The Role of Radiation Therapy in the Management of Lung Cancer

WILSON APOLLO, MS, CTR, RTT
WHA CONSULTING
OCTOBER 4, 2018

Objectives

- Describe and explain how a linear accelerator (Linac) works, and list the various treatment modalities it can deliver,
- Distinguish between 2D, 3D-Conformal, IMRT, SBRT, SART, & Online/offline Adaptive Radiotherapy,
- Explore NCCN Guidelines for EBRT for lung cancer,
- Apply the 2018 STORE Manual RT coding rules to clinical scenarios.

Clinical Scenario 1

72 y/o white female w/ h/o HTN, Hyperlipidemia, CAD, GERD, COPD, who recently presented with productive cough that did not respond to a course of antibiotics, steroids or cough suppressants. Pt has never smoked, no alcohol consumption and no relevant family history.

2/5/18: CXR= 1.4 cm LUL nodular density of indeterminate etiology

2/13/18: Chest CT w/o contrast= 3 cm LUL mass highly suspicious for neoplasm. No pathologically enlarged mediastinal lymph nodes or gross evidence of hilar lymphadenopathy.

2/16/18: PET/CT= Ill-defined 3 cm LUL mass demonstrated hypermetabolic activity, SUV max: 5.5 and is suspicious for a neoplastic process. No other hypermetabolic activity.

2/19/18: LUL Navigational Bronchial FNA= No malignant cells observed.

Clinical Scenario 1…

Surgery recommended, but pt reluctant and opted for EBRT.

Treatment Summary:

- 2/26/18-3/7/18: Left upper lobe, 10MVX/IMRT, stereotactic body radiotherapy (SBRT), 5 Gy x 6 fx= 30 Gy, prescribed to the 100% isodose line with seven noncoplanar beams @ 100 SAD, with DIBH technique. Patient tolerated treatment well.

Where do we start?

Small cell lung cancer (SCLC)

According to the International Association for the Study of Lung Cancer (IASLC), ***limited stage disease*** refers to the absence of distant metastatic dz. It is confined to ipsilateral hemithorax, contralateral mediastinal & s'clav nodes & ipsilateral pleural effusion.

Extensive state disease includes disease in contralateral hemithorax & distant mets

Journal of Oncology Practice 12: 111-117, 2016

Non-Small Cell Lung Cancer

Most common type of lung cancer, making up ~ 85% of all lung cancers.

Tumors that arise centrally are usually squamous cell carcinomas.

Most peripheral tumors are adenocarcinomas or large cell ca.

Only ~ 16% of pts are diagnosed with stage I disease.

Management of NSCLC

Only about 15% of pts have localized disease at time of diagnosis to attempt a curative resection. Of this group, ~ 50% of them relapse either locally or systemically.

For early stage operable disease, a lobectomy with mediastinal/hilar lymph node sampling, is the standard of care.

If determined medically inoperable by thoracic surgeon, clinical stage I-II pts should receive curative radiation therapy.

Objectives

- Describe and explain how a linear accelerator (Linac) works, and list the various treatment modalities it can deliver,

PREPARED BY WILSON APOLLO, MS, RTT, CTR

Linear Accelerator-Linac

The term **linear accelerator (Linac)** means that charged particles (electrons) travel in straight lines as they gain energy from an altering electromagnetic field.

Most Linacs have dual modalities: they can operate in photon mode(multiple energies) & electron mode (multiple energies as well).

Linear Accelerator-Linac

Gantry

Collimator

Linear Accelerators (LINACs) in Radiation Therapy

Linacs are the main component/tool used in the delivery of radiation therapy treatment to cancer patients.

Multiple ways of delivering dose via a linac, so it is important to have a basic understanding of this equipment and its fundamental operation.

Important for a CTR to know the difference among the various forms of delivering the dose (i.e. 3D conformal, IMRT, IGRT, SIB-IMRT, DART, etc.).

Linacs

Most linear accelerators have beam energies of 6 MV through 20 MV as well as electron energies of 4-20 MeV.

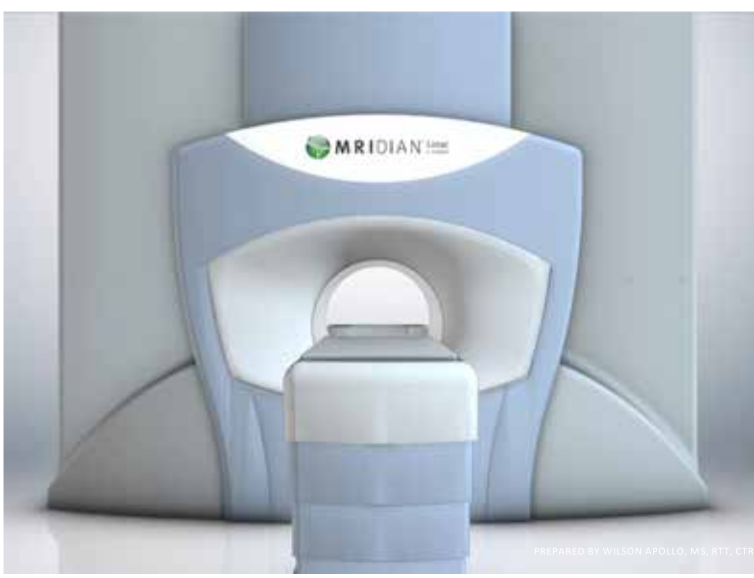
The linear accelerator can be used to treat deep seeded as well as superficial tumors due to these wide range of energies.

Keep in mind: Most modern linacs can treat with either photons or electrons.

ViewRay MRIdian Linac System

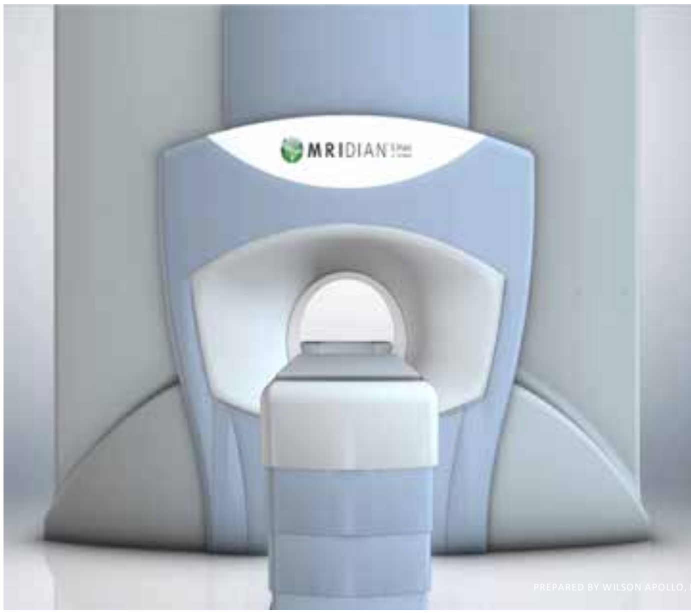
- Rotating gantry assembly w/ three Cobalt 60 heads (Avg energy: 1.25 MV),
- 1st system on the market with Split-magnet MRI imaging system; also allows for imaging during txt (w/o adding to radiation exposure to pt,
- Treatment modality includes IMRT, 3D-Conformal, SRS, SBRT.

ViewRay MRIdian 6 MV Linac System



- 6 MV Linac allows for treatment of deeper seated tumors,
- 1st system on the market with Split-magnet MRI imaging system; also allows for imaging during txt (w/o adding to radiation exposure to pt,
- Treatment modality includes IMRT, 3D-Conformal, SRS, SBRT.

ViewRay MRIdian Linac System



- MRI-Guided Online Adaptive Radiotherapy involves the changes to a treatment plan based on actual observed changes to the anatomy of a tumor due to shrinkage, patient motion, or patient weight loss/gain.
- Change can be done on a daily basis, if warranted.
- **Treatment Modality Code**: 02, External Beam Photons.
- **Treatment Planning Technique:** 10, MRI Guided Online ART
- Also referred to as 4D Adaptive RT

Small cell lung cancer (SCLC)

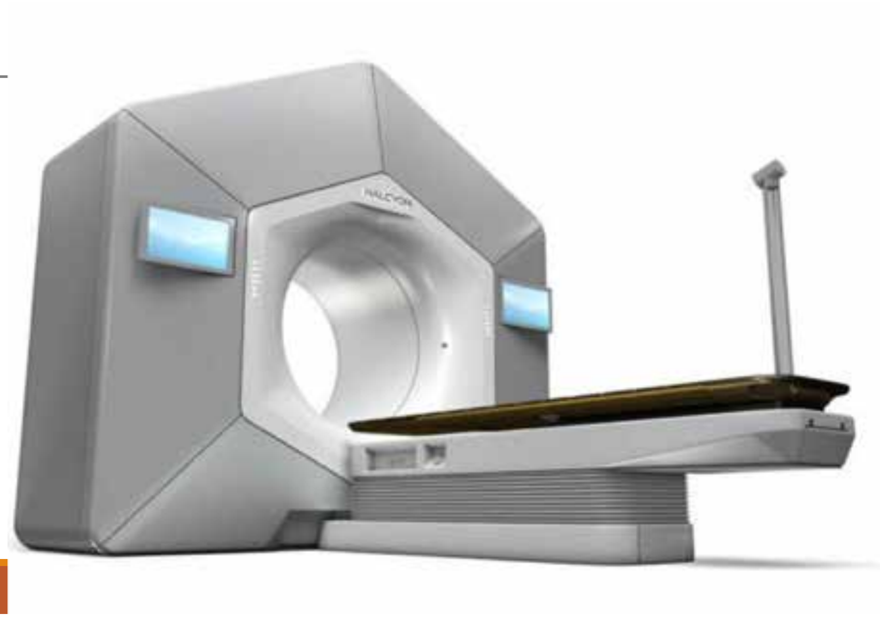
Makes up about 10-15% of all lung cancers.

It is also considered a systemic disease, even at its early stages.

About 70% of pts are diagnosed with SCLC with extensive disease.

The most important prognostic factor associated with SCLC is stage of disease, *specifically limited vs. extensive disease.*

Varian Halcyon Treatment System



Varian Halcyon Treatment System

Received FDA 510(k) clearance in 2017,

New Linac (6 MV) design, cleaner look (Human-centered approach),

Wide 100 cm bore,

Very high dose rates; allows for faster delivery of treatment. Ex: 2 field IMRT breast treatments delivered w/i 60 seconds,

15 sec image acquisition,

Very fast arc therapy, SBRT,

100% image-guided RT

Cyberknife

Cyberknife

6 MV linear accelerator,

Can adapt to pt motion during treatment, adjusting for breathing, organ motion,

Fiducial gold markers inserted into tumor for tracking,

Uses Synchrony Respiratory Tracking System,

Sub-millimeter precision,

Treatment Modality= 02, External beam, photons,

Planning Technique= 07, Stereotactic radiotherapy or radiosurgery, robotic.

Tomotherapy

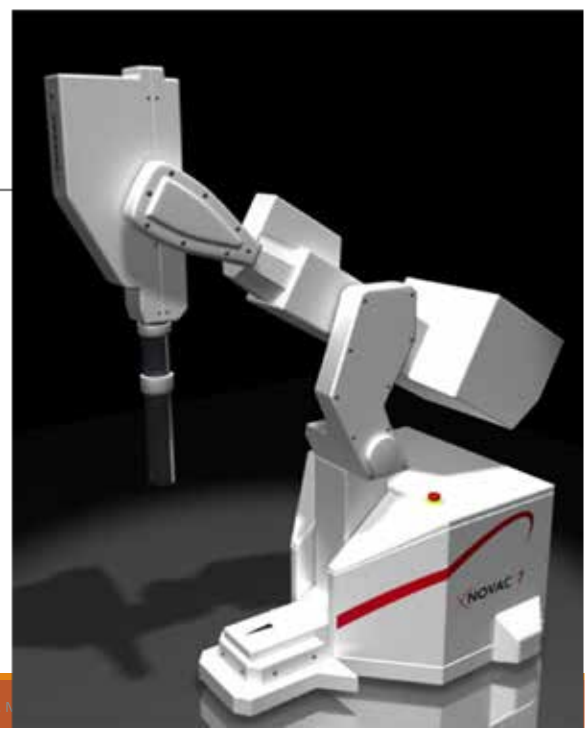
- Beam generated by ***6 MV linac*** mounted on a slip ring gantry.
- Ring gantry continuously <u>rotates</u> while pt is moved through the rotating beam plan. Dose is delivered in helical fashion.

Zeiss INTRABEAM

Because of the manner in which the x-rays are generated in this system (very much like a linac), and taking into account the low energies produced, this modality ***should be coded*** *12, Brachytherapy, electronic*.

LIAC & NOVAC Linear Accelerators

- Electron linear accelerators
- Used for IORT or IOERT
- Since **treatment modality** is electron, code to 04, External beam, electrons.
- **Planning Technique**: 01, External Beam, NOS.

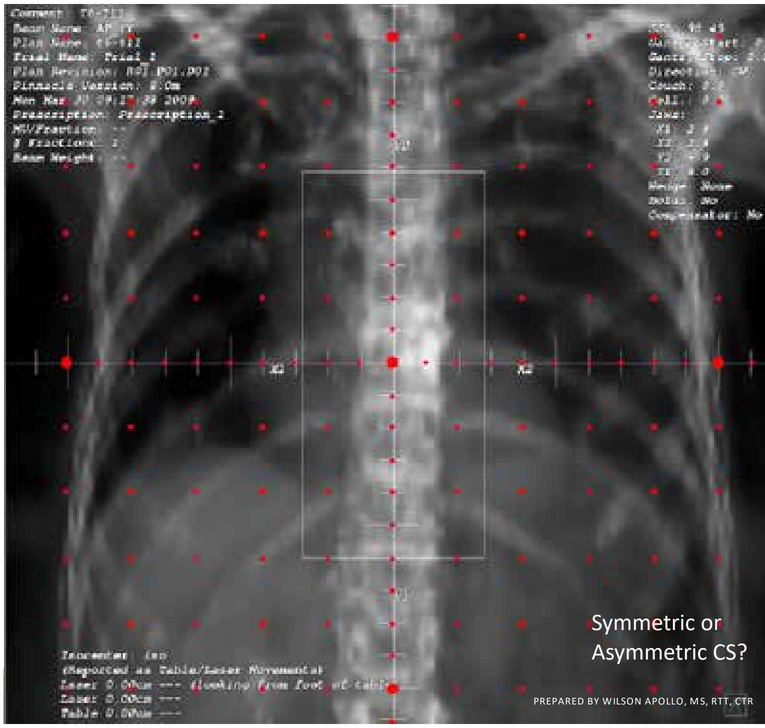


Objectives

- Describe and explain how a linear accelerator (Linac) works, and list the various treatment modalities it can deliver,
- Distinguish between 2D, 3D-Conformal, IMRT, SBRT, SART, & Online/offline Adaptive Radiotherapy,
- Explore NCCN Guidelines for EBRT for lung cancer,
- Apply the 2018 STORE Manual RT coding rules to clinical scenarios.

Target Delineation- RT Planning Technique-2D

- Most often applied when treating metastatic dz, particularly for bone mets to extremities and spine.
- Parallel-opposed fields used
- Often referred to as a Simple Plan.
- When applied with a Linac, **<u>code to 02: External Beam Photons</u>**



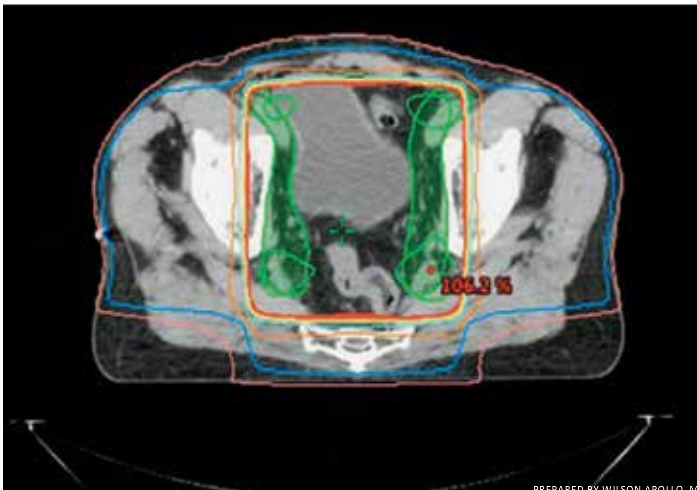
Quite often, metastatic dz to spine is treated with **<u>2D planning technique (03),</u>** composed of two coplanar (180 degrees apart) treatment fields, AP/PA.

3D-Conformal

3D-Conformal RT is essentially the predecessor to IMRT. Using MLC leaves, treatment planners can sculpt the shape of the beam to conform to the shape of the target volume.

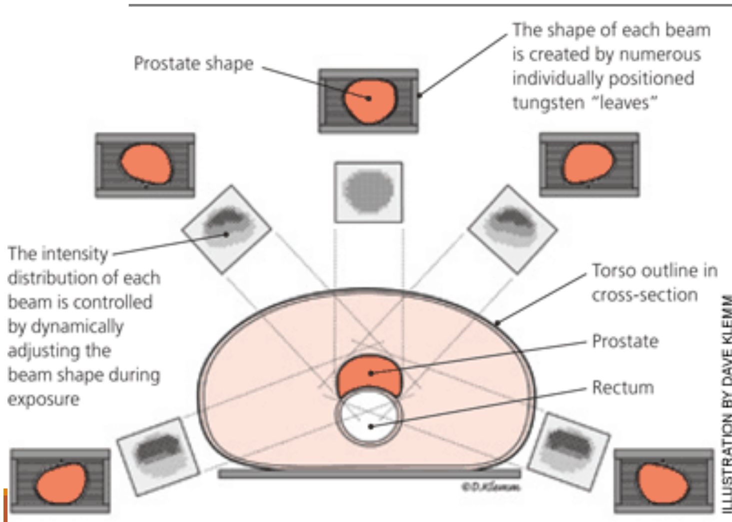
The main difference between IMRT and 3D-Conformal plans is that when the latter is used, the ***<u>MLC leaves remain stationary</u>***. It still uses multiple fields as with IMRT, and each field conforms to the shape of the target as seen from various angles, but the collimator leaves are static through the duration of treatment.

Target Delineation-3D



- **<u>Treatment Modality Code</u>**: 02, External beam photons.
- **<u>Planning Technique</u>**: 04, Conformal or 3D Conformal.

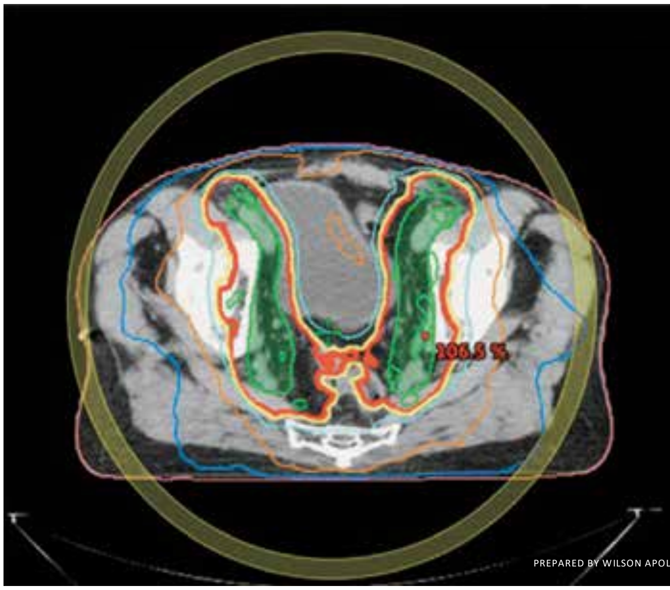
IMRT



Technology made possible by DMLC,

IMRT not always mentioned in RT Treatment Summary. Important to look in <u>Treatment Plan</u>.

Target Delineation-VMAT-IMRT



- **<u>Treatment Modality Code</u>**: 02, External beam photons.
- **<u>Planning Technique</u>**: 05, Intensity Modulated Radiation Therapy (IMRT), *when standard fx size used.*

Volumetric-modulated arc therapy: **VMAT**

<u>Commercial name used by Eleckta for the RT technique. It</u> is similar to Varian's **<u>RapidArc</u>** and Siemen's Cone-Beam Therapy (**<u>CBT</u>**).

Introduced in 2008. Dose can be delivered faster than conventional fixed IMRT or Tomotherapy tx.

<u>Modality Code</u>: 02, External beam photons.

It is a form of **IMRT** and should be coded as such, **code 05** *(When standard fractionation is used).* Arc therapy also used for SBRT. Review RT prescription.

Fraction size

Standard fraction size = 180-200 cGy/fx, typically seen when prescription calls for multiple fractions (anywhere from 10 to 40+).

Hypofractionation = > 200 cGy/fx, ex: 500 cGy x 5 fx, often used for SBRT treatments, which calls for large fraction size and only a few fractions (1-6 max).

Hyperfractionation = < standard fractionation. Ex: 125 cGy/fx. Sometimes used for H&N treatments.

Rapid Arc-Varian

Type of volumetric arc therapy (VMAT); form of IMRT while the gantry is rotated about the patient.

Increased accuracy of treatment made possible by three factors: speed of gantry rotation, shape of the txt aperture through use of DMLC, and dose rate delivery.

Code **02**, External beam, photons.

Code as **IMRT**, **05** *(When standard fractionation is used)*.

Note: Arc therapy also used for SBRT. Review RT prescription.

Dynamic adaptive radiotherapy-**DART**

An advanced form of IGRT-IMRT treatment. It can adapt to daily changes to tumor volume and pt parameters to adjust the accuracy of the beam. Also referred to as 4D treatment.

Code **02**, External beam, photons,

Code minimally as IMRT, **05**, more likely **SBRT, 06**. Review RT prescription for confirmation. Look for fraction size!

Objectives

- Describe and explain how a linear accelerator (Linac) works, and list the various treatment modalities it can deliver,
- Distinguish between 2D, 3D-Conformal, IMRT, SBRT, SART, & Online/offline Adaptive Radiotherapy,
- Explore NCCN Guidelines for EBRT for lung cancer,
- Apply the 2018 STORE Manual RT coding rules to clinical scenarios.

NCCN Guidelines for EBRT
NCCN v 5.2018- **NSCLC**

Preference of IMRT over 3D-Conformal, based on prospective study that showed an approximated 60% decrease in high-grade radiation pneumonitis w/ similar survival and tumor control outcomes when compared to 3D-conformal plans, even when a larger tumor volume was treated(RTOG 0617). The study included patients w/ Stage III dz.

NCCN Guidelines for EBRT
NCCN v 5.2018- **NSCLC**

SABR recommended for pts who are medically inoperable, high surgical risk, or refuse surgery. Studies have shown SABR to achieve tumor control and survival rates comparable to lobectomy.

For pts who undergo surgery, RT *not recommended* unless there are +margins or upstaging to N2.

Concurrent chemo/RT for pts w/ inoperable stage II (node+) and stage III NSCLC, followed by consolidation durvalumab for stage III.

NCCN Guidelines for EBRT

NCCN v 2.2018- **SCLC**

Guidelines for NSCLC on RT use are applicable to SCLC.

45 Gy in 3 wks (BID, 1.5 Gy/fx) superior over 45 Gy in 5 wks. Also 45 Gy BID comparable to 66 Gy w/ daily treatments.

In pts w/ limited stage SCLC, prophylactic cranial irradiation (PCI) decreases brain mets & increases overall survival. Even pts w/ extensive dz who have responded to treatment benefit from PCI. Preferred dose is 25 Gy in 10 fx.

American Society for Radiation Oncology (ASTRO) clinical practice guidelines-2015

- When lung cancer is managed by RT alone, a minimum of 60 Gy, 2 Gy/fx daily,
- Dose escalation > 60 Gy w/ concurrent chemotherapy not associated w/ clinical benefits.
- For pts who undergo surgery, post-op RT improves local control for pts with N2 dz.

Management of NSCLC-Stereotactic Body Radiation Therapy (SBRT)

When treating **centrally located lung tumor** with SBRT, recommendation is to use >3 fractions; preferably use 6-15 fractions(fx) to reduce potential severe toxicity to surrounding structures (esophagus, proximal bronchial tree).

It is safer to use 3 fractions when treating peripherally located lung lesions.

SBRT in 4-5 fx for tumors close to the heart & pericardium.

J Clin Oncol 2018;36: 710-719

Management of NSCLC-SBRT

Lymph nodes **not** targeted by SBRT.

Multiple non-coplanar fields used to minimize dose to healthy tissues and organs at risk (OARs).

Ideally suited for lesions < 5 cm.

PREPARED BY WILSON APOLLO, MS, RTT, CTR

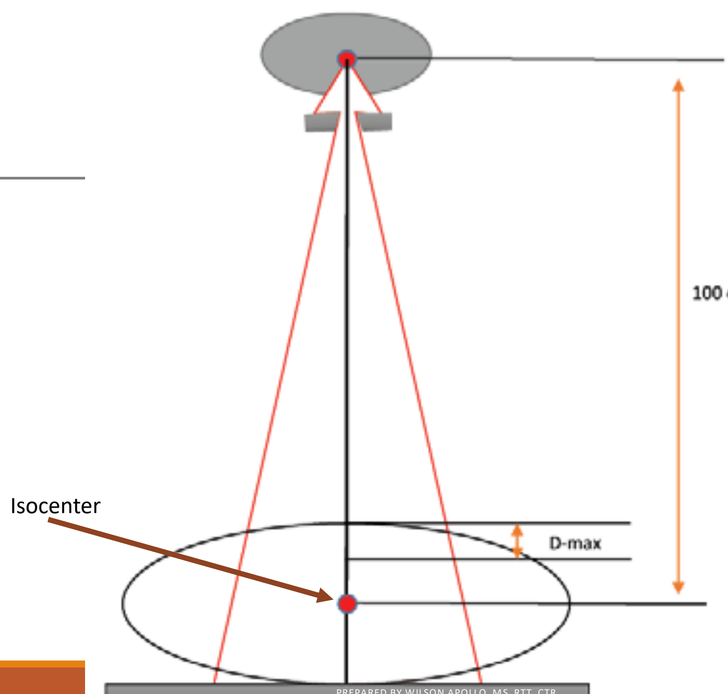
Objectives

- Describe and explain how a linear accelerator (Linac) works, and list the various treatment modalities it can deliver,
- Distinguish between 2D, 3D-Conformal, IMRT, SBRT, SART, & Online/offline Adaptive Radiotherapy,
- Explore NCCN Guidelines for EBRT for lung cancer,
- Apply the 2018 STORE Manual RT coding rules to clinical scenarios.

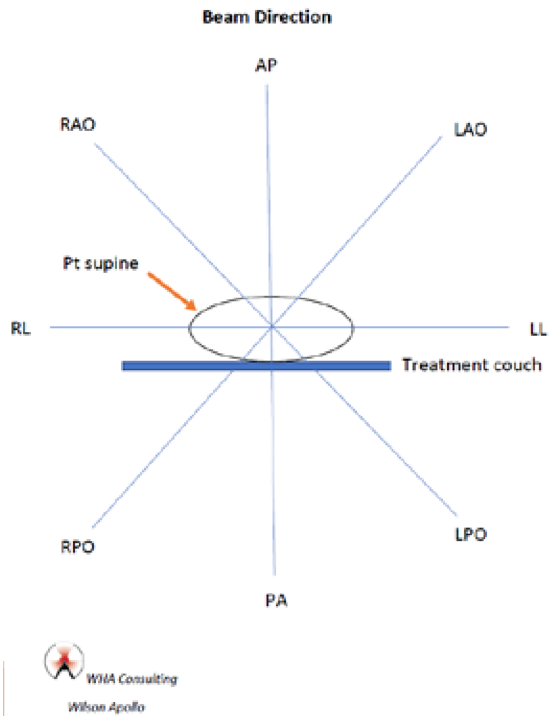
Canswer Forum Question 9/4/18

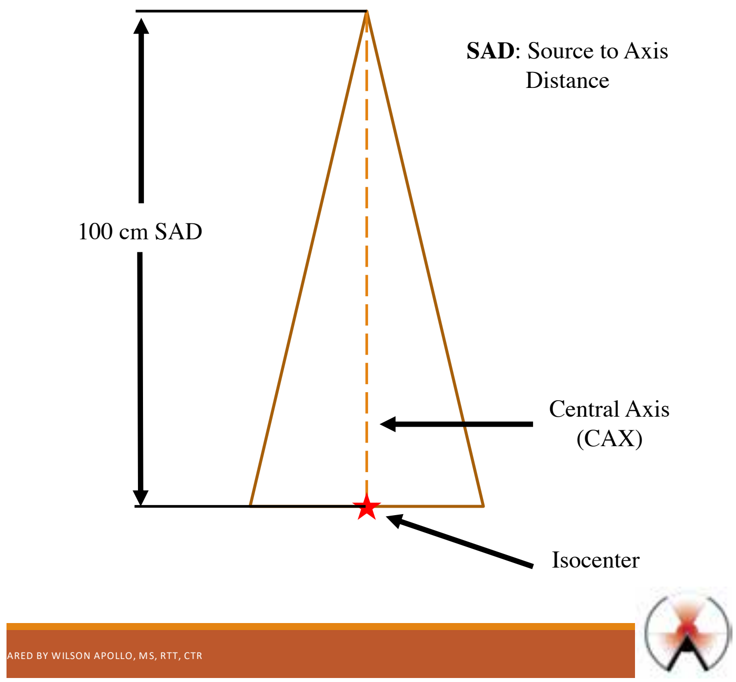
"How do we code the field External Beam Planning Technique if the radiation oncologist just calls it AP/PA?"

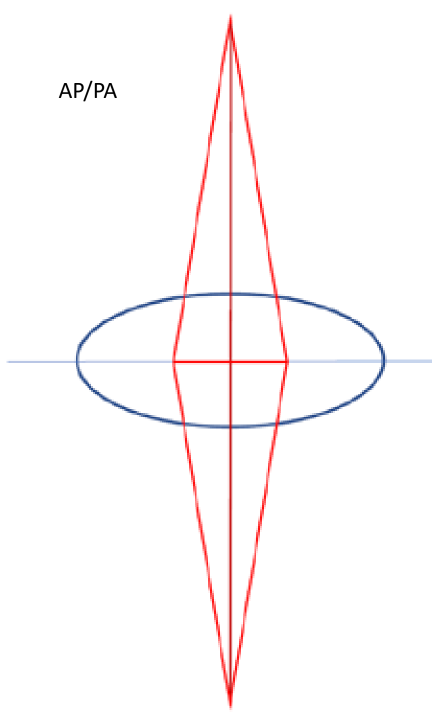
*The term AP/PA refers to the **direction** of the radiation beam only. It provides no information whatsoever on the planning technique code that should be used. AP/PA means that the pt was irradiated with the gantry @ 0 degrees and @ 180 degrees.*



PREPARED BY WILSON APOLLO, MS, RTT, CTR

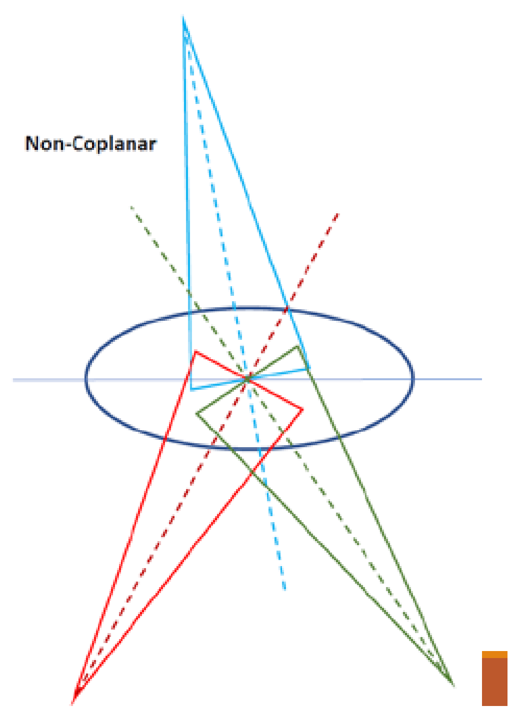






Coplanar beams: Central axes of pairs of radiation beams overlap, such as in AP/PA or RL/LL fields.

Non-coplanar beams: Central axes of multiple beams do not overlap; reduces dose to healthy tissues, thereby reducing the likelihood of short-term & long-term radiation-induced toxicities.



Clinical Scenario 1: Lung ca

72 y/o white female w/ h/o HTN, Hyperlipidemia, CAD, GERD, COPD, who recently presented with productive cough that did not respond to a course of antibiotics, steroids or cough suppressants. Pt has never smoked, no alcohol consumption and no relevant family history.

2/5/18: CXR= 1.4 cm LUL nodular density of indeterminate etiology

2/13/18: Chest CT w/o contrast= 3 cm LUL mass highly suspicious for neoplasm. No pathologically enlarged mediastinal lymph nodes or gross evidence of hilar lymphadenopathy.

2/16/18: PET/CT= Ill-defined 3 cm LUL mass demonstrated hypermetabolic activity, SUV max: 5.5 and is suspicious for a neoplastic process. No other hypermetabolic activity.

Clinical Scenario 1…

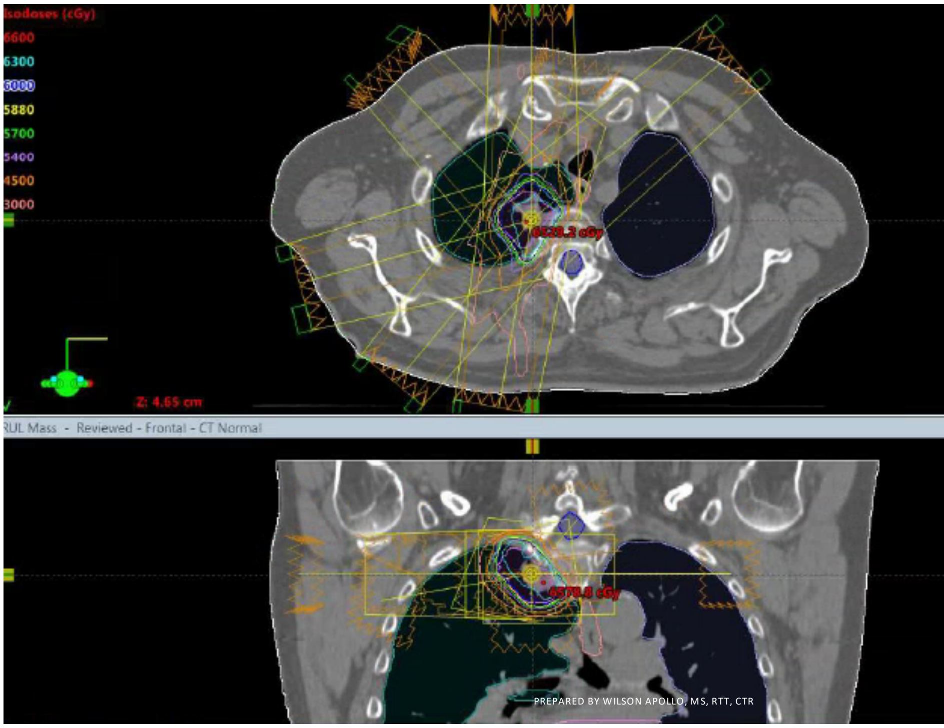
2/19/18: LUL Navigational Bronchial FNA= No malignant cells observed.

Surgery recommended, but pt reluctant and opted for EBRT.

Treatment Summary:

- 2/26/18-3/7/18: Left upper lobe, 10MVX/IMRT, stereotactic body radiotherapy (SBRT), 5 Gy x 6 fx= 30 Gy, prescribed to the 100% isodose line with seven noncoplanar beams @ 100 SAD, with DIBH technique. Patient tolerated treatment well.

Where do we start?



Clinical Scenario 1…

Seven non-coplanar beams??
DIBH technique??
100% isodose lines?

Patient and Disease Information	
Report Date	
Name	
Date of Birth	
Sequence Number	
Medical Record Number	
Date of Diagnosis	
Phase I Radiation	
Phase I Primary Treatment Volume	
Phase I to Draining Lymph Nodes	
Phase I Treatment Modality	
Phase I External Beam Planning Technique	
Phase I Dose Per Fraction (cGy)	
Phase I Number of Fractions	
Phase I Total Dose (cGy)	
Phase II Radiation	
Phase II Primary Treatment Volume	
Phase II to Draining Lymph Nodes	
Phase II Treatment Modality	
Phase II External Beam Planning Technique	
Phase II Dose Per Fraction (cGy)	
Phase II Number of Fractions	
Phase II Total Dose (cGy)	
Course Summary	
Total Dose in Radiation Course (cGy)	
Date Radiation Started	
Date Radiation Ended	
Number of Phases	
Radiation Treatment Discontinued Early?	
Radiation/Surgery Sequence	
Rad Onc	

Patient and Disease Information	
Phase I Radiation	
Phase I Primary Treatment Volume	
Phase I to Draining Lymph Nodes	
Phase I Treatment Modality	
Phase I External Beam Planning Technique	
Phase I Dose Per Fraction (cGy)	
Phase I Number of Fractions	
Phase I Total Dose (cGy)	
Phase II Radiation	
Phase II Primary Treatment Volume	
Phase II to Draining Lymph Nodes	
Phase II Treatment Modality	
Phase II External Beam Planning Technique	
Phase II Dose Per Fraction (cGy)	
Phase II Number of Fractions	
Phase II Total Dose (cGy)	
Course Summary	
Total Dose in Radiation Course (cGy)	
Date Radiation Started	
Date Radiation Ended	
Number of Phases	
Radiation Treatment Discontinued Early?	
Radiation/Surgery Sequence	
Reason for No Radiation	

Take away point:

- *When* ***SBRT*** *is prescribed for curative treatment of lung cancer, regional LNs are* ***not*** *included in irradiated field.*

Clinical Scenario 2

An 84 year old white male presents with a history of prostate cancer diagnosed in 2000. Pt. is status post radical prostatectomy, NED to date. Pt. is known to have peripheral neuropathy, atrial fibrillation, congestive heart failure, and now presents with an enlarging RUL lung nodule, which appears to be PET neg; also presents with bilat pleural effusions, secondary to CHF. Former cigar smoker. Still drinks socially. FHX+: His brother died of liver cancer at 48.

Pt opted for EBRT over surgical intervention.

Clinical Scenario 2…

4/23/18-4/26-18 @ our facility: RUL lung mass, 10 MVX/IMRT/SBRT, 15 Gy x 4 fx= 60 Gy with use of 7 non-coplanar fields @ 100 cm SAD.

Note the large fx size (1500 cGy). Combined with the low # of fxs, these are characteristic of an SBRT plan!!

Patient and Disease Information	
Phase I Radiation	
Phase I Primary Treatment Volume	
Phase I to Draining Lymph Nodes	
Phase I Treatment Modality	
Phase I External Beam Planning Technique	
Phase I Dose Per Fraction (cGy)	
Phase I Number of Fractions	
Phase I Total Dose (cGy)	
Phase II Radiation	
Phase II Primary Treatment Volume	
Phase II to Draining Lymph Nodes	
Phase II Treatment Modality	
Phase II External Beam Planning Technique	
Phase II Dose Per Fraction (cGy)	
Phase II Number of Fractions	
Phase II Total Dose (cGy)	
Course Summary	
Total Dose in Radiation Course (cGy)	
Date Radiation Started	
Date Radiation Ended	
Number of Phases	
Radiation Treatment Discontinued Early?	
Radiation/Surgery Sequence	
Reason for No Radiation	

Take away point:

Be attentive to fx size and # of fx! Large fx size combined with a few total fractions indicates SBRT (or SABT).

When IMRT and SBRT are mentioned in the prescription, code to SBRT!

Clinical Scenario 3

Ms X is a very pleasant 71 Y/O W/F, former smoker (30 pk-yr), w/ pmh of Barrett's esophagus, GERD, HTN, Hyperlipidemia, anxiety, who presents for additional eval of persistent LLL lung nodule, which was noted late last year (2017) and has been followed since then. Patient denies SOB, cough and sputum production. No hemoptysis, dyspnea on exertion or pleuritic chest pain.

Patient is married, no children, retired PT. Younger sister dx'd with breast cancer @ 56. Pt denies asbestos exposure. BMI= 27.13 (131 lb @ 4 ft, 11 in). Social etoh. Pt underwent surgical resection @ outside facility and comes in to consider EBRT for positive margins on LUL lingula wedge resection.

Clinical Scenario 3…

6/19/18 @ outside facility: LT lower lobe & LUL lingula wedge resection & mediastinal LN dissection= A. LLL wedge; 1.5 cm invasive mucinous adenocarcinoma. LVI-. No visceral pleural invasion. LVI+. B. LLL completion lobectomy; no residual malignancy identified. Bronchial & vascular margins free of tumor. C. LUL, lingula= Adenocarcinoma, predominantly papillary w/ focal lepidic pattern. No visceral pleural invasion. LVI+. Carcinoma present on inked margin.

Four peribronchial lymph nodes negative for malignancy (0/4). Level 7 & Level 9 LNs negative for malignancy (0/2). 8th Edition AJCC Pathologic stage: pT1b, pN0.

Clinical Scenario 3-EBRT Treatment

Txt Site	Energy	Dose/Fx (cGy)	# of Fx	Total Dose (cGy)	Start date	End date	Elapsed days
LT Lingula	10X	600	6/6	3,000	7/18/18	7/30/18	12

IMRT, SBRT technique was used with 5 non-coplanar beams, 100 SAD.

CASE SCENARIO 3	
Phase I Radiation	
Phase I Primary Treatment Volume	
Phase I to Draining Lymph Nodes	
Phase I Treatment Modality	
Phase I External Beam Planning Technique	
Phase I Dose Per Fraction (cGy)	
Phase I Number of Fractions	
Phase I Total Dose (cGy)	
Phase II Radiation	
Course Summary	
Total Dose in Radiation Course (cGy)	
Date Radiation Started	
Date Radiation Ended	
Number of Phases	
Radiation Treatment Discontinued Early?	
Radiation/Surgery Sequence	
Reason for No Radiation	

Take away points:

- *When there are positive LNs and EBRT is prescribed, expect standard fractionation to be used, (180-200 cGy/fx)*
- *When there are no + LNs, SBRT can be prescribed.*
- *Always pay attention to fraction size & # of fractions used.*
- *Review RT prescription!*

PREPARED BY WILSON APOLLO, MS, RTT, CTR

Clinical Scenario 4-Metastatic dz

63 y/o w/f w/ long h/o smoking presented w/ persistent cough. W/u imaging revealed suspicious lesions on RT lung, extensive nodal mets in thorax & s'clav region, along w/ numerous enhancing lesions throughout brain, on MRI, c/w metastatic dz. Also numerous osseous lesions to RT ischium, RT acetabulum.

8/2/18: RUL lung bx= adenocarcinoma, moderately differentiated, w/ acinar & lepidic patterns.

Clinical Scenario 4- Gamma Knife

8/14/18: Gamma Knife Radiosurgery targeting 9 CNS lesions. Peripheral Margin Tumor Dose= 20 Gy.
Total # of sources= 192
Source Strength= 2.2611 Gy/min
Total Activity= 3369.98 Ci
Total shots= 16

CASE SCENARIO 4	
Phase I Radiation	
Phase I Primary Treatment Volume	
Phase I to Draining Lymph Nodes	
Phase I Treatment Modality	
Phase I External Beam Planning Technique	
Phase I Dose Per Fraction (cGy)	
Phase I Number of Fractions	
Phase I Total Dose (cGy)	
Course Summary	
Total Dose in Radiation Course (cGy)	
Date Radiation Started	
Date Radiation Ended	
Number of Phases	
Radiation Treatment Discontinued Early?	
Radiation/Surgery Sequence	
Reason for No Radiation	

Take away points:

- *Gamma Knife is considered EBRT and treatment modality code is always 02: external beam.*
- *Always code the prescribed dose! For brain mets, it is typically 18-20 Gy in a single session/fx.*
- *There is a special code for planning technique for* ***Gamma Knife, 08***.

In summary…

- New RT items in the STORE 2018 manual requires that CTR have a more in-depth understanding of the principles of radiation therapy and the various modalities associated with it.
- Important to keep up with the latest advances in radiation oncology.
- Critical to learn the language of radiation therapy and radiation oncology!
- Critical need for a methodical and expansive effort to educate our profession on these topics. Lack of adequate training can lead to inaccurate capturing of RT data.
- Welcome NAACCR initiative to provide this type of training to our professionals.

Quiz –question 1

During VMAT treatment,

a. the gantry of a Linac, is rotated to specified gantry angle, then prescribed dose is delivered with gantry in stationary position before moving on to next prescribed gantry angle,
b. prescribed dose is delivered continuously as gantry rotates about prescribed arc around the patient,
c. electron therapy is administered,
d. Hypofractionation is used.

Quiz –question 2

Which of the following distinguishes SBRT from standard fractionated RT?

a. Fraction size,
b. Number of fractions,
c. Target volume,
d. All of the above.

Quiz –question 3

Pt is treated to a LUL lung mass with 15X/IMRT/SBRT, 20 Gy x 3 fx= 60 Gy with use of 9 non-coplanar fields @ 100 cm SAD. The Radiation Treatment Modality code for this phase is

a. 01: External beam, NOS
b. 02: External beam, photons
c. 04: External beam, electrons
d. 99: RT modality unknown.

Quiz –question 4

Pt is treated to a LUL lung mass with 15X/IMRT/SBRT, 20 Gy x 3 fx= 60 Gy with use of 9 non-coplanar fields @ 100 cm SAD. The RT Planning Technique code for this phase is

a. 01: External beam, NOS
b. 05: Intensity Modulated Therapy (IMRT)
c. 06: Stereotactic radiosurgery or radiosurgery, NOS
d. 07: Stereotactic radiosurgery or radiosurgery, robotic.

Quiz –question 5

Pt is treated to a RLL lung mass and mediastinal lymph nodes with 6MV/IMRT, 2 Gy x 30 fx= 60 Gy with use of 5 non-coplanar fields @ 100 cm SAD. The Primary Treatment Volume code & Radiation to Draining Lymph Nodes for this phase is

a. 30: Lung or bronchus & 88: NA
b. 39: Chest/lung (NOS) & 02: Thoracic lymph node regions
c. 39: Chest/lung (NOS) & 88: NA
d. 30: Lung or bronchus & 02: Thoracic lymph node regions

Questions

Questions

Questions

Questions

You can submit your RT coding questions to

apollow@mac.com ***or***

wapollo72@gmail.com

PREPARED BY WILSON APOLLO, MS, RTT, CTR