# Current and Emerging Treatment Landscape of Lung Cancer II: Radiation Oncology Perspective

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# Radiation Oncology in lung cancer

- Curative
  - Early stage unresectable (Stage I-II NSCLC)
  - Locally-advanced unresectable NSCLC
  - Limited-stage SCLC
  - Oligo-categories (oligometastatic and oligoprogressive)

- Palliative principles
  - Improve symptoms, prevention of symptoms (i.e. fractures or obstruction), and/or durable local control
  - Often the most difficult of decisions we make
    - Treat vs not treat; what to treat; dose/fractionation; coordination with systemic therapy
    - Brain mets – few vs multiple

- Integration of radiation with systemic therapies with radiation
  - Timing with palliative RT and novel agents

# Radiation Oncology Tools

- **Photons**
  - Linear Accelerator – traditional linac; CT-based TrueBeam; MRI-based Unity or ViewRay; PET-based Reflexion
  - Intensity-modulated RT (IMRT); Volumetric modulated arc therapy (VMAT); Image-guided RT (IGRT); 3 dimensional conformal (3DCRT); hypofractionated RT (i.e. 6-20 fractions); stereotactic body radiation therapy (SBRT or SABR); radiosurgery (SRS, 1 fraction)
  - Special equipment – 6 DoF couches; Hypersight (near diagnostic CT quality images); camera-based body surface imaging (for breath hold delivery)

- **Protons**
  - Passive scattering (older systems; most have been upgraded)(similar to 3DCRT)
  - Pencil-beam scanning (also called intensity-modulated proton therapy or IMPT)
  - Volumetric arc proton therapy (not yet FDA approved)
  - FLASH therapy – currently research only

- **Brachytherapy** – not used much in lung cancer setting

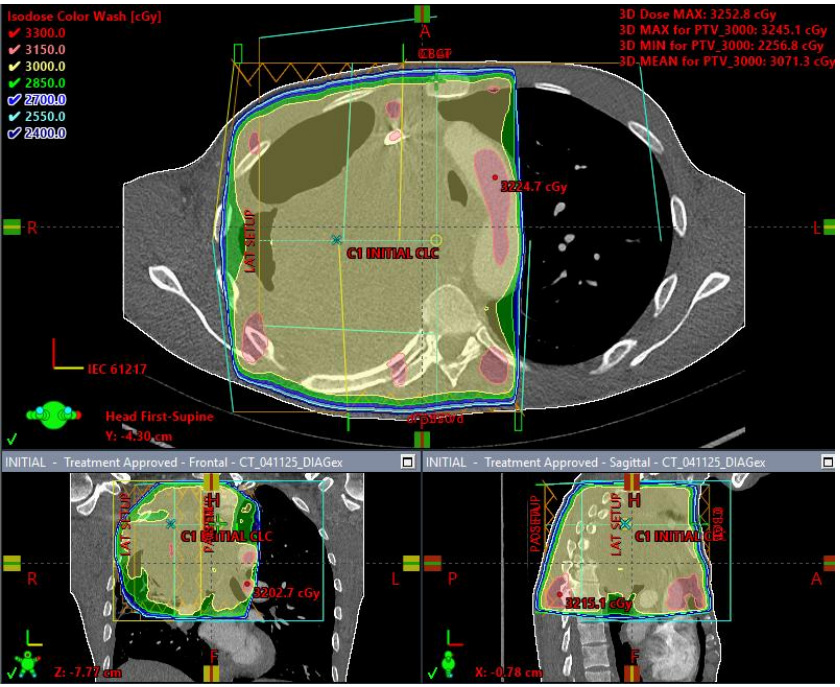
# Radiosurgery options

Gamma knife –
Frame-based
Brain and BOS

Cyberknife-
Brain and body

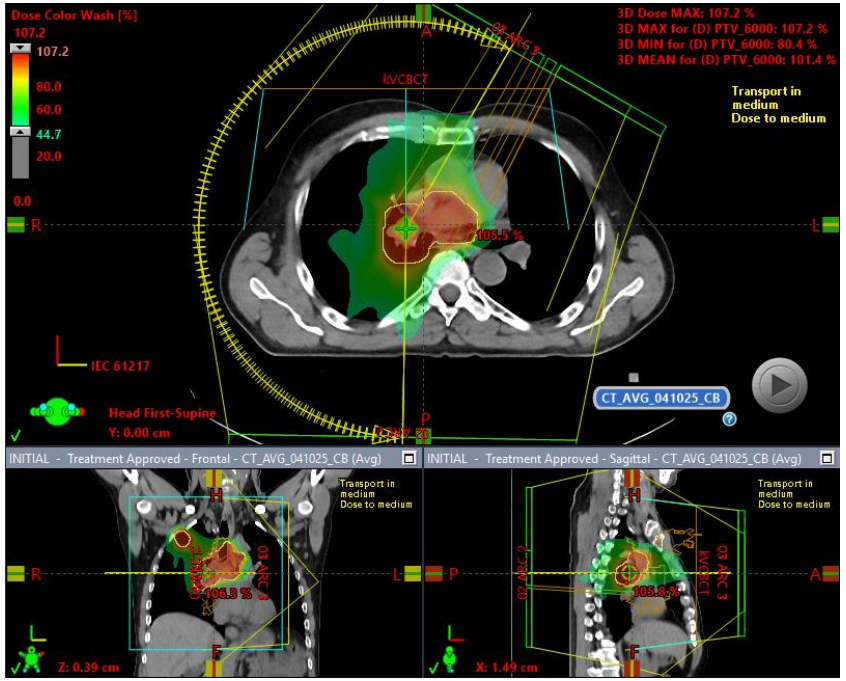
Linac-based
Frameless
Brain and body

## 3DCRT - photons



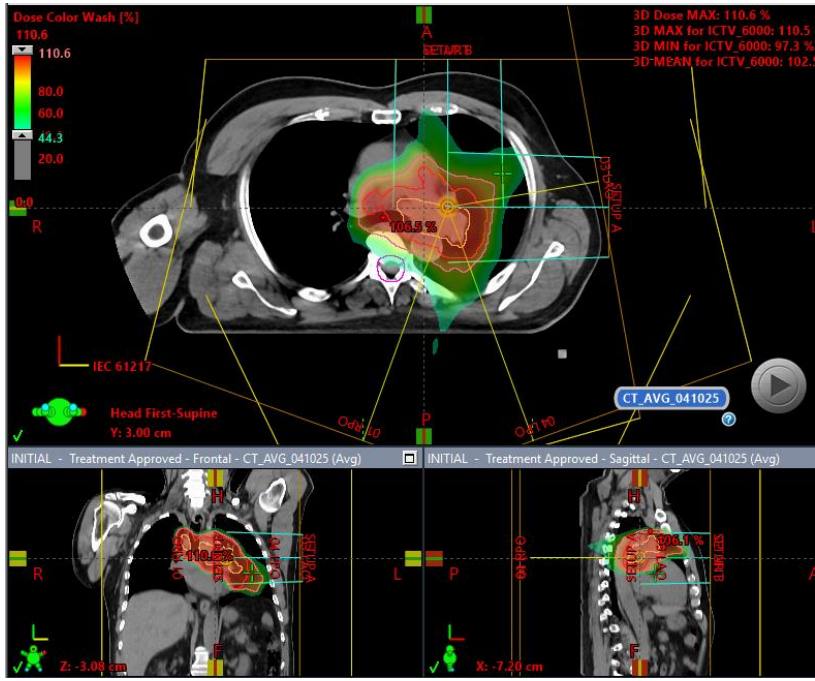

-Palliative RT
-Quick forward planning
-Commonly 30 Gy / 10 fractions or 20/5

## VMAT IMRT - photons



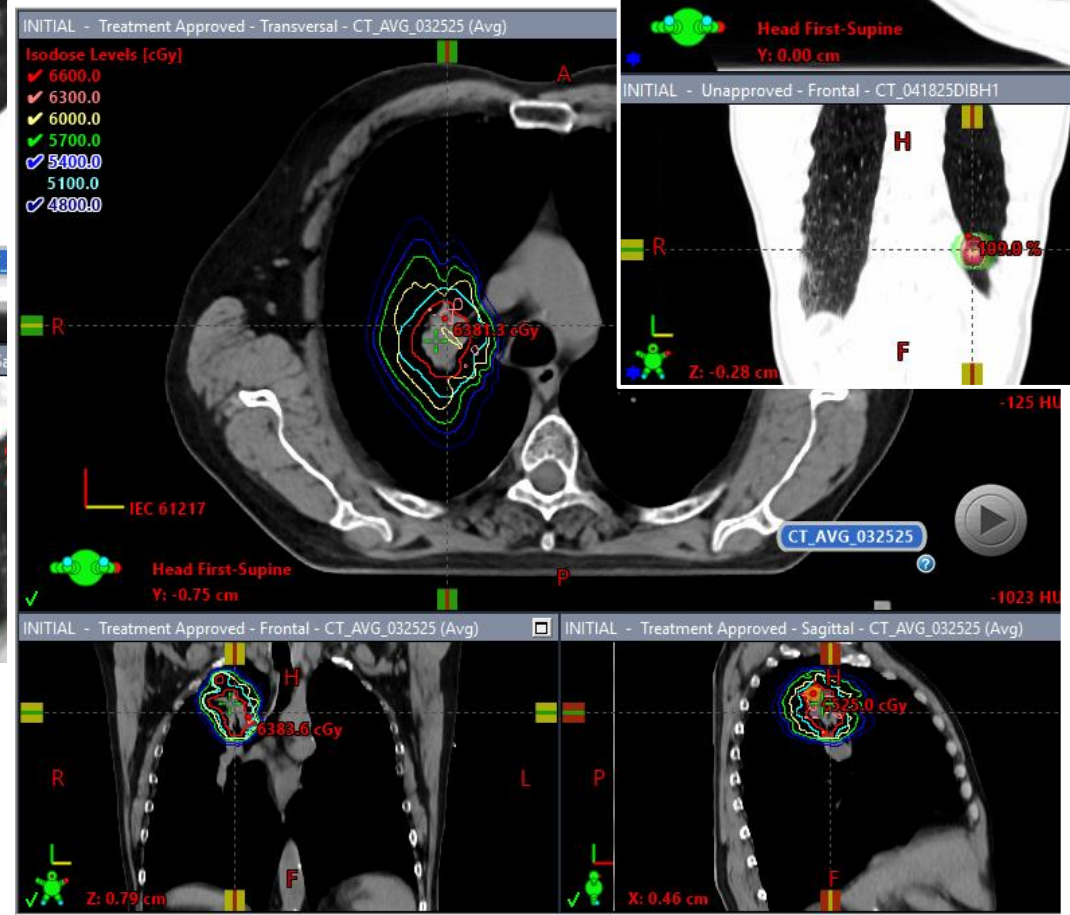

-All OARs contoured
-Inverse planning (AI automated)
-Commonly 60-66 Gy in 30-33 fractions with chemo
-Can be hypofractionated (w/o chemo)
-Applies to adaptive RT equipment

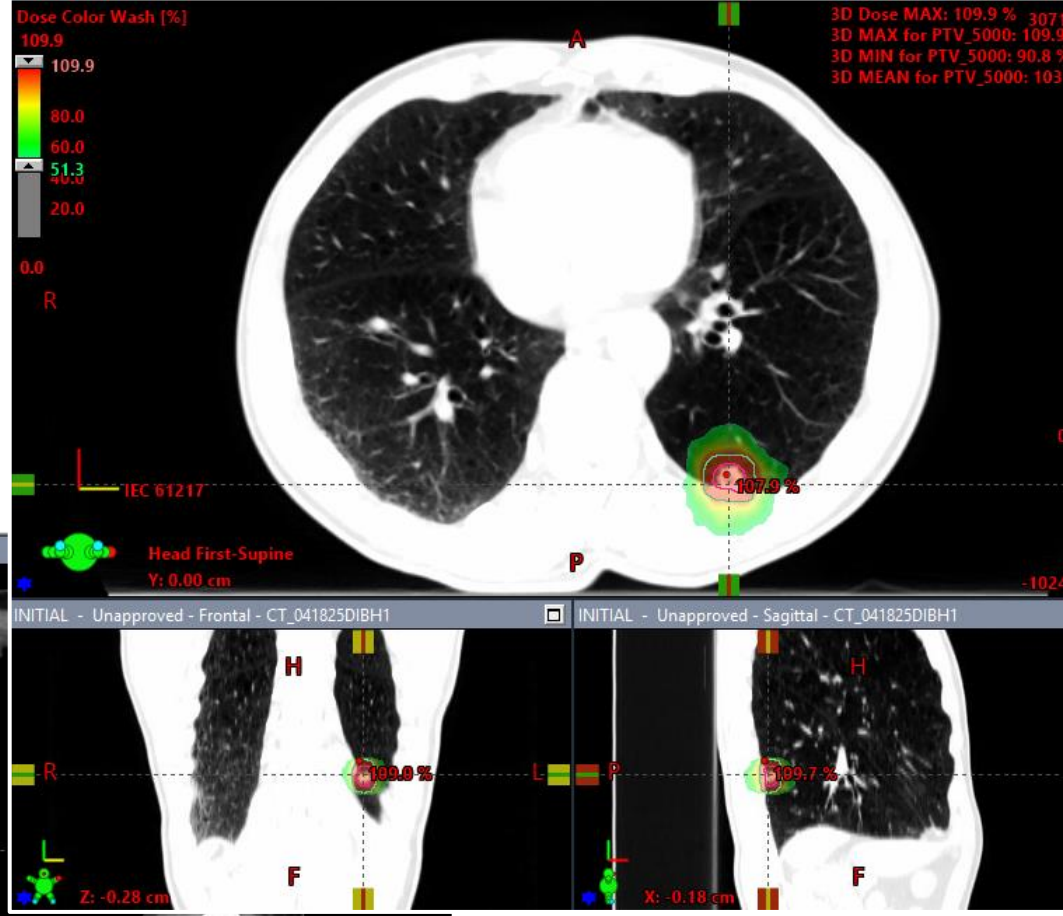
## IMPT - Protons



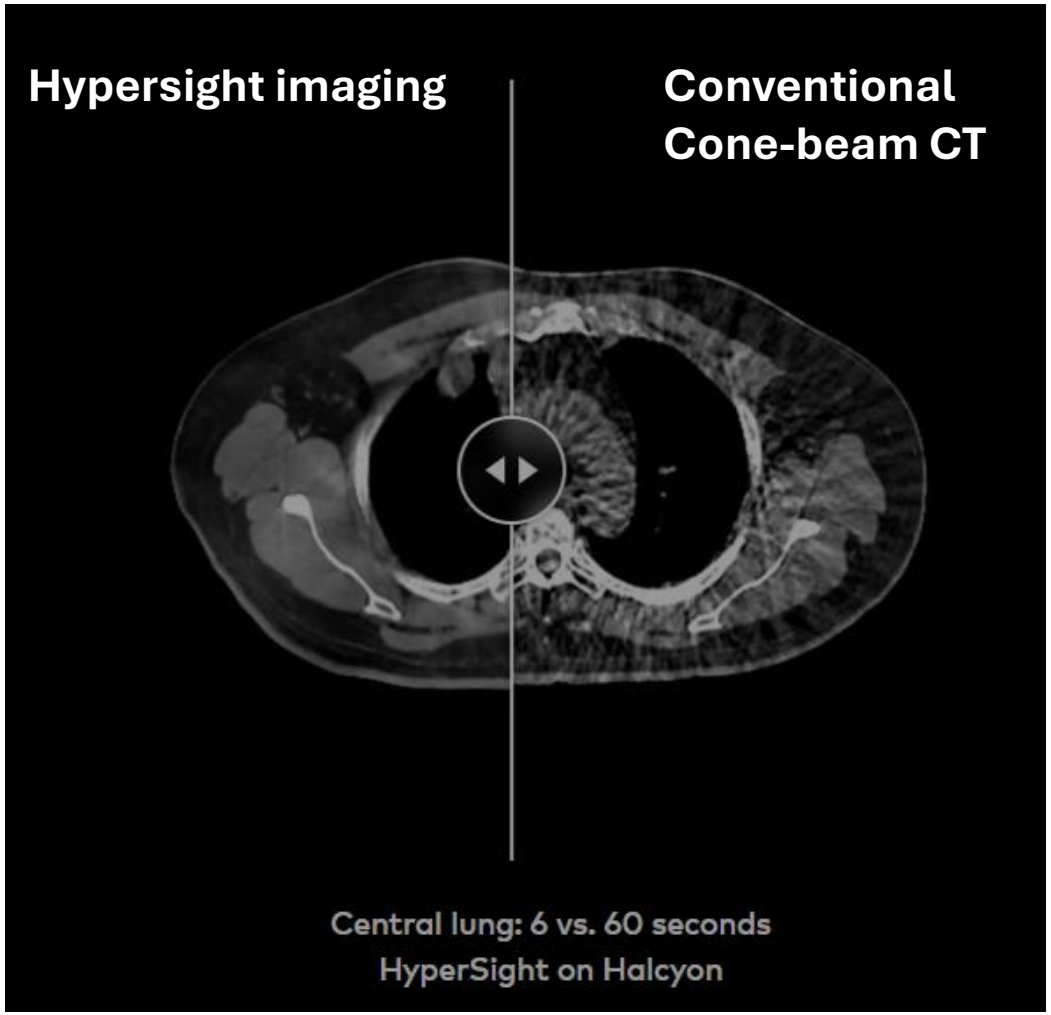

-All OARs contoured
-Forward planned
-Commonly 60-66 Gy in 30-33 fractions with chemo
-Can be hypofractionated (w/o chemo)

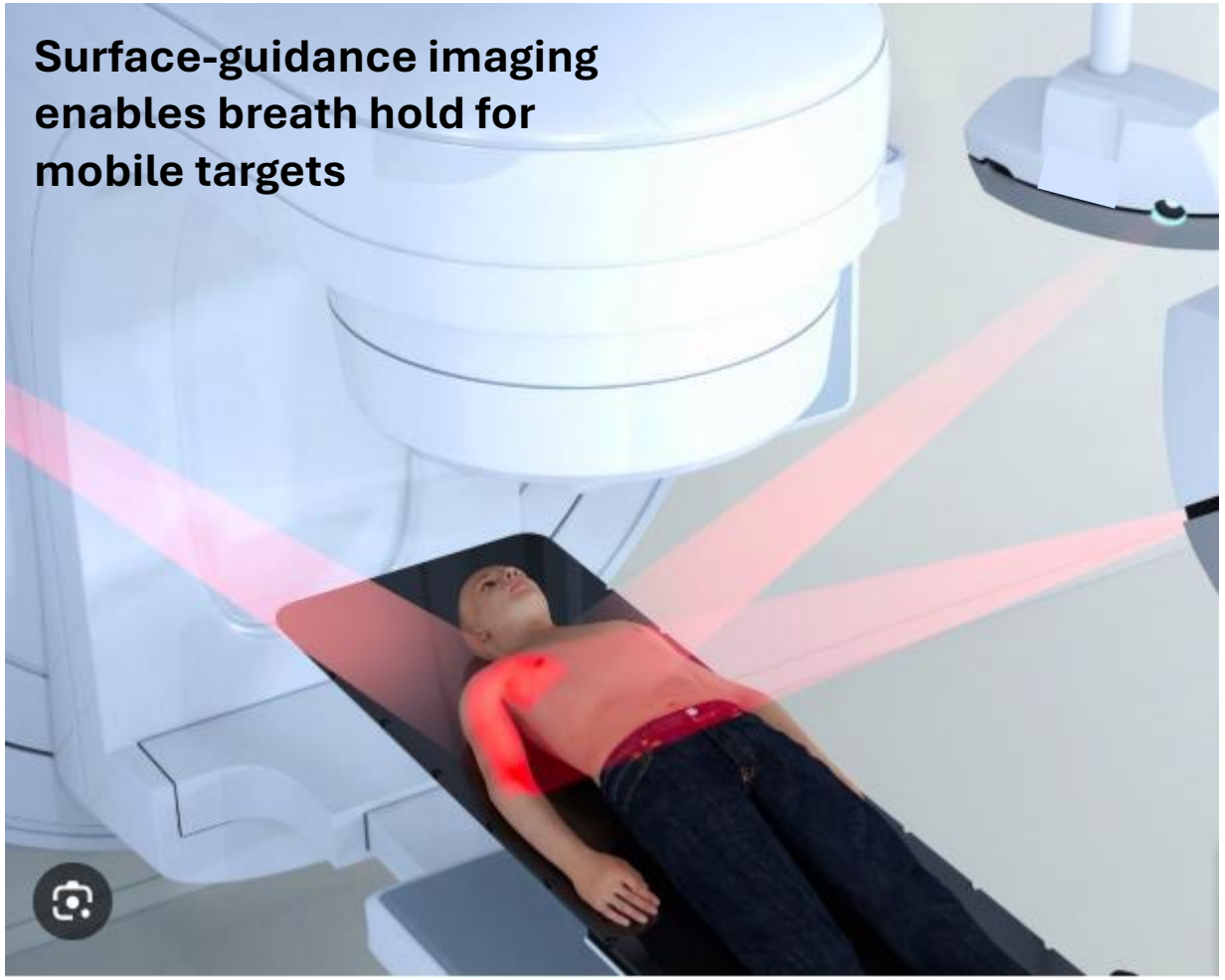
# Size, location, and OARs

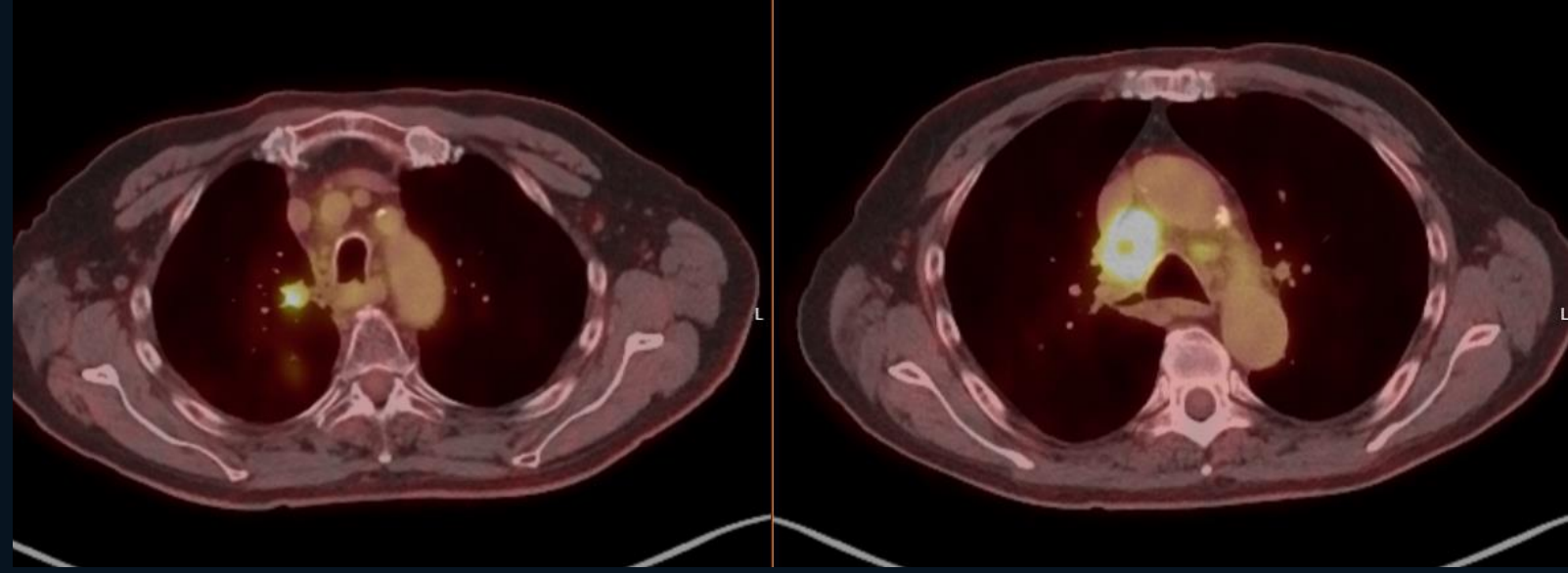



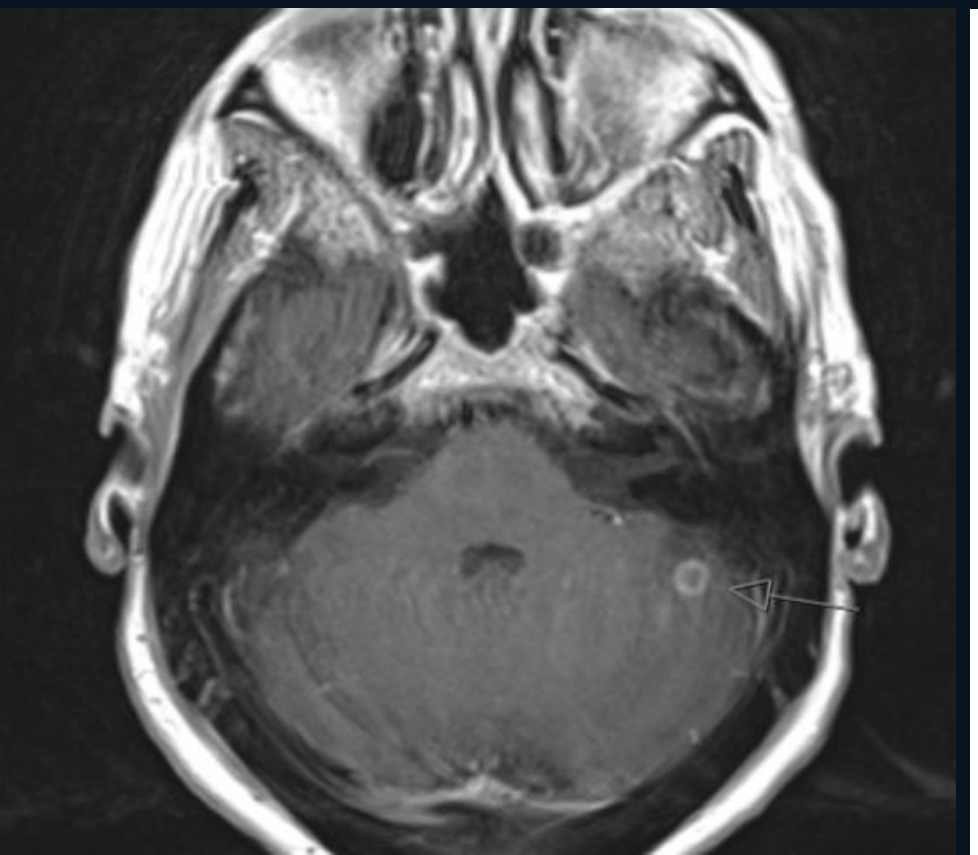
# Special Features: On-board imaging and Surface Guidance Examples



# Patient case





- 74 yo male with severe COPD with newly-diagnosed RUL squamous cell carcinoma involving R4 node. PDL1 is 20%.  Has solitary brain metastasis.
- What do you recommend?

# Patient Case

**Major decisions to make**

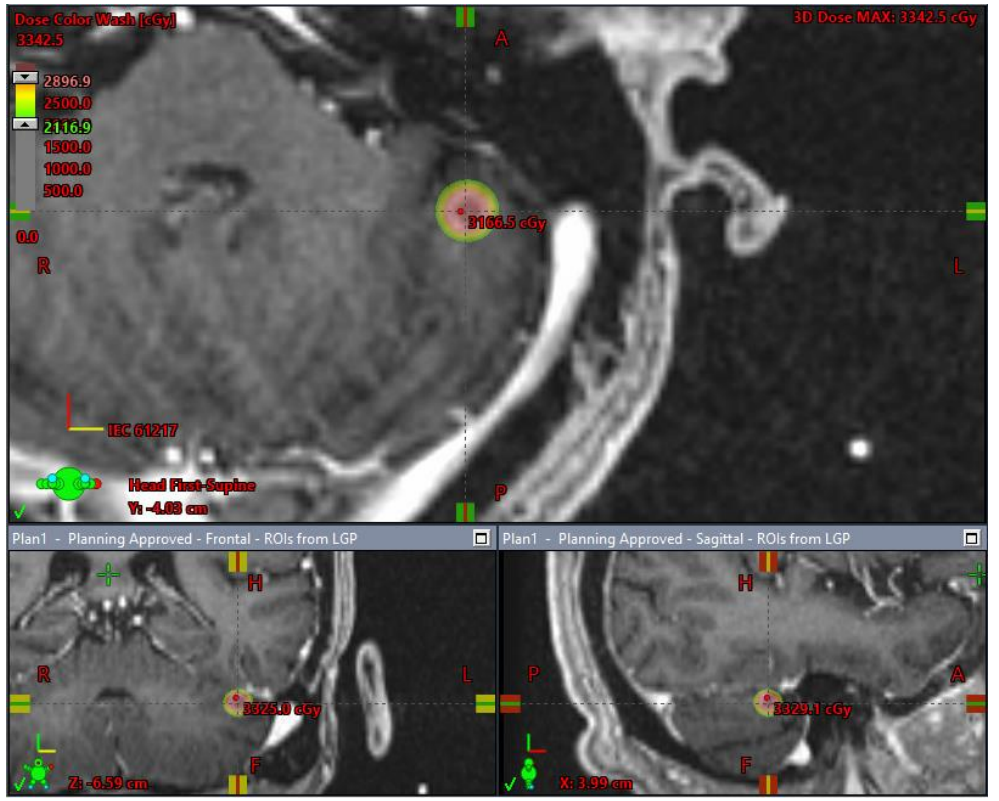
- Curative vs Palliative

- Operable vs inoperable
  - Brain
  - Lung

- Systemic therapy
  - Palliative setting - optimal systemic therapy first vs. benefit of doubt for curative therapy
  - Curative setting - sequential chemo vs. concurrent with RT

- Radiation therapy
  - Radiation dose, fractionation, volume, method of delivery

# Patient Case



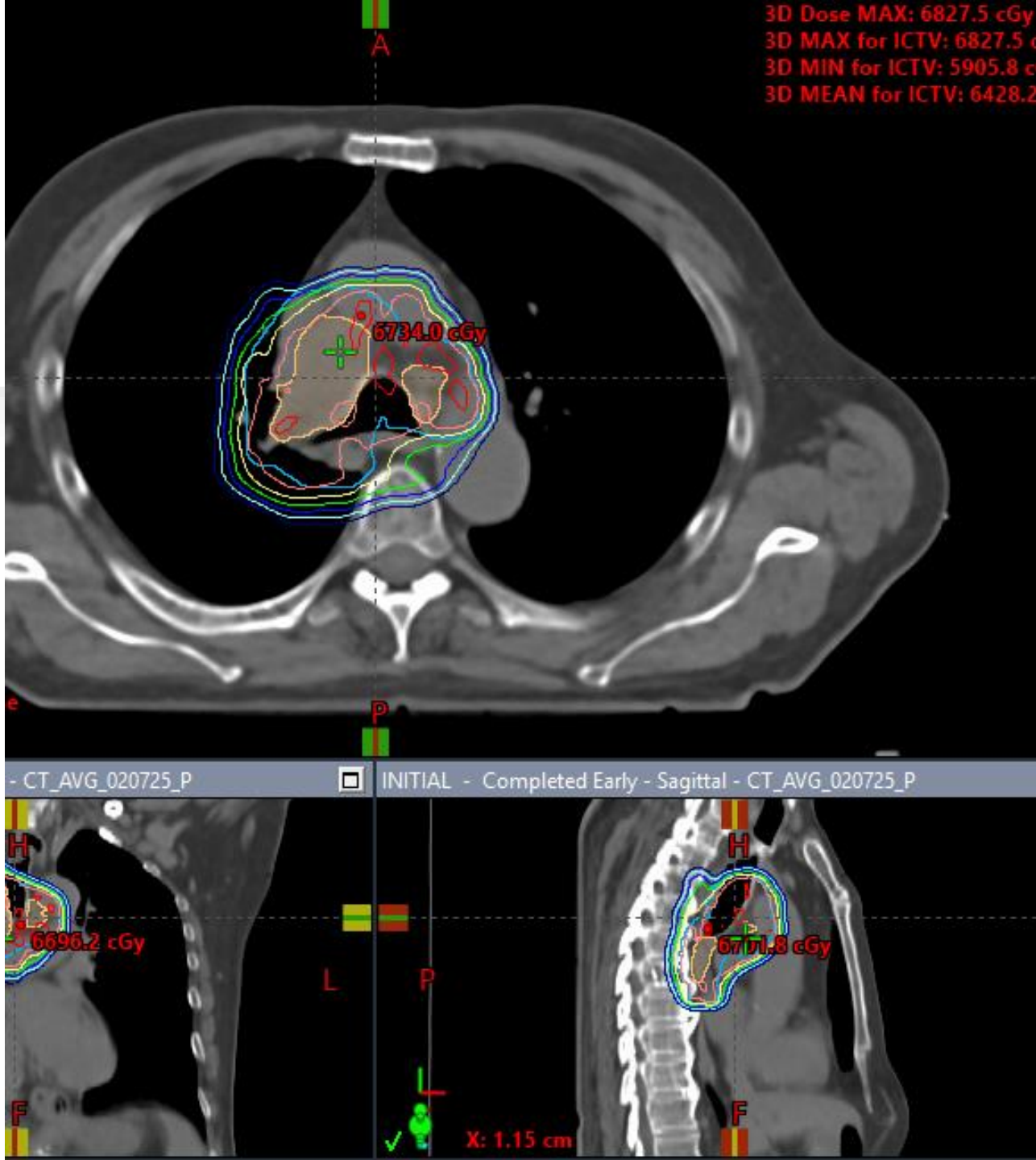

## Major decisions to make

- Curative vs Palliative
  - Curative
- Operable vs inoperable
  - Brain – non-operative mgmt. w/ SRS
  - Lung – poor pulmonary function, so non-operative
- Systemic therapy
  - Palliative setting - chemo vs. IO vs. both
  - Curative setting - sequential vs. concurrent
  - IO – when to add
- Radiation therapy
  - Radiation dose, fractionation, volume, method of delivery

# Patient Case

Pt received SRS first, 21 Gy x 1

Followed by 60 Gy IMRT concurrent chemoRT (weekly carbo-paclitaxel) followed by durvalumab



# Conclusions

- The multidisciplinary aspect of lung cancer makes it a fun job
- Rad Onc has a technology focus, but needs optimal integration with systemic therapy to have most impact
- Each patients needs are unique and while we rely on our basic principles in management, it’s ok to think outside of the box and meet our patients needs

# Questions?