Conclusions: The SourceCheck 4Pi ionization chamber shows an additional dependence with the air density which is clearly linear. The air density dependence of the three analyzed chambers can be represented by the same function, showing that there is not a significative variability between them regarding this dependence.

Acknowledgement: We are grateful for financial and material support from PTW.

References

OC-0271
A multicentre audit of HDR and PDR brachytherapy absolute dosimetry in association with the INTERLACE trial
P. Diez1, E.G.A. Aird1, C.A. Gouldstone2, T. Sander2, D.J. Eaton3, P.H.G. Sharpe4
1Mount Vernon Cancer Centre, Radiotherapy Physics, Northwood Middlesex, United Kingdom
2National Physical Laboratory, Radiation Dosimetry, Teddington Middlesex, United Kingdom

Purpose/Objective: A multicentre audit to evaluate HDR and PDR brachytherapy using alanine and ion chamber absolute dosimetry. This is the first National UK audit of its type, performed for both INTERLACE and non-INTERLACE study centres treating gynaecological tumours using brachytherapy.

Materials and Methods: 45 UK brachytherapy centres were visited from October 2013 to August 2014. A variety of source types including: 7 Flexisource, 23 mHDR-2, 11 GammaMed HDR Plus, 2 GammaMed PDR Plus, one VS2000 and one Co0.6 detected in the measurements and differences were within 5%. There was a significant positional variation of the source detected in the measurements and differences were also seen between the source types.

Conclusions: A comprehensive audit of absolute dose to water from a line brachytherapy source was performed showing all centres could deliver the prescribed dose to within 5%. There was a significant positional variation of the source detected in the measurements and differences were also seen between the source types.

OC-0272
"Magic phantom" - a quality assurance system for high dose rate brachytherapy
A. Espinoza1, M. Petasecca1, I. Fudul1, A. Howie2, S. Corde1, J. Bucci2, M. Jackson3, M.L.F. Lerch1, A.B. Rosenfeld1
1University of Wollongong, Centre for Medical Radiation Physics, Wollongong NSW, Australia
2St George Hospital Cancer Care Centre, Prostate Cancer Institute, Kogarah NSW, Australia
3Prince of Wales Hospital, Department of Radiation Oncology, Randwick NSW, Australia

Purpose/Objective: Due to the high risk of complications resulting from an incorrect treatment of High Dose Rate (HDR) Brachytherapy, it is essential that methods and instrumentation for quality assurance (QA) are available to medical physicists. Direct and accurate verification the treatment plan delivery and the functionality of the remote afterloader are of paramount importance in ensuring appropriate treatment. Currently, there are no comprehensive QA solutions available for HDR brachytherapy.

Materials and Methods: A novel QA device, named ‘magic phantom’ (MPh), has been developed which will allow for the pre-treatment delivery verification of plans in HDR brachytherapy. It assesses source dwell positions and times, and potential differences in planned and calculated delivered dose. The MPh system comprises of a two-dimensional array of 121 silicon diode detectors with low noise and fast readout electronics, a measurement and analysis software toolkit, and a portable Perspex phantom. The detector array is inserted within the phantom, between two rows of HDR brachytherapy catheters, allowing for the verification of treatment plans with up to 20 catheters.

A 20 catheter plan was generated to simulate a nonspecific patient treatment scenario. This was delivered to the MPh and using a developed four-dimensional source tracking algorithm, the treatment dwell position and times were determined in post-processing. A new metric, the ‘position-time gamma index’, was developed to quantify the quality of the measured delivery when compared to the treatment plan. The original plan dwell positions and timing patterns were then modified to simulate multiple afterloader delivery errors. These changes were not disclosed to the investigators, and were to be determined by the MPh measurement.

Results: The device was shown to determine dwell times as short as 0.06 s and dwell positions separated by 1 mm. For the original plan, the MPh measured all dwell positions and timing patterns within 0.93 mm and 0.25 s from the planned, respectively. By assessing the altered plan and comparing it to the unmodified, the use of the position-time gamma index showed that all amendments made could be easily detected. See In Fig. 1, all 11