

# ScandiDos Discover System Evaluation

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## Introduction

The Discover system is presented by Scandidos as the first QC system to monitor irradiation parameters at the accelerator output during treatments.

Positioned at the collimator output, the Discover system equipped with a 4040 diodes matrix with a total thickness of 23 mm is presented as a high-resolution, radiation-transparent system capable of detecting submillimetric MLC positioning errors.

The Discover system has FDA and CE approval. It was in this context that the Centre Georges François Leclerc (CGFL) carried out an initial evaluation of the system.

No patients were treated using the system.



The Discover was tested on a TrueBeam (Varian) with a 6 MV beam (TPR20 / 10 = 0.666). The evaluation of the system was divided into 4 phases.

## Phase n°1 : Getting started

### Material & Methods

Manipulation, installation and use of the system  
Software Configuration  
Evaluation of battery life without use.

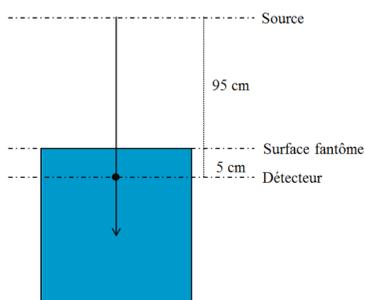
### Results

Handling: Fast, simple  
Software: intuitive  
Battery: Announced = 8h; Measured = 7h

## Phase n°2 : Attenuation Measurement

### Material & Methods

PTW 30013 0.6cc ionisation chamber  
Positionned according to the following figure.  
10 cm x 10 cm field.



### Results

Announced attenuation: 1%  
Measured attenuation: 1,5%

## Phase n°3: Measurements reproductibility

### Material & Methods

Verification of 2 treatment plans (Cervix/ Head and Neck) using the Discover system on different days (9 acquisitions).  
Calculation of the reproducibility of the gamma index percentage according to the criteria (Global / 3% / 3 mm / 10% threshold /  $D_{MAX}$  normalization).

### Results

$\text{Gamma}_{p1} < 1 = (99.1 \pm 1.1)\%$   
 $\text{Gamma}_{p2} < 1 = (97.5 \pm 1.5)\%$

## Phase n°4 : Treatment plans evaluation

### Material & Methods

Acquisition of 13 treatment plans for different locations and fractionation, VMAT or Dynamic conformal arc.  
Verification of 13 plans using PDIP (Varian), Delta4 (ScandiDos) and Discover (ScandiDos).

Comparison of the percentage of gamma satisfying the criteria (Global / 3% / 3 mm / seuil 10% /  $D_{MAX}$  Normalisation) and the mean gamma for these different detectors.

### Results

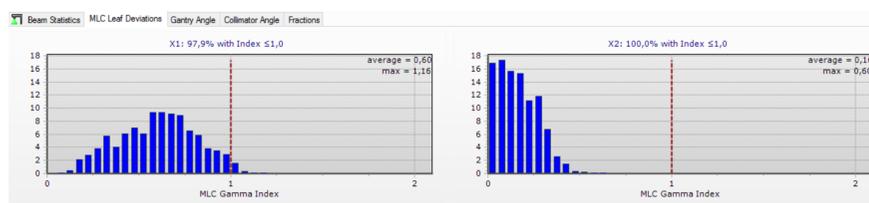
The following table summarizes the average analysis (13 plans) of gamma index percentage satisfying the criterion, the mean gamma and the median dose deviation

	% Gamma<1	Mean Gamma	Median Dose Dev
PDIP	99.7	0.19	/
Delta4	99.3	0.25	0.6
Discover	98.2	0.33	1.2

The percentage of gamma that does not satisfy the criteria is more important with the Discover system, like the mean gamma value. Looking at the dose parameters, DTA or median dose deviation, the Discover attenuation, must be taken into account in planning or dose calibration even if ScandiDos announces it as not necessary.

### Additional Results

The software allows to check the positioning of the MLC by giving the distribution of the deviations between expected position and measured position.



The analysis of the positioning of the MLC allowed us to highlight a wear of the nuts of our MLC on X1 jaw (figure on the left). An intervention has been scheduled to solve the problem.

## Conclusion

This first evaluation of the Discover system highlights the potential of the system. Nevertheless, further dosimetric evaluations have still to be carried out to make it a recognized dosimeter for in vivo monitoring of the radiation beam during treatment.