Frequently Asked Questions

This benchmark case comes from a patient with 2 adrenal metastases that are within 5 cm of each other. PTVs were generated by expanding the GTVs by 5mm in the lateral and anterior-posterior dimensions and by 7mm in the superior-inferior dimension. The metastasis on the right side, PTV\_4500\_7a, overlaps partially with liver OAR while the metastasis on the left, PTV\_4500\_7b, overlaps partially with the stomach and left kidney. The benchmark is to be planned to deliver 4500cGy in 3 fractions, incorporating all guidelines in Section 6.0 of NRG BR001.

**Why do I need to plan a benchmark case?**

Benchmarks serve as a planning tool by which to familiarize each institution with the specific planning goals of the protocol. Due to the complexity of this protocol, the benchmark has been chosen to demonstrate competing requirements of PTV coverage and OAR protection for irradiation of two nearby metastases.

**If I plan the benchmark, am I required to send in patient cases for rapid review?**

A pre-treatment review for the first patient registered at the institution on this protocol must be submitted to TRIAD for review prior to delivery of radiation treatment. If the initial case at the institution treats a single metastasis with SBRT, the institution will also be required to submit their first multiple metastases case to be treated with SBRT for pre-treatment review prior to delivering any protocol treatment. The plan(s) will be reviewed centrally by the PIs within 3 business days (see Section 6.8).

**In addition to the benchmark, what other radiotherapy credentialing requirements exist?**

1. IGRT credentialing for 2 separate anatomical sites is required: 1) lung/liver from a patient treated with the motion management technique you will utilized for this protocol and 2) spine. If you have previously been credentialed for either of these sites by RTOG/NRG, you will not be required to repeat the IGRT credentialing.
2. SBRT phantom irradiation is required to be performed utilizing the motion management technique that will be used to treat patients enrolled onto this protocol. If you wish to use IMRT/VMAT or flattening-filter free (FFF) beams, you must have credentialed for these techniques. If you wish to irradiate two targets with a single isocenter, you must have credentialed for this technique. These irradiations can be combined (e.g., IMRT using FFF delivered with motion management).

To inquire about your current credentialing status, contact IROC-Houston.

**Can my institution plan the benchmark with a single isocenter even though my institution has not yet credentialed to deliver treatment to 2 metastases using a single isocenter?**

Yes, the benchmark can be planned with a single isocenter. Your institution must credential for single isocenter treatment prior to treating multiple lesions with a single isocenter (see Section 5.1.2 & 6.2.5).

**What QA should be performed after importing the plan into my TPS?**

Please verify that 113 CT slices from mid-thorax to iliac crests have imported. In addition, verify that the following structures have imported and appear to be correct (i.e., LUNGS versus LUNG\_L and LUNG\_R):

**Table 1**

|  |
| --- |
| **External** |
| **GTV\_4500\_7a**  |
| **GTV\_4500\_7b** |
| **PTV\_4500\_7a** |
| **PTV\_4500\_7b** |
| **\*PTV\_4500** = PTV\_4500\_7a + PTV\_4500\_7b |
| **\*PTV\_20** = PTV\_4500 + 2cm |
| **\*Non\_PTV** = External – PTV\_4500 |
| **Liver** |
| **Lung\_L** |
| **Lung\_R** |
| **\*Lungs** = Lung\_R + Lung\_L |
| **SpinalCord** |
| **Kidney\_R** |
| **Kidney\_L** |
| **\*Kidneys** = Kidney\_R + Kidney\_L |
| **Stomach** |
| **Bowel** |
| **Esophagus** |
| **Heart** |

**Why is there a separate structure set to download if I use MultiPlan?**

MultiPlan does not allow for a single image voxel to be simultaneously designated as two contours unless the voxels are contiguous, thereby affecting the accuracy of structures such as KIDNEY\_R, KIDNEY\_L , and KIDNEYS. Instead, the non-contiguous, intersecting contour must be a subset structure in order to be properly imported into MultiPlan. Therefore, a structure set with non-overlapping contours has been created for MultiPlan users. Once the structures are imported and verified, proceed to manually generate the contours that are designated by a “\*” in Table 1 within the MultiPlan TPS using the equations supplied.

**What should I do if an OAR is not in the structure set?**

For purposes of benchmark evaluation, only the OAR provided in the structure set will be evaluated. An institution is permitted to contour additional OARs for their planning process but these OARs will not be explicitly evaluated for the benchmark case.

Note for patient treatments, all OARs within 2cm of any metastasis must be contoured and evaluated during the planning process (see Section XXX), even if they are not explicitly listed in Tables 6-6 or 6-7. See Section 6.5.2.

**What QA measurements are required?**

It is not necessary to perform any QA measurements prior to submitting the benchmark plan to IROC. However, the plan should be deliverable based on past institutional experience (i.e., this should not be the institution’s first VMAT plan). In other words, only planning techniques that are routinely used clinically should be utilized for the benchmark plan.

**I cannot meet the PTV coverage requirements while also meeting all the OAR constraints in Table 6-6. How should these competing constraints be balanced?**

Due to the overlap of PTV with OAR, both sets of constraints cannot be simultaneously satisfied. BR001 provides guidance in the “planning priorities” (Section 6.4.5). It is left to the discretion of the institution as to whether they will prioritize PTV coverage over OAR (e.g., stomach) constraints. Keep in mind the following minimum requirements:

1. Spinal dose constraints, as assessed on the composite dose map, must always be met.
2. PTV coverage may not fall below 70% of the 45 Gy prescription dose.
3. No dose greater than 47.25Gy may exist outside PTV. In addition, no dose greater than 47.25Gy may exist in PTV volumes that overlap directly with OAR (e.g., LIVER, Kidney\_L, stomach, bowel). See Sections 6.4.3 & 6.5.4.

**Should the benchmark plan be reviewed by our physician?**

Yes, only benchmark plans that would be considered clinically acceptable for treatment should be submitted. The physician must guide the planning process in order to balance the competing demands of PTV coverage and OAR sparing.

**For an IMRT/VMATplan, is a normalization of 60-90% required?**

For 3D-CRT, a normalization < 90% ensures PTV coverage with beam apertures that are tightly shaped to the PTV (i.e., block edge to PTV is essentially zero). While this normalization is not necessary for IMRT/VMAT plans, every effort should be made to produce compact isodose curves with rapid dose falloff outside the PTV. For purposes of this protocol, the maximum point dose in the plan will be normalized to 100% (see Section 6.4.3).

**How should the conformality of the plan be assessed?**

Section 6.4.3 provides guidelines about the high-dose spillage allowed (page 24 & Table 6-4). In general, doses > 95% of the prescription dose must tightly conform to the PTV. For the benchmark case in which there are 2 nearby metastases, doses of 80% and greater should not treat the entire volume of normal tissue between the metastases but should begin to “break up” between the two lesions. Because SBRT is a conformal treatment, each institution should strive for the highest possible conformality while maintaining OAR dose limits and PTV coverage limits.

**If the plan is intended to treat both lesions simultaneously on the same day, am I required to submit separate dose grids for each lesion?**

No, in cases when a single plan is utilized to treat both metastases it will not be possible to create dose maps for each separate metastasis. In this case, only the composite dose map is required and all dose evaluations for both PTV and OARs will be performed on this composite dose map. See Section 6.7.2.

**How will the benchmark be evaluated?**

IROC and NRG will use the Dose Volume Analysis (DVA) Excel spreadsheet to evaluate the plan. In addition, the protocol PIs and medical physics co-chairs will review the plan in all slices. The composite dose will be used to evaluate all OAR constraints including 105% hotspot location (see Sections 6.2.6 & 6.5.4). If each metastasis is planned for treatment on separate days and individual dose maps have been submitted, these dose maps will be used to evaluate PTV coverage.

Note: The 70% and 105% dose levels will be evaluated as absolute doses of 31.5Gy and 47.25Gy.

Note: it is recommended to download the DVA form and to utilize it in-house during the planning process at your institution.

**How should the benchmark plan be submitted?**

Please use TRIAD to submit the benchmark plan and be sure to designate the submission as a “benchmark case.” A DDSI form must accompany the digital submission. The digital submission should include the RT Structure set and the RT Dose. If lesions are planned using separate plans that are to be delivered on separate treatment days, the RT dose maps for each lesion’s separate plan should be individually submitted. In addition, the composite RT Dose map should also be submitted. See Section 5.2 for more details about TRIAD submission.**Thanks to all institutions for participating in this protocol!**