

Treatment of Symptomatic Local Recurrence and Bulky Pleural Metastases from Thymoma Using Heterogeneously Prescribed Image-guided Intensity-Modulated Radiation Therapy Techniques (IG-IMRT)

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Background

- Standard treatment for thymoma includes surgery with post-operative radiation for select patients. Patterns of failure include local tumor recurrence and pleural metastatic spread. These lesions are often refractory to systemic therapy and become progressively symptomatic.
- We present the case of a 66 year old male patient with locally recurrent thymoma with an enlarging upper anterior mediastinal mass, progressive under multi-agent chemotherapy [CAP]. He was also diagnosed with multiple symptomatic right pleural based metastatic lesions. He had undergone initial resection of the primary tumor, and re-resection with adjuvant radiation therapy to 60 Gy for a local recurrence 12 months prior to this presentation. He was referred for consideration of re-irradiation of second local recurrence with concern for impeding airway compromise (Figure 1).
- Owing to prior radiation exposure, he received palliative heterogeneously-prescribed IMRT to the 53 mm upper mediastinal mass to a dose of 37.5 Gy (max. dose 45 Gy) over 15 fxs @ 2.5 Gy/fx with dramatic radiographic response, near complete tumor resolution while under radiation treatment. (Figure 2-3). Based on this favorable response, consensus recommendation was to also initiate focal radiation therapy to the rapidly growing and increasingly symptomatic pleural lesions.

Methods

Based on PET-CT simulation (Figure 4), an intensity-modulated arc therapy plan (RapidArc, Varian) was developed (37.5 Gy over 15 fractions; heterogeneous dose prescription with dose maximum of 48.8 Gy). Early significant tumor response required re-simulation and adaptive re-planning after 8 fractions (Figure 5). The cumulative V20 lung was 12%, mean liver dose was 18 Gy.

Results:

At 6 week f/u partial tumor response of pleural disease was documented (volume reduction >75%), (Figure 6). The right sided chest wall pain had resolved, and the patient had regained uncompromised physical activity (ECOG 0). PET-CT at 3 months post completion of RT revealed further disease resolution, with near complete tumor response and decrease in maximum tumor SUV to 2.4 (Figure 7).

Conclusions

Modern radiation therapy concepts and modalities, namely heterogeneous dose prescription delivered using rotational IMRT techniques, can result in dramatic tumor response of chemotherapy resistant thymoma and offer effective short-term palliation without appreciable toxicity.

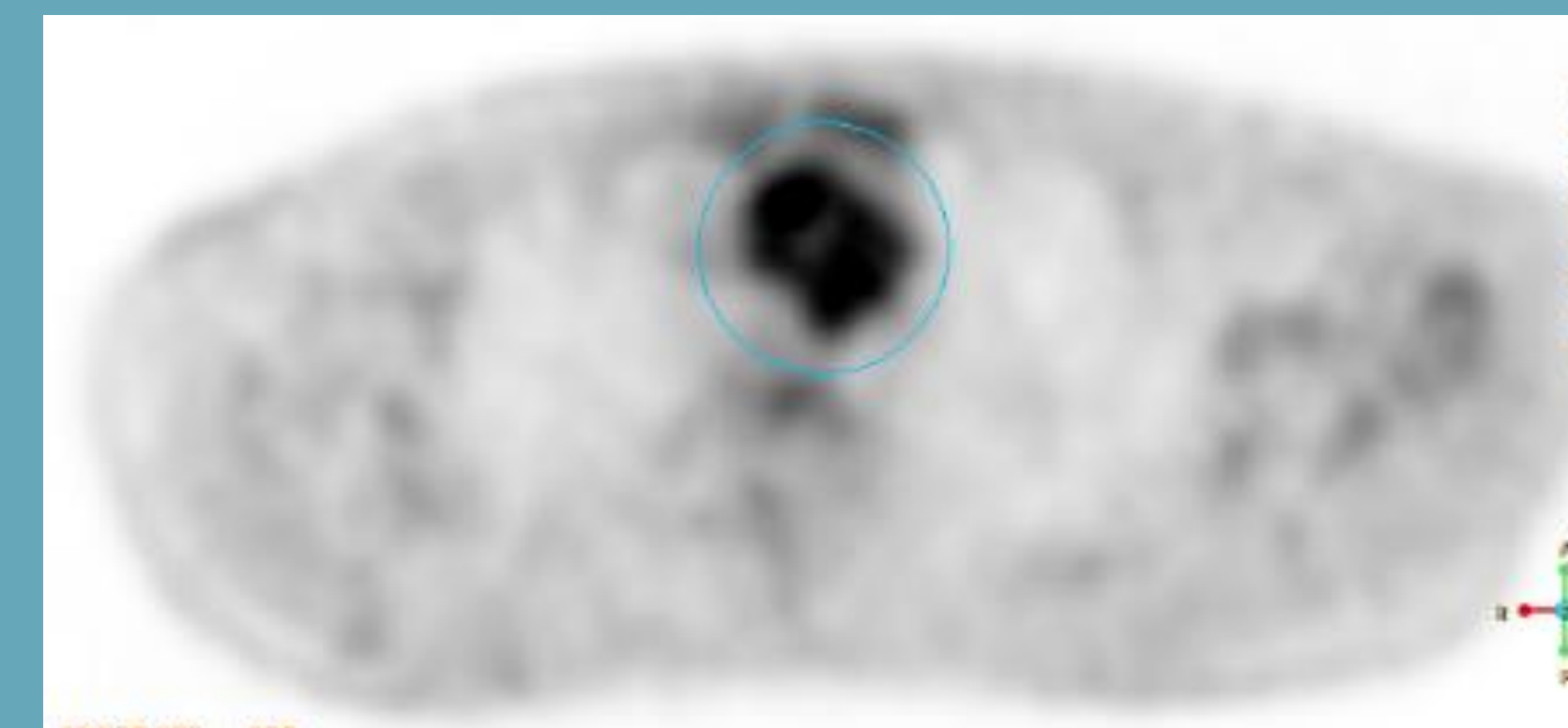


Figure 1: PET-CT simulation of anterior mediastinal lesion; max SUV 3.4

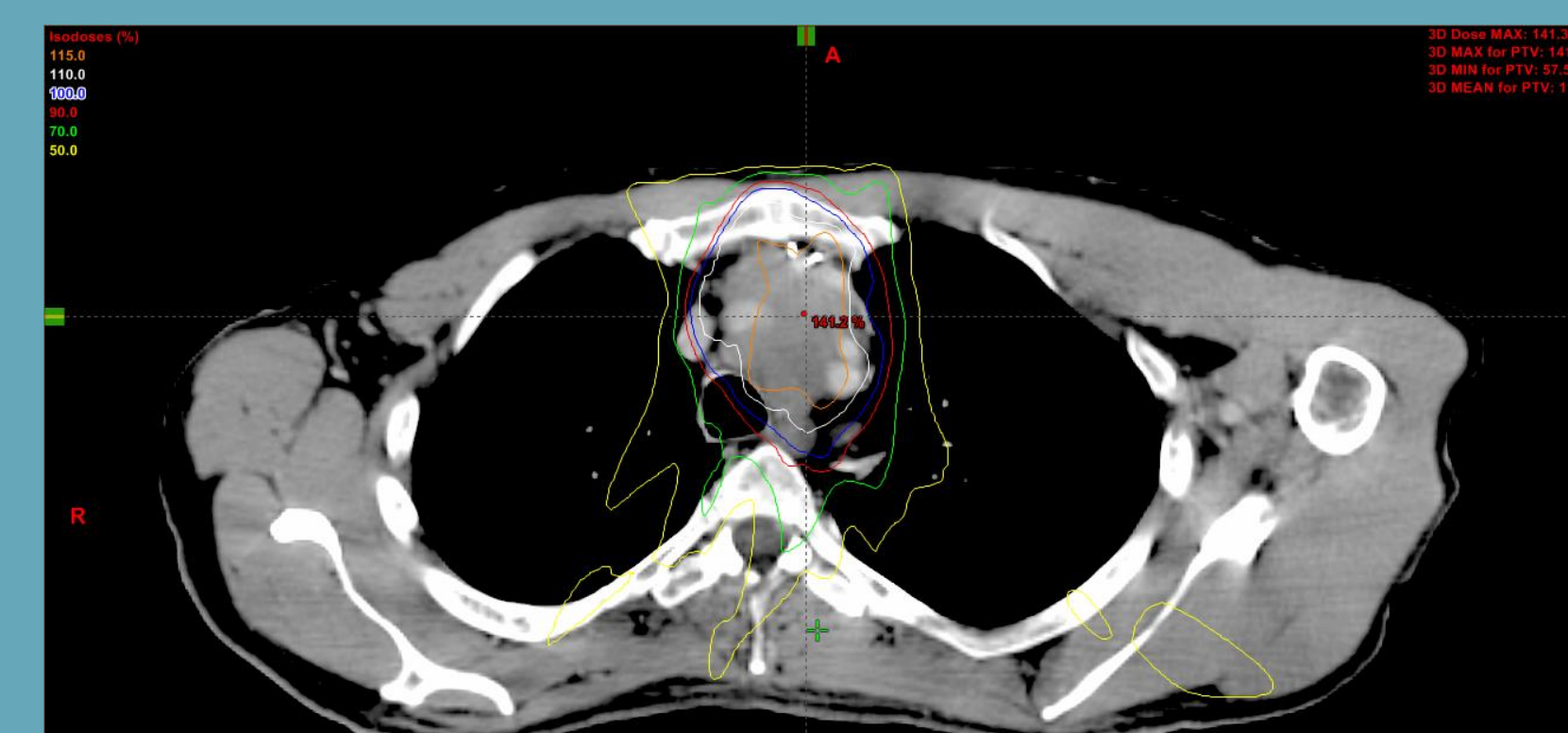
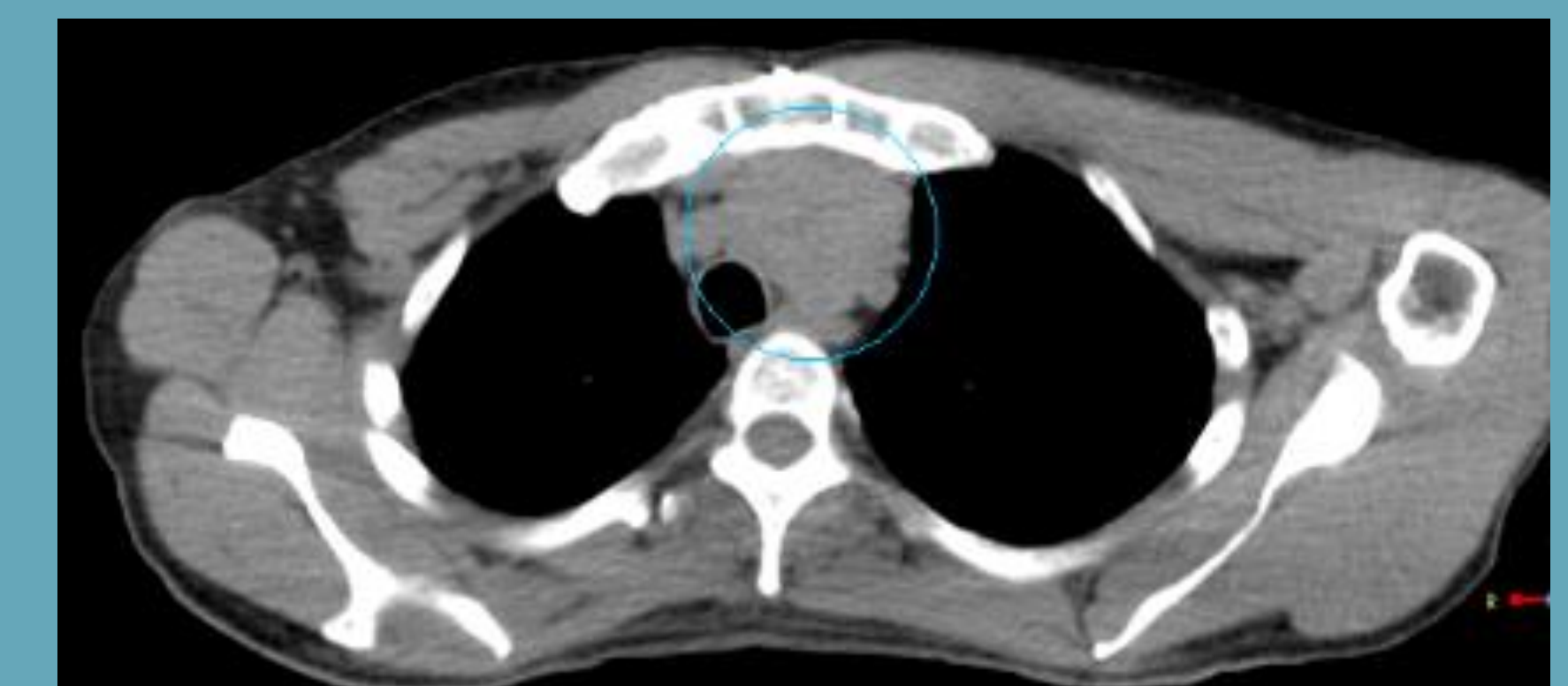


Figure 2: 4 field IMRT plan, Dmax 63.6 Gy, V20 Lung 8%

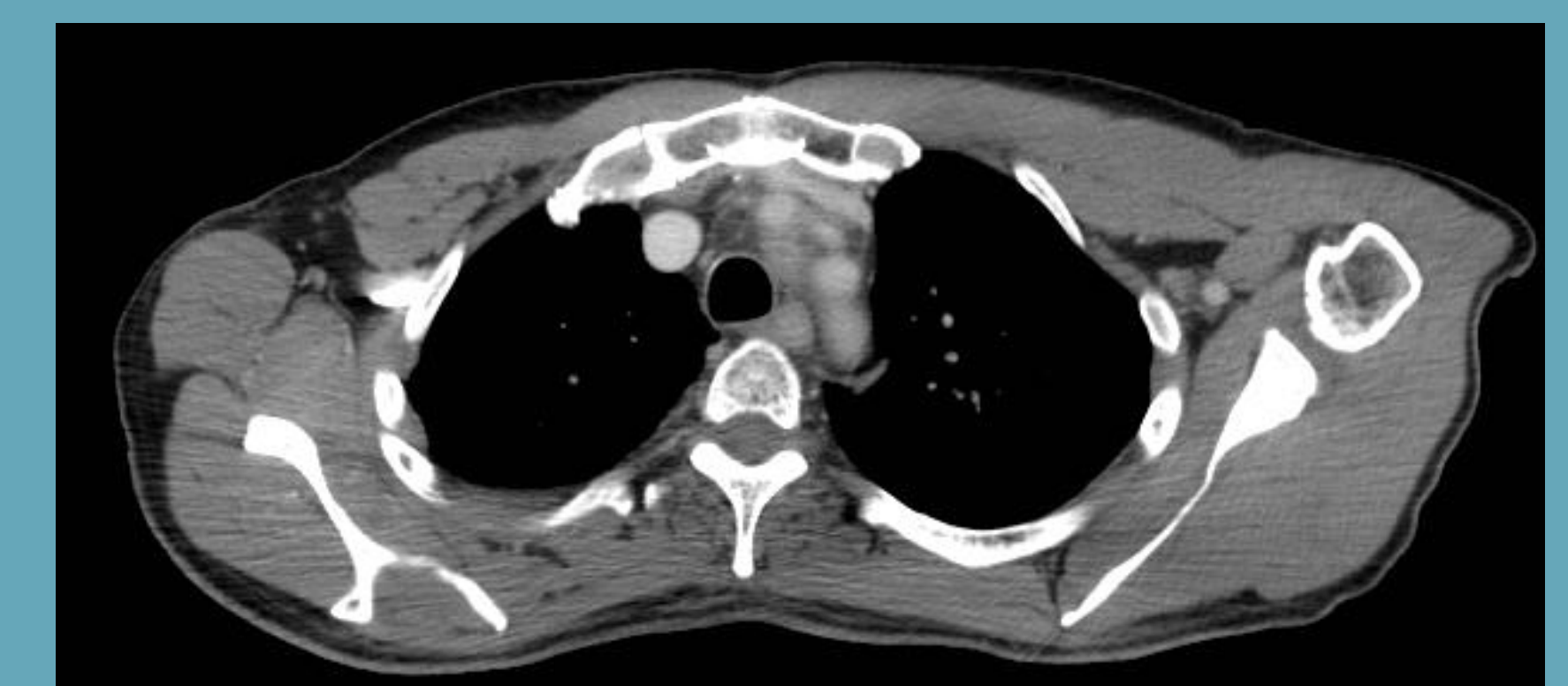


Figure 3: CT thorax at completion of treatment

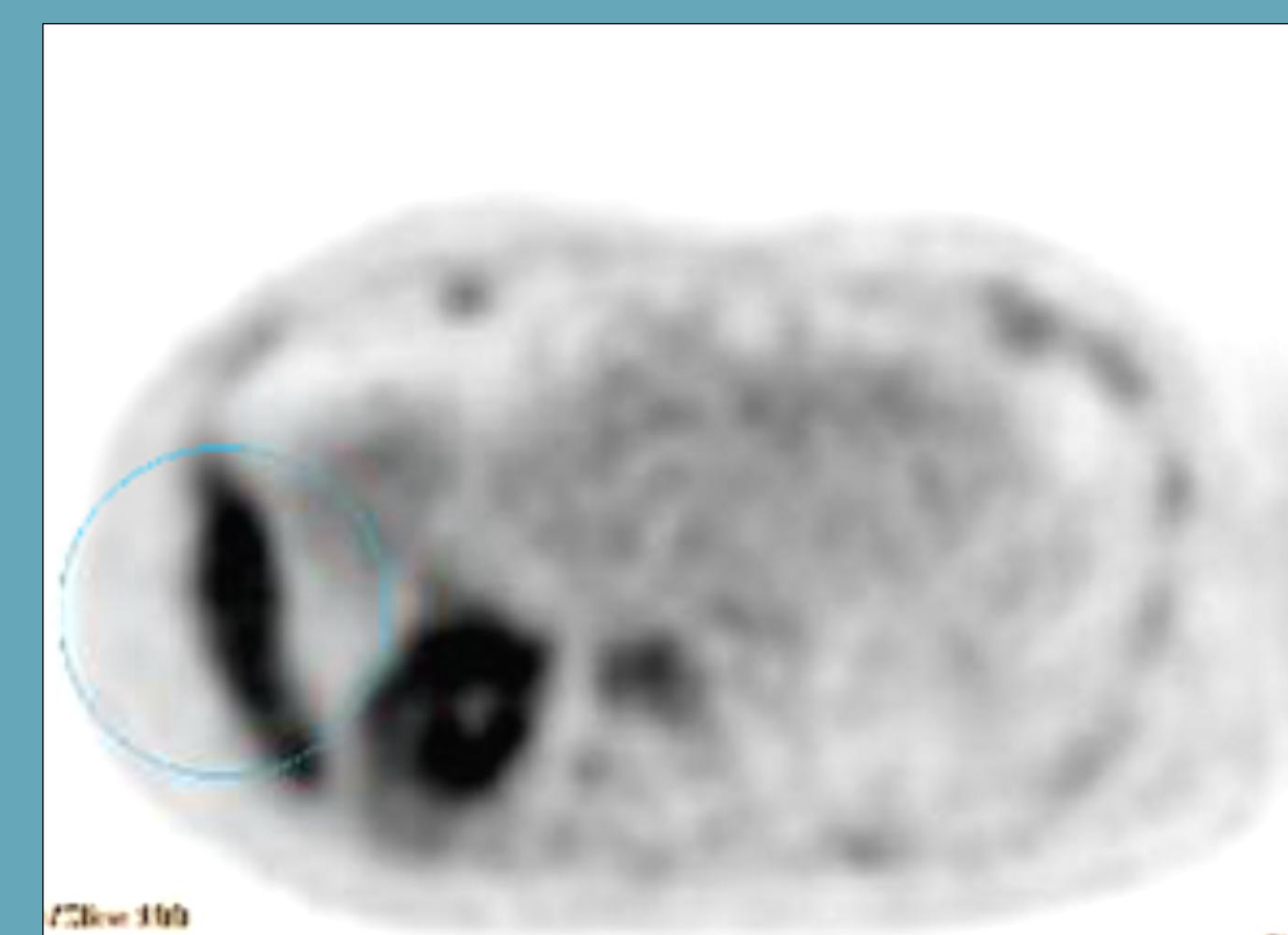


Figure 4: PET-CT simulation. Max SUV 3.8

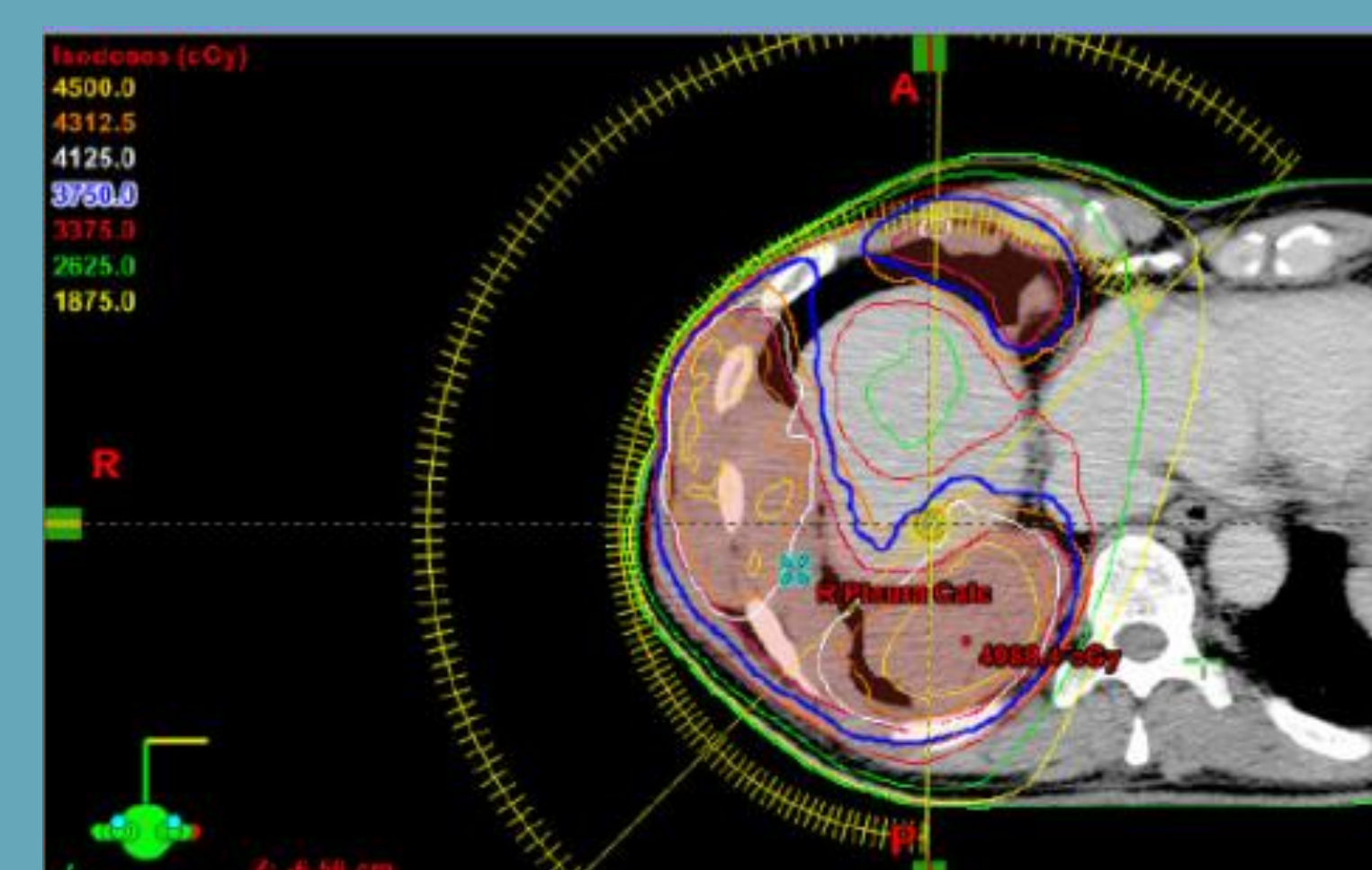


Figure 5: IMRT plan, Dmax 48.8Gy, V20 Lung 12%, mean liver dose 18Gy

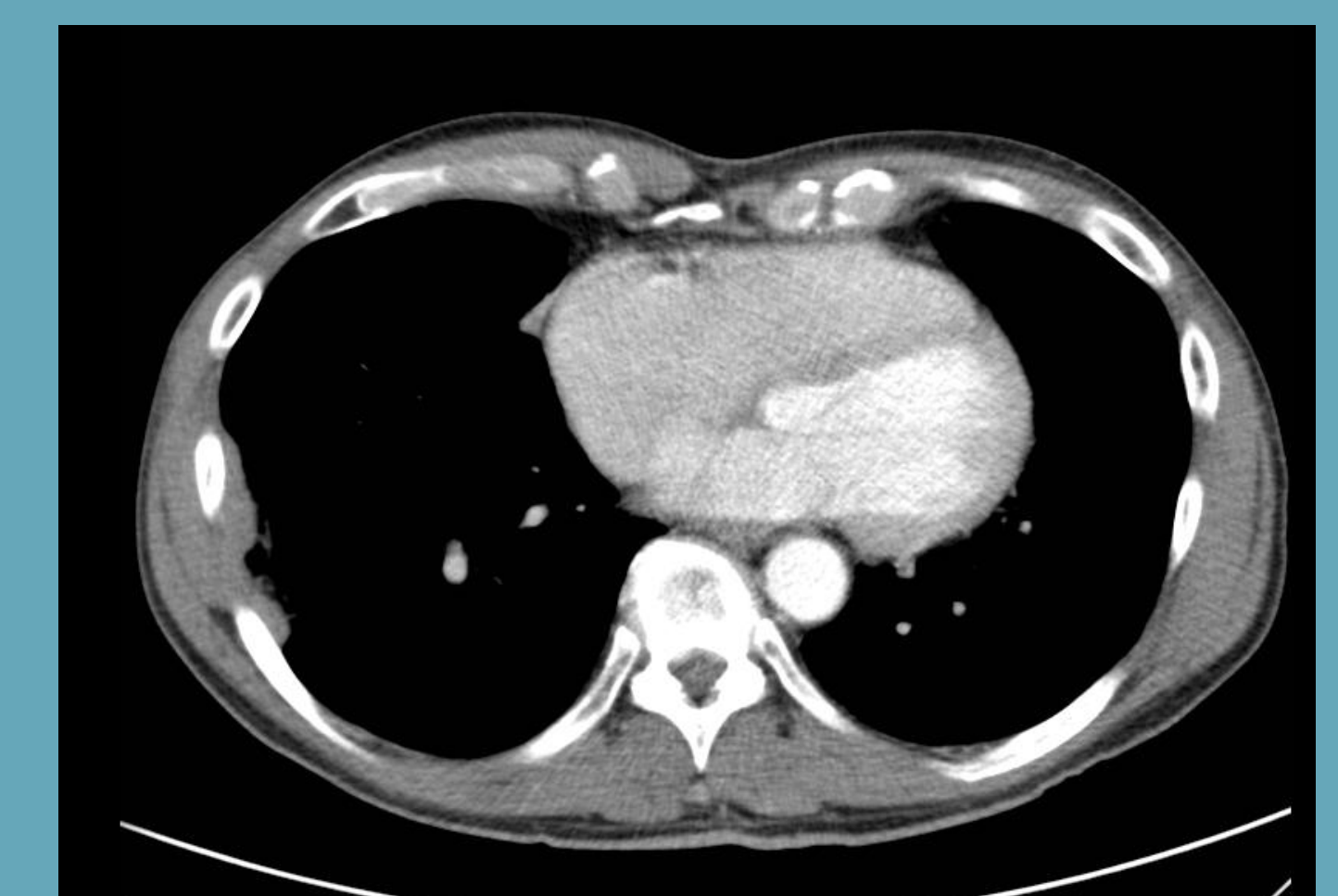


Figure 6: Follow up CT 6 weeks post treatment with >75% tumor reduction



Figure 7: Follow up PETCT at 3 months post treatment. Max SUV 2.4.