Maastricht University Medical Centre - GROW (MAASTRO), Maastricht, The Netherlands, [2]Institut Curie, Paris, France, [3]Department of Radiation Oncology, University of Pennsylvania, Philadelphia, PA, [4]TheraPanacea, Paris, France, [5]Department of Genetics and Genome Biology, University of Leicester, Leicester, United Kingdom, [6]Leicester Cancer Research Centre, University of Leicester, Leicester, United Kingdom, [7]Gustave Roussy, Cancer Campus, Villejuif, France, [8]Department of Radiation Oncology, Division of Physics, University of Pennsylvania, Philadelphia, PA, [9]Athens University of Economics and Business, Athens, Greece, [10]Centrale Supelec, University of Paris-Saclay, Computer Science and Applied Mathematics, Gif-sur-Yvette, France

Purpose/Objective(s): PRE ACT is an EU funded project that aims to predict the risk of radiotherapy side effects, including arm lymphedema in breast cancer patients based on 4 multicenter international studies CANTO, HYPOG-01 and REQUITE. Because of inter-investigators variability and clinical practice diversity across different centers and cohorts, manual contours are not homogeneous enough to extract necessary features to train the predictive model. The aim of this study is to conduct qualitative and comparative evaluation of the automatic and manual contours to showcase the reliability of the former.

Materials/Methods: We have generated Organ-at-Risk (OAR) contours with Annotate module from ART-Plan (from TheraPanacea) for six crucial OARs for dose planning of breast cancer loco regional radiotherapy, *i.e.* esophagus, thyroid, heart, ipsilateral lung, ipsilateral humeral head and contralateral breast. For this evaluation, four independent international radiation oncologists have been presented blindly with both automatic and manual contours from a randomly selected subset of left and right breast cancer patients from the PRE ACT dataset (7052 patients). 10 automatic and manual cases were presented across two sessions, with a washout of a minimum of 48 hours. Rating of the contours followed an A-B-C grid, with A for satisfactory contours, B requiring minor changes, and C needing major changes or redoing. A and B contours were estimated as acceptable, therefore ratings of A and B contours define the acceptance rate for each organ.

Results: Average qualitative evaluations are presented in table 1. Automatic contours acceptance ranges from 92 to 100%, whilst manual contours acceptance ranges from 72% to 100%. Inter-expert agreement varies a lot across organs. The lowest inter-expert agreement was obtained for humeral head and heart (45 % for both) for automatic contours and thyroid for manual contours (38,3%). The highest inter-expert agreement was for esophagus and left breast (68.3%) for automatic contours and left breast for manual contours (66.7%). These values are averaged across 4 experts.

Conclusion: With this study, we demonstrate that automatic contouring is an excellent and reliable tool to obtain segmentation of OARs with a robust a homogeneous clinical acceptability across diverse cohorts, with many applications to clinical trials.

Abstract 3446 — Table 1: Qualitative evaluation of automatic vs manual contours for 9 OARs

		Eso-phagus	Thy-roid	Heart	Left breast	Right breast	Left Humeral head	Right Humeral head	Left lung	Right lung
Automatic	A+B	100%	92,5%	97,5%	97,5%	100%	100%	100%	100%	100%
	C	0%	7,5%	2,5%	2,5%	0%	0%	0%	0%	0%
Manual	A+B	100%	92,5%	85,0%	72,5%	77,5%	95,0%	97,5%	97,5%	97,5%
	C	0%	7,5%	15,0%	27,5%	22,5%	5,0%	2,5%	2,5%	2,5%

Author Disclosure: **K. Verhoeven**: None. **T. Brion**: None. **W.R. Green**: None. **M. Balia**: None. **A. Webb**: None. **T. Rattay**: None. **Y. Liang**: None. **L. Assia**: None. **I. Hafsa**: None. **S. Romdhani**: None. **R. Iandolo**: None. **A. Bombezin-Domino**: None. **K. Teo**: None. **R. McBeth**: None. **I. Koutsopoulos**: None. **C. Talbot**: None. **N. Paragyos**: None. **S. Rivera**: None.

3447

Physicians' Views on Explainable Artificial Intelligence Models to Predict the Risk of Toxicity Following Breast Radiotherapy

Y. Liang,[1] J. Rainbird,[2] G. Cortellessa,[3] M. Balia,[4] G. Bologna,[5] I. Koutsopoulos,[6] A. Pannison,[7] A. Perotti,[7] B. Ramaekers,[8] T. Rattay,[9] S. Rivera,[10] A. Romita,[11] C. Roumen,[12] C. Talbot,[13] K. Verhoeven,[1] M. Bergeaud,[14] and F. Fracasso[3]; *[1]Department of Radiation Oncology, Maastricht University Medical Centre - GROW (MAASTRO), Maastricht, The Netherlands, [2]Leicester Cancer Research Centre, University of Leicester, Leicester, United Kingdom, [3]Consiglio Nazionale delle Ricerche, Instituto di Scienze e Technologie della Cognizione (CNR-IST), Roma, Italy, [4]TheraPanacea, Paris, France, [5]University of Applied Sciences and Arts of Western Switzerland, HES-SO, Geneva, Switzerland, [6]Athens University of Economics and Business, Athens, Greece, [7]CENTAI Institute, Turin, Italy, [8]Department of Clinical Epidemiology and Medical Technology Assessment, Maastricht University, Medical Center+, Maastricht, The Netherlands, [9]Leicester Cancer Research Centre, University of Leicester, Leicester, United Kingdom, [10]Gustave Roussy, Cancer Campus, Villejuif, France, [11]Medical Data Works B.V., Maastricht, The Netherlands, [12]Department of Health Services Research, Care and Public Health Research Institute (CAPHRI), Faculty of Health Medicine and Life Sciences, Maastricht University, Maastricht, The Netherlands, [13]Department of Genetics and Genome Biology, University of Leicester, Leicester, United Kingdom, [14]Unitrad, Unicancer, Paris, France*

Purpose/Objective(s): In breast cancer (BC) treatments, arm lymphedema can represent a side effect with potential major impact on patient's quality of life. The possibility to obtain a personalized prediction of the risk occurrence for lymphedema can inform a more tailored treatment plan and suggest lifestyle advice to minimize the side effect and its severity. In the ongoing Horizon Europe project PRE-ACT (Prediction of Radiotherapy side Effects using explainable AI for patient Communication and Treatment modification), explainable Artificial Intelligence (XAI) algorithms are developed to predict and interpret lymphedema risk and other side effects in BC patients who underwent surgery, with or without systemic treatment and loco-regional radiotherapy (RT). A dedicated communication tool (PRE-ACT tool) for shared decision-making (SDM) is being designed to support radiation oncologists (ROs) and will be evaluated in a multi-center randomized clinical trial (PRE-ACT-01) for which clinicians' needs and recommendations are crucial.

Materials/Methods: From May to July 2023, interviews with ROs were carried out to gather feedback from potential stakeholders of the PRE-ACT tool and incorporate their point of view in the design process. Participants were recruited in the Netherlands, the United Kingdom and France (5, 5 and 8 ROs respectively). Questions regarding the *kind of information* that is needed about patient's personalized lymphedema risk, *how* the information should be given to them and *when* the information is needed, were asked. The interviews were audio-recorded, transcribed verbatim and analyzed qualitatively following a thematic analysis.

Results: ROs considered the PRE-ACT tool primarily as a support during joint consultation with patients before the start of RT. A global overview including the lymphedema risk accompanied with oncological benefits of RT should be provided. Explanations should cover a description of risk factors, highlighting their cumulative effect, and the risk estimation over different time periods after RT. Information should be provided at different levels of complexity (e.g. through pictograms, graphs, statistics, etc.) to embrace inclusivity together with personalized suggestions to minimize the risk. General sections on lymphedema, radiotherapy and prevention should also be incorporated as additional material. Trust in the predicted risk should be fostered ensuring reliable validation of the XAI model. This model should be trained on a good-quality dataset and supported by literature.

Conclusion: ROs have provided clear recommendations on what kind of information is needed as well as on how and when to receive the information of XAI prediction models, highlighting the need of accessibility and trustworthiness. Focus groups with former BC patients were held in parallel

with the interviews with the ROs. These recommendations have fed into the design of a digital communication package, which will be tested in a clinical trial.

Author Disclosure: **Y. Liang**: None. **J. Rainbird**: None. **G. Cortellessa**: None. **M. Balia**: None. **G. Bologna**: None. **I. Koutsopoulos**: None. **A. Pannison**: None. **A. Perotti**: None. **B. Ramaekers**: None. **T. Rattay**: None. **S. Rivera**: None. **A. Romita**: None. **C. Roumen**: None. **C. Talbot**: None. **K. Verhoeven**: None. **M. Bergeaud**: None. **F. Fracasso**: None.

3448

Radiation to Sites of Skeletal Involvement in Large B-Cell Lymphoma: Trends and Impact on Survival

K. Vo,[1] C.J. Ladbury,[2] A.L. Schwer,[3] A. Amini,[2] J.Y.C. Wong,[2] N. Khan,[4] A. Kallam,[4] S. Kambhampati,[4] A. Borogovac,[5] J. Baird,[4] G. Shouse,[4] M. Mei,[4] A. Herrera,[4] T. Siddiqi,[4] L.E. Budde,[4] and S.V. Dandapani[2]; [1]*Western University of Health Sciences, College of Osteopathic Medicine of the Pacific, Pomona, CA,* [2]*Department of Radiation Oncology, City of Hope National Medical Center, Duarte, CA,* [3]*Department of Radiation Oncology, Lennar Comprehensive Cancer Center, City of Hope National Medical Center, Irvine, CA,* [4]*Department of Hematology and Hematopoietic Cell Transplantation, City of Hope National Medical Center, Duarte, CA,* [5]*Department of Hematology and Hematopoietic Cell Transplantation, Lennar Comprehensive Cancer Center, City of Hope National Medical Center, Irvine, CA*

Purpose/Objective(s): In the era of rituximab, large B-cell lymphoma (LBCL) with secondary skeletal involvement has been associated with worse overall survival (OS) and higher relapse rates. Prospective data suggest an improvement in progression-free survival (PFS), and OS in patients with skeletal involvement treated with consolidative radiation (RT). Despite these positive results, real-world adoption of skeletal radiation and associated oncologic outcomes, are not well characterized. We hypothesized that RT for patients with skeletal involvement from LBCL remains underutilized, leading to a detriment of OS.

Materials/Methods: We conducted a retrospective analysis using the National Cancer Database for patients with LBCL with bone involvement with chemotherapy +/- RT from 2016-2020. Due to limitations on how skeletal involvement was coded prior to 2016, we excluded data from previous years. Patients who did not receive rituximab + chemotherapy, had prior malignancy, unknown RT treatment, or unknown follow-up were excluded. Patients who received palliative doses of RT (<30 Gy) were also excluded. Receipt of radiation treatment was defined as skeletal (SRT), non-skeletal (NSRT), or none. Trends in the utilization of RT were assessed using linear and logistic regressions. Survival analysis was performed using Cox regression and Kaplan-Meier methods.

Results: A total of 641 patients met the inclusion criteria, with 8.7% receiving SRT, 7.2% receiving NSRT, and 84.1% without RT. In 2016, 80.6% and 13.9% of patients received no RT and SRT, respectively. In 2020, 84.9% and 7.9% of patients received no RT (slope: 1.1%/yr; p = 0.141) and SRT (slope: -1.6%/yr; p = 0.186), respectively. No patient or clinical factors were associated with receipt of either SRT or RT in general. Median follow-up was 2.6 years (IQR = 1.1-4.2 years). The 3-yr OS rates in the SRT, NSRT, and no RT cohorts were 87.0% (95% CI = 74.7−93.6%), 83.4% (95% CI = 68.1−91.8%), and 72.6% (95% CI = 68.5−76.3%), respectively. Relative to no RT, receipt of SRT was associated with improved OS on univariable Cox regression (HR = 0.41; p = 0.020) and multivariable (MVA) Cox regression (HR = 0.44; p = 0.032). In comparison, relative to no RT, receipt of NSRT was not associated with improved OS on univariable Cox regression (HR = 0.54; p = 0.087) or multivariable (MVA) Cox regression (HR = 0.55; p = 0.098). Factors associated with OS on MVA included age and Charlson Deyo score. Other factors including race, ethnicity, insurance type, hospital type, and IPI score were not significant.

Conclusion: Consistent with prospective data, SRT conferred a statistically significant improvement in OS, with a numerical improvement similar to prior prospective analyses. Despite this benefit, rates of consolidative RT to skeletal sites are low and potentially decreasing. Future studies should further elucidate the benefit of consolidative RT for patients with LBCL with skeletal involvement and barriers to such treatment.

Author Disclosure: **K. Vo**: None. **C.J. Ladbury**: Grant/research funding; RefleXion Medical. Compensation/Payment; Radiation Oncology Institute. **A.L. Schwer**: None. **A. Amini**: Grant/research funding; Varian, Genentech, RefleXion. **J.Y. Wong**: Grant/research funding; Varian/Siemens, Reflexion, Inc., Accuray, Inc., Blue Earth Diagnostic, Janssen, Fusion, Inc, Novartis, Lantheus, Imaginab. Honoraria; Varian/Siemens, Reflexion, Inc. Compensation/Payment; Telix Inc. Uncompensated; Varian/Siemens, Reflexion, Inc., Accuray, Inc., Blue Earth Diagnostic. **N. Khan**: None. **A. Kallam**: None. **S. Kambhampati**: None. **A. Borogovac**: None. **J. Baird**: None. **G. Shouse**: None. **M. Mei**: None. **A. Herrera**: None. **T. Siddiqi**: None. **L.E. Budde**: None. **S.V. Dandapani**: Grant/research funding; Imaginab, Bayer. Provides imaging agent for my IIT; Imaginab.

3449

Analysis of Dual-Energy CT (DECT) Parameters in Patients with Stage I Non-Small Cell Lung Cancer Treated with Stereotactic Ablative Body Radiation (SABR) in a Prospective Study

W.C. Hsu,[1] S. Mao,[2] E. Vonderhaar,[2] P.B. Illei,[3] R.K. Hales,[4] C. Hu,[5] J.R. Brahmer,[6] P. Forde,[7] J. Naidoo,[8] V. Anagnostou,[9] K. Smith,[10] C.T. Lin,[11] and R. Voong[4]; [1]*Johns Hopkins University S, Baltimore, MD,* [2]*Department of Radiation Oncology and Molecular Radiation Sciences, Johns Hopkins University School of Medicine, Baltimore, MD,* [3]*Department of Pathology Johns Hopkins University, Baltimore, MD,* [4]*Johns Hopkins Radiation Oncology Kimmel Cancer Center, Baltimore, MD,* [5]*Division of Quantitative Sciences, Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins University School of Medicine, Baltimore, MD,* [6]*Department of Oncology, Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins University School of Medicine, Baltimore, MD,* [7]*Johns Hopkins University School of Medicine, Baltimore, MD,* [8]*Sidney Kimmel Comprehensive Cancer Center and Bloomberg-Kimmel Institute for Cancer Immunotherapy at John Hopkins University, Baltimore, MD,* [9]*Bloomberg-Kimmel Institute for Cancer Immunotherapy, Johns Hopkins, Baltimore, MD,* [10]*Department of Oncology Johns Hopkins University, Baltimore, MD,* [11]*Department of Radiology and Radiological Science, Johns Hopkins School of Medicine, Baltimore, MD*

Purpose/Objective(s): DECT scans measure intratumoral iodine concentration, which provides valuable insights into the tumor environment including blood supply and metabolic activity. The purpose of this study is to examine the short-term changes in DECT parameters patients with stage I non-small cell lung cancer (NSCLC) after SABR therapy.

Materials/Methods: Patients ≥18 years with stage I NSCLC were consented and enrolled in an IRB-approved prospective study. Patients received SABR (48Gy/4 fractions or 50Gy/5 fractions) and had chest DECT scans before and 5-7 days following SABR. Color iodine maps and atomic number maps were generated utilizing a post-processing algorithm (Siemens Syngo.via). Two blinded radiologists reviewed scans and quantified DECT parameters (iodine concentration (IC) and atomic numbers (Zeff)). Normalized iodine concentration (NIC) was calculated to decrease hemodynamic impact by dividing the IC of the tumor by the IC of the aorta. Descriptive statistical analysis compared the parameters before and after SABR. The difference between values was calculated as the post-SABR value minus the pre-SABR value.

Results: Six patients enrolled, with a median age of 75 years (66 - 83) and a median tumor size of 1.9 cm (0.84 - 3.0). Adenocarcinoma was the predominant histopathology (n = 4). At a median follow-up of 40 months, 83% (5/6) patients had tumor control after SABR alone. One patient experienced locoregional recurrence 13 months post-SABR. In comparing IC from color iodine maps pre- and post-SABR, the mean IC was 1.95 and 2.37, respectively. Four patients showed increase in IC, with the patient who later developed recurrence displaying the largest increase (pre-SABR 2.5 ng/ml, post-SABR 3.6 ng/ml, difference 1.1 ng/ml). NIC analysis followed a similar pattern of increase in mean values post-SABR (pre-SABR: