



Proton Therapy Enables Hemi-Thoracic Irradiation in Malignant Pleural Mesothelioma: A Prospective Dosimetric Analysis From the HIT-Meso Trial

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Background

- Between 2016-2018 nearly 7000 UK individuals were diagnosed with malignant pleural mesothelioma (MPM).
- The use of radiotherapy with MPM is predominantly limited to palliation, with only 15% of individuals receiving any radiation. Previous trials of conventional radiation to the hemithorax have resulted in high toxicity rates.
- Standard of Care (SoC) systemic therapy consists of immunotherapy, but outcomes remain poor with a 3-year OS of <25%. There is no benefit seen with early initiation of systemic therapy. As a result, deferral of systemic therapy until there is evidence of progression is SoC.
- Several radiotherapy planning studies have shown the potential benefit of Proton Beam Therapy (PBT) for hemithoracic radiotherapy in individuals with MPM due to reduced radiotherapy dose to healthy tissues, however clinical data remains limited to single centre retrospective cohort studies.
- This study reports on the dosimetric outcomes from the first individuals enrolled in the HIT-Meso trial. The PBT treatment plan prescribed 50 Gy in 25 fractions to the hemi-thorax clinical target volume (CTV), with a simultaneous integrated boost to 60 Gy to the visible tumour, defined as the internal gross tumour volume (iGTV).

Objectives

HIT-Meso aims to explore a new SoC first line treatment option to delay the need for systemic anti-cancer therapy in MPM patients suitable for surveillance by evaluating the efficacy and safety of PBT. It seeks to establish whether PBT leads to improved Overall Survival (OS) for these patients, with acceptable acute and late toxicity, and no significant impact on Quality of Life (QoL).

Co-primary endpoints:

- i) Progression-free survival (PFS);
- ii) Overall survival (OS)

Secondary endpoints:

Safety and toxicity, quality of life, health and social care resource use, incremental cost-effectiveness

Methods

- The first nine patients treated with hemi-thoracic PBT as part of the HIT-Meso study were analysed.
- Dosimetric parameters, including target coverage, target volumes, and doses to organs at risk (OARs), were analysed.

Results

- Acceptable target coverage was achieved in all patients.
- Six had right-sided disease and three had left-sided disease; five were male and four female.
- The mean age was 73.3 years, and WHO performance status was 0 in six individuals and 1 in three.

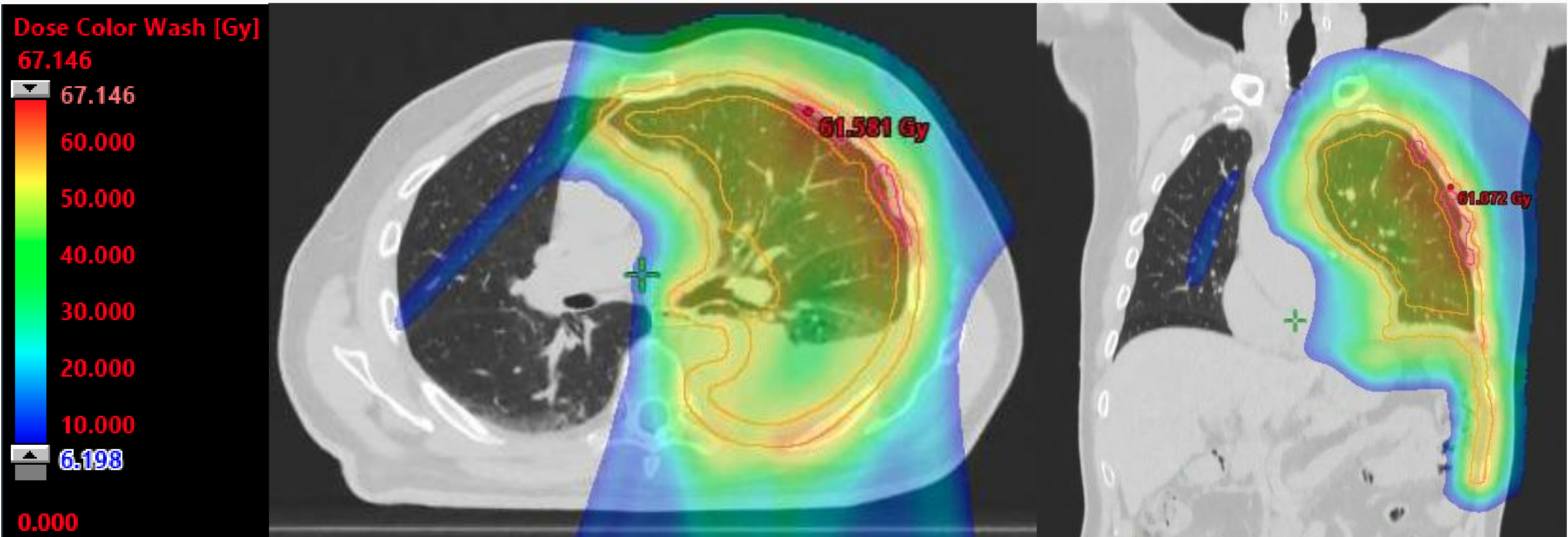
Results

Target Volume Radiation Dose

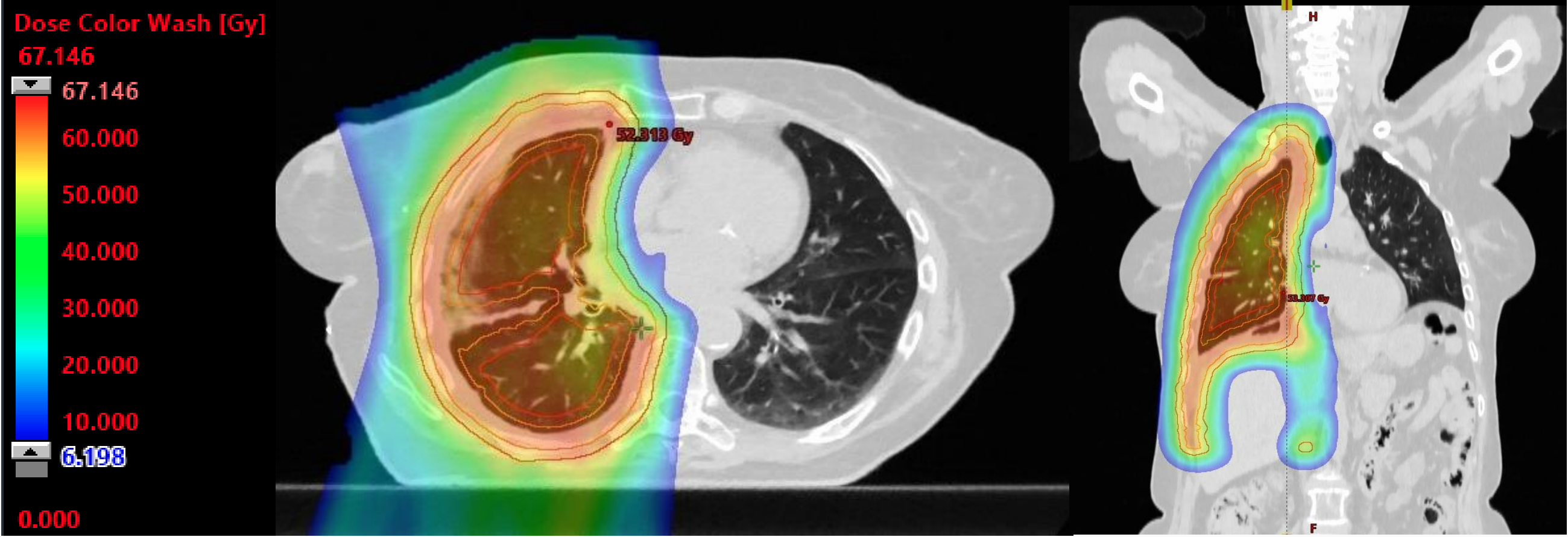
Structure	Mean Dose (Gy)
Nominal D95% iGTV	58.01 (53.41-59.28)
Worst Case D95% iGTV	55.10 (50.62-57.91)
Nominal D95% CTV	51.35 (48.65-58.99)
Worst Case D95% CTV	47.94 (45.92-51.38)

Organ at Risk Radiation Dose

Structure	Mean Dose (Gy)	Constraint (Gy)
Heart	13.31	<15
Contralateral Lung	0.45	<2
Ipsilateral Kidney	7.33	<18
Oesophagus	22.6	<14



Proton beam therapy plan for left sided MPM



Proton beam therapy plan for right sided MPM

Adaptive replanning was required in 8 patients

- In two cases, target volumes were modified to reduce OAR dose.
- Three individuals developed pleural effusions during treatment; these were drained and PBT plans adapted.
- One individual developed an additional pleural nodule, identified as gross disease on day 3 daily cone-beam CT imaging, replanning was required to incorporate this nodule into the iGTV.
- One individual developed a chest infection during treatment, resulting in delays and a replan.

Conclusions

- Hemi-thoracic PBT achieves robust target coverage while minimising radiation to cardiopulmonary structures
- High rate of adaptive replanning highlights the complexity of delivering this treatment
- Trial is ongoing with active recruitment

References:
Allen AM et al, Fatal pneumonitis associated with intensity-modulated radiation therapy for mesothelioma. Int J Radiat Oncol Biol Phys. 2006 Jul 1; 65(3):640-5
Minatel E et al, Radical radiation therapy after lung-sparing surgery for malignant pleural mesothelioma: survival, pattern of failure and prognostic factors. Int J Radiat Oncol Biol Phys. 2015 Nov 1; 93(3):606-13
Baas P et al, First line nivolumab plus ipilimumab in unresectable malignant pleural mesothelioma (CheckMate 743): a multicentre, randomised, open-label, phase 3 trial. The Lancet. 2021 Jan 21; 397(10272):375-86
Schmid S et al, Immediate Versus Deferred Systemic Therapy in Patients With Mesothelioma. Clin Lung Cancer. 2024 Apr 20:S1525-7304(24)00066-4.
Pan HY et al, Early experience with intensity modulated proton therapy for lung-intact mesothelioma: a case series. Pract Radiat Oncol. 2015 Jul-Aug; 5(4):e345-53
Zeng J et al, International Particle Therapy Cooperative Group Thoracic Subcommittee. Consensus statement on proton therapy in mesothelioma. Pract Radiat Oncol. 2021 Mar-Apr; 11(2):119-33
Royal College of Physicians. National Mesothelioma Audit organisational audit report 2019. London: RCP, 2020

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