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ASTRO's 62nd Annual Meeting (October 23-29, 2020) Late-breaking Abstracts

LBA 1

Initial Report of a Randomized Trial Comparing Conventional- vs Conventional plus Fluciclovine (^{18}F) PET/CT Imaging-Guided Post-Prostatectomy Radiotherapy for Prostate Cancer

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Purpose/Objective(s): Molecular imaging is increasingly used to guide prostate cancer (PCa) radiotherapy (XRT) decisions & treatment planning. We explored the role of fluciclovine (^{18}F) PET/CT [PET]-guided XRT in improving PCa control over conventional imaging [CI] (bone scan & CT or MRI of abdomen+pelvis)-guided XRT in a randomized trial.

Materials/Methods: From 2012 to 2019, pts with PCa with detectable PSA post-prostatectomy (RRP) & negative CI were stratified by (a) PSA (<2.0 v ≥2.0 ng/mL), (b) adverse pathology [extracapsular extension (ECE), +seminal vesicle (SV), +margin, +node] (none v any), & (c) ADT use (Y v N) & randomized to XRT directed by CI (Arm 1) v CI+PET (Arm 2). In Arm 2, XRT decisions were rigidly determined by PET: (A) extra-pelvic uptake (no XRT); (B) pelvic uptake (XRT to pelvis {45.0-50.4 Gy} + prostate bed [PB] {64.8-70.2 Gy}); (C) PB-only uptake (XRT to PB); & (D) no uptake (XRT to PB). In Arm 2, PET was also registered with planning CT for target delineation. Kaplan-Meier curves (with failure defined as any of: PSA > 0.2 ng/mL from nadir followed by another rise, persistent PSA, imaging or digital rectal exam failure, or initiation of systemic therapy) were generated 4 years from end-XRT (time=0) & compared using the logrank test. Failure rates at 3Y (primary study endpoint) & at 4Y were compared using the Z test. Univariate & multivariable analyses were performed for demographic, disease, & treatment factors. Secondary endpoints included provider-reported [acute & late, GI & GU] toxicities, which were compared between Arms using χ^2 or Fisher's exact test.

Results: 165 pts were enrolled (Arm 1: 82; Arm 2: 83). Arms were balanced on age, race, PSA, Gleason score (GS), ECE, SV, +margin, +node, & ADT use. In Arm 1, 1 pt withdrew before XRT. In Arm 2, 3 pts withdrew before & 1 pt was unable to undergo PET (but this pt received XRT). PET uptake in Arm 2 (n=79) was: extra-pelvic: 4; pelvic+/-PB: 27; PB only: 32; none: 16. This resulted in a 35.4% rate of decision changes, including 4 pts having XRT aborted. For pts undergoing XRT (Arm 1: 81; Arm 2: 76), median FU was 2.48 Y (3.06 Y for those not failing); 125 pts had minimum FU of 3Y. 3Y failure-free survival rate for Arm 1 v Arm 2 was 63.0 v 75.5% (p=0.003), & at 4Y was 51.2 v 75.5% (p<0.001). On univariate analysis Arm (p=0.054) achieved a statistical trend; GS (p=0.012), ECE (p=0.009), SV (p=0.022), pelvic field (p<0.001), & PSA [≥1 ng/mL] (p<0.001) reached significance. On multivariable analysis, Arm (HR=2.04 [95% CI: 1.06-3.93], p=0.033), ECE (p=0.035), pelvic field (p=0.031), & PSA (p<0.001) reached significance. Toxicity was similar in both Arms, suggesting PET-guided treatment was well-tolerated.

Conclusion: This first-ever randomized trial of PET over CI alone when finalizing post-RRP XRT decisions & target volumes shows inclusion of fluciclovine resulted in a significant improvement in failure rate at 3Y. The integration of novel PET radiotracers into XRT decisions & planning (including dose-escalation to regions of PET uptake) for pts with PCa warrants further study.

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LBA 2

CCTG SC.24/TROG 17.06: A Randomized Phase II/III Study Comparing 24Gy in 2 Stereotactic Body Radiotherapy (SBRT) Fractions Versus 20Gy in 5 Conventional Palliative Radiotherapy (CRT) Fractions for Patients with Painful Spinal Metastases

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Purpose/Objective(s): To compare complete response rates (CR) for pain between high dose SBRT and conventional low dose CRT to a painful site of spinal metastases.

Materials/Methods: In this randomized Phase 2/3 trial (NCT02512965), patients with a de novo site of painful spinal metastases were randomized (1:1) to 24Gy in 2 SBRT fractions or 20Gy in 5 CRT fractions. Inclusion criteria consisted of a target site spinal metastases (≤3 consecutive metastatically involved spinal segments) arising from a solid primary tumor causing a pain score of ≥2 using the Brief Pain Inventory (BPI), an ECOG of 0-2 and not mechanically unstable per the Spinal Instability Neoplasia Score classification system. Stratification factors were extra-osseous extension (yes/no) and radioresistant vs. radiosensitive type. The primary endpoint was the CR rate for pain in the treatment area at 3 months post-radiation using International Consensus Pain Response End-points. Secondary endpoints included the 6-month pain CR rate, radiation site progression-free-survival (RSS PFS: defined as the time from randomization to local progression or death), and quality of life (QoL). The study had an 80% power to show a 17% improvement in the 3-month CR rate in favor of the SBRT arm. Efficacy analyses were intent-to-treat and safety analyses were as treated. Adverse events (AE) were evaluated per the Common Terminology Criteria for Adverse Events version 4.0 (CTCAE v 4.0). The trial sponsor was the Canadian Cancer Trials Group (CCTG) in collaboration with the Trans Tasman Radiation Oncology Group (TROG).

Results: Of the 229 enrolled patients between Jan 2016 to Sept 2019, 115 were randomized to CRT and 114 to SBRT of which 4 patients in the SBRT arm were either ineligible or withdrew prior to radiation. 38 patients (22 in the CRT and 16 in the SBRT arm) were not evaluable for the primary endpoint. The median baseline worst pain score was 5 (range, 2-10) and SINS was 7 (range, 3-12) in both arms, and median follow-up was 6.7 months. At 3 months, 16/115 (14%) in the CRT arm vs. 40/114 (36%) in the SBRT arm ($p<0.001$) achieved a CR to pain. Significance was retained in multivariable analyses (MVA, $p<0.001$) and the risk ratio (RR) was 1.33 (95% C.I=1.14−1.55) favoring SBRT. At 6 months, 18/115 (16%) in the CRT arm vs. 37/114 patients (33%) in the SBRT arm achieved a CR ($p=0.004$), significance retained on MVA ($p<0.001$), and the RR was 1.24 (95% C.I. 1.07 − 1.44) favoring SBRT. The 3-month RSS PFS for CRT vs. SBRT was 86% vs. 92% ($p=0.4$), and at 6 months was 69% vs. 75% ($p=0.42$), respectively. For QoL outcomes, only financial perception at 1 month significantly differed ($p=0.03$) favoring SBRT. There were 20 (17%) vs. 12 (11%) post-radiation vertebral compression fractures, and 2 (2%) vs no (0%) patient progressed to malignant epidural spinal cord compression, in the CRT vs. SBRT arm, respectively. Grade 2+ AE were observed in 12% and 11% in the CRT and SBRT arms, respectively, and no Grade 5 events.

Conclusion: SBRT is superior to CRT in improving the CR rate for pain at 3 and 6 months post-radiation.

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LBA 3

Patterns of Disease Progression after Carboplatin/Etoposide + Atezolizumab in Extensive-Stage Small-Cell Lung Cancer (ES-SCLC)

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Purpose/Objective(s): Chemo-immunotherapy became the standard of care in the first-line treatment of ES-SCLC after the IMpower133 trial demonstrated an improvement in overall survival with carboplatin/etoposide (CP/ET) + atezolizumab (atezo). This exploratory analysis seeks to examine patterns of first progression after CP/ET + atezo in IMpower133 (NCT02763579).

Materials/Methods: 403 patients with ECOG PS 0-1 and no prior systemic therapy for ES-SCLC were randomly assigned (1:1) to 4 cycles of CP and ET with either atezo or placebo, followed by maintenance atezo or placebo until disease progression (per RECIST 1.1), loss of clinical benefit or unacceptable toxicity. Patients with treated asymptomatic brain metastases were allowed. Prophylactic cranial irradiation (PCI) was allowed at the discretion of the treating physician. Consolidative thoracic radiation was not permitted. Patients were stratified by sex, ECOG PS (0 or 1) and presence of brain metastases (yes or no). Progression of disease was investigator assessed (per RECIST 1.1). Patterns of progression were summarized descriptively. Time to progression was estimated by Kaplan-Meier methodology, and comparisons between treatment arms were made with an unstratified log-rank test.

Results: The number of patients receiving PCI in the intent-to-treat (ITT) population was comparable in both arms (11%). In the ITT population, time to intra-cranial progression, defined as first development of new lesions in the brain or receipt of brain radiation without new brain lesions reported during the follow-up period, was improved in patients receiving atezo, with a median of 20.2 vs 10.5 mo (HR, 0.66; 95% CI: 0.44, 1.00). In patients who did not receive PCI (placebo, n = 180; atezo, n = 179), a similar trend was seen, with a median time to intra-cranial progression of 16.7 mo in the atezo arm vs 9.8 mo in the placebo arm (HR, 0.72; 95% CI: 0.47, 1.09). 59.4% of patients in the placebo arm progressed in initial target lesions compared with 56.2% of patients in the atezo arm. Progression outside of initial sites of disease developed in 53.0% vs 48.3% of patients in the placebo vs atezo arm, respectively. In the ITT population, the most common sites of progression in patients who progressed in new sites were the brain (13.4% vs 12.4% [placebo vs atezo]), lymph nodes (12.4% for both arms), lung (11.9% vs 11.4%) and liver (10.4% vs 10.0%).

Conclusion: CP/ET + atezo delayed the time to intra-cranial progression, indicating potential CNS efficacy in a disease in which brain metastases are pervasive. In both treatment arms, the most dominant pattern of progression was in initial sites of disease. This suggests a role for consolidative radiation to initial thoracic disease and sites of metastases to further improve outcomes in patients with ES-SCLC receiving chemo-immunotherapy; this is being evaluated in the NRG Oncology LU007 study (NCT04402788).

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Prognostic Significance of *IDH1/2* Mutation and *MGMT* Promoter Methylation Status in RTOG 9813

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Purpose/Objective(s): This study investigated the prognostic significance of *IDH1/2* mutation and *MGMT* promoter methylation status in RTOG 9813, a phase III study of radiation (RT) and temozolomide (TMZ) versus RT and nitrosourea (NU) in anaplastic astrocytoma.

Materials/Methods: *IDH1/2* mutation status was determined by a multi-platform approach using next-generation sequencing and immunohistochemistry. The MGMT-STP27 prediction model was used to calculate *MGMT* promoter methylation status from Illumina 450K data. Overall survival (OS) and progression-free survival (PFS) by marker status were determined using the Cox proportional hazards model and tested using the log-rank test. A stepwise model was used for multivariable analyses and patient pre-treatment characteristics were included as covariates.

Results: Of the 116 eligible patients with available tissue, *IDH1/2* mutation status was obtained on 111 patients, where 61 (55%) were *IDH1/2* mutant (*IDH*mut) and 50 (45%) were *IDH1/2* wild-type (*IDH*wt). *MGMT* promoter methylation status was obtained on 67 patients, with 36 (54%) determined to be *MGMT* methylated and 31 (46%) *MGMT* unmethylated. Upon univariable analysis, it was evident that *IDH*mut patients had significantly longer OS (HR: 0.34 (0.21-0.54); $p < 0.001$) and PFS (HR: 0.41 (0.27-0.63); $p < 0.001$) compared to those patients with *IDH*wt tumors. Statistical significance for *IDH1/2* mutation status was maintained in multivariable analyses for OS (HR: 0.35 (0.22-0.58); $p < 0.001$) and PFS (HR: 0.46 (0.28, 0.75); $p < 0.001$). Patients with *MGMT* methylated tumors trended towards having better OS (HR: 0.56 (0.31-1.02); $p = 0.05$) upon univariable analysis and significance was established in multivariable analysis (HR: 0.47 (0.25-0.90); $p = 0.023$). In a multi-marker multivariable model incorporating *IDH1/2* mutation and *MGMT* methylation, *IDH1/2* mutation (HR: 0.32 (0.14-0.73); $p = 0.006$), age (HR: 0.34 (0.15-0.75); $p = 0.008$), and gender (HR: 0.51 (0.26- 1.00); $p = 0.049$) retained significance for OS and only *IDH1/2* was significant for PFS (HR: 0.30 (0.16, 0.58); $p < 0.001$). When looking at the two treatment arms separately, *IDH*mut patients do well regardless of treatment type, where median overall survival time (MST) was 7.9 years for patients treated with RT + NU and not reached for those treated with RT + TMZ. *MGMT* methylation status appeared to be a strong predictor of survival in the RT + NU arm, where MST for *MGMT* methylated patients was found to be 8.0 years compared to 2.0 years for unmethylated patients.

Conclusion: Here we show in an updated analysis using RTOG 9813, *IDH1/2* mutation status is a more valuable prognostic marker for grade III anaplastic astrocytomas compared to *MGMT* methylation status. *MGMT* methylation status appears to be of prognostic value in the setting of RT + NU; however, further validation is warranted.

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Randomized, Double-Blinded, Placebo-controlled Multicenter Adaptive Phase 1-2 Trial of GC 4419, a Dismutase Mimetic, in Combination with High Dose Stereotactic Body Radiation Therapy (SBRT) in Locally Advanced Pancreatic Cancer (PC)

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Purpose/Objective(s): Local progression of PC causes substantial morbidity & mortality. High dose SBRT is limited by GI tract toxicity. RT forms superoxide ($O_2\bullet^-$) causing normal tissue toxicity; another RT product, OH•, causes cancer cell death. GC4419, a selective superoxide dismutase mimetic, converts $O_2\bullet^-$ to H_2O_2, which is more toxic to cancer vs normal tissue, while not decreasing OH•. GC4419 was synergistic with hypofractionated RT in multiple in vivo tumor models, while protecting normal tissue. We hypothesized GC4419, already in Phase 3 trials for another indication (NCT03689712), might improve the clinical benefit-risk ratio of high dose SBRT.

Materials/Methods: After completing first line chemotherapy, patients with locally advanced (LA) or borderline resectable (BR) PC were randomized (double-blind) 1:1 at 4 centers to IV 90 mg GC4419 or placebo (PBO) (up to 24/arm), prior to each of 5 daily SBRT fractions. SBRT dose assignment proceeded separately in each arm based on dual endpoints (Gr 3-4 GI toxicity/death; local stable disease/better) by 90 days post SBRT using a Late Onset Efficacy/Toxicity tradeoff (LO-ET) adaptive design. SBRT dose levels: 10, 11, or 12 Gy x 5 (BED10 = 100, 115.5 and 132Gy), given as an integrated boost to the gross tumor volume, while preserving normal bowel constraints. Primary endpoint: dose-limiting toxicity and efficacy with GC 4419 & placebo evaluated within 90 days from treatment. Other endpoints included acute (90 day) and late (12 month) radiation toxicity, overall survival (OS), progression-free survival (PFS), locoregional control (LRC) and time to distant metastases (TDM).

Results: Enrollment completed per protocol May 2020, n = 42 (23M/19F; median age 71 yrs; LA/BR 32/10; ECOG 0/1/2, 21/20/1; median prior chemo 18 wks; CA19-9 >1000 U/mL, 3); all completed assigned SBRT: 10 Gy x 5 (n = 24) or 11 Gy x 5 (n = 18). Optimal SBRT dose determinations based on pending 90-day f/u of full cohorts to be included in presentation of full study results, along with 90-day safety and tumor efficacy. Interim Analysis (N = 19, single center, all LA, prior chemo median 21 wks, followed > 1 yr, post-SBRT chemotherapy similar between arms):

Conclusion: Selective dismutase mimetics may improve tumor outcomes of LAPC treated with SBRT (10-11Gy x 5). The combination

Abstract 5: Table

Arm	Pts (N)		Best Overall Response (CR+PR)	Medians (weeks from SBRT)			
	10Gy x 5	11Gy x 5		OS	PFS	LRC	TDM
GC4419 (n=11)	5	6	54%	NR	29.3	NR	34.7
PBO (n=8)	6	2	13%	40.4	12.7	15.0	12.7
Hazard Ratio				*0.3*	*0.4*	*0.1*	*0.4*
P (log-rank)				*0.046*	*0.078*	*0.051*	*0.068*

NR = Not Reached Interim Safety: GC4419 (N=11) vs. PBO (N=8): 1 vs. 1 Gr3 SAE @ 90d; 5 vs. 4 Gr3 AEs & 4 vs. 3 SAE @ 1 yr.

demonstrated favorable OS, PFS, locoregional/distant metastasis control, and acceptable safety, at interim analysis.

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LBA 6

Family Planning, Fertility, and Career Decisions in Female Radiation Oncologists

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Purpose/Objective(s): Female radiation oncologists spend their 20s and 30s in training and establishing careers; these are prime years that can impact fertility and childbearing. As nearly a quarter of female physicians deal with infertility and more oncology trainees are choosing to delay pregnancy for career and social support reasons, there is rising interest in fertility preservation. This study was designed to understand barriers to family planning and the impact of fertility treatment options among female oncologists.

Materials/Methods: A novel questionnaire was designed to collect cross-sectional data on attitudes toward family planning and assisted reproductive technology (ART) among U.S. female oncologists of all career levels. It included 39 questions compiled after comprehensive literature review. After IRB approval, the online survey was distributed via email and social media channels. Data was collected anonymously via REDCap from May-June 2020. Descriptive statistics were generated.

Results: Of the 1010 responses collected, 351 (35%) were radiation oncologists; this represents approximately a fifth of the entire female radiation oncology workforce including trainees. Of 351 who started the survey, 341 answered all 39 questions (97% completion rate). The majority were married (79%, n=278) and had children (68%, n= 238). Most were between 31-40 years (60%, n=211). The plurality (44%, n= 154) were employed in academic medicine, 22% (n=76) were hospital-based or private practice, and 26% (n=90) were still in training. Most (74%, n=259) reported strong influence from their career plans in the timing of when to start a family and 29% (n= 100) stated that family planning influenced their decision regarding their choice of academics versus private practice. Nearly a quarter (24%, n=85) had difficulty with infertility or required fertility counseling/treatment and 66% (n=229) wished fertility preservation was discussed at some point during their training. Twenty-two percent (n=77) felt that either ART would have benefited them if it had been available or were planning to or have already utilized fertility preservation. When asked about maternity leave, 23% (n=79) had either no formal policy during training or less than 1 month of leave; 15% (n=53) felt pressure to take less leave than was policy. A third (33%, n=116) did not feel supported during training for issues related to fertility and/or pregnancy. Furthermore, almost a third reported experiencing discrimination for being pregnant (32%, n=111) or for taking maternity leave (30%, n=103).

Conclusion: In the largest study to date of female radiation oncologists on the topic, a considerable proportion of women in our field have faced infertility and difficult career choices related to family planning. Systemic changes are necessary early in medical education and training to ensure women are supported and able to advance equitably in the field.

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Evaluating Speaker Introductions at the American Society for Radiation Oncology Annual Meeting

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Purpose/Objective(s): Introducing a physician with or without a formal title may reinforce gender disparities in academic medicine by influencing perceived credibility. We evaluated the use of formal titles in speakers' introductions at recent American Society for Radiation Oncology (ASTRO) annual meetings.

Materials/Methods: We reviewed archived videos of oral presentations from the 2017, 2018, and 2019 ASTRO annual meetings. A "formal introduction" was defined as "Doctor" or "Professor" followed by the speaker's first name/last name or last name. We collected introduction type (formal or informal), introducer gender, and the speakers' gender, degree, degree year, academic rank, and geographic location of speaker institution. We excluded presentations missing a complete introduction or presentations from speakers without a known doctoral degree. Analysis was performed using chi-squared tests and multivariable regression (MVA).

Results: Of 3,267 presentations, 1,357 introductions were available for review (41.5%) and 1,226 met inclusion criteria (37.5% or 653, 211, and 362 presentations from 2017, 2018, and 2019 respectively). Of included presentations, speakers were 65.8% male (n=807) and introducers were 57.9% male (n=710). Formal titles were used in 73.8% (2017), 69.2% (2018), and 68.0% (2019) of presentation introductions. Overall, male introducers were less likely to introduce a speaker by their formal title

Abstract 7: Table

Introduction	Female Speaker (n=419)	Male Speaker (n=807)
Formal (Dr/Prof)	**306** (73.0%)	**568** (70.4%)
Informal	**113** (27.0%)	**239** (29.6%)
First and Last Name	106 (25.3%)	222 (27.5%)
First Name only	7 (1.7%)	17 (2.1%)

regardless of speaker gender (64.0% male introducers vs 81.2% female introducers, p<0.0001). Male introducers used formal titles equally for female vs male speakers (67.1% vs 79.2%, p=0.245) and female introducers used formal titles equally for female vs male speakers (82.4% vs 81.7%, p=0.698). In the entire cohort, female speakers were equally as likely to be introduced with a formal title compared to male speakers (73.0% vs 70.4%, p=0.361). On MVA, male introducer was associated with decreased use of formal title (OR 0.39, 95% CI 0.29-0.52, p<0.001), however speaker gender, year, type of talk, academic rank, degree, degree year, and geographic location of speaker institution were not associated.

Conclusion: Recent ASTRO annual meetings did not appear to show a gender bias in the use of formal titles in speaker introductions. However, male introducers were significantly less likely to introduce any speaker, regardless of gender, by their professional title; there was also a slight decrease in the use of formal introductions from 2017 to 2019. Providing formal ASTRO introducer guidelines for future meetings (similar to the "Language of Respect" issued for the ASCO 2020 Annual Meeting) may help increase the use of professional titles at future ASTRO meetings.

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Immunomodulatory Low-Dose Whole-Lung Radiation for Patients with COVID-19-Related Pneumonia

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Purpose/Objective(s): Phase I clinical trials have established that low-dose, whole-lung radiotherapy (LD-RT) is safe for patients with COVID-19-related pneumonia. By focally dampening cytokine hyperactivation, LD-RT may improve COVID-19 outcomes through immunomodulation.

Materials/Methods: Patients with COVID-19-related pneumonia were treated with 1.5 Gy whole-lung LD-RT, followed for 28 days, and compared to age- and comorbidity-matched controls. Eligible patients were hospitalized, SARS-CoV-2 positive, had radiographic consolidations, and required supplemental oxygen. Efficacy endpoints were time to clinical recovery (TTCR), radiographic improvement, and biomarker response. Two-sample t-tests, chi-square tests, univariate Cox proportional hazard models, cumulative incidences, and hazard ratios were reported.

Results: Ten patients received whole-lung LD-RT between April 24 and May 24, 2020 and were blindly compared to ten controls treated with best supportive care and COVID-directed therapies. Median TTCR was 12 days in controls compared to 3 days in the LD-RT cohort (HR 2.9, p=0.05). Median time to hospital discharge was 20 versus 12 days (p=0.19) and intubation rates were 40% versus 10% (p=0.12), respectively. 28-day overall survival was 90% for both cohorts. Age ≥65 was associated with lower oxygen requirement and shorter TTCR in the LD-RT cohort (p=0.01) but not controls (p=0.40). The LD-RT cohort had superior improvement in radiographs (p=0.03) and delirium (p<0.01). Change in inflammatory biomarkers was detected for both C-reactive protein (CRP, p<0.01) and lactate dehydrogenase (p=0.03), with improvements compared to pre-LD-RT levels (p=0.01 and p=0.07, respectively). CRP rose at a median rate of 22% per day before LD-RT, but thereafter fell more rapidly than in controls (p=0.01), at a median rate of 11% per day. Creatine kinase also changed after LD-RT (p<0.01), with improvement over controls approaching significance (p=0.08). Troponin rose 5% per day in controls versus 1% per day after LD-RT, but this was not significant (p=0.32). Liver function tests remained low following LD-RT but rose more commonly in controls (AST p=0.07; ALT p=0.04). Immunomodulatory LD-RT reduced white blood cell count (p=0.04), monocytes (p=0.02), and neutrophil-to-lymphocyte ratio (p=0.04). Differences in renal function (p=0.46) and clotting factors (p=0.49) were not significant.

Conclusion: A cohort of predominantly elderly hospitalized patients with COVID-19-related pneumonia were recovered to room air quicker than age- and comorbidity-matched controls treated with best supportive care alone or with COVID drug therapies. LD-RT improved delirium, radiographs, and biomarkers, with no significant acute toxicity. LD-RT for patients with COVID-19 appears safe and may be an effective immunomodulatory treatment to speed recovery and prevent muscle, cardiac, and/or hepatic injury. Confirmatory clinical trials are needed. Clinical Trial Registration: NCT04366791.

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A Statewide Multi-institutional Study of Asymptomatic Pre-Treatment Testing of Radiation Therapy Patients for SARS-CoV-2 in a High-Incidence Region of the United States

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Purpose/Objective(s): To establish the prevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in asymptomatic patients scheduled to receive radiation therapy and its impact on management decisions.

Materials/Methods: Between April 2020 and July 2020, patients without influenza-like-illness (ILI) symptoms at four radiation oncology departments (2 academic university hospitals and 2 community hospitals) underwent polymerase chain reaction (PCR) testing for SARS-CoV-2 prior to the initiation of treatment. Three centers were located in New Jersey and one in Southeast Pennsylvania. According to the centers of disease control (CDC), during this period of time, the 7-day average of daily confirmed cases in this region ranged from 3,197 (April 27, 2020) to 295 (July 24, 2020). Testing strategy was determined by each individual institution (all patients vs. chemo-radiotherapy patients only, etc.). Patients were tested either prior to radiotherapy simulation or after simulation but prior to treatment initiation. Patients tested for indications of ILI symptoms were excluded from this analysis. Management of SARS-CoV-2-positive patients was individualized based on disease site and acuity.

Results: Over a three-month period, a total of 385 asymptomatic patients were tested either prior to simulation (n=154) or post-simulation, prior to treatment (n=230). A total of 5 patients tested positive for SARS-CoV-2, for a pre-treatment prevalence of 1.3% (2.6% in North/Central NJ and 0.4% in Southern NJ/Southeast PA). The median age of positive patients was 58 years (range: 38-78 years). All positive patients were white and were relatively equally distributed with regard to gender (2 male, 3 female)

and ethnicity (2 Hispanic and 3 non-Hispanic). The median Charlson comorbidity score among positive patients was 5. All 5 patients were treated for different primary tumor sites, the large majority had advanced disease (80%), and all were treated for curative intent. The majority of positive patients were being treated with either sequential or concurrent immunosuppressive systemic therapy (80%). Initiation of treatment was delayed for 14 days with the addition of re-testing for 4 patients, while one patient was treated without delay but with additional infectious-disease precautions.

Conclusion: In the era of universal respiratory and contact precautions, broad-based pre-treatment asymptomatic testing of radiation oncology patients for SARS-CoV-2 is of limited value, even in a high-incidence region. Future strategies may include focused asymptomatic testing for higher-risk patients according to demographics, comorbidities, disease stage and combination of treatment with cytotoxic chemotherapy.

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Evaluating the Impact of COVID-19 on Clinical Decision Making During the Initial Outbreak in a High-prevalence Environment

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Purpose/Objective(s): Being at the epicenter of the initial outbreak of COVID-19 in the US, we sought to characterize the impact of the pandemic on oncologic care at the two largest radiation oncology departments within the Rutgers-Barnabas health system in New Jersey (NJ). We hypothesized that management was modified for a significant percentage of patients due to a combination of patients' fears, physician's efforts to minimize patient exposure to the healthcare setting and the reallocation of hospital resources.

Materials/Methods: A multi-institutional retrospective review was performed on all patients seen at two radiation oncology departments in NJ between 3/9/20-6/15/20, corresponding to peak of the pandemic in the state. Patients who were seen in consultation either via telemedicine or in person, undergoing treatment planning or on active treatment during this period were included. Patients whose care had been modified due to the pandemic were identified, and the details of how care had been altered were documented. Care changes were classified into several categories including RT delay, RT fractionation change, RT omission, RT modality change, disruption of RT course and change in sequencing of treatment.

Results: All 482 patients seen at the two radiation oncology departments during the period of interest were identified. 103 patients (21.3%) experienced at least one COVID related care change. Of the 103 patients who experienced care changes, the most common change was a delay in RT (53.3%), followed by RT omission (10.6%), change in the sequencing of treatment (7.8%) and RT fractionation change (6.8%). RT delays were attributed to the reallocation of hospital resources for 43.6% of patients, physician's independent clinical judgement for 31% of patients, patient's own fears of presenting to clinic for 20% patients and positive COVID tests for 5.5% patients. Among the patients for whom RT was omitted, the decision to avoid RT as part of the treatment course was physician driven for 6 (54.5%). Patients with the following tumor types were most likely to experience care changes: rectal (75%), endometrial (44%), breast (36.5%), H&N (23.3%) and prostate (12.9%).

Conclusion: Over a fifth of the patient cohort experienced changes in care including RT delays, omission, or changes in the sequencing of treatment and fractionation. The likelihood of care changes also varied noticeably across different tumor types. This study, set at the heart of the initial outbreak, may provide a valuable perspective for the oncology community throughout the rest of the nation on how cancer care may be affected in balancing the need for protecting patients from COVID-19 and optimizing cancer outcomes.

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Initial Impact and Operational Response of Radiation Oncology Practices to the COVID-19 Pandemic in the United States, Europe, and Latin America

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Purpose/Objective(s): The COVID-19 pandemic has profoundly changed practice patterns in medicine around the world. The full impact on radiation oncology in the United States (US), Europe, and Latin America remains unknown. We surveyed radiation oncology practice leaders from each region to gauge initial impact and immediate operational responses to the pandemic.

Materials/Methods: From April 16 - May 30, 2020, the American Society for Radiation Oncology (ASTRO), European SocieTy for Radiotherapy and Oncology (ESTRO), and Rayos Contra Cancer in Latin America surveyed radiation oncology practices by email to gauge initial impact and immediate operational responses to the COVID-19 pandemic.

Results: In total, 474 of 1,246 practice leaders responded across 45 nations [222/517 (43%) in the US, 139/500 (28%) from 29 nations in Europe, 115/229 (50%) from 15 nations in Latin America]. All practices in the US and Europe and 97% of practices in Latin America reported uninterrupted operation. Average treatment volumes were reduced to 68%, 75%, and 59% of baseline in the US, Europe, and Latin America, respectively. Postponement of radiation therapy for low-risk patients was widely adopted (92%, 65%, 60%). Estimated reductions in revenue greater than 20% were reported by 71%, 25%, and 53% of US, European and Latin American practices, respectively. Nearly all practices (98%, 95%, 97%) implemented formal safety procedures to protect patients and staff from infections. Staffing (70%, 57%, 52%) and PPE shortages (69%, 48%, 51%) impacted all regions; first-time adoption of telemedicine programs was widespread (89%, 76%, 64%).

Conclusion: Surveyed impact of the early COVID-19 pandemic on radiation oncology practices across the US, Europe, and Latin America was substantial. Treatment access policies reflected rapidly published

international guidelines to delay treatment for low-risk diagnoses. Patients with higher risk disease continued to receive uninterrupted access to care. Despite staffing shortfalls, safety supply deficits, and financial instability, practices across these regions demonstrated resilience, quickly adopting safety recommendations and leveraging new telemedicine programs to facilitate prioritized treatment continuity. Continued surveying of international practice responses to the evolving pandemic is planned to estimate the impact on oncological outcomes. Wider outreach and surveying of practices from low and middle-income countries and regions is warranted.

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