region of interest (ROI) of each patient was defined as the neck and mandible inside the beam's eye view. The integrated transit fluence, φ_e, of the ROI of each patient at each fraction was calculated from the corresponding WD measurement. The CBCT, performed on the same day, was used to determine the volume of the ROI. The changes on n^{th} day relative to the baseline, day 0, in the transit fluence, $\Delta\varphi_e$, and the volume of the ROI, ΔV_{ROI}, were defined as the $\varphi_{e,n}$ - $\varphi_{e,0}$ and $V_{ROI,n} - V_{ROI,0}$ respectively. The effectiveness of monitoring the volumetric change was assessed by calculating the correlation and t-statistics between $\Delta\varphi_e$ and ΔV_{ROI}. A decrease of 5.0% in volume, corresponding to 10% decrease in neck separation, was used as the replanning trigger. A set of replanning decisions based on CBCT, assumed to follow binomial distribution, was obtained. The probability of replanning at session i, P_i, was modeled by using logistical regression with and the CBCT based decision. The association between the volumetric change and transit fluence change was assessed by the logarithmic odds ratio (OR). The reliability of the transit fluence signal in supporting the decision making of replanning was assessed by area under the curve (AUC) of the receiver operating characteristic curve (ROC).

Results: A total of 108 pairs of CBCT and RTPD measurements were obtained. The correlation, excluding the baseline points, between and DV_{ROI} were found to be -0.837 with a p-value <0.001. The OR was found to be 71.9 with p-value < 0.001. The AUC of the ROC was found to be 0.91.

Conclusion: A transit fluence based DSM is not only a viable alternative to serial CBCT in assisting clinicians in the patient selection for replanning, but also lowers the resource barrier of ART implementation.

Author Disclosure: **S.B. Lim**: None. **C. Tsai**: None. **P. Greer**: None. **T. Fuangrod**: None. **K. Hwang**: None. **S. Fontenla**: None. **S. Gohel**: None. **F. Coffman**: None. **N. Lee**: Consultant; Lily. Advisory Board; Pfizer, Vertex, Merck. **D. Lovelock**: None.

1272

Hafnium Oxide Nanoparticles Activated By Radiotherapy: Potential for Local Treatment of a Wide Variety of Solid Tumors

A.P. Dicker,[1] C. Shen,[2] T. De Baere,[3] C. Hoffmann,[4] J.W. Welsh,[5] Y. Rolland,[6] B. Doger,[7] R.B. Den,[1] E. Trabulsi,[8] C. Lallas,[9] T.Y. Seiwert,[10] N. Fernando,[11] A. Iannessi,[12] F. Pilleul,[13] R. Tetreau,[14] P. Rutkowski,[15] Z. Papai,[16] and H. Brisse[4]; *[1]Thomas Jefferson University, Philadelphia, PA, [2]University of North Carolina Hospitals, Chapel Hill, NC, [3]Institut Gustave Rousey, Villejuif, France, [4]Institut Curie, Paris, France, [5]MD Anderson Cancer Center, Division of Radiation Oncology, Houston, TX, [6]Centre Eugène Marquis, Rennes, France, [7]START Madrid, Madrid, Spain, [8]Jefferson University, Philadelphia, PA, [9]Thomas Jefferson University Hospital, Philadelphia, PA, [10]Department of Medicine, Section of Hematology/Oncology, The University of Chicago Medicine, Chicago, IL, [11]Northside Hospital, Atlanta, GA, [12]Centre Anticancer Antoine Lacassagne, Nice, France, [13]Unicancer - Leon Berard Cancer Center, Lyon, France, [14]Montpellier Cancer Institute, Montpellier, France, [15]Centrum Onkologii-Instytut im. Sklodowskiej-Curie w Warszawie, Warszawa, Poland, [16]Magyar Honvedseg Egeszsegugyi Kozpont, Budapest, Hungary*

Purpose/Objective(s): Local interventional treatments of cancers include interventional radiology and radiotherapy (RT). NBTXR3, hafnium oxide nanoparticles, is deeply associated to both. Given as a single local administration it increases energy dose deposit inside tumor cells only when activated by ionizing radiation. Various interventional treatments have been used to treat cancers such as liver, lung, bone. Because entirely new therapies such as NBTXR3 are being introduced, implementation of interventional approaches is continuously growing.

Materials/Methods: NBTXR3 is being evaluated in soft tissue sarcoma (STS, extremity, trunk wall) [NCT02379845], head and neck (HN) [NCT01946867, NCT02901483], prostate [NCT02805894], liver [NCT02721056] and rectal cancers [NCT02465593]. NBTXR3 injected volume is a percentage of baseline tumor volume, and therefore heterogeneous. Image guidance allowed for accurate injection. Standard catheters, needles, and syringes were used for preparation and injection. Importantly, percutaneous needle positioning was done within the region to be irradiated to control potential seeding of cancer cells. NBTXR3 was then activated by IMRT (STS, HN), EBRT or combination brachytherapy/EBRT boost (prostate), SBRT (liver), IMRT or IMAT (rectum).

Results: Thus far, NBTXR3 has been administered to 171 patients by intratumoral/lesional, and intraprostate injections depending on indication. NBTXR3 injections have been demonstrated safe and very well tolerated. Local infection, ulceration or massive tumor necrosis were never observed. This has been confirmed by adequate application of treatment schedules, fitting planned irradiation onset 1 to 5 days post-injection. Importantly, grade 1 ecchymosis and hematoma at puncture site (needle entry) observed in few cases always resolved spontaneously and did not impact dosimetry. Indeed, change of tumor/lesion/prostate volume resolved when water (NBTXR3 vehicle) was drained via lymphatic system. So far, inflammatory response to injection procedure itself was mild. Concerning AEs, grade 3 pain was observed in conscious patients under local anesthesia with STS close to joints (limited extensibility), and in needle shift in injection within a subcapsular liver tumor.

Conclusion: Across 7 clinical trials involving tumors in extremity, trunk wall, liver, rectum, prostate and HN, NBTXR3 injection was well tolerated and demonstrated a very good safety profile. The savoir faire of interventional radiology for local treatment of cancers supported implementation of injection procedures with specific parameters according to anatomy. Intratumoral/lesional or intraprostate injection ensures optimum bioavailability at site of irradiation, protecting patients from systemic toxicity. Future clinical research will involve other anatomical sites such as lymph nodes and lung lesions [NCT03589339].

Author Disclosure: **A.P. Dicker**: Research Grant; Radiation Therapy Oncology Group. Travel Expenses; Prostate Cancer Foundation. **C. Shen**: Honoraria; Nanobiotix. **T. De Baere**: Honoraria; Nanobiotix. **C. Hoffmann**: Honoraria; Nanobiotix. **J.W. Welsh**: Honoraria; Nanobiotix. **Y. Rolland**: Honoraria; Nanobiotix. **B. Doger**: Honoraria; Nanobiotix. **R.B. Den**: Honoraria; Nanobiotix. **E. Trabulsi**: Honoraria; Nanobiotix. **C. Lallas**: Honoraria; Nanobiotix. **T.Y. Seiwert**: Honoraria; Astra Zeneca, BMS, Merck/ MSD, Jounce, Aduro, Roche Diagnostics, Innate, Bayer, Celgene, Nanobiotix. Speaker's Bureau; BMS, Merck/ MSD. Advisory Board; Astra Zeneca, BMS, Merck/ MSD, Jounce, Aduro, Roche Diagnostics, Innate, Bayer, Celgene, Nanobiotix. Travel Expenses; Astra Zeneca, BMS, Merck/ MSD, Jounce, Roche Diagnostics, In. **N. Fernando**: Honoraria; Nanobiotix. **A. Iannessi**: Honoraria; Nanobiotix. **F. Pilleul**: Honoraria; Nanobiotix. **R. Tetreau**: Honoraria; Nanobiotix. **P. Rutkowski**: Honoraria; Nanobiotix. **Z. Papai**: Honoraria; Nanobiotix. **H. Brisse**: Honoraria; Nanobiotix.

1273

Post-Mastectomy CO_2 Tissue Expander Device: Important Impact on Plan Quality

A. Ahamad,[1] B. Farnia,[2] P. Pereira,[1] C.A. Wilgenbusch,[1] C. Takita,[3] and E.L. Bossart[4]; *[1]Department of Radiation Oncology, University of Miami / Sylvester Comprehensive Cancer Center, Miami, FL, [2]University of Miami; Jackson Health System, Miami, FL, [3]Department of Radiation Oncology, University of Miami/Sylvester Comprehensive Cancer Center, Miami, FL, [4]University of Miami, Miami, FL*

Purpose/Objective(s): To test the hypothesis that a tissue expander with a large air cavity and a metal CO_2 reservoir that abuts the chest wall, impacts quality of post-mastectomy radiotherapy. Because patients can self-release CO_2 using a remote control, circumventing the need for frequent surgeon visits, the device is gaining acceptance. Dosimetric effects on skin and chest wall clinical target volume (CTV) were not formally tested: this study examines plan quality with expander in situ.

Materials/Methods: A model of a left chest wall was created on a thorax phantom. The anterior surface was covered with 5mm thermoplastic shell with fixed dwell positions for dosimeters placed anterior and posterior to shell (representing the chest wall surface that abuts expander's posterior surface and 5mm deep in chest wall). Skin and subcutaneous tissue were