Purpose/Objective: To investigate the potential of ultrathin polyvinylpyrrolidone (PVP)-decorated tungsten oxide (W\textsubscript{18}O\textsubscript{49}) nanowires as an effective therapeutic platform for concurrent dose-enhancement radiation therapy (RT) and photothermal therapy (PT).

Materials and Methods: W\textsubscript{18}O\textsubscript{49} nanowires was synthesized using a modified solvothermal approach. The effects on photothermal conversion, production of singlet oxygen, and radiation dose enhancement in vitro were analyzed by aqueous solution heating, DPBF quenching, and MRI-mediated polymer gel dosimetry experiments. Mice harboring breast cancer cell line 4T1 xenografts were treated with RT/PT with/without administration of W\textsubscript{18}O\textsubscript{49}-PVP nanowires to evaluate their impact on treatment outcome.

Results: The in vitro and in vivo experiments demonstrated that nanowires could generate extensive ablative/oxidative damages (i.e. heat / singlet oxygen) to cancer cells under the 980 nm NIR-laser excitation and also serve as a radiation dose intensifier to achieve a locally enhanced X-ray dose deposition under radiotherapy. Tumor complete regression (CR) was observed in the animals receiving concurrent W\textsubscript{18}O\textsubscript{49}-based RT/PT therapies and no recurrence was found in the 9-month follow-up period. Moreover, high atom number (Z = 74) and strong X-ray attenuation ability of tungsten element (4.438 cm\textsuperscript{-1}/g, 100 KeV) enabled these nanowires as excellent CT contrast agents for image-guided therapy. The toxicity study demonstrated tolerable toxic profile with minor side effects on hematological system and major organs of mice within one month.

Conclusions: This study showed promising roles of W\textsubscript{18}O\textsubscript{49}-PVP nanowires in radiation therapy and photothermal therapy with potential image guidance capability as CT contrast agents.

PO-1080

The abscopal effect of local radiotherapy in the clinic: a systematic review on its occurrence

K. Reynders\textsuperscript{1}, I. Illidge\textsuperscript{2}, S. Siva\textsuperscript{3}, J. Chang\textsuperscript{4}, D. De Ruysscher\textsuperscript{5}

\textsuperscript{1}University Hospital Gasthuisberg, Radiation Oncology, Leuven, Belgium

\textsuperscript{2}University of Manchester, Institute of Cancer Sciences, Withington, United Kingdom

\textsuperscript{3}Peter MacCallum Cancer Centre, Division of Radiation Oncology and Cancer Imaging, Melbourne, Australia

\textsuperscript{4}MD Anderson Cancer Center, Department of Radiation Oncology, Houston, USA

\textsuperscript{5}University Hospital Gasthuisberg, Department of Radiation Oncology, Leuven, Belgium

Purpose/Objective: In this review we assess the current clinical experience regarding the abscopal effect of RT and try to identify the potential of immune therapy in this context.

Materials and Methods: We identified papers through searches of Medline and Embase with the search term ‘abscopal’ from 1960 until July, 2014. The following inclusion criteria were used: patients had to receive single or multiple fractions of radiotherapy for any malignancy. Following radiotherapy, a non-irradiated tumor site needed to show regression. Whole body irradiation or concurrent systemic treatments with a cytotoxic drug were not allowed. Sequential cytotoxic treatment after radiotherapy was not allowed unless an abscopal radiotherapy response was assessed before the following systemic treatment was given. Concurrent or sequential immune modifying therapy was included.

Results: Thirty case reports were found, all based on one or more clinical cases. Two case reports which described 12 individual clinical cases were rejected due to insufficient clinical information. Ultimately, we retrieved 23 case reports of a perceived abscopal effect through radiation therapy with or without immune therapy. Patient age ranged from 28 to 83 years, with a median age of 64.5. Interestingly, renal cell carcinoma was the most frequent histology, with 7 cases, followed by 4 cases of hepatocellular carcinoma. Radiation doses varied as well, with a median total dose of 30 Gy (range 12 Gy - 60,75 Gy). Fractionation size ranged from 1,2 Gy to 26 Gy. Eight cases were irradiated on the primary tumor site, 14 on a distant metastatic or nodal site. Time to documented abscopal response ranged between less than 1 and 24 months, with a median reported time of 5 months. Once an abscopal response was achieved, a median time of 13 months went by before disease progression occurred or the reported follow-up ended (range 3-39 months).

Conclusions: Abscopal effects were observed at all ages, with a trend towards immunogenic tumor types and with substantial differences in radiotherapy regimens and techniques. At the same time, the rarity of documented reports suggest that abscopal effects induced by RT alone are
unlikely to have major clinical impact on cancer cure in the context of metastatic disease. Therefore, combination treatments with immune modifying drugs hold considerable promise for inducing long lasting T cell responses. Attention needs to be given towards optimizing of dose regimens and timing of concurrent treatments. These are necessary steps to unlock a more efficient long term immune response after radiotherapy and make the abscopal effect clinically relevant.

Poster: RTT track: Patient preparation, patient immobilisation and support aids

PO-1081
The impact of a diet protocol on prostate IGRT patients’ rectal volumes and their inter-fraction consistency
National Cancer Centre Singapore, Department of Radiation Oncology, Singapore, Singapore

Purpose/Objective:
Prostate Image Guided Radiotherapy (IGRT) with daily Cone Beam Computed Tomography (CBCT) allows direct adjustment for rectal distention. Studies have tested the effects of low fibre diet advice and laxatives, both separately and in combination, on rectal distention with contradictory results. This study retrospectively investigates the effects of a dietary protocol on rectal volumes and their inter-fraction consistency of patients undergoing prostate IGRT.

Materials and Methods:
A dietary protocol was derived where patients would receive 1) a brochure with low-fibre diet advice and 2) laxatives (1 sachet of Macrogol 4000 daily) two days prior to and on the day of Computed Tomography Simulation (CT Sim); and two days prior to commencement till the completion of treatment. All patients had daily CBCT imaging. CBCT images from the first five fractions were obtained and rectal volumes of each image were contoured from the level of the top of the femoral heads to the most inferior slice of the ischial tuberosity. Centre of Mass (COM) imaging. CBCT images from the first five fractions were compared, the difference between groups trended towards significance (p=0.078). The median reading of mean COM shifts from the first five days of treatment was 0.335 (0.134-0.615, SD=0.11) for the protocol group and 0.317 (0.257-0.642, SD=0.12) for the non-protocol group. When rectal volumes at treatment were compared to CT Sim rectal volumes.

Results:
34 subjects were analysed, with 17 receiving the protocol and 17 without. When all rectal volumes from the first five fractions were compared, the difference between groups trended towards significance (p=0.078). The median rectal volumes of the protocol and non-protocol groups were 40.4cc (26.5-76.1, SD=9.6) and 42.6cc (24.3-114.7, SD=16), respectively. The difference in COM treatment shift deviations was insignificant between groups (p=0.62) where the median reading of mean COM shifts from the first five days of treatment was 0.335 (0.134-0.615, SD=0.11) for the protocol group and 0.317 (0.257-0.642, SD=0.12) for the non-protocol group. When rectal volumes at treatment were compared to CT Sim, the similarity of volumes was high for both groups. For the protocol group, the median reading of mean DICE coefficients from the five CBCTs was 0.7 (0.63-0.82, SD=0.05) compared to 0.72 (0.56-0.82, SD=0.06) for the non-protocol group (p=0.969).

Conclusions:
The results of this study suggest that the dietary protocol introduced did not significantly reduce rectal volumes of patients or affect COM treatment shift deviations and DICE similarity coefficients of rectal volumes.

PO-1082
Treatment setup errors in pelvic patient comparing Orfit-AIO Solution and Vacklocks immobilization devices
T. Teekendra Singh
Fortis Hospital Mohali, Radiation Oncology, Mohali Punjab, India

Purpose/Objective:
This study aimed at evaluating the treatment setup errors in pelvic malignancies patient treated supine by comparing AIO Solution (Pelvic Cushion, Orfit Industries, NV) and Vack locks immobilization devices without using thermoplastic mask for patient positioning.

Materials and Methods:
2 groups of each comprising of 20 pelvic malignancies patient (includes cervical, ovarian, bladder, uterine, vaginal, endometrium and prostate cancers) were considered for our study. All patients were planned and treated in supine position on Synergy®Linac (Elekta Medical Systems, Crawley, UK). The first group was immobilized with Orfit- AIO Solution (Pelvic Cushion) without thermoplastic mask and the second group was immobilized with Vacklock immobilization devices without thermoplastic mask. During treatment, KV-CBCT was taken on alternate days for image guidance. This CBCT image set was registered with the Gray Value (T+R) matching algorithm available in the XVI® (Elekta Medical Systems, Crawley, UK) CBCT software. The displacements in Medio-Lateral, Supero-Inferior and Antero-Posterior directions were recorded as X, Y and Z respectively. For each patient, set up errors were calculated in these directions.

Results:
KV-CBCT images were taken on alternate days for each group of patients. The mean isocenter displacement in Medio-Lateral (X), Supero-Inferior (Y) and Antero-Posterior (Z) directions were +/- 0.26cm, +/- 0.21cm, +/- 0.35cm with AIO Solution immobilized patients and +/- 0.32cm, +/- 0.27cm, +/- 0.51cm respectively with Vack locks immobilized patients. The AIO Solution device was found to be significantly better than the Vack locks in term of reproducibility, especially in Z direction.

Conclusions:
The results shows that immobilization with AIO Solution is comparatively better than vac lock for pelvic malignancies patients. As we know that vac lock looses its shape and rigidity after certain period of time. While AIO is used to fit today’s requirements for image guided radiation therapy (IGRT), and precision radiation therapy. As a radiation therapist we have to play a greater role not only in treatment delivery but also we have to select a proper immobilization for each individual patient as per patient comfort and requirement without compromising with the quality of treatment. To maintain the treatment accuracy good treatment setup and imaging protocol should be adopted and regular supervision is required.

PO-1083
A randomized controlled trial on the effect of thoracic immobilization in patient positioning and clinical outcomes