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# Assessment of portal dosimetry accuracy as a QA tool for VMAT clinical treatment plans using DOLPHIN/COMPASS tools

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## Résumé

### 1. Introduction

Thanks to intensity modulated radiotherapy and dynamic arctherapy techniques, the degree of complexity of modern radiotherapy treatments has reached an important level, especially when attempting to better spare organs at risk, while trying to escalate the dose to target volumes. In order to achieve this, quality has to be ensured through the whole RT quality assurance chain.

At CHU de Charleroi, patients with head and neck and pelvic cancers are treated on a Novalis powered by Truebeam STx (VARIAN) linac using VMAT technique, and thus patient specific QA is performed for each single clinical treatment plan.

### 2. Material and methods

VMAT patient QA is known to be very time and energy consuming; our current routine methodology is based on a 2D coronal plane comparison containing measured and calculated absorbed fluences in the detector plane in a phantom. Portal dosimetry of each clinical treatment arc is also performed and looks attractive thanks to its rapid measurement and potential efficiency but is not a dose measurement. As measurement with flat panel for portal dosimetry shows a totally different geometry, in terms of measurement conditions, both measurements cannot be correlated.

Therefore, for localizations requiring high intensity modulation such as head and neck and some challenging pelvic cases, a special methodology has been developed in order to be able to compare such fluences. This is made feasible thanks to a new dosimetry equipment acquiring radiation at the exit of the collimator, called DOLPHIN using COMPASS software in the framework of a scientific collaboration with IBA Dosimetry. Basically, the aim of this detector system is to reconstruct the dose into the patient CT, injecting delivered fluence instead of the calculated one from the TPS model software.

### 3. Results and discussion

Until now, few cases have been investigated but the feasibility is demonstrated. So far, good agreement between predictions and measurements is obtained. Actually, for 14 clinical arcs evaluated (for all localizations), in average 97,4% of the pixels passed, and 0,5% of the

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\*Intervenant

points are between 1 and 1,05 for a gamma criterion of 3%-3mm. Results for more than 30 patients will be presented sorting out dosimetry information from different localizations.

#### 4. Conclusions

For all cases –including head and neck and pelvic localizations- analyzed and showed in this study, measurements performed by linac flat panel and considered detector showed excellent agreement.

**Mots-Clés:** Dolphin/Compass, patient QA, portal dosimetry, VMAT, Truebeam