PET-CT based metabolic regression velocity following SBRT for spinal oligometstases

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Introduction

SBRT, predominantly, causes indirect cell kill through Ceramide induced vascular apoptosis which starts few hrs after treatment & peaks around 3rd day. Another mechanism of cell kill occus through immunological alteration in the host tumor microenvironment which starts around 3rd day post-treatment & peaks at 10-12 days.[1] Routine Post SBRT follow up imaging is advocated after 3 months.

Objective

In this study, we evaluated the clinicoradiobiolgic response with the aid of serial FDG -PETCT scans following single or multi-fraction spine SBRT.

Material and Methods

- Study type - Proof of concept study
- No of patients included – Five with localized spinal metastases
- Disease primaries from lung (2 patients), breast (2 patients) and Renal Cell carcinoma (1 patient)
- Location - anywhere from C1 to L5 and/or para-spinal mass less than 5 cms
- Exclusion criteria – patients with 2 contiguous spine levels with >50% body involvement, spinal instability or when the gap between edge of the lesion and spinal cord <3mm.

Radiation protocol –

- Immobilization - S board rigid fixation / body fix immobilization,
- Treatment Fractionation - 16 / 1 fraction or 24gy/3 Fraction based on the clinical scenario, goals of treatment & projected life expectancy.

Imaging protocol –

- Modality used - limited FDG PETCT scan
- Time frame of scans –
  - Pre- treatment (before SBRT)
  - Post-treatment – At 48 hours, 10 days, 30 days, 60 days, 90 days

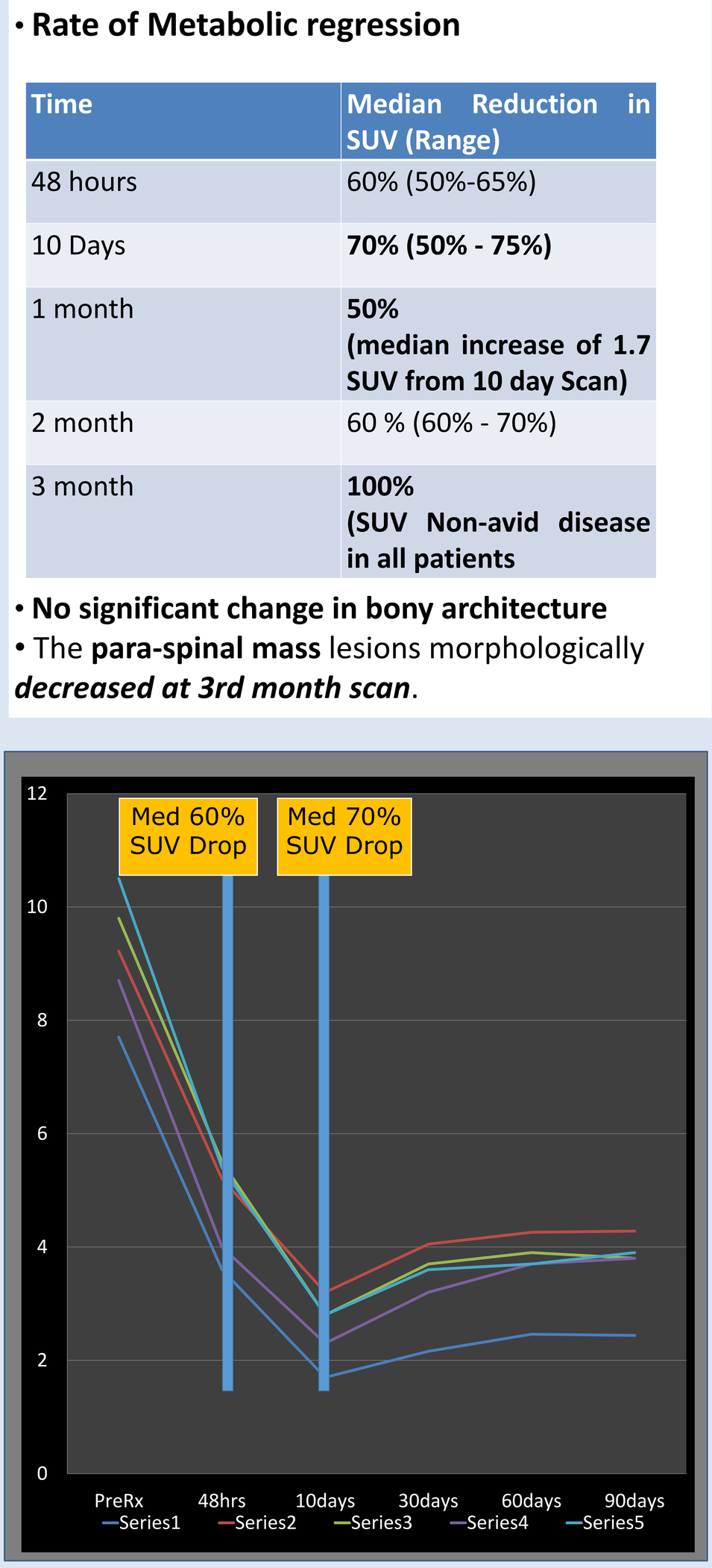
PET-CT images were reviewed in order to determine the pre- and post- treatment maximum standardized uptake value (m-SUV) of the lesion. Morphologic changes in the target lesions and surrounding normal bony were studied on the PET-CT images during the 3 moth evaluation period.

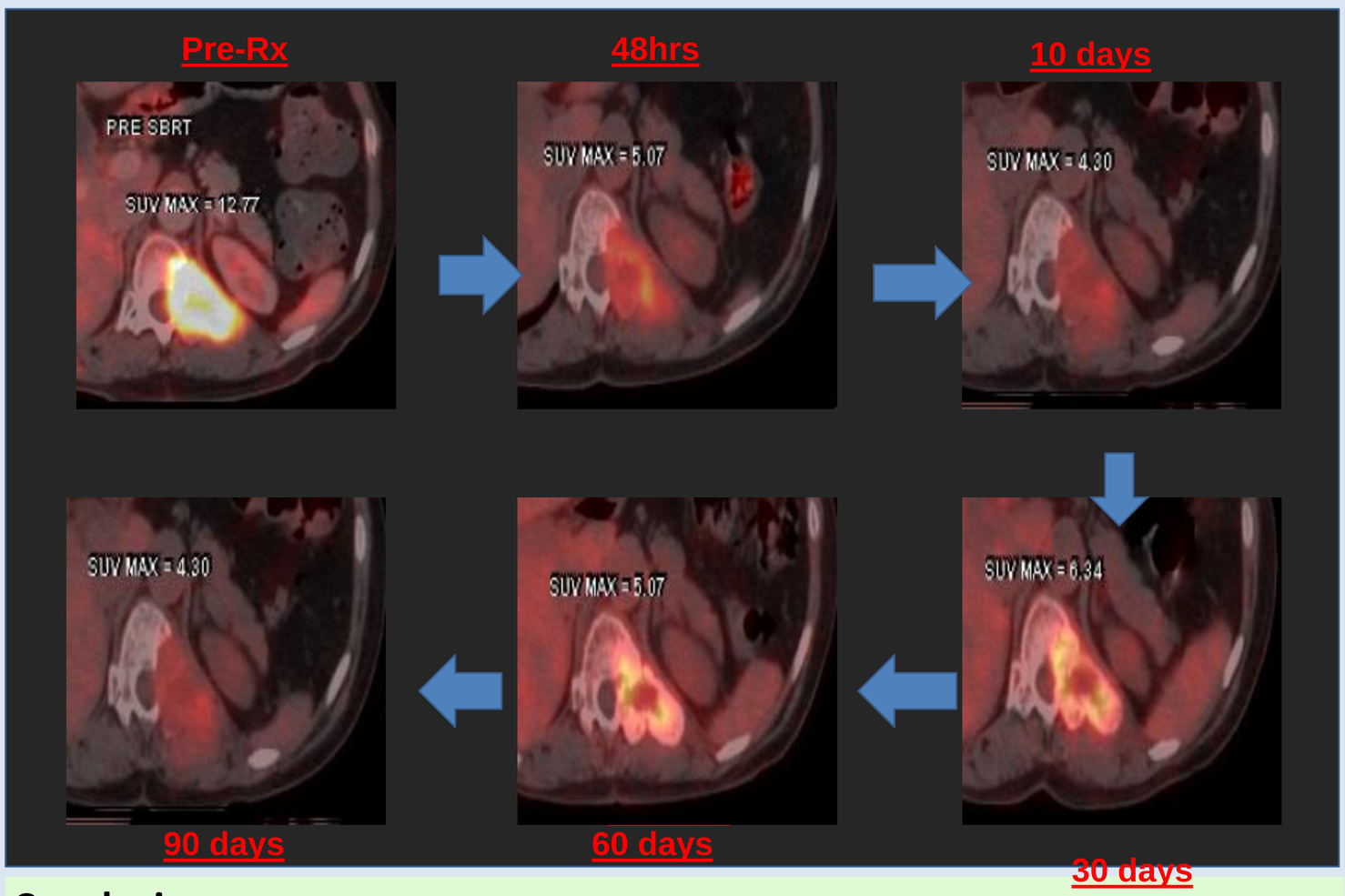
Results

- **Serial Regression observed in all 5 patients**.
- **Rate of Metabolic regression**

Time	Median Reduction in SUV (Range)
48 hours	60% (50%-65%)
10 Days	**70% (50% - 75%)**
1 month	**50% (median increase of 1.7 SUV from 10 day Scan)**
2 month	60 % (60% - 70%)
3 month	**100% (SUV Non-avid disease in all patients**

- **No significant change in bony architecture**
- The **para-spinal mass** lesions morphologically ***decreased at 3rd month scan***.





Conclusion

Early metabolic response following Spine SBRT can be seen as early as 48 hours post treatment. The maximum metabolic response was seen at 3 months post SBRT.

This is the first study reported in literature which looked into the serial metabolic trending in first 3 months post Spinal SBRT for spinal oligometastatic disease.

Bibliography
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