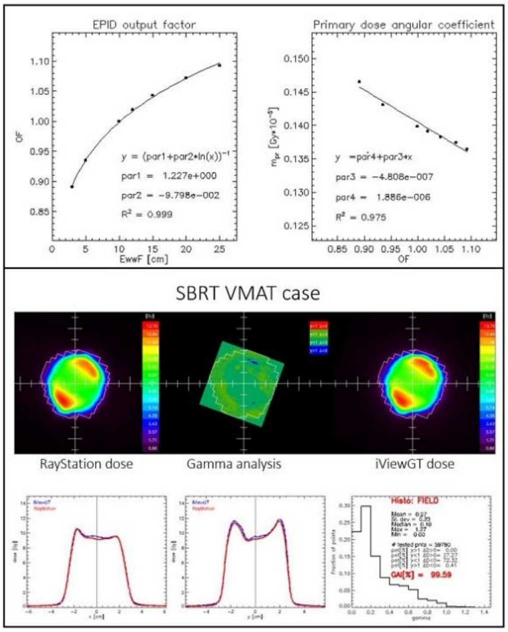


Conclusion

GLAaS algorithm application to iViewGT EPID is a smart tool to easily set-up flexible and reliable pre-treatment verification QA. Moreover, the high resolution of the EPID is of interest in highly demanding conditions such as in SRS/SBRT treatments and/or complicate fluence patterns. Indeed, the GLAaS approach allows a straight comparison between EPID measurements and TPS water dose maps (calculated with the same algorithm used clinically for the patient). The GLAaS compatibility with the two main EPID manufacturers could offer a valid measurement tool in multicentric studies dealing with treatment delivery and dose calculation aspects.

EP-1747 In vivo dosimetry with electronic portal imaging device in VMAT for prostate cancer

S. Inui[1], Y. Ueda[1], S. Ono[1], S. Ohira[1], M. Isono[1], Y. Nitta[1], S. Murata[1], M. Miyazaki[1], T. Teshima[1]
[1]*Osaka International Cancer Institute, Radiation Oncology, Osaka, Japan*

Purpose or Objective

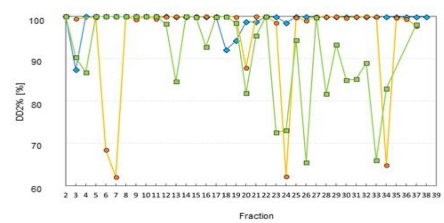
This study aimed to identify inhomogeneity regions such as those with rectal gas during volumetric modulated arc therapy (VMAT) by using electronic portal imaging device (EPID)-based *in vivo* dosimetry (IVD).

Material and Methods

All measurements were performed using TrueBeam STx system (Varian Medical Systems) by determining the radiation fluence using an EPID and analysed using PerFRACTION (version 1.7.3, SunNuclear) commercial software. Two phantom studies were performed to assess EPID-based IVD in prostate cancer patients. The anthropomorphic phantom was correct setup and irradiated while radiation fluence data were captured using EPID images. Systematic setup errors were simulated by moving this phantom 1, 3, and 5 mm in each translational direction. In the cube phantom attached to the Quasar phantom (Modus Medical), single-arc VMAT plan was used for baseline measurements after correct setup. An air cavity of 12 (2 × 2 × 3) cm^3 and 48 (4 × 4 × 3) cm^3 was created 1 cm below the center of the cube phantom. The presence of small and large air cavities was controlled by moving the Quasar phantom after single-arc VMAT quarter ($T_{25\%}$), half ($T_{50\%}$), and three quarter times ($T_{75\%}$). A complete air cavity ($T_{0\%}$) was also measured. From April 2017 to May 2018, 30 prostate cancer patients [median age: 76 (64-81)] received EPID-based IVD during single-arc VMAT in our institute. X-ray images after the treatment of 16 patients were acquired to confirm the presence of rectal gas via offline reviews (Varian Medical Systems).

Results

In the phantom study, no systematic setup error was detected. The 2% dose difference (DD2%) in small and large air cavities were 75.62% and 58.11%, 92.79% and 62.63%, 93.19% and 72.64%, and 99.40% and 80.71%, respectively, in the appearance of the air cavity after $T_{0\%}$, $T_{25\%}$, $T_{50\%}$, and $T_{75\%}$. The mean rectal diameter was 3 cm, which was between the sizes of the large and small air cavities in the phantom studies. We decided to assess the occurrence of rectal gas for DD2%<90% in the clinical study by calculating the mean values of $T_{75\%}$ in the large and small air cavities. In the clinical study, some fractions caused a sharp decline in the DD2% pass rate (Figure 1). The amount of DD2%<90% was almost as same as that of the fraction confirmed with a rectum full of rectal gas (Table 1). The average DD2% values of the fractions with an empty rectum and a rectum full of rectal gas after irradiation were 96.12% and 86.13%, respectively.



	Fraction (%)
All patients (n=30, 1102 fractions)	
DD2% ≧ 90%	961 (87.21)
DD2% < 90%	141 (12.79)
Patients confirmed rectal gas after VMAT (n=16, 589 fractions)	
Empty rectum	524 (88.96)
Rectum full of rectal gas	65 (11.04)

Conclusion

This study suggests that EPID-based IVD is better for the identifying of inhomogeneity regions such as those with rectal gas than for detecting systematic setup errors in VMAT for prostate cancer patients. There is a high possibility that rectal gas may occur in ~13% of the fractions in the clinical study.

EP-1748 Adaptive solution for an improved treatment verification using Dosimetry Check system

Y. Md Radzi[1], R.S. Windle[2], D.G. Lewis[2], E. Spezi[3]
[1]*Universiti Sains Malaysia, School of Physics, Penang, Malaysia ;* [2]*Velindre Cancer Centre, Department of Medical Physics, Cardiff, United Kingdom ;* [3]*Cardiff University, School of Engineering, Cardiff, United Kingdom*

Purpose or Objective

Advanced radiotherapy such as IMRT and VMAT require an accurate and precise QA dose verification to avoid dosimetric errors [1-2]. In recent years, the use of one of the commercially available EPID-based method such as Dosimetry Check (DC) has been growing and demanded for an accuracy in treatment validation [3]. In this work, an Adaptive Arm Backscatter Solution (AdABS) [4-5] to accommodate the future application of DC allied with the widespread use of Varian aSi EPID was investigated.

Material and Methods

An existing feature in DC facility was investigated for a practical and more convenient way of routinely applying