even out irregular contours in the patients. When bolus is placed on the skin surface for megavoltage irradiation, skin sparing is lost.
7. Brachytherapy  
   From the Greek meaning short, a special treatment procedure that utilizes the irradiation of a target with sealed radioactive sources placed at short distances from the target and inside the patient's body. Typically, the sources are implanted in the target tissue directly (interstitial brachytherapy) or are placed at distances of the order of a few mm from the target tissue, in body cavities such as the uterus, mouth, etc. (intracavitary brachytherapy).
8. Bragg Peak  
   A sharp increase in the dose distribution curve of a charged particle at a particular depth. It is this physical phenomenon that is exploited in proton radiation treatments.
9. BrainSCAN  
   (BrainLAB). A treatment planning system for all patients on the Novalis Linear Accelerator. It can perform conventional, dynamic conformal arc, stereotactic cones, and IMRT plans.
10. Bremsstrahlung  
    German term for "braking" radiation. The principal interaction in x-ray production results in the output or bremsstrahlung radiation.
11. Build-up Region  
    The region between the skin surface and the depth of Dmax. A buildup region is a characteristic of MV irradiation. In this region the dose increases with depth until it reaches a maximum at the depth of Dmax.
12. Central Axis  
    It is the central portion of the beam emanating from the target in a linear accelerator. It is the only part of the beam that is non divergent.
13. Cesium-131  
    A recent addition to the stable of radionucleotides used for Prostate brachytherapy, it has a half-life of 10 days and an average energy of 30.4 keV.
14. Cesium-137  
    A radioactive isotope with a half-life of 30.2 years and an average energy of 662 keV. It is a pure beta emitter and is used for Low Dose Rate (LDR) Brachytherapy especially for use in tandem and ovoid treatments for gynecological cancers.
15. Characteristic Radiation  
    Photon radiation that is emitted in discrete energies when an outer shell electron fills an inner shell position after the original inner shell electron is ionized. The binding energy difference between residing in the outer shell compared to the inner shell is the energy of the photon emitted.
16. Cheese Phantom  
    A cylindrical phantom, 30 cm in diameter and 18 cm long, made of Solid Water. For patient QA, it separates into two hemispheres to place film and can have an ion chamber within 5 mm or film.
17. Clarkson Integration  
    A method used to calculate the dose in an irregularly shaped field.
18. Clinical Target Volume  
    (CTV) The visible (imaged) or palpable tumor plus any margin of subclinical disease that needs to be eliminated through the treatment planning and delivery process.
19. Cobalt-60  
    A radioactive isotope with a half-life of 5.26 years that was heavily used for external radiation therapy before the popularization of linear accelerators. It is a beta emitter that decays to Ni-60 and gives off two gamma rays of average energy 1.25 MeV in the process. This is the therapeutic part of the beam. One major disadvantage of Cobalt compared to Linear Accelerators is a wider penumbra at the field edge. It is seldom used for external beam treatments but is still employed in the Gamma Knife stereotactic system.
20. Cold Spot  
    A decrease of dose to an area significantly under the prescribed dose. While there is no hard fast rule as to what quantifies a cold spot, numbers greater than 5-10% below prescription should be scrutinized.
21. Collimator  
    An arrangement of shielding material in the linear accelerator designed to define the dimension of the beam of radiation. The collimators are in the treatment head and are usually made of tungsten alloy.
22. Collimator Field Size

The unblocked or open field size as defined by the collimator setting and projected at the reference distance, usually the isocenter of the machine. It is this field size that determines the Output Factor of the beam.

1. Compensator  
   An early version of IMRT that is still used today in centers without Multi-Leaf Collimators (MLCs). It is a beam modifier that allows known non-uniformities within the irradiated field to better conform to the target volume. It is made of tungsten and is machined.
2. Complex Immobilization Device  
   Individualized devices that restrict patient movement and ensure reproducibility in positioning.
3. Computed Radiography
4. Cone beam CT  
   (CBCT) CT imagery acquired without incrementing the couch.
5. Conformal Arc  
   Teletherapy delivered through a beam with independently variable gantry angle and aperture opening, in which MLC leaves do not occlude the target.
6. Conformal Radiation Therapy  
   Therapy that, with the use of 3D treatment planning, allows the delivery of higher tumor doses to selected target volume without increasing treatment morbidity. Requires a CT Simulator, 3D Treatment Planning System (TPS) and usually Multi-Leaf Collimators (MLCs) on the linear accelerator.
7. Contralateral  
   Refers to a body component on the opposite side of the body.
8. Conventional Fractionation  
   Fractionation in which the total dose of radiation is typically divided into 180 or 200 cGy increments and delivered once a day, 5 days a week.
9. Coplanar  
   A geometrical principle describing two radiation fields configured in such a way that the beam edges lie in the same plane. An example of a non-coplanar field would be delivering one beam at one couch angle, and then kicking (rotating) the couch and delivering a second beam.
10. Coronal Plane  
    Perpendicular (at right angles) to the sagittal plane and vertical divides the body into anterior and posterior sections.
11. CORVUS  
    An inverse treatment planning system for creating intensity modulate fields (IMRT). It was the first system used for IMRT in this department and has since been largely replaced by other TPS.
12. Couch  
    A device used to support the patient in a position roughly parallel to the floor during delivery of a treatment procedure.
13. Craniospinal Irradiation  
    (CSI) Complex irradiation of all central nervous system and cerebrospinal fluid regions from behind the eye down to the midsacrum for treatment of medulloblastoma and other cerebrospinal fluid seeding tumors.
14. Critical Structures  
    Normal tissue whose radiation tolerance limits the deliverable dose.
15. CT Simulation  
    A type of simulation that operates along with a 3D geometric planning computer. The extension of a CT system allows the single acquisition of many thin slices over a required treatment area. After scanning, radiation beams, isocenter, and blocks can be visualized and placed on the 3-dimension CT images set. CT simulation also allows for the construction of a Digitally Reconstructed Radiograph (DRR) that is helpful for verifying patient setup when compared to port films with a film cassette or Electronic Portal Image Device (EPID).
16. CT Simulator  
    A computed tomography scanner equipped with software that can provide information needed to design the patient's treatment parameters. CT based planning allows more spatial orientation information required for 3D treatment planning
17. Curie (Ci)  
    A historical unit of radioactivity that equals 2.22 x 10^12 dpm or 3.7 x 10^10 Bq.
18. Cyclotron  
    A charged particle accelerator that is used to produce certain therapeutic and diagnostic radionucleotides such as F-18 for PET Scanners. They are also used in some proton radiation treatment centers to accelerate the particles up to therapeutic energies.
19. Definitive Treatment  
    A course of radiation therapy in which the objective is to cure by eradication of the disease.
20. Desquamation  
    An acute effect of irradiation characterized by shedding of the epidermis.
21. Digital Imaging and Communications In Medicine  
    (DICOM) A standard for handling, storing, printing, and transmitting information in medical imaging. This protocol was formed to provide communication standards for sharing image information regardless of manufacturer and has included radiation therapy treatment information. This facilitates the use of picture archival and communications systems (PACS) and allows diagnostic images to be widely distributed.
22. Digitally Reconstructed Radiograph  
    (DRR) 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 and can be used in conjunction with patient Port Films to check patient treatment setup prior to irradiation.
23. Divergence

Divergence is the spreading out of the beam of radiation. The farther from the source, the more the beam has spread. We need to be aware of beam divergence when setting up adjacent fields or where field edges are near critical structures. The divergence of the beam is considered when performing field size calculation and many dose calculations.

1. Dmax  
   The depth at which electronic equilibrium occurs for photon beams. This is also the depth of maximum absorbed dose and ionization, for photons, from a single treatment field. The depth of maximum ionization and maximum absorbed dose are usually not the same depth for electrons.
2. Dose Calculation Matrix  
   The area in the 3D treatment planning system that dose is calculated. It is split into units called voxels (indicating a volume, hence 3D). The higher the resolution (smaller the voxel size) the more accurate the dose calculation, however, the tradeoff is a longer period to make the calculation as there are now more voxels to calculate.
3. Dose Distributions  
   Spatial representation of the magnitude of the dose produced by a source or radiation. They describe the variation of dose with position within an irradiated volume. These are usually visualized in the form of isodose lines on the 3D planning system.
4. Dose Equivalent  
   Product of the absorbed dose and a quality factor (QF), which takes into account the biologic effects of different types of radiation on humans; units are the rem (1 rem = 1 rad x QF = 1 cGy x QF = 1 cSv). Photons and electrons have a QF of 1 for instance whereas protons have a QF of 3 and neutron 5-20.
5. Dose Rate  
   Also known as output, the dose rate of a treatment machine is the amount of radiation exposure produced by a treatment machine or source as specified at a reference field size and at a specified reference field. Most linear accelerators treat between 200-600 cGy/min.
6. Dose Volume Histogram  
   (DVH) A plot of target or normal structure volume as a function of dose. It is, in essence, a frequency distribution of the number of target or normal-structure voxels receiving a certain dose. In its most common form (the "cumulative" or "integral" DVH), it is a plot of volume versus the minimum dose absorbed within that volume.
7. DoseLab  
   Pro Software used to compare doses measured with film to doses computed by a treatment planning system. These comparisons are typically performed for every IMRT plan, as required by billing.
8. Dosimetrist  
   Radiation therapy practitioner responsible for production of the patient's treatment plan and any associated quality assurance components. They also deal with certain dosimetric aspects of low dose rate (LDR) brachytherapy.
9. EBT2 film
10. EDR2 film
11. Effective Dose Equivalent  
    The dose equivalent weighted by the proportionate risk for various tissues. For example, the gonads are more sensitive to radiation than the fingers so there weighting of effective dose is higher. Thus, for equal equivalent dose to the gonads and the fingers, the gonads would be more adversely affected.
12. Electron Binding Energy  
    The amount of energy required to remove an electron from its orbit in an atom. This amount is subtracted from the initial energy acquired by the photon or electron once it leaves the proximity of the atom.
13. Electron Density  
     Number of electrons per unit mass.
14. Electron Gun  
    The electron gun is responsible for producing electrons and injecting them into the accelerator structure.
15. Electronic Portal Imaging Devices

(EPID) A system producing near real-time portal images on a computer screen for evaluation. This is attached to the linear accelerator and is composed of amorphous Silicon (aSi) crystals. They receive MV x-rays that image the patient’s setup and is used to compare to the DRR's from the Treatment Planning System (TPS). These are done almost universally on all patients now.

1. Electrons  
   A form of beta particle. Negatively charged subatomic particles that can be accelerated by a variety of machines or are emitted from decaying isotopes and are used for external beam treatment and brachytherapy.
2. Elekta
3. Ependymoma  
   Tumors arising from the ependymal cells lining the brain ventricles and central spinal canal. They may be low or high grade.
4. Equivalent Square  
   The square field that has the same percentage depth dose and output of a rectangular field. An equation is (4A/P) = 4 times the Area of the field divided by the perimeter of the field.
5. Erythema  
   This acute radiation effect, manifested by redness and inflammation of the skin or mucous membranes, is caused by capillary congestion, caused by dilation of the superficial capillaries.
6. Exit Dose  
   The dose at the exit surface of the patient.
7. Exposure  
   Amount of ionization produced by photons in air per unit mass of air. The SI unit is Coulombs / kilogram (C/kg). Another popular unit, although not recognized by SI is the Roentgen (R). 1 R = 2.58 x 10-4 C/kg.
8. Extended Distance Setup  
   An extended distance setup occurs when the setup source to skin distance (SSD) is greater than the reference SSD. The reference SSD is normally 80 cm for cobalt-60 treatment, and 100 cm for linear accelerator treatment.
9. External Beam Radiotherapy  
   Also known as teletherapy. Therapeutic radiation doses are delivered remotely to the patient via a linear accelerator to the patient.
10. Feathering  
    Moving the location of a junction between two fields in order to spread out any hot or cold spot that is inherent in the ultimately imperfect matching of the two or more fields.
11. Fibrosis  
    The abnormal formation of fibrous tissue caused by alteration in the structure and function of blood vessels.
12. Fiducial Marker  
    Fiducial markers include natural anatomy (such as identifiable bony structures) and artificial markers placed internally or at the skin surface to aid in proper and reproducible patient setup.
13. Film Badge  
    A device for measuring dose. It makes use of the following phenomenon: when film is exposed to radiation and subsequently developed, the amount of blackening (AKA Optical Density) is proportional to the dose delivered to the film. By measuring this darkening, it is possible to determine the amount of dose the badge received. These are worn by all radiation workers to document the dose received during their time at work.
14. Film dosimetry  
    Process by which radiation dose is measured through its ability to induce chemical change, producing opacity change, in a solid-state detector.
15. Flash  
    Region outside the patient's body which is intentionally encompassed by a therapeutic radiation beam.
16. Focal spot  
    The section of the target at which radiation is produced. The smaller the focal spot, the sharper the field produced (very defined penumbra), however the smaller the focal spot also means the hotter the target material gets and can cause damage. Therefore, a compromise must be struck between sharper fields and adequate and reasonable heat loading of the target.
17. Focal spot  
    On a simulator, it is a mechanical C-shaped device that supports the x-ray tube and collimator device at one end and an image system at the other and allows the duplication of treatment unit motions.
18. Forward Planning  
    The process of entering dose-altering parameters and beam modifiers into the treatment plan by the planner as opposed to giving the Treatment Planning System algorithm the goals of the plan and allowing the software to come up with an optimal solution. Forward Planning is done for most 3D conformal plans.
19. Fractionation  
    Radiation therapy treatments given in daily fractions (segments) over an extended period, sometimes up to 6 to 8 weeks.
20. Free Radical  
    An atom or atom group in a highly reactive transient state that is carrying an unpaired electron with no charge. These are often created by radiation and are one of the main mechanisms in which radiation damages chromosomal DNA, thus giving radiation its therapeutic value, making it carcinogenic and teratogenic.
21. Gamma Rays  
    Electromagnetic radiation emitted from decaying isotopes and used for external beam and brachytherapy treatments. Since it is electromagnetic radiation, it is a photon and has no mass and no charge. Gamma Rays typically have similar energies to X-rays but are distinguished from these radiations by the origin of emanation. Gamma Rays are from the nucleus of the atom whereas X-Rays come from the electron shells outside of the nucleus.
22. Gap  
    The distance between the borders of two adjacent fields. The gap is usually measured on the patient's skin. The skin gap is usually calculated to verify the depth at which the two adjacent fields abut.
23. Germ Cell Tumors  
    Tumors developing from embryologic nests of tissue located throughout the body, from the brain down to the ovaries and testes.
24. Gray  
    The unit of absorbed dose. If one joule of energy is deposited in one kilogram of a medium, then absorbed dose is said to be 1 Gray
25. Gray  
    (Gy) The special unit used to describe absorbed dose and KERMA. It has unit of Joules / kg (J/kg). 1 Gray = 100 rads.
26. Gross Tumor Volume  
     GTV) The gross palpable or visible tumor.
27. Half-Life  
     The time period in which the activity decays to one half of the original value. It is the essential value to employ the decay formula for a particular isotope.
28. Half-Value Layer  
     (HVL) The thickness of absorbing material necessary to reduce the x-ray intensity to half its original value. Depending on the material, this thickness varies. Lead, for example, has a much shorter HVL than aluminum due to its increased density.
29. Head Scatter
30. High contrast resolution  
     The ability of an imaging system to distinguish small features from nearby features of similar opacity in an environment of dissimilar opacity.
31. High Dose Rate  
     (HDR) Brachytherapy The delivery of brachytherapy on an outpatient basis using HDR brachytherapy equipment. The actual treatment delivery last approximately 5-10 minutes in contrast to a hospital stay that might take several days for low-dose rate (LDR) brachytherapy. HDR is almost always done with remote afterloader devices due to the high exposures hospital personnel would receive if they stayed in the room with the patient during administration.
32. Hot Spot  
     An increase of dose to an area significantly over the prescribed dose. While there is no hard fast rule as to what quantifies a hot spot, numbers greater than 5-10% above prescription should be scrutinized.
33. Hyperfractionation  
     Fractional doses smaller than conventional, delivered two or three times daily to achieve an increase in the total dose in the same overall time.
34. IGRT  
     The process of basing teletherapy treatment position on radiographic images acquired at the time of treatment.
35. Image Fusion  
     The process of combining images from different modalities with a CT image. Properly fused images combine the enhanced contrast imaging capabilities of MRI and/or the enhanced functional/physiological capabilities of PET with the spatial accuracy of CT. Usually the anatomy or Tumor Volume is defined on either the MRI or PET and then placed onto the CT which is then used to plan the treatment.
36. Immobilization  
     The process of ensuring that a patient doses not move out of treatment position, thus allowing for reproducibility and accuracy in treatment.
37. Immobilization Device  
     A device that reproduces the treatment position while restricting movement (i.e., casts, masks, bags, or bite blocks)
38. IMRT  
    Intensity modulated radiation therapy) Instead of making one shape per linac beam angle, multiple shapes are made to create an intensity pattern and allow more dose to hit the tumor while avoiding critical structures nearby.
39. IMRT QA  
    Process of validating consistency between an IMRT plan and IMRT delivery, in terms of absolute dose and dose distribution, on a per field and/or integral basis.
40. Intensifying Screen  
    Used to convert the invisible energy of X-ray beam in visible light energy. This is used on equipment such as a fluoroscopy unit.
41. Intensity Modulated Arc Therapy  
    (IMAT) Teletherapy delivered through a beam with independently variable gantry angle and aperture opening, in which MLC leaves sometimes partially occlude the target.
42. Intensity Modulated Radiation Therapy  
    (IMRT) Therapy that delivers non-uniform exposure across the beam's eye view (BEV) rather than an open field. This type of treatment can be delivered with a machined compensator (rare outside of community clinics), linear accelerator Multi-Leaf Collimator (MLC) leaves or Tomotherapy binary leaves. The IMRT plan is usually (but not always, i.e., breast tangents with control points) developed with an inverse treatment planning system. While it can deliver a more conformal plan to the patient, extra care and quality checks must be done to ensure proper delivery due to its increased complexity..
43. Interlocks  
    Safety switches blocking or terminating radiation production and thus treatment.
44. Interstitial Brachytherapy  
    Treatment technique that is characterized by the placement of radioactive sources directly into a tumor or tumor bed. Interstitial implants can be either permanent or temporary. They often involve needles.
45. Intracavitary Brachytherapy  
    In this aspect of brachytherapy, radioactive sources are placed within a body cavity for treatment. This type or brachytherapy has been the mainstay in treatment of cervical cancer for more than 50 years.
46. Intraoperative Radiation Therapy  
     (IORT) A boost technique in which a single dose of 10-20 Gy is delivered directly to the tumor bed with electrons or photons. The tumor bed has been surgically exposed, allowing critical normal structures to be shielded or displaced out of the radiation beam.
47. Intravascular Brachytherapy  
     (IVB) Delivering radioactive sources through vascular routes.
48. Inverse Planning  
    Treatment planning in which the clinical objectives are specified mathematically and computer software is used to determine the best beam parameters (mainly beam weighting) that will lead to the desired dose distribution. This is usually (but not always) used for IMRT.
49. Inverse Square Law  
     A mathematical relationship that describes the change in beam intensity as the distance from the source changes. The change in intensity is primarily caused by the divergence of the beam. The mathematical formula states that the intensity decreases inversely proportional to the square of the distance. (Intensity = 1/r2). Example: Triple the Distance (r), the Intensity drops by a factor of 9.
50. Ionizing Radiation  
     Radiation with sufficient energy to separate an electron from its atom.
51. iPlan  
     (BrainLAB) The updated contouring and image fusion tool for BrainSCAN.
52. Ipsilateral  
    Refers to a body component on the same side of the body.
53. Iridium-192  
    A radioactive isotope with a half-life of 74 days. It is used in wire form for interstitial brachytherapy and as the source for HDR brachytherapy.
54. Irradiated Volume  
    The volume of tissue receiving a significant dose (e.g., >50%) of the specified target dose.
55. isocenter  
    Point in treatment vault that the linac, collimator, and couch rotate about.
56. Isocenter  
     The point of intersection of the three axes of rotation (gantry, collimator, and bade of couch) of the linear accelerator. Usually, the location of this point is defined on the patient for setup purposes.
57. Isocenter  
    Point about which the apparent source of radiation rotates (x, y, z axes)
58. Isocentric Technique  
    Also called the Source-Axis Distance (SAD) approach, which is a strategy in which the isocenter is placed within the target volume rather than on the skin. This allows for setup to only one location rather than multiple ones as would be required with an SSD setup.
59. Isodose Distributions  
    The plotted percentage depth dose at various points in the beam along the central axis and elsewhere. This is a 2D tool that is used by the Treatment Planning System to help visualize dose coverage.
60. Jaws   
     Large pieces of metal that shape the beam into a rectangle. <0.2% leakage.
61. Kilovoltage Units  
    Equipment carry out external beam treatment by using x-rays generated at voltages up to 500 kVp. These are normally used for superficial treatments.
62. Kinetic energy released in matter  
     (KERMA)
63. Klystron  
    Equipment that converts kinetic energy to microwave energy in the linear accelerator. Klystrons are high-vacuum devices that use a well-focused pencil electron beam that directs the stream through several microwave cavities, which are tuned at or near operating frequency of the tube. Conversion takes place as a result of the amplified RF input signal, causing the electron beam to form "bunches". These "bunches" give up their energy to the high-level induced RF fields at the output cavity. The simplified signal is extracted from the output cavity through a vacuum window.
64. Linear Accelerator  
    (LINAC) Machine that produces high energy photons and electrons for patient treatment by accelerating electrons to megavoltage energies.
65. Low contrast resolution  
    The ability of an imaging system to distinguish small features from nearby features of similar opacity in an environment of similar opacity.
66. Magnetron  
    Generates microwaves. Energy of microwave may be varied slightly by varying applied voltage, this was used in low energy systems to increase/decrease beam energy. Fine frequency adjustments can be made on tunable models that change the physical thickness of the side cavities.
67. Mammosite  
    Applicator for delivering partial breast irradiation using brachytherapy.
68. Mantle field
69. MapCHECK

(Sun Nuclear Corporation)

1. MatriXX  
    (iba)
2. Multileaf Collimator  
   (MLC) A series of 0.3-1.0 cm wide metal leaves each robotically controlled to shape the radiation beam precisely. <2% leakage. The leaves are either singly focused, double focused, or rounded. Doubly focused MLCs are curved to match beam divergence.
3. Monitor Chamber  
    Monitor chambers are located following the flattening filter. Used in several of the LINACs feedback systems to monitor and correct for dose rate, symmetry, and total dose delivered. The physicist is responsible for setting the dose calibration of the monitor chamber (ex. 1 monitor unit = 1cGy/MU at dmax on CAX 100SSD setup.
4. MOSAIQ  
   (Impac Medical Systems, Inc.) An integrated software package that contains radiation oncology billing, schedules, record and verify for linear accelerators, prescriptions, documentation, etc.
5. MVCT  
   Computed tomography acquired using a beam of megavoltage energy.
6. nanoDot OSLD  
    see OSLD
7. On-board imaging  
   (OBI) Kilvoltage x-ray source and detector pair added on a linear accelerator.
8. Optically Stimulated Luminescence Dosimeter  
   (OSLD) Dose is recorded by a material that is read by a LASER. The LASER stimulates the emission of photons relating to the total dose recorded. The benifit is that only part of the chip is read at a time, one can re-read the same chip many times.
9. Palliative Radiation Therapy  
   A course of radiation therapy in which the objective is not cure of the disease, but rather alleviation of symptoms with the goal of improving "quality of life".
10. Phantom

A non-living device used as a substitute for a living organism

1. Photons  
   The radiation used to treat most patients, 6 MV and 18 MV energies most common, 6 MV = 100% dose at 1.5 cm, 66% at 10 cm, 23 MV = 3.3 cm dmax and 80% at 10 cm
2. Pinnacle  
   (Philips Medical Systems) A treatment planning system for conventional and Varian IMRT treatments. It can perform conventional, dynamic conformal arc, IMRT, and brachytherapy plans.
3. Plesiotherapy  
   Treatment technique in which the radiation source is placed in contact with the patient's surface.
4. RadCalc  
   (LifeLine Software, Inc.) Software that performs simplified MU calculations to double check MUs generated by treatment planning systems.
5. RapidArc  
   Varian's (www.varian.com) implementation of IMAT.
6. Source to Axis Distance  
   SAD For isocentric machines. The distance from the source or focus to the axis of rotation of the gantry. It is 100 cm for most linacs and 80 cm for most cobalt units. There are also 80 cm linacs and 100 cm cobalt units, but they are uncommon.
7. Savi  
    Brand name of an HDR-PBI applicator. The applicator looks like an eggbeater where each rung is a catheter. The source can move along each rung of the device to deliver dose. The competing technology is a liquid filled balloon where the catheters are placed more centrally to the device and thus some distance away from the breast tissue. The SAVI catheters are in direct contact with breast tissue. The applicator can be expanded and collapsed. Typically, tissue will drop down in between the struts, this is called invagination, thus the distance between any two struts may change significantly from the date of simulation to any date of treatment. The struts may become inverted due to the structural demands and may require the device be removed or the plan be changed. The surgical cavity will fill partially with seroma and/or error. Some data is available to show that the air heterogeneity may account for as much as a 10% dose change.
8. SBRT  
   (Stereotactic Body Radiotherapy)
9. Siemens  
   A vendor which produces LINACS.
10. SmartArc  
     Philips / ADAC software tool used to plan modulated arc therapy.
11. Spoke Shot
12. Spread Out Bragg Peak  
     (SOBP)
13. Stereotactic Radiation Surgery  
    (SRS)
14. Stereotactic Radiotherapy  
     (SRT) Stereotactic radiation surgery (SRS) delivered using a fractionation scheme consisting of greater than 3 fractions.
15. Tangent beams  
    Radiotherapy beams that intersect the body at a non-orthogonal angle and which encompass a region outside the body.
16. Teletherapy Radiotherapy

Treatment delivered by a source of radiation which is external to the patient's body.

1. Tomo Image  
   A megavoltage CT image created on the Tomotherapy machine immediately prior to treatment. Used to verify setup of the patient.
2. TomoTherapy  
   The rotational delivery of modulated beams. This machine is similar in physical appearance to a CT Scanner, however instead of delivering keV X-rays to garner diagnostic information, it delivers MV (therapeutic) beam and is outfitted with a collimator with two sets of binary leaves that either open and close and deliver modulated dose patterns to the patient.
3. TumorLOC  
   (Philips Medical Systems) A program on newer Philips CT simulators that allows therapists to easily set an isocenter and move the room lasers to mark the patient.
4. VMAT   
   Elekta's term for IMAT
5. Winston-Lutz test  
   A series of images of an opaque sphere acquired under varying geometric conditions, for the purpose of demonstrating the isocentricity of a teletherapy delivery system.
6. X-lite  
   Used to check the optical and radiation field congruence in real time
7. X-ray Target  
   A material used for the generation of x-rays when electron is incident on it. The type of targets are different for therapeutic and