# BEAM DELIVERY CHECK AND IN-VIVO DOSIMETRY DURING BREAST RADIOTHERAPY TREATMENT


UNIVERSITÀ DEGLI STUDI FIRENZE
DIPARTIMENTO DI SCIENZE BIOMEDICHE SPERIMENTALI E CLINICHE

Talamonti C[1,2], Marrazzo L[2], Arilli C[2], Galeotti C[3], Casati M[3], Calusi S[1], Domizi C[1], Fidanzio A[4], Meattini I[3], Scoccianti S[3], Bonomo P[3], Piermattei A[4], Pallotta S[1,2]

Azienda Ospedaliero Universitaria Careggi

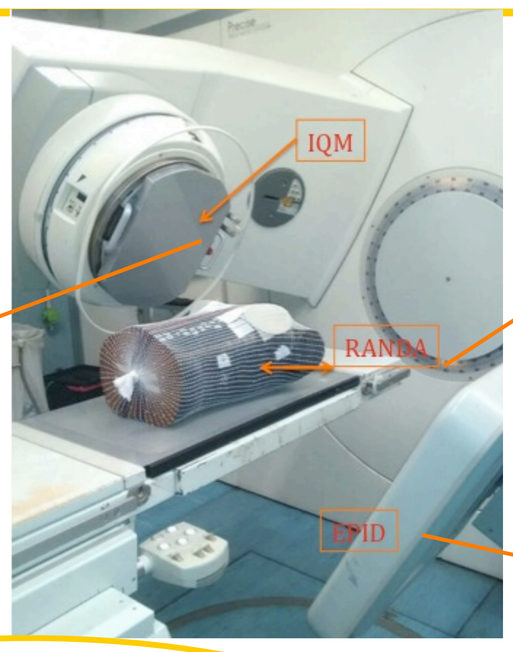
*[1]University of Florence, Department of Clinical and Experimental Biomedical Sciences "Mario Serio", Florence, Italy,*
*[2] Medical Physics Unit AOU Careggi, Florence, Italy, [3] Radiotherapy Unit AOU Careggi, Florence, Italy, [4]Università Cattolica del Sacro Cuore, Rome, Italy*


## *Objectives*:

The goal of this study is to verify the delivery of the prescribed dose during radiotherapy treatment using the Integral Quality Monitoring (IQM) device (iRT Systems GmbH, Koblenz, Germany) and the portal imaging together with the software SoftDiso (Best Medical Italy Srl) for in-vivo measurements. Furthermore the ability in detecting positional and delivery errors intentionally introduced in breast treatments was studied.

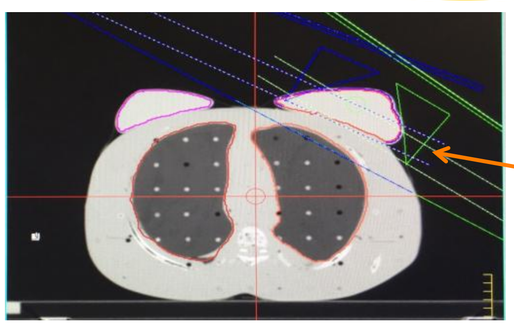
## *Methods:*

**IQM :** It consists of a large area ionization chamber, with a gradient in the electrode plate separation, to be mounted on the accelerator gantry. It is an independent on-line beam monitoring system able to verify the accuracy and consistency of beam delivery during each treatment session.



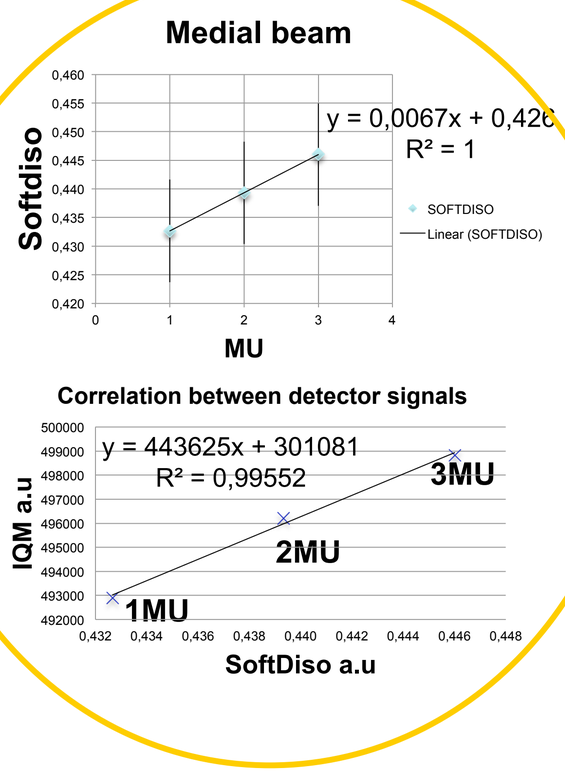

**PHANTOM**: the Anderson Rando modified to mimic a female torso by adding two silicon gel breast implants was used.

**EPID :** The software SoftDiso permits to evaluate the dose at the isocenter on the basis of portal images acquired during the delivery and it allows to compare dose distributions at the isocenter plane of different acquisitions.

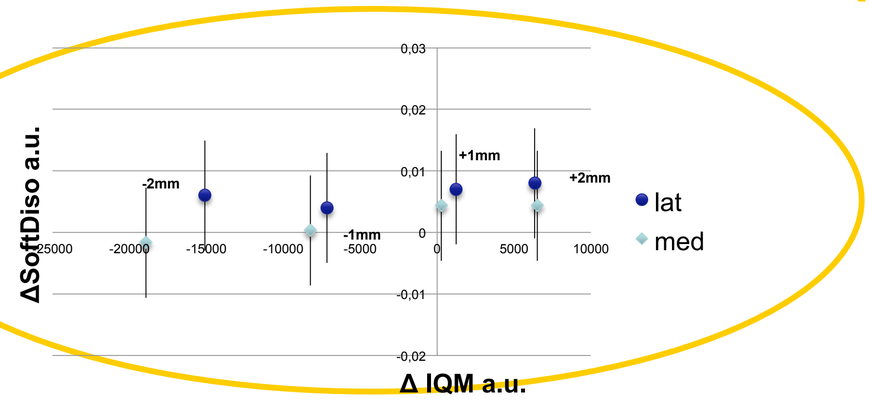


**3DCRT** plan for breast treatment with two beams was calculated on a phantom and small delivery errors were induced to simulate deviation on the treatment plans due to delivery problems and/or to a wrong positioning of the phantom.

## *Results:*




The sensitivity of Softdiso in detecting small errors modifying the number of delivered MU from 1 to 3 is shown for the medial beam as an example. Softdiso values are averaged over three acquisitions delivered in different sections and the errors is $\sigma/\sqrt{3}$. The correlation between IQM and Softdiso detectors signals is also reported.




In the second experiment one jaw (Y2) was closed and opened. In figure is reported the variation of signal respect to the reference plan for lateral and medial beams. There is no correlation between Softdiso and IQM. The response of SoftDiso is not significant when jaw aperture change of few mm.

## *Conclusions:*

The concurrent use of the two tested systems allow for a check of the correct functioning of all components in the radiotherapy chain, including the treatment planning, the delivery system and the patient positioning and thus play an important role in meeting the needs of modern and upcoming radiotherapy QA.


FARE E INNOVARE AIFM 2016 PERUGIA, 25/28 FEBBRAIO