Plan QA

The ElectronRT App includes a set of QA Tools that allow the user to measure each treatment beam dose on a water phantom, compute dose on bolus simulation CT images and compare results, and export QA PDF reports. The QA Tools block is only enabled for approved treatment plans.

Dose QA

The Dose QA block computes and displays the dose for each beam in the treatment plan to a water phantom. For each beam, the user is able to define the SSD and the depth of a measurement plane. This measurement plane will be used to take a cross-sectional sample of the water phantom dose. The dimensions of the water phantom, as well as the default measurement plane depth and dose grid spacing, are defined and editable in the Site QA Options.

After defining the measurement plane depth for at least one beam, the user will be able to click the Export QA Dose Files button to export a QA Dose DICOM file for every measurement plane dose to a local directory. The exported DICOM will include:

1. A 1cm thick dose image around the set measurement plane
2. [optional] The full 3D water phantom dose - if the user has selected the full 3D dose export option

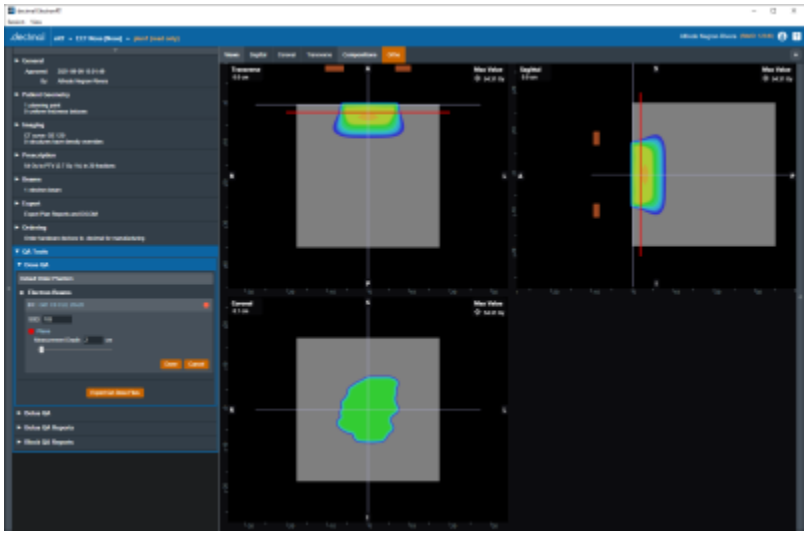

Fig. 1: Dose QA

Bolus QA

The Bolus QA block allows the user to import DICOM CT images and an optional structure set used for bolus QA simulation. The process is very similar to the DICOM Patient Import.

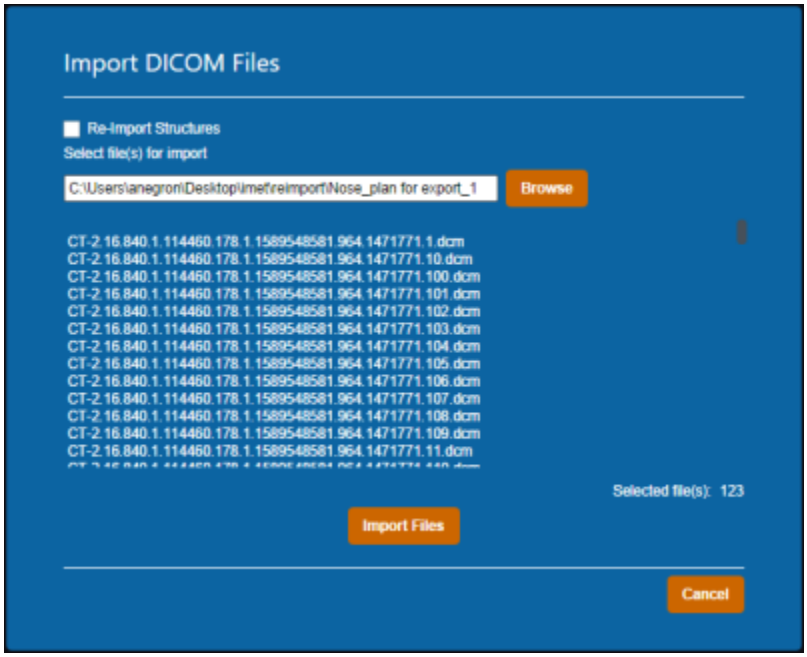

Fig. 3: Bolus QA Import

QA is performed by computing dose on the re-imported CT images (which now contain the actual manufactured bolus) using the same beams as the original treatment plan. The recomputed dose, as well as the original plan dose and a comparison image (using gamma score), are available for display in the UI. The user can edit the Bolus QA block controls to change the gamma parameters as well as shift the isocenter for each beam in the re-computed dose to account for positional shifts in the bolus simulation CT images.

The comparison view shows the three images simultaneously on the corresponding CT images as well as a graph displaying the DVHs for the original and re-computed dose images. The user can switch between Transverse, Sagittal, and Coronal for the comparison view in the Bolus QA Display Options in the right side controls.

Users can also set the gamma calculation parameters and required passing rates. This includes:

- **Passing Rate (%):** The percentage of voxels that must be within tolerance in order for QA to “pass”.
- **Spatial Tolerance (cm):** The maximum allowable distance-to-agreement (DTA) value, where DTA is the distance from a point in the original dose field to the nearest point in the re-computed dose field the has the same dose value.
- **Value Tolerance (%):** The maximum allowable dose difference between corresponding points in the original and recomputed dose fields.
- **Max Threshold (%):** The relative dose value below which dose comparison calculations will no longer be performed

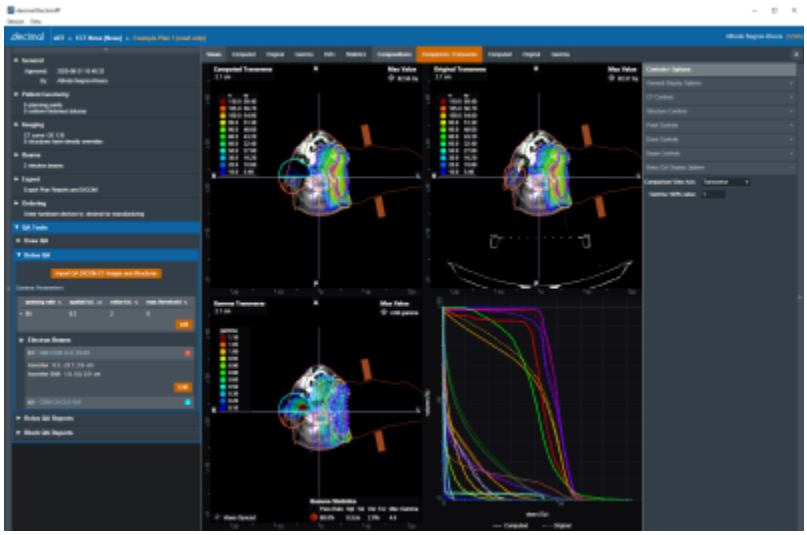

Fig. 4: Bolus QA

Bolus QA Reports

The Bolus QA Reports block allows the user to export PDF reports with data gathered from the Bolus QA block. Just like with Plan Reports, the user can add screenshots of the Bolus QA display UI to the Bolus QA report.

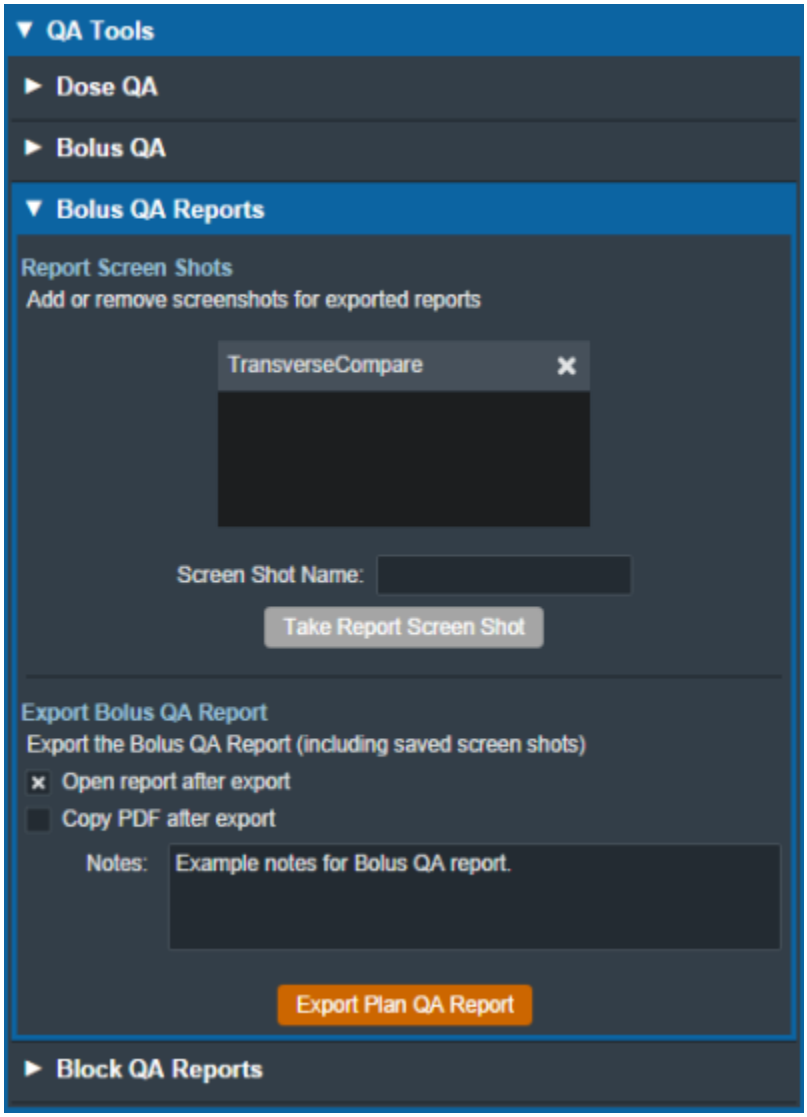

Fig. 5: Bolus QA Reports UI

Bolus QA reports contain basic patient and treatment plan information as well as gamma analysis results, dose reference point data, and structure dose statistics.

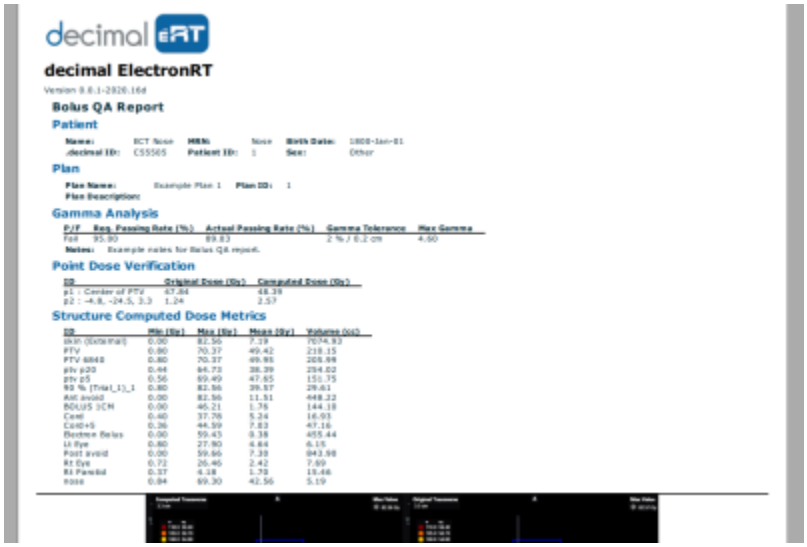

Fig. 6: Bolus QA Report

Block QA Reports

The Block QA Reports block allows the user to export PDF printouts of the electron blocks used in the treatment plan. The user can choose to display each block as a physical (true size) or isocenter projection. There is also a printer-friendly option that removes the color from the block projection.

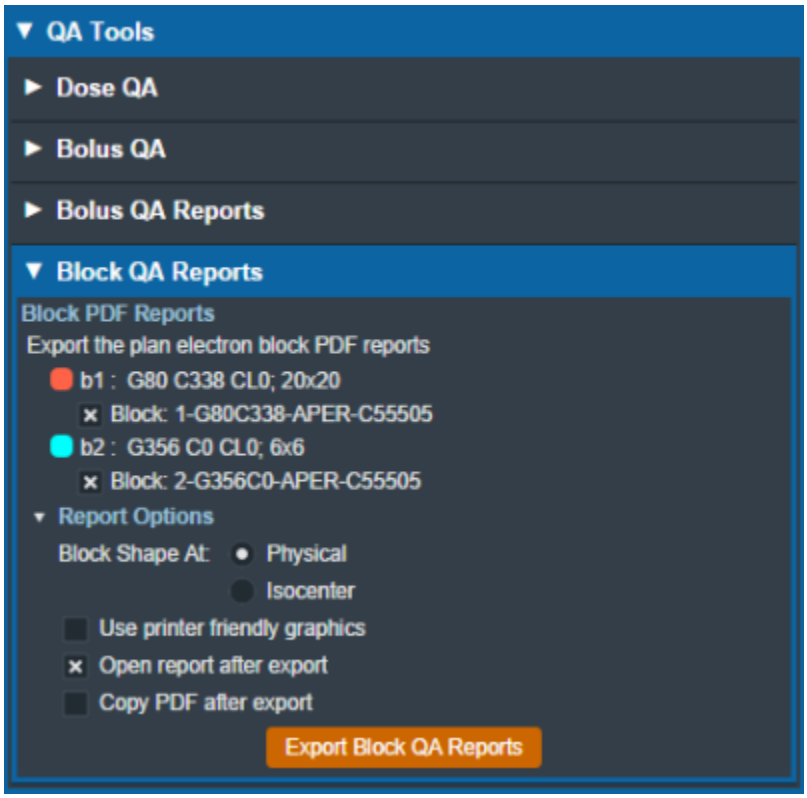

Fig. 7: Block QA Reports UI

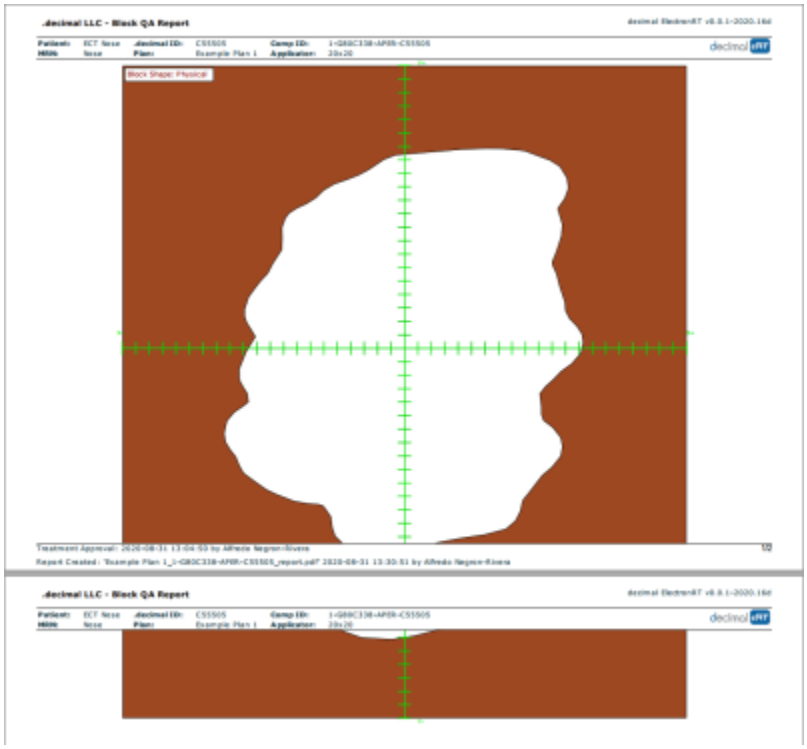

Fig. 8: Block QA Report