dynamic fields highlighted differences between measurements and calculations. Discrepancies are higher for the MLC central region where leaves are thinner, and thus TG effect more consistent, with differences up to 8% for Acuros and 4% for PRIMO (Fig2). Differences in the external part of the MLC are below 3% for both algorithms. The differences in handling the MLC parameters between PRIMO and Acuros don't consistently affect the dose distribution resulting in Gamma Agreement Index (GAI) values (3%,2mm) always >97.5% for the PTV volume and 99.5% for the Body region. With more selective thresholds, however, these differences start to be noticeable, with mean GAI values of 98% (2%,2mm) and 90% (1%,1mm) for the Body and 92.2% (2%,2mm) and 65.5% (1%,1mm) for the PTV, confirming possible issues for the thinner leaves.

Conclusion

This study highlighted some critical issues in the MLC handling in both static and dynamic settings. PRIMO showed a better agreement with measurements compared to Acuros in all settings. In the considered clinical plans however, these differences lead to acceptable dose distributions for both Acuros and PRIMO though these results should be verified on a larger dataset of patients. In conclusion PRIMO can be an interesting tool to help the fine tuning of the TPS parameters in conditions where experimental measurements have high uncertainties and could benefit from simulations.

EP-1773 Radioiodine therapy: a dosimetric study in a patient with DTC after rhTSH stimulation

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Purpose or Objective

The main approach to the Differentiated Thyroid Cancer (DTC) therapy is still empiric, consisting of fixed activities administration, generally besides 1.1 GBq and 7.4 GBq. Repeated treatments, however, may cause stunning effect. An individualized dosimetric study may represent an important tool to determine the best activity to prescribe, in particular for patients with distant metastases or when therapy with rhTSH stimulation is deemed necessary.

We present the case of a patient underwent rhTSH stimulation before radioiodine therapy. This study illustrates the necessity of measuring both red marrow (RM) and blood (BL) absorbed dose during the treatment, because of estimating the activity that could be administered to the patient, in order to not exceed the dose limit of 2 Gy to RM, so as to avoid repeating radioiodine treatment several times. Afterward a variety of dosimetric approaches has been proposed.

Material and Methods

To calculate the absorbed dose to the RM it is necessary to know both the BL and whole-body (WB) residence times (τ_{BL} and τ_{WB}) and the weight of patient, m_P, in kg. In this study, the BL absorbed dose was calculated using the EANM formulations and the dose to RM using the AIFM and the Traino methods. Dosimetry to the RM and BL were performed during the treatments, after administration of nominal therapeutic activity A_0 of ^{131}I equal to 3.7 GBq (3.3 ± 0.2 GBq measured), without modifying the fixed activity schema. Dosimetric calculations were carried out on blood samples of 3 ml at 2, 6, 24, 48, 144 hours after administration of the therapeutic activity, measured through a dose calibrator. Moreover, the patient underwent to WB measurements with an environmental ionization chamber at 2, 6, 24, 48, 144 hours after therapeutic administration, with a full bladder. The first data after 2 hours correspond to effective administered activity A_0.

Results

τ_{BL} and τ_{WB} by decreasing mono and bi-exponential fit of the experimental data were obtained [Fig.1-2]. Following the RM calculated dose was of 411.53 ± 14.68 mGy for AIFM method, 395.54 ± 12.69 mGy for Traino method, instead the BL calculated dose was 527.32 ± 19.48 mGy, under the dose limit of 2 Gy. This result allows to estimate the maximum administrable activity, considering all approaches. The value obtained confirms that could have been administered to the patient an activity at least 4 times higher in a single treatment, after evaluation of the specialist.

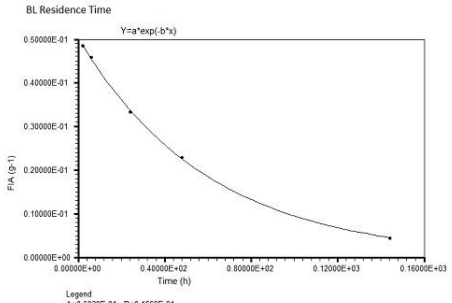

Fig.1

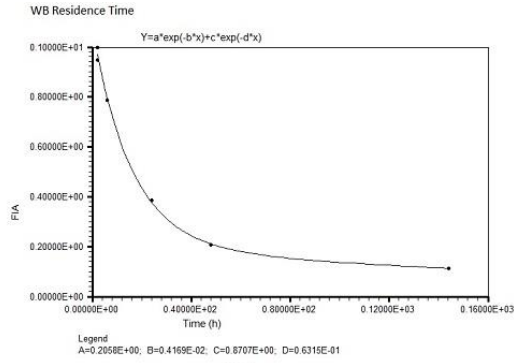

Fig. 2

Conclusion

The results suggests the possibility to restrict the number of treatments, so reduced the risk of stunning effect and, where possible, eliminate an additional source of stress and dejection for patients. This is the most important result of this preliminary work. In fact, thanks to dosimetric study it was highlighted that it is possible to administrate individualized activities for DTC patients, in particular after rhTSH stimulation.

EP-1774 Independent dose verification of brachytherapy TPS and automation of EQD2 reports using Matlab Code

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Purpose or Objective

To study the accuracy of an independent dose calculation of gynaecological treatments and develop an automated EQD2 report using a Matlab program (Figure 1