IMRT/RART techniques for brain, H&N, lung, breast, prostate cancers

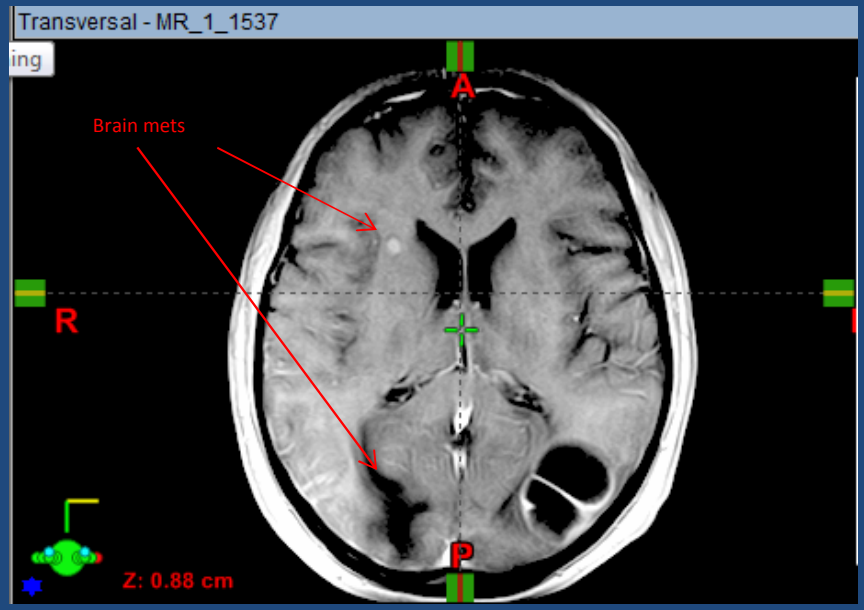
Hasan Murshed, MD
ABR board certified
Hope Radiation Cancer Center
Lynn Haven, FL 32444

RART for mets Brain

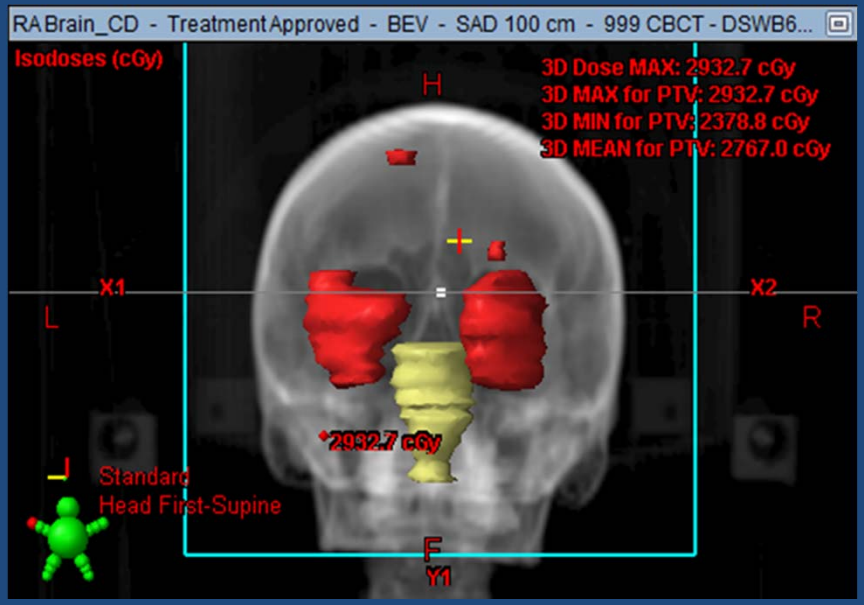
- 47 yom with h/o SCCa of H&N, s/p chemoRT to 7000 cGy in 2014
- Presented with hallucination and confusion
- MRI brain + for multiple mets lesions
- Stage IV
- Previous RT field overlaps with WB field
- RART to lesions 3000 cGy +/- 2000 cGy
- On Steroid 4 mg po q6hrs

MRI brain fused with planning CT

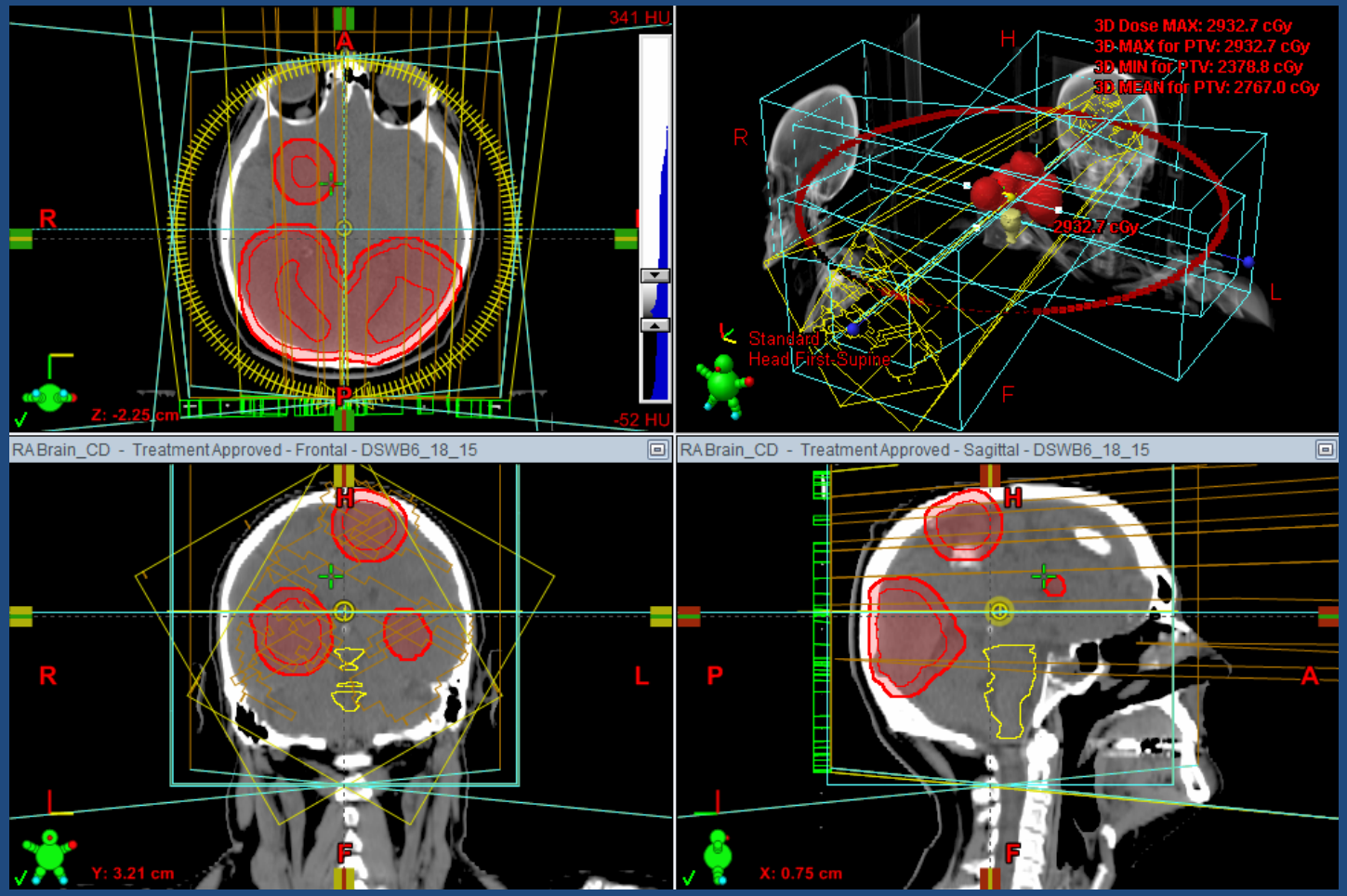
MRI showing mets/cystic mass



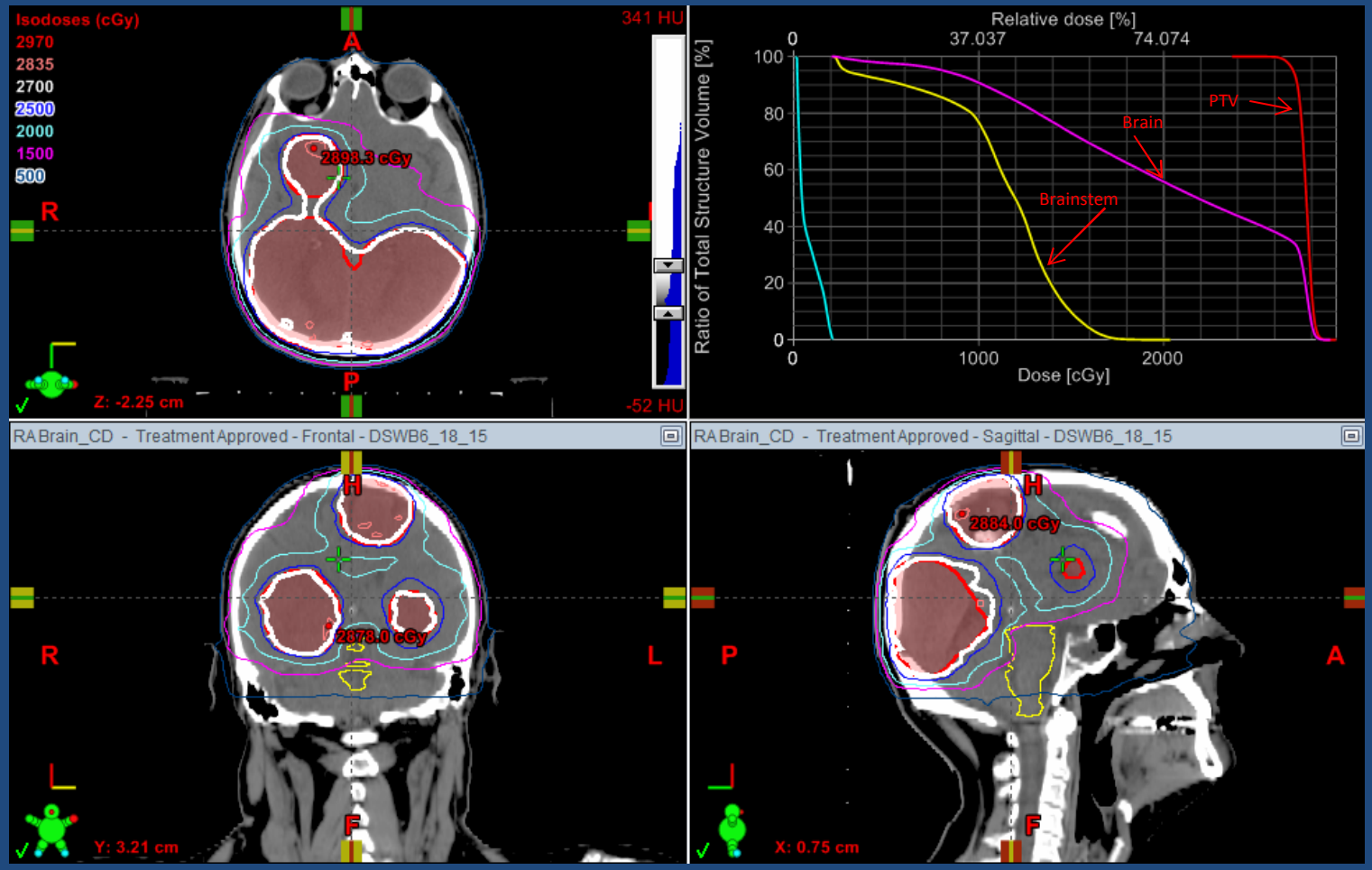
GTVs and critical strcutures



RT beam orientations



Isodose lines/DVHs



Daily CBCT

CTSim scan

CBCT scan

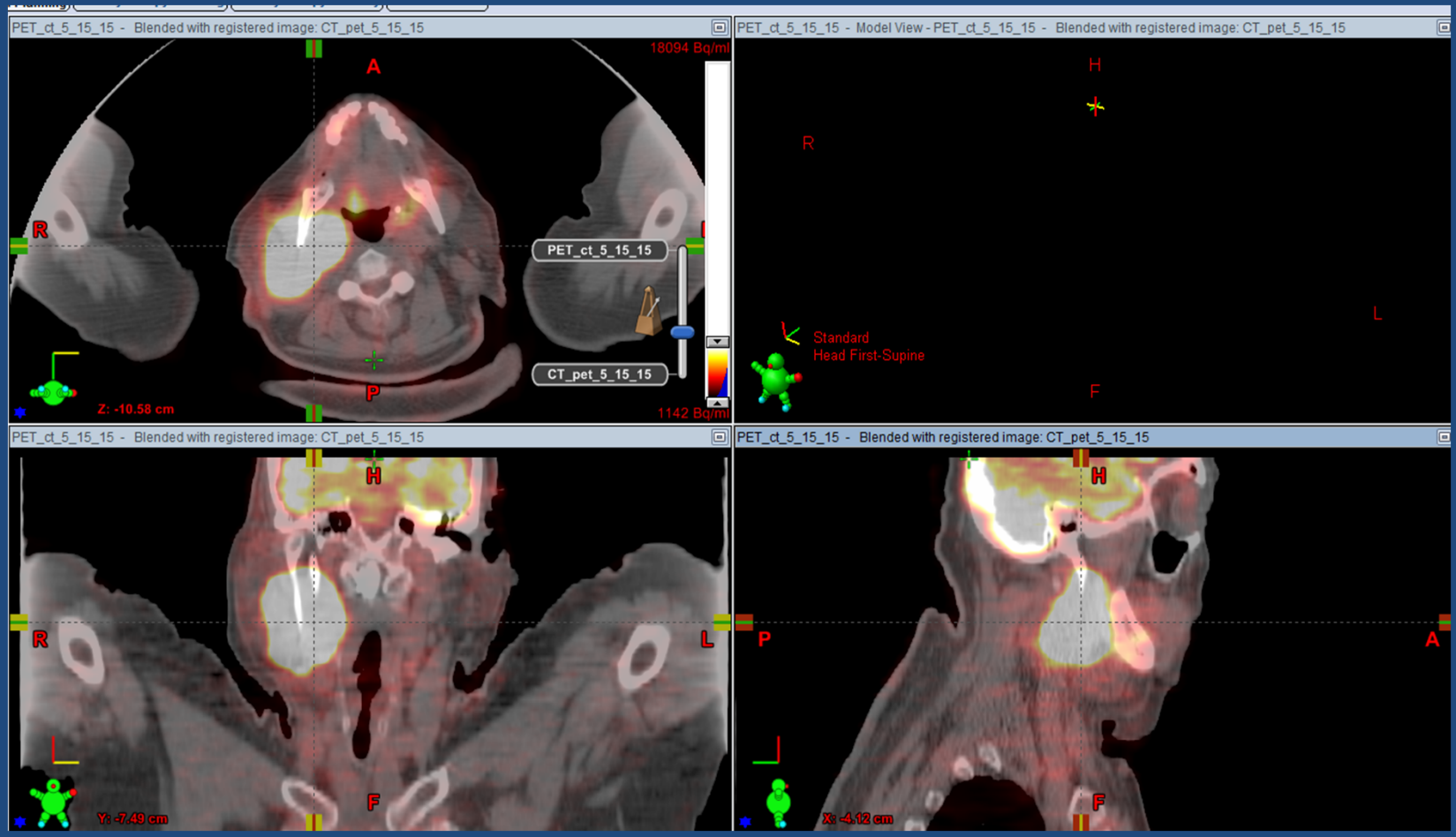
RART for mets Brain

- RART plan met Rx and all the constraints
  - Brain v30<5%, Brainstem=17Gy; no overlap with the previous H&N RT
- Currently under RT
- His hallucination resolved, no headache, no nausea
- Steroid stopped

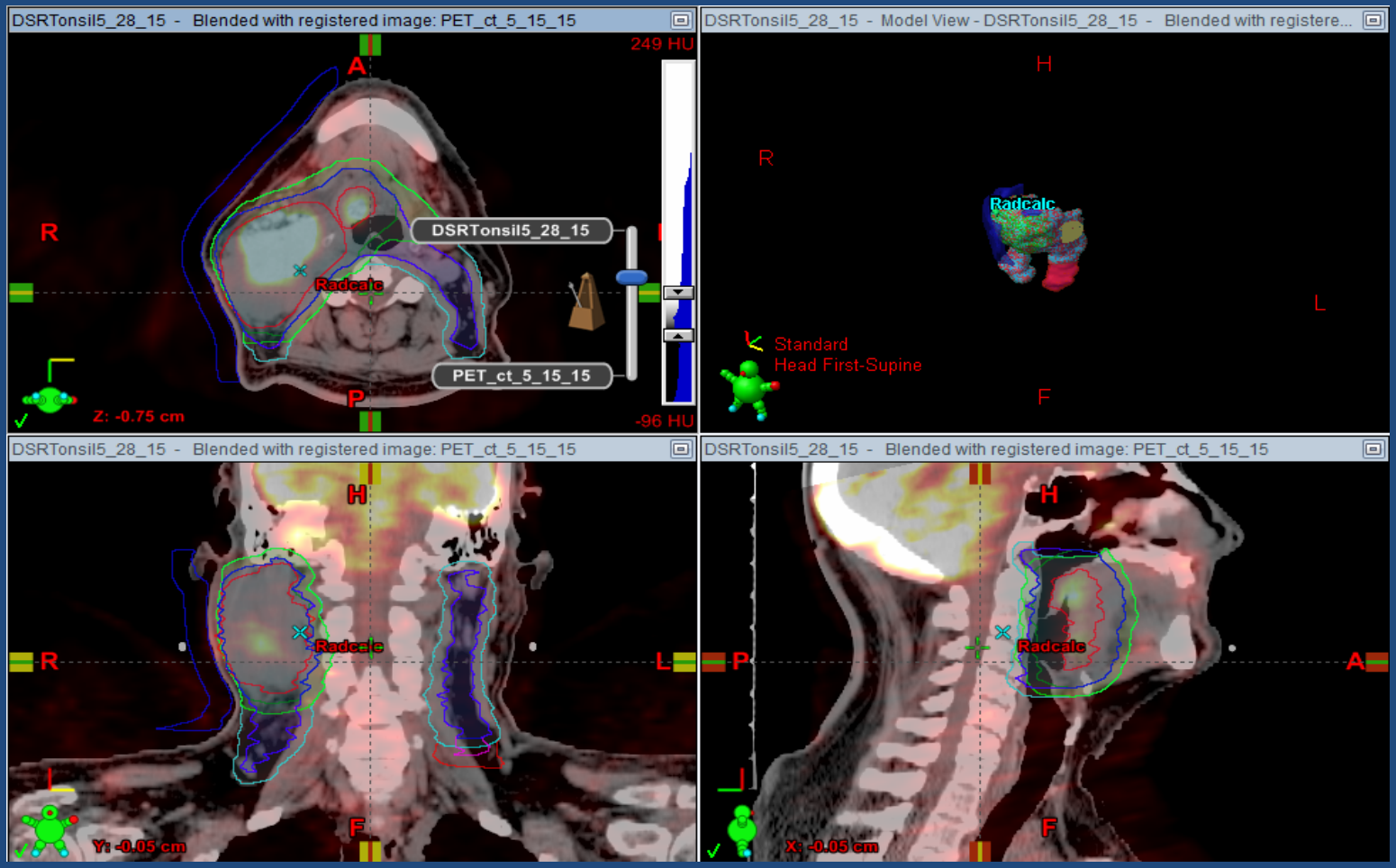
Rt tonsil SCCa

- 65 yom current smoker, presented with Rt ear pain and Rt neck large mass
- P/e Rt tonsil mass, bx + for SCCa
- PET + for Rt parapharyngeal tonsil/Rt neck mass, no distant mets
- Stage T2N3M0, IVB
- Chemo/RT to 7000 cGy, CDDP q21d

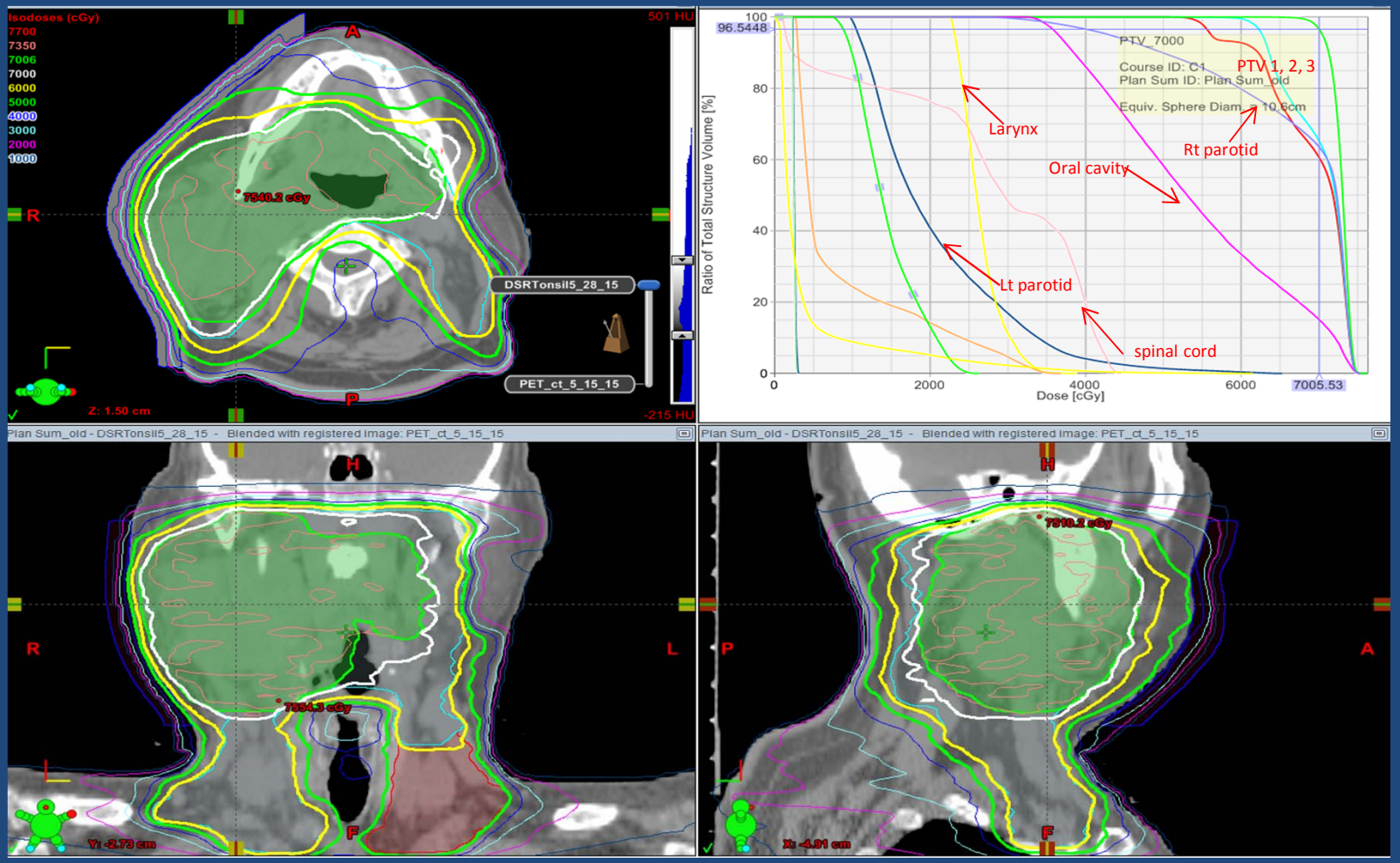
PET scan


PET_ct_5_15_15 - Blended with registered image: CT_pet_5_15_15
18094 Bq/ml
A
R
P
PET_ct_5_15_15
CT_pet_5_15_15
1142 Bq/ml
Z: -10.58 cm
PET_ct_5_15_15 - Model View - PET_ct_5_15_15 - Blended with registered image: CT_pet_5_15_15
H
R
L
F
Standard
Head First-Supine
PET_ct_5_15_15 - Blended with registered image: CT_pet_5_15_15
H
R
L
F
Y: -7.49 cm
PET_ct_5_15_15 - Blended with registered image: CT_pet_5_15_15
H
P
A
F
X: -4.12 cm

PET fused with planning CT

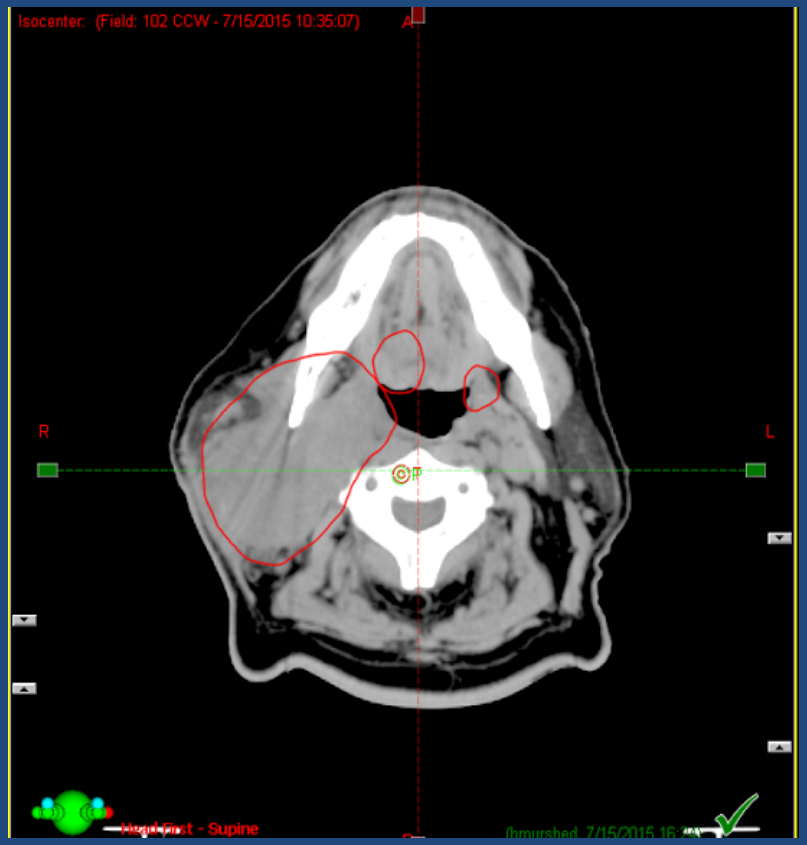


Isodose lines/DVHs

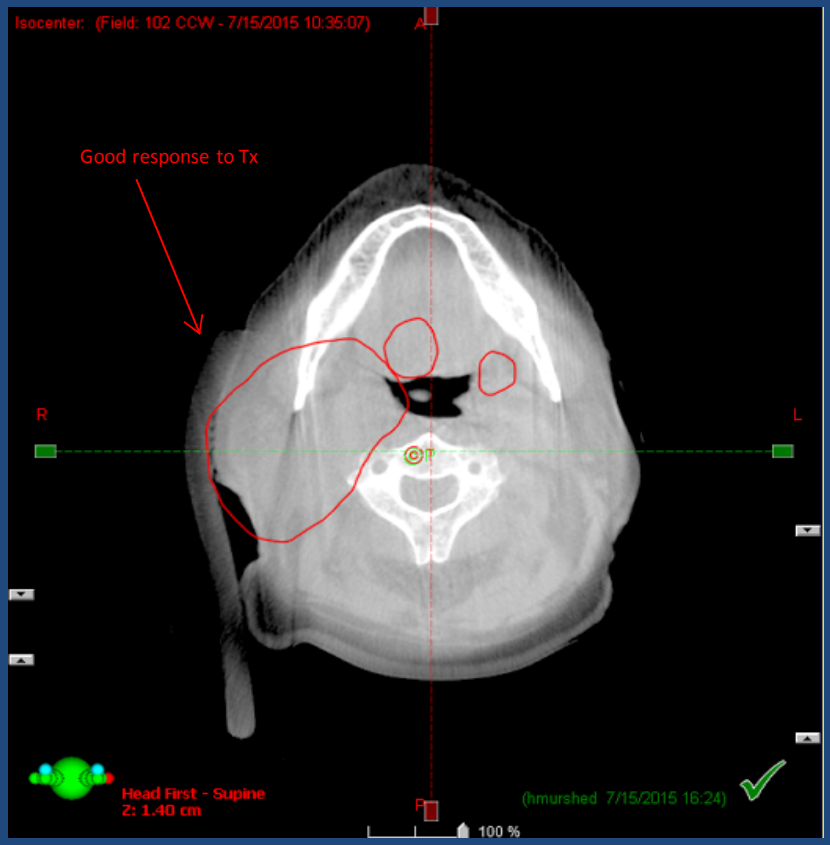


Daily CBCT

CTSim scan



CBCT scan



Rt tonsil SCCa

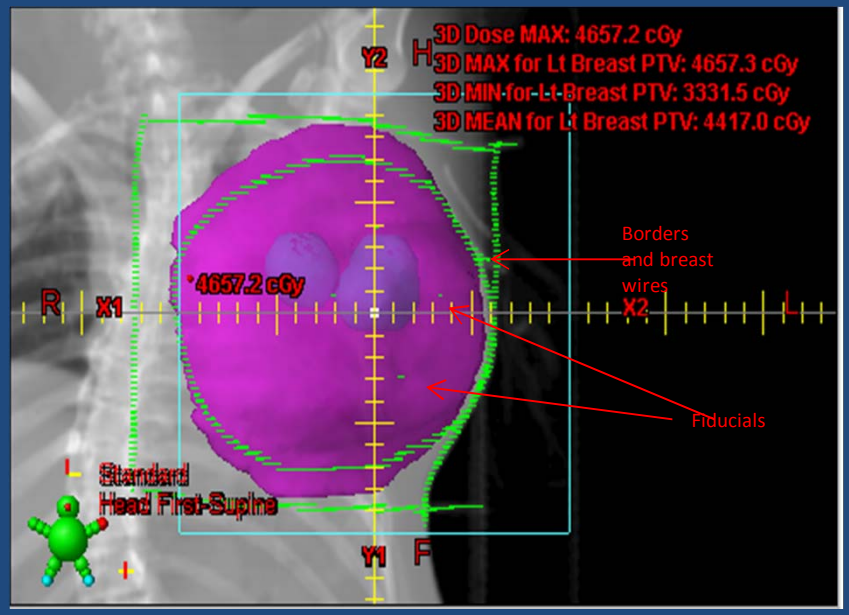
- RART Plan met Rx and constraints
  - Lt Parotid gland V26=25%, spinal cord=43Gy, Larynx=35Gy
- Currently under Tx, good response to Tx
  - Will get re-CT at 4000 cGy and re-plan
- Rt ear pain resolved, Rt neck mass decreased
- Pain meds reduced
- Typical H&N chemoRT side effects
- On peg tube for feeding

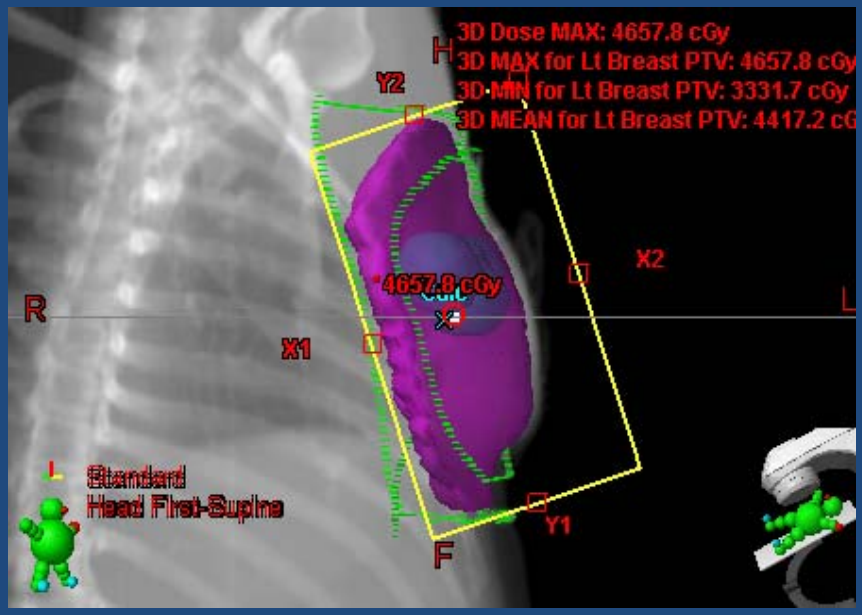
Invasive ductal cancer

- 49 yow, no family h/o breast cancer
- MGM/US + for Lt breast 1.6 cm mass at 10 o'clock
- Bx + for mod diff IDC
- MRI + Lt breast mass, no other mass
- S/p lumpectomy/SLND, neg LN/margins
- ER/PR +, Her 2 neu +
- Stage pT1cN0M0, IA
- S/p Taxol, carboplatin, Herceptin x12
- Presented for post-op RT to 6120 cGy

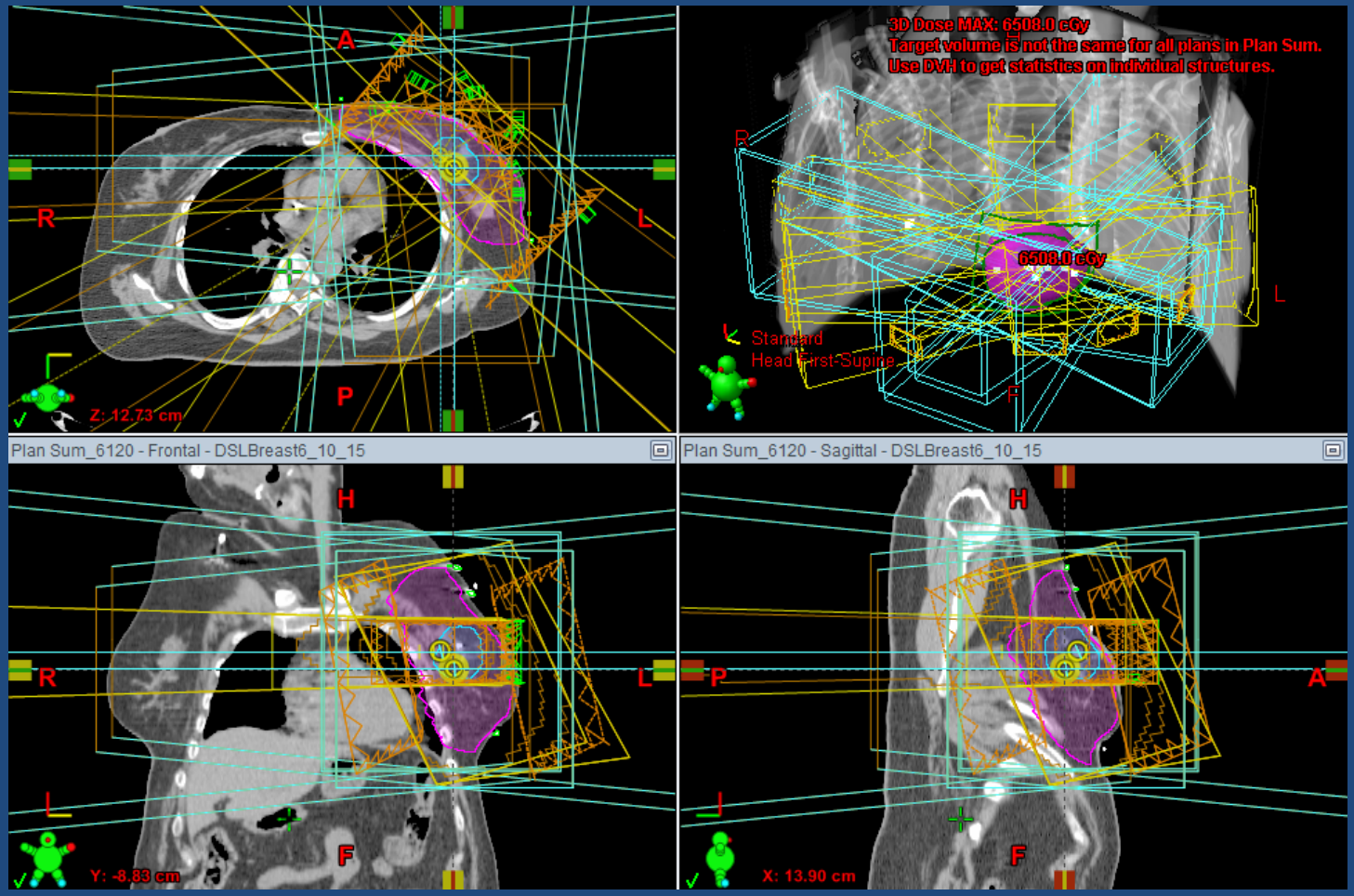
CTSim and volumes

- AP and Med view

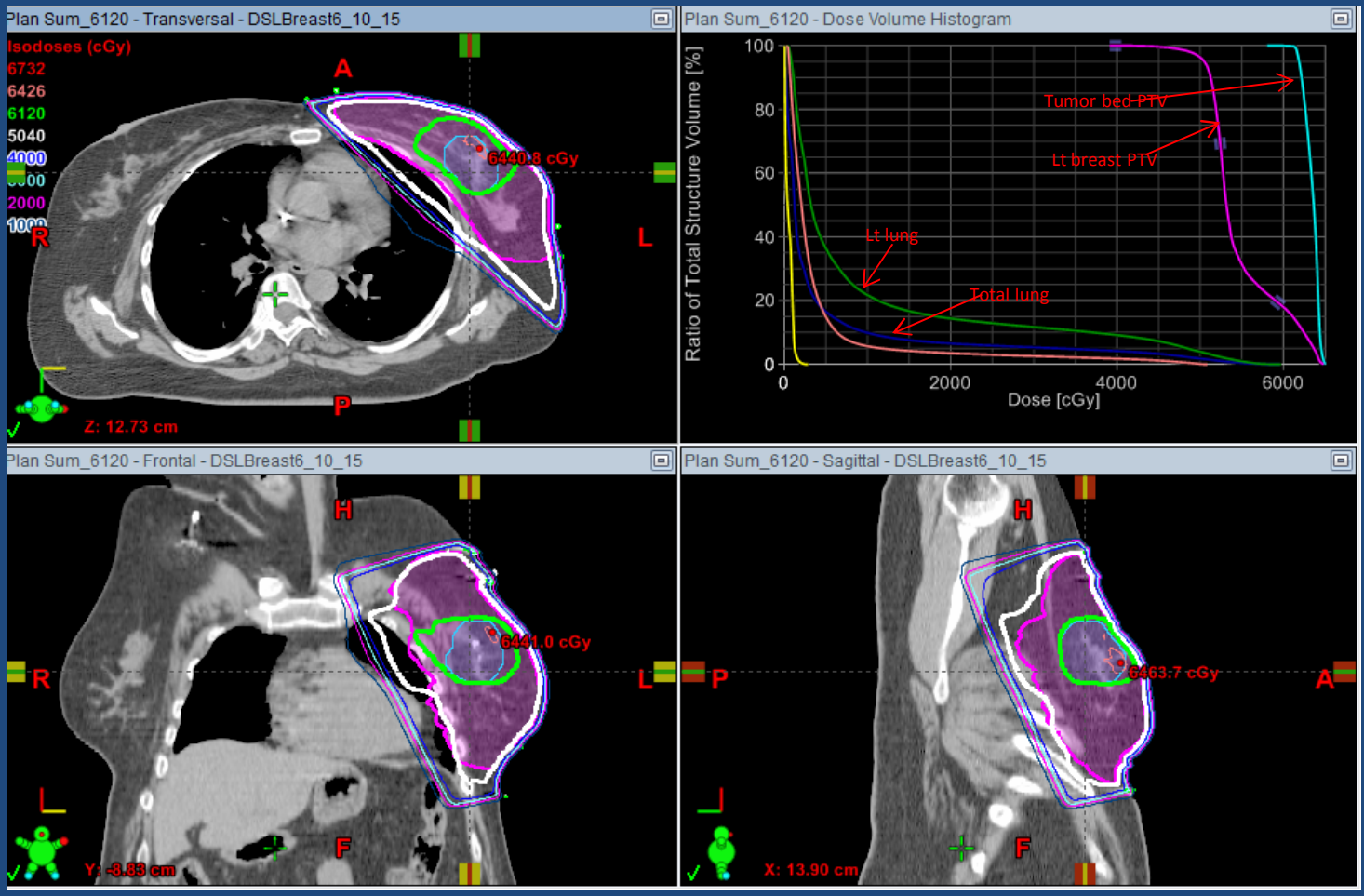




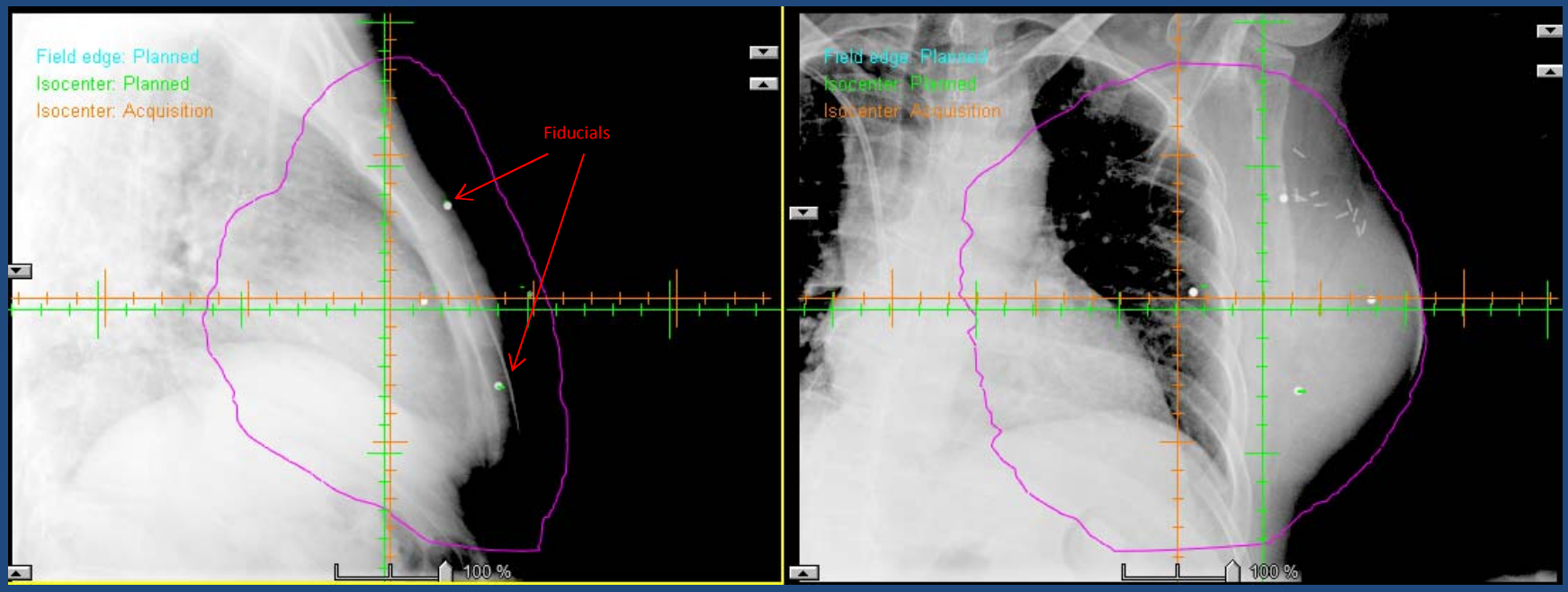
RT beam orientation



Isodose lines/DVHs



Daily X-ray IGRT



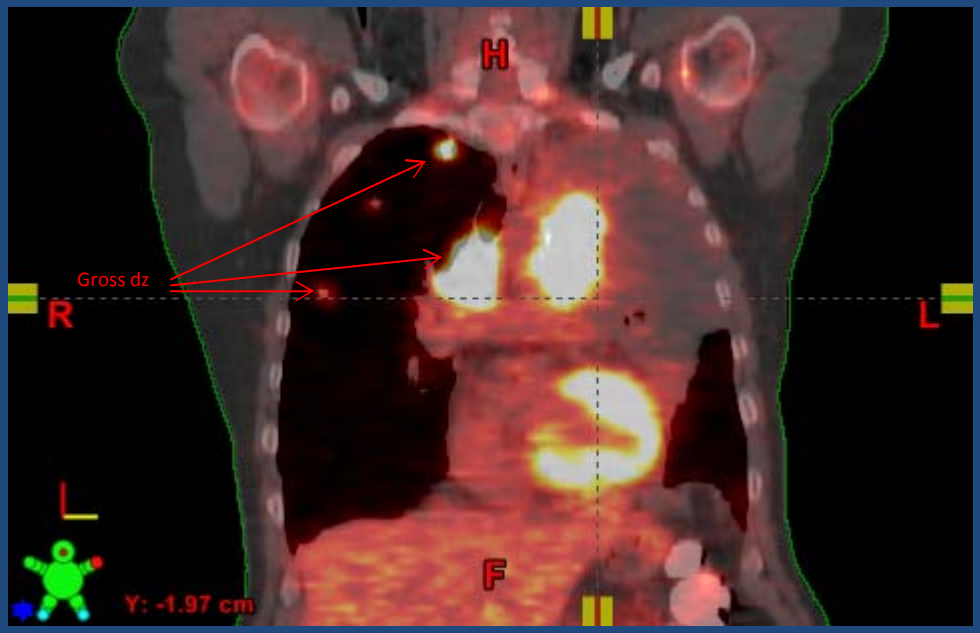
Invasive ductal cancer

- IMRT plan met Rx and contraints
  - Hot spot=5%, total lung v20<6%, heart V30<3%
- Currently under Tx, dose 4500 cGy
- Pt is doing well, no skin reaction

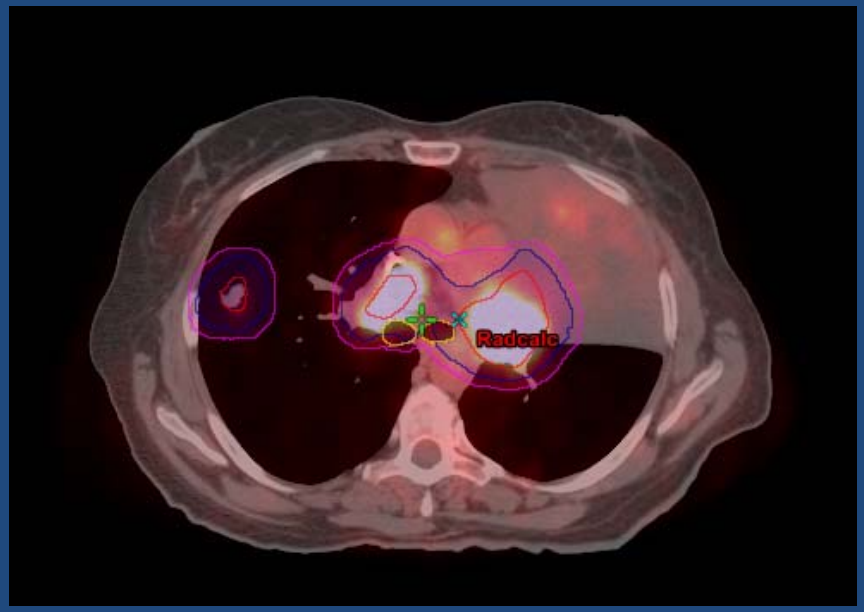
Lt lung NSCLC

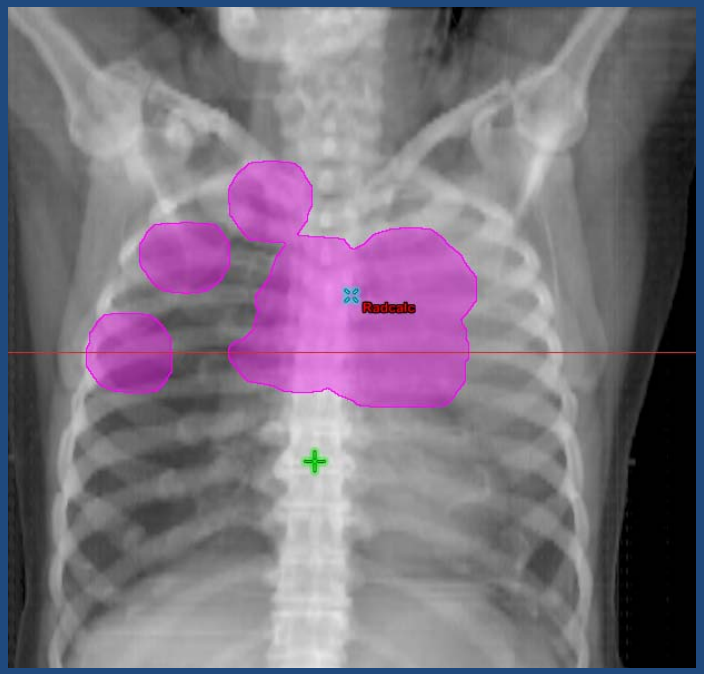
- 61 yow with h/o lt breast IDC, s/p lumpectomy/RT in 2007, current smoker
  - C/o lt cw pain radiating to lt shoulder, wt loss
- CT c/a + lt lung mass
- PET scan + lt lung mass/AP window LN/rt paratracheal LN/RUL nodule
- Transbronchial bx + PD NSCLC
- Stage T2aN3M1a, stage IV
- ChemoRT to 7000 cGy, Carbotaxol qwk

PET scan

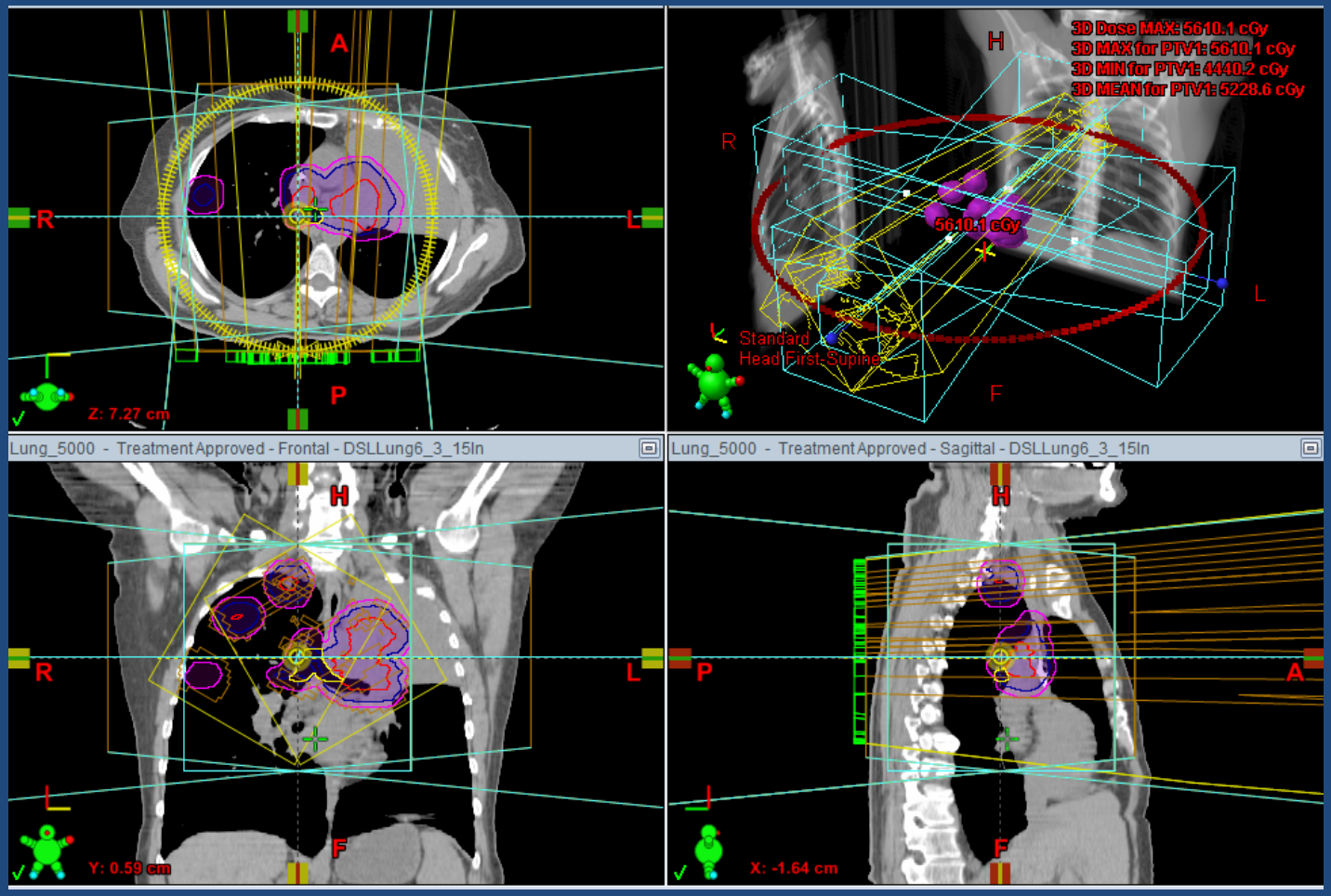


PET fused with planning CT

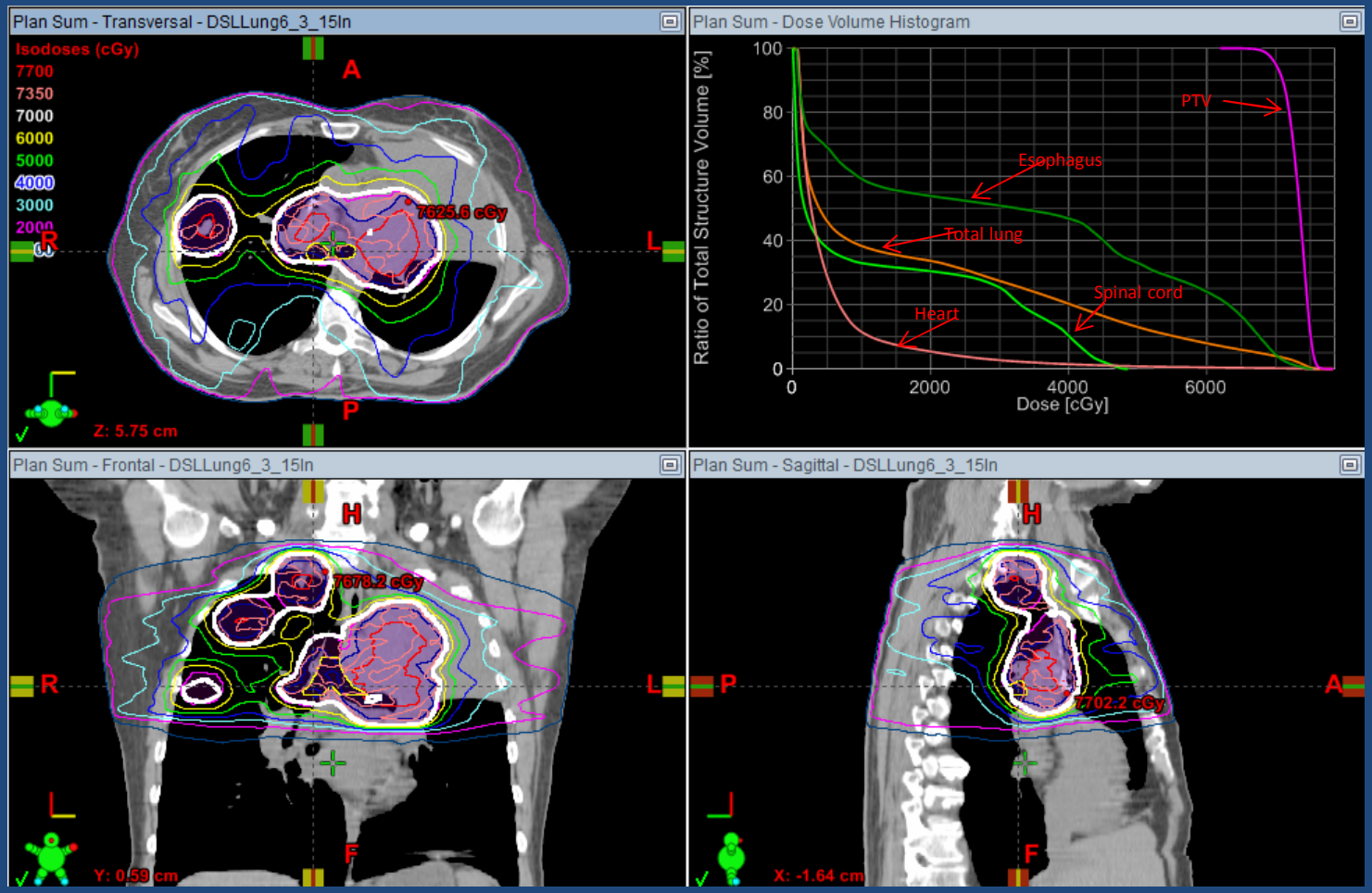




RT beam orientation



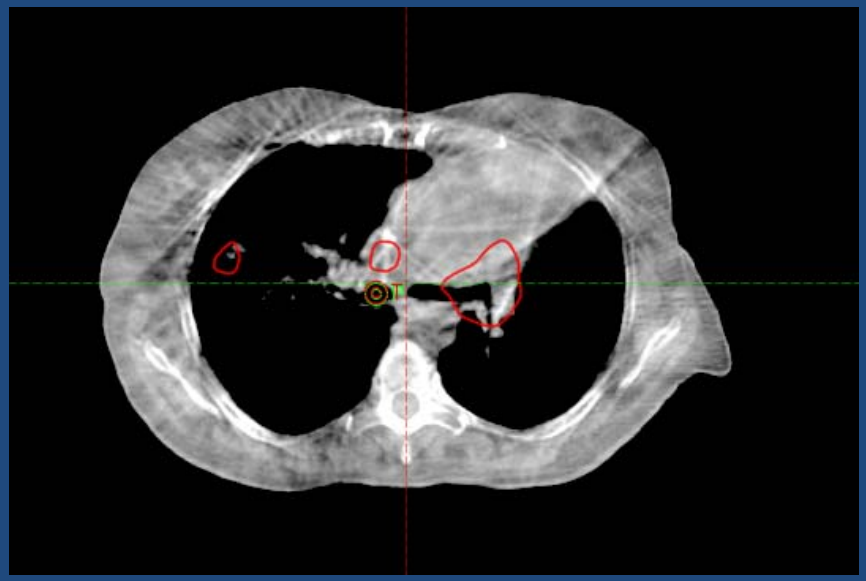
Isodose lines/DVHs



Daily CBCT

CTSim scan

CBCT scan



Lt lung NSCLC

- RART plan met Rx and constraints
  - Total lung v20=33%, V10=39%, heart v30=3%, spinal cord=46Gy
- Currently under Tx, good response to chemo/RT
- Rescan at 4000 cGy and replan
- Doing well, no SOB/cough/esophagits
- Quit smoking

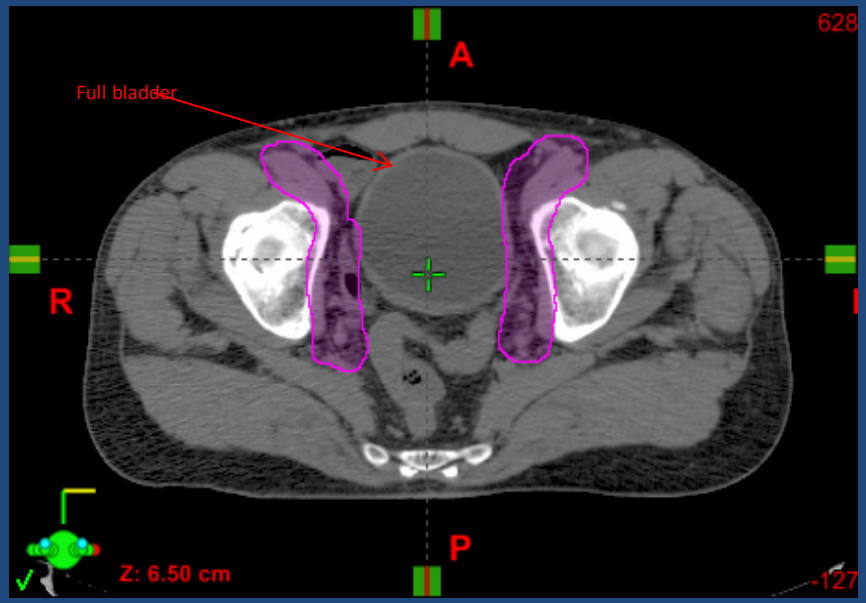
Prostate adenocarcinoma

- 58 yom c/o increased nocturia, suspected prostatitis, Txed with antibiotics
- Noted PSA 2.4, PCA3 score is 49
- TRUS Bx + CAP, 2/12 + cores, gl 3+4=7
- F18 NaFl PET neg for mets
- IPSS score is 21
- Surgery not recommended
- RT to 7560 -7920 cGy, HTx declined by pt

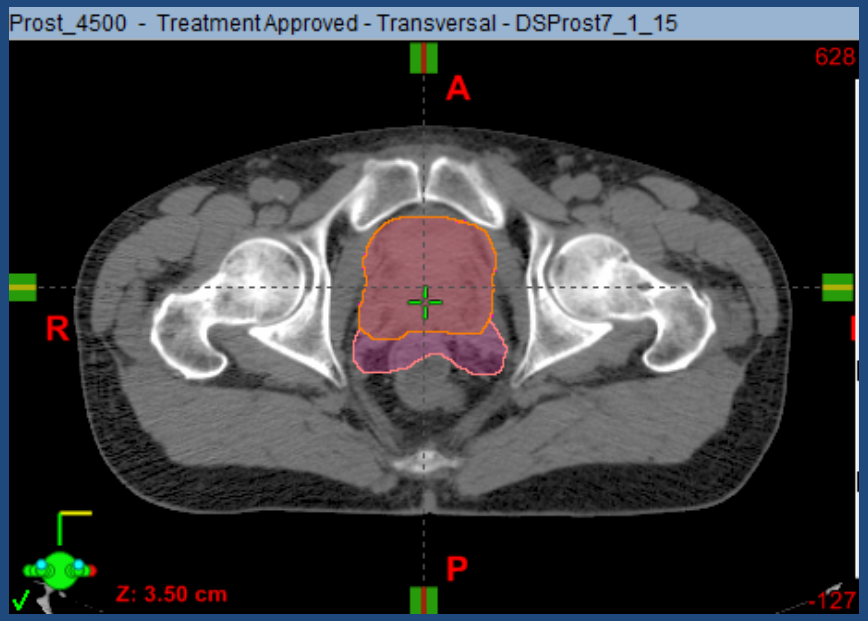
CTSim

Target volumes

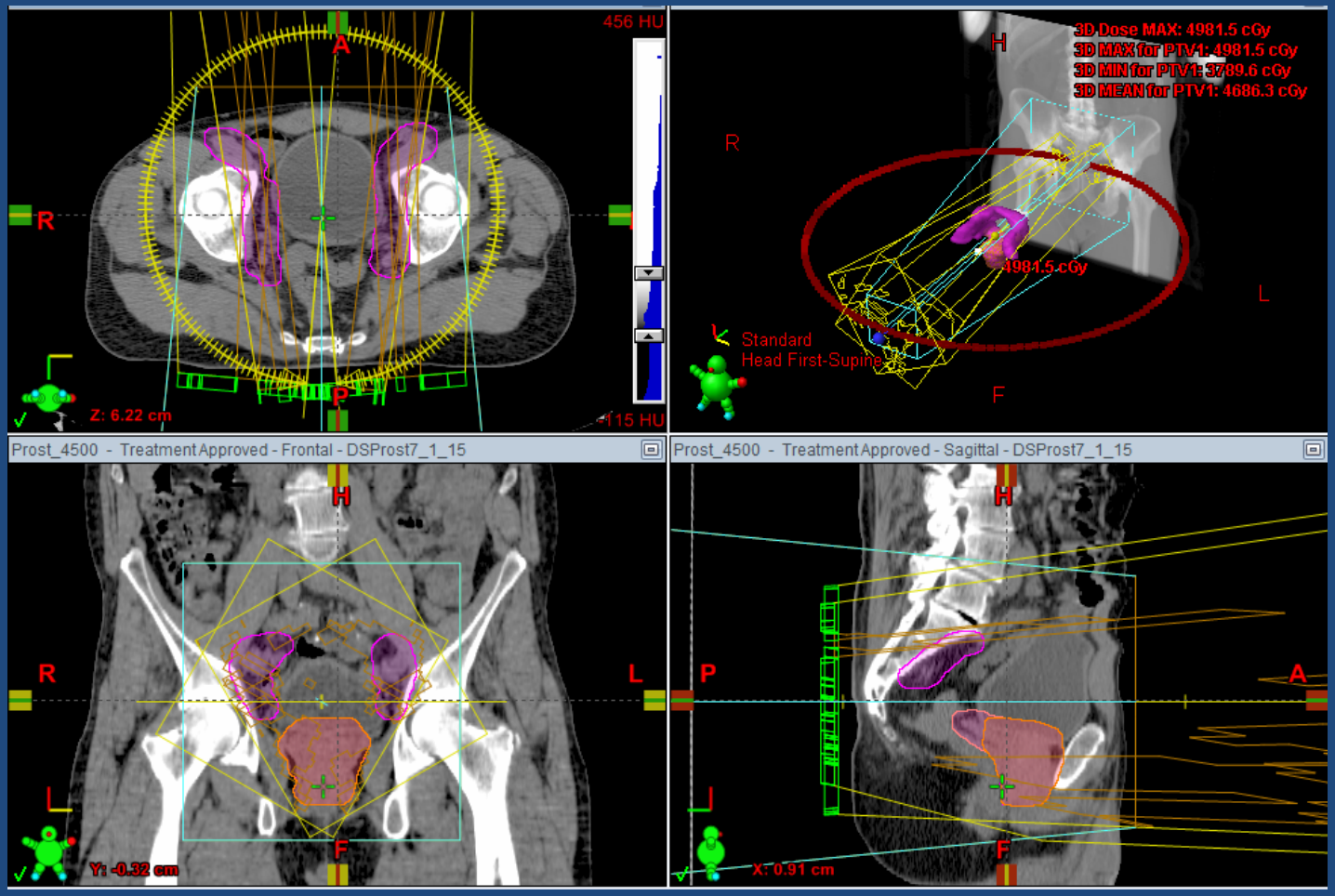
LN target volume



Prostate/SV target volume

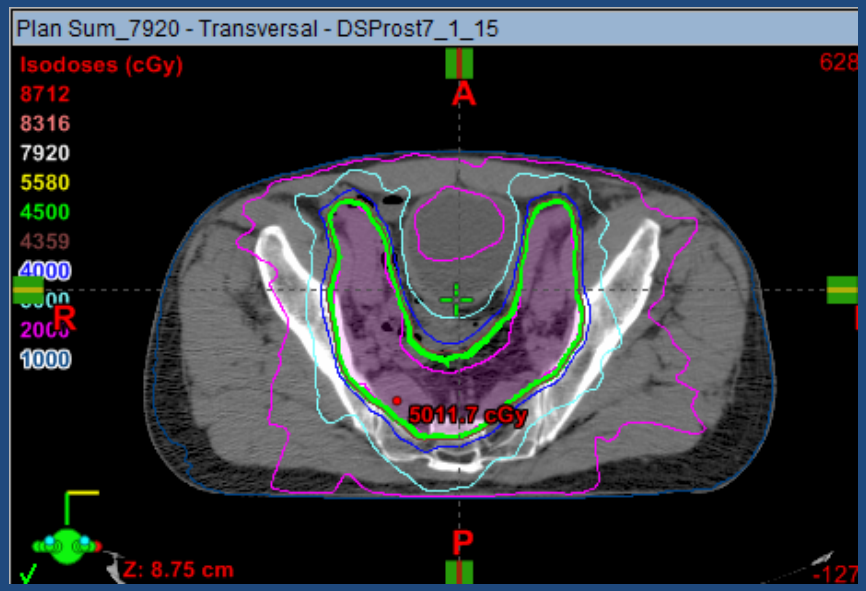


Beam orientations

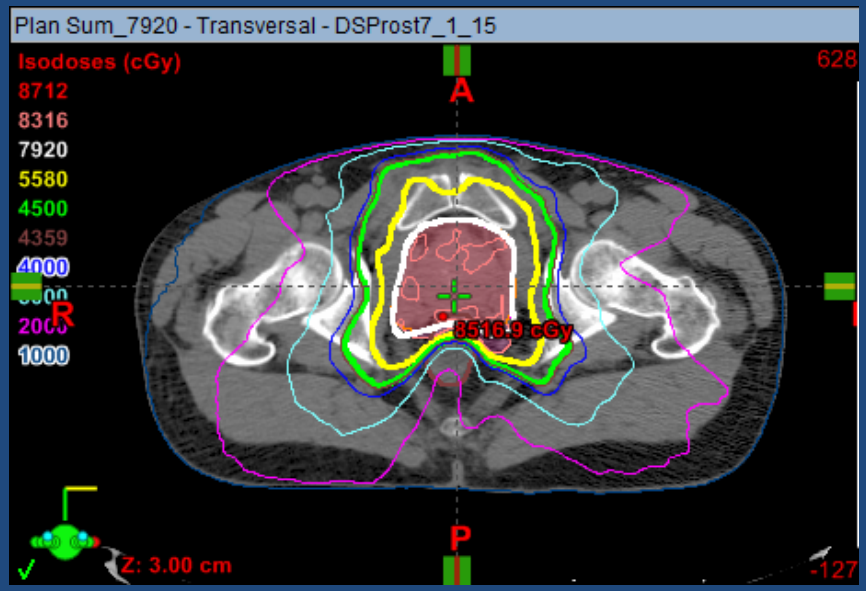


Isodose lines

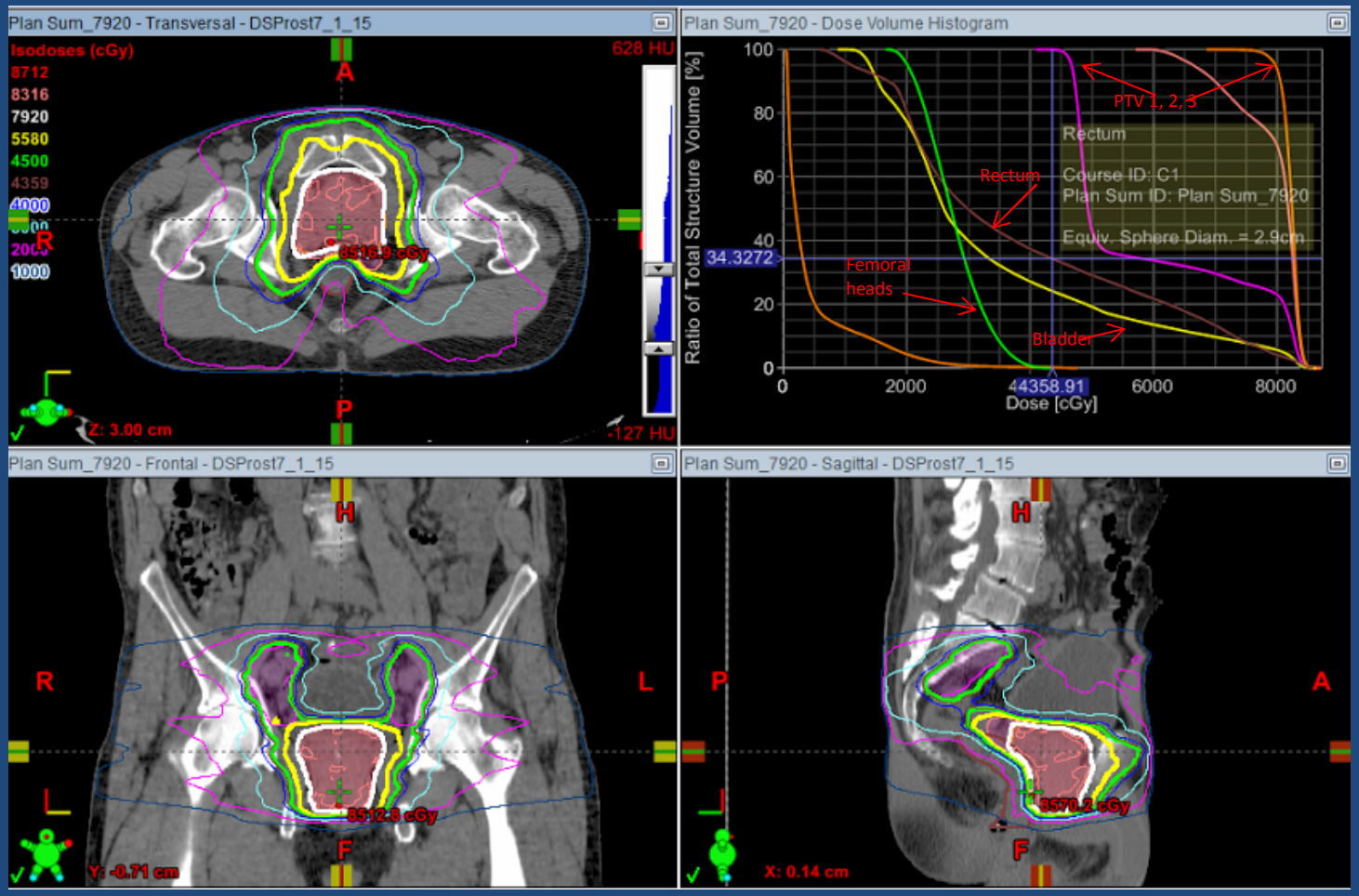
LN coverage



Prostate/SV coverage



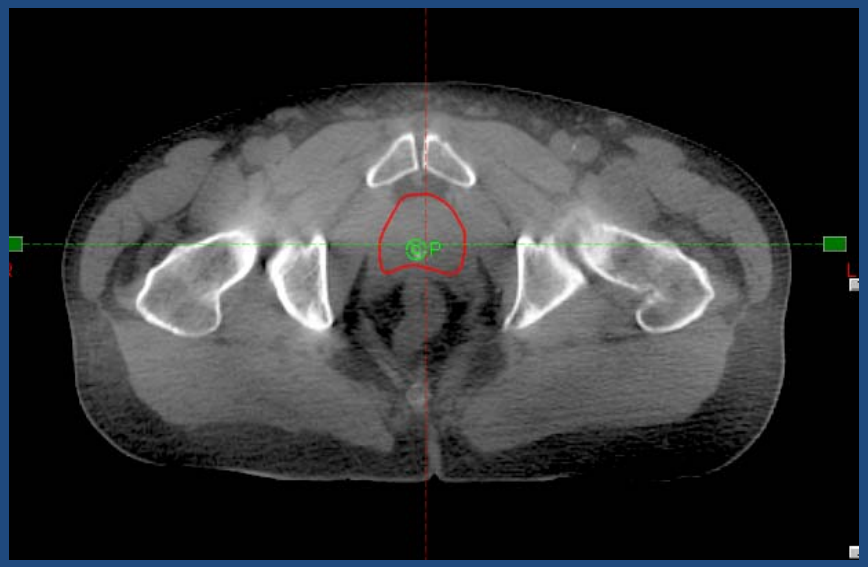
Isodose lines/DVHs



Daily CBCT

CTSim scan

CBCT scan



Prostate adenocarcinoma

- RART plan met Rx and constraints
  - Rectum v75=8%, v70=13%, v50=29%
  - Bladder v75=8%, v70=9%, v65=12%
  - Femoral heads=4000 cGy, v45<0%
  - Penial bulb mean dose=19Gy
- Pt has not started RT yet

Conclusions

- The VMAT/RA varies 3 parameters simultaneously
  - the speed with which the radiation machine rotates around the patient
  - the dimensions of the beam shaping aperture, which molds the radiation beam to precisely fit the shape and size of the tumor
  - the rate at which the radiation dose is given to the patient
- The VMAT/RA technique can turn a 20-minute treatment time into a highly precise 90-second treatment time for many select cancer patients.

Conclusions

- By shortening the treatment time, the effect of the patient's breathing and involuntary movement during treatment can also be minimized, further improving tumor targeting accuracy.

- The benefits to the patients are obvious
  - the cancer can be treated with great precision in significantly less time
  - minimizing side effects of treatment and improving the patient's quality of life
- Patients are much more comfortable with a positive emotional and physical impact.