

# Influence of detector selection for VMAT patient QA on a gamma analysis result

A. Sarvari, P. Peterlin, T. Pernek

Institute of Oncology Ljubljana, Ljubljana, Slovenia, asarvari@onko-i.si



## Introduction

The aim of this study was to investigate how the selection of detector for VMAT patient QA influences on a gamma analysis result.

## Materials / Methods

Twenty RapidArc (10 prostate, 10 head & neck) plans were made in an Eclipse (ver. 10.0, AAA algorithm) treatment planning system (Varian Medical Systems) were measured with Delta 4PT, Delta 4+ (ScandiDos) and MatriXX MultiCube (IBA Dosimetry) detectors. Most prostate plans consisted of 2 full arc fields while some of the head & neck plans had only 2 half arc fields. The measurements were performed on a Varian Novalis Tx linear accelerator with use of a 6 MV energy. With one device we have measured the entire number of plans on a single day in order to avoid the error of the daily dose output variation and the daily phantom setup error. Before the start of the RA plan measurements we performed a warm up and measured the daily correction factor for the linear accelerator output as well as the temperature correction. Based on the measurements we have applied a phantom position correction to eliminate the error caused by alignment of the phantom to laser system. Gamma evaluations using the same global settings (DTA 3 mm, dose difference 3%, gamma 95% < 1, dose threshold 20%) were performed.

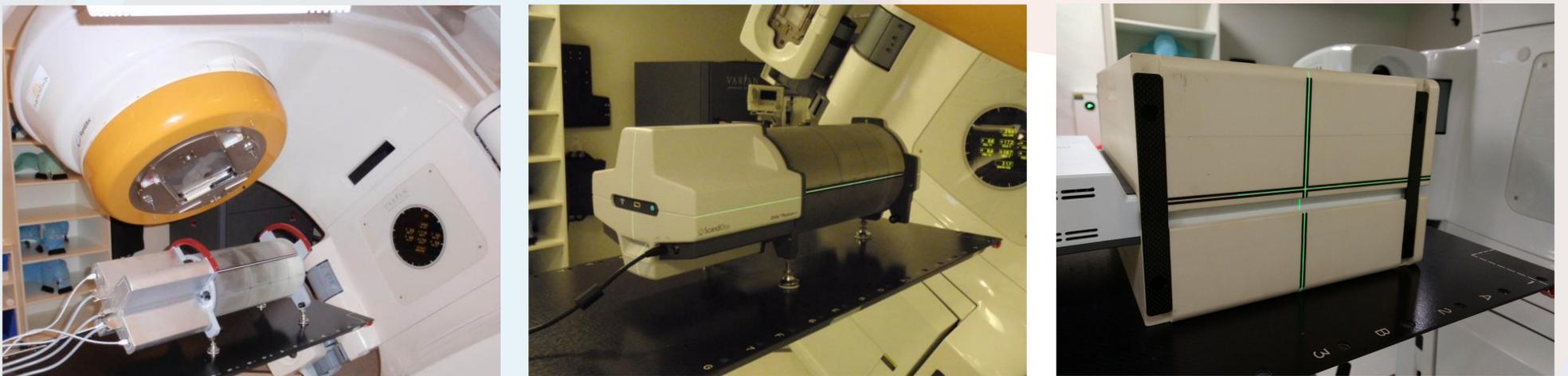


Figure 1: Delta 4PT, Delta 4+ and MatriXX (from left to right) detectors set up at the Novalis Tx linear accelerator

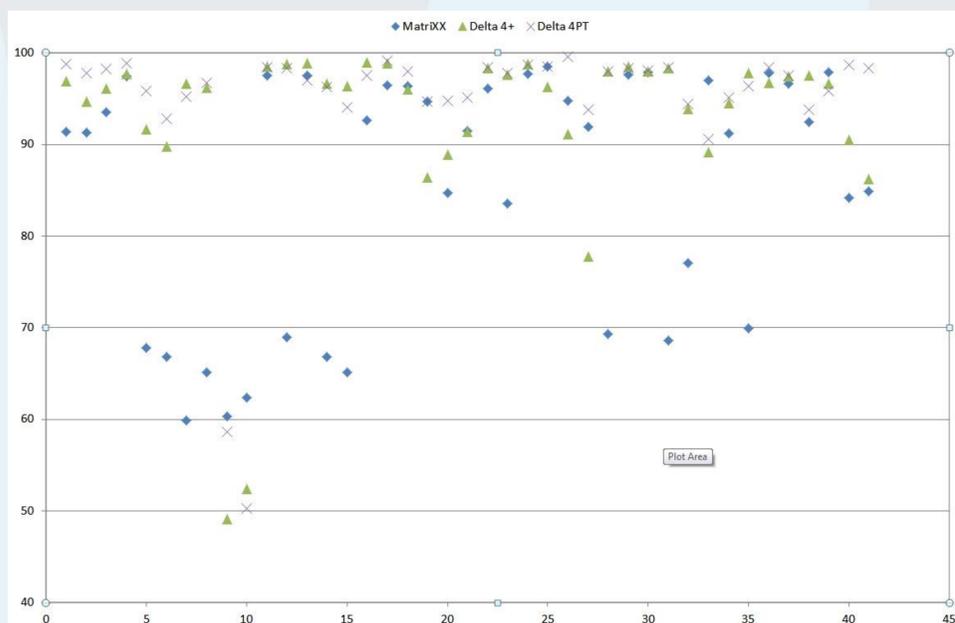


Figure 2: percentage of points that are within  $\pm 3\%$  of dose deviation for different detectors

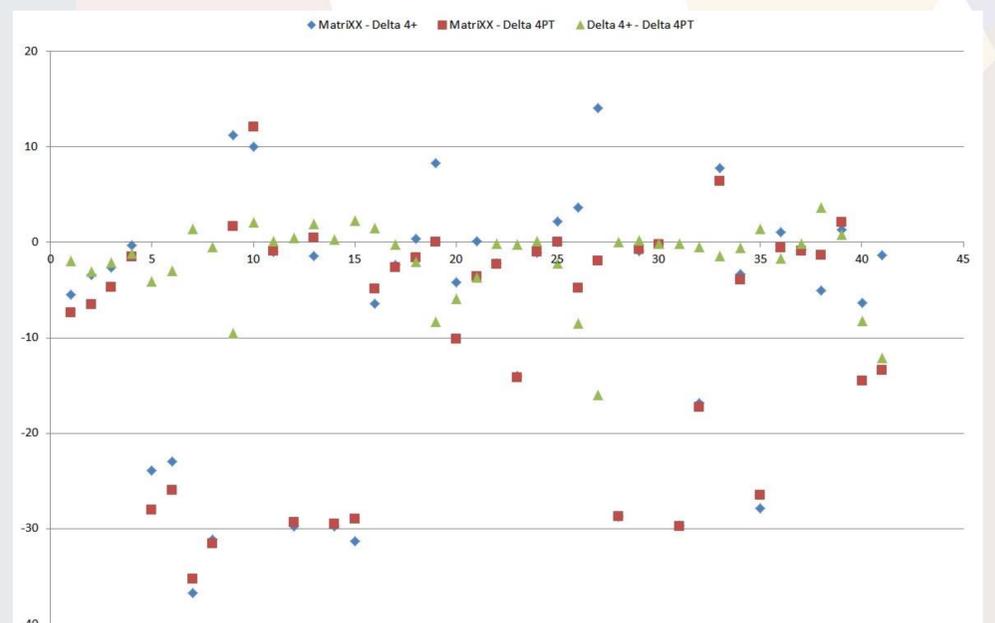


Figure 3: difference between the different detectors of the dose deviation

## Results and conclusion

In total 41 fields were measured with one device. The biggest difference between the results of gamma analysis for different detectors was detected in a dose difference parameter. The Delta 4+ and Delta 4PT had an average difference between the dose difference parameter 2%, while the average differences regarding to MatriXX MultiCube were 7.5% and 9.5%.

Based on the results we can conclude that both Delta4 systems are more suitable for VMAT patient QA than the MatriXX MultiCube. The MatriXX is designed for verification where the device is perpendicular to radiation field. Nevertheless the decision of the appropriate equipment to be used for the patient QA is upon the medical physicist.