



What is the difference between standard IMRT QA and IMRT QA with COMPASS?

Answer: Patient-specific IMRT QA can be done in two ways. Fieldwise verification, using a 2D detector (film or electronic detector) with some build-up with perpendicular incident beam. The second option is to use the film or electronic detector placed in a phantom. In both cases the dose to the patient is not verified directly, but a hybrid plan using the original patient's fields applied to the phantom geometry and composition is created. Therefore, the verification does not use the original patient anatomy as defined in the planning CT. Dose computation does not include the effect of inhomogeneity, nor can it evaluate the effect of delivery discrepancies to the target and organ at risk structures.

COMPASS can determine the 3D dose distribution in the patient anatomy, based on the measured beam intensity. Therefore, it directly addresses the expected clinical consequences of delivery discrepancies, which are evaluated (among other representations) as DVH for target and OAR structures.

What is verified with COMPASS - dose or fluence or ...?

Answer: Primarily, COMPASS determines the fluence for all segments in a beam. As this quantity cannot be directly measured, COMPASS does first a calculation of the expected response (=electrical signal) for each segment and detector pixel, based on LINAC and detector models. After the measurement, expected and delivered responses are compared. The residual response (=response difference) is then used for a computation of the really delivered fluence.

The dose computation in COMPASS is a second, independent step in which the resulting dose to the patient is determined based on a collapsed-cone algorithm.

Which measurement devices are used in combination with COMPASS?

Answer:

- MatriXX^{Evolution} detector (1020 pixels) for pre-treatment verification of conformal IMRT plans
 - MatriXX^{Evolution} and Gantry Angle Sensor for pre-treatment verification of rotational plans
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Which beam data is required for the beam model?

Answer: The commissioning is equivalent to a TPS commissioning, and usually data from TPS commissioning can be used (profiles, depth dose curves, output factors, absolute calibration). A list of recommended input data is given in Appendix A.

Which algorithm is used with COMPASS?

Answer: COMPASS uses a collapsed cone superposition algorithm for 3D dose determination.

If my TPS currently calculates with collapsed cone, how is COMPASS an independent verification?

Answer: COMPASS uses the collapsed cone superposition algorithm, but in an implementation which is different from any TPS. The primary quantity determined by COMPASS is the fluence for each segment. Discrepancies in the delivery can be visualized as differences in the response pattern. The fluence determined in COMPASS is then used (together with the planning CT) as input for the dose computation with the collapsed cone algorithm, whose accuracy can be seen at the same level as state-of-the-art TPS algorithms.

A comparison of COMPASS and TPS algorithms (and commissioning) can be done by a pure computational dose determination in COMPASS, just assuming nominal delivery. This dose distribution (as well as the reconstructed dose distribution) can be exported as 3D DICOM dose cube for analysis with other tools.

Which file formats does COMPASS accept?

Answer: COMPASS accepts the following file formats:

- for Plan import: DICOM (see question 8)
- for beam data input: .RFB (IBA) and .ASC (IBA) or ASCII .csv



Which information does COMPASS software need from my TPS?

Answer: For each treatment, COMPASS needs 4 data sets (all DICOM):

- the Plan (DICOM RTPLAN)
 - the TPS dose computation (DICOM RTDOSE)
 - the segmentation (ROIs) (DICOM RTSTRUCT)
 - the planning CT (DICOM)
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How would I use MatriXX Evolution with COMPASS?

Answer: There are 2 versions of gantry mount with SSD = 762 mm (1 cm resolution in isocenter, 31 x 31 cm² max field size) and SSD = 1000 mm (0.762 cm resolution in isocenter, 23.6 x 23.6 cm² max field size) . An additional build-up (30 x 30 cm² plates) is placed on the detector, recommended 20 mm WE. No backscatter is needed.

Can I use COMPASS to verify Rotational Therapy plans?

Answer: Yes. COMPASS 2.0 supports MatriXX^{Evolution} with the Gantry Angle Sensor. Measured frames are recorded together with the measured angle. The 3D dose calculation takes the actually measured gantry angle into account.

If I already have a MatriXX or MatriXX Evolution, do I only need to buy the COMPASS software?

Answer: For each detector used together with COMPASS (MatriXX, MatriXX^{Evolution}) a software interface is needed which contains a detector modeling and control functions.

For verification of rotational plans, the MatriXX has to be upgraded to MatriXX^{Evolution} functionalities in addition. This upgrade includes the Gantry Angle Sensor.

COMPASS. Maximize efficiency. Minimize errors. Better Outcome.