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Poster #1

Active surveillance among intermediate favorable-risk prostate cancer: Pushing the envelope at a National Comprehensive Cancer Network center

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Introduction: We sought to investigate utilization of active surveillance (AS) among patients with National Comprehensive Cancer Network (NCCN) intermediate favorable-risk prostate cancer.

Methods: A retrospective review of our prospectively maintained AS database was performed (1995 and 2021). Patients who underwent AS were grouped into those with very low/low-risk vs. intermediate favorable-risk disease. Data were summarized using descriptive statistics. Kaplan-Meier method was used to depict treatment-free survival (TFS) and significance was assessed using log-rank test. Multivariable regression model was used to investigate variables associated with discontinuation of AS.

Results: A total of 946 patients received AS; 661 (73%) had a very low/low-risk and 217 (24%) had an intermediate favorable-risk prostate cancer. Median followup (IQR) was 6 years (2–10) and 3 years (2–6) for each group, respectively (p<0.01). A total of 208 (23%) patients received treatment: 155 (74%) in the very low/low-risk group and 53 (26%) in the intermediate favorable-group. TFS at 5 and 10 years were 76% and 64% for the very low/low-risk group and 65% and 55% for the intermediate favorable-risk group, respectively (log rank p=0.01) (Figure 1). Higher PSA density at the initiation of AS (HR 1.40, 95% CI 1.16–1.69, p<0.01) was associated with conversion to treatment.

Conclusions: Patients with intermediate favorable-risk prostate cancer were more likely to convert to treatment compared to patients with low or very low-risk. Higher PSA density at the initiation of AS was associated with conversion to treatment.

Poster #3

Impact of NCCN-compliant multidisciplinary conference on the utilization of active surveillance for patients with localized prostate cancer

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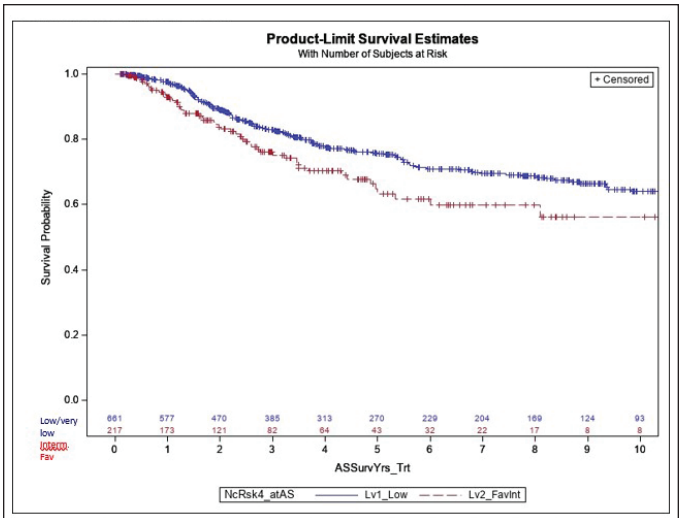
Introduction: We sought to investigate the impact of the National Comprehensive Cancer Network (NCCN)-compliant multidisciplinary conference on the uptake of active surveillance (AS) for patients with localized prostate cancer.

Methods: Retrospective review of the Localized Prostate Cancer Conference (LPCC) database between 2009 and 2019 was performed. Patients who presented for a second opinion at our NCCN-compliant institution were presented to the multidisciplinary localized prostate cancer conference (LPCC) (urologists, radiation oncologists, GU pathologists, and patient advocates). Patients eligible for AS (very low, low, and intermediate favorable NCCN risk) were identified. We investigated the frequency AS was recommended by community urologists vs. LPCC, and how many patients received it. Multivariate regression (MVA) model evaluated variables associated with receiving AS. Cochrane-Armitage test assessed trends over time.

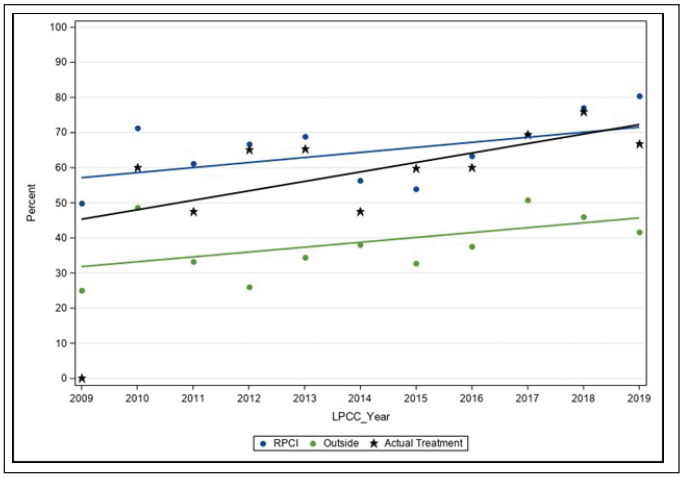


NCCN Risk	Years	1	2	3	4	5	6	7	8	9	10
Low/Very Low Risk	Survival Rate (%)	98	89	83	78	76	71	70	69	67	64
Intermediate Favorable	Survival Rate (%)	93	84	76	70	65	62	60	60	55	55

Poster #1. Figure 1. Treatment-free survival for patients with NCCN low-/very low-risk vs. intermediate favorable-risk (log-rank p=0.01).

Results: Of the 612 patients eligible for AS, 15% were NCCN very low-, 39% low-, and 46% favorable intermediate-risk. Community urologists recommended AS in 247 cases (40%) and the LPCC in 404 cases (66%) and 301 (62%) received AS. Patients who elected treatment were older (64 vs. 60 years, p<0.01), had larger prostate volume (37 vs. 34 mL, p <0.01), less positive biopsy cores (2 vs. 3, p <0.01), longer PSA doubling time (6 vs. 5 years, p=0.01), lower PSA density (0.11 vs. 0.16 ng/mL^2, p<0.01), Gleason grade 3+4 less frequently (27% vs. 64%, p<0.01), and NCCN favorable intermediate-risk less frequently (67% vs. 31%, p<0.01). On MVA, more recent LPCC era (OR 9.63, 95% CI 3.03–30.60, p<0.0001), and older age (OR 1.12, 95% CI 1.08–1.15, p<0.0001) were more likely to receive AS. Higher number of positive biopsy cores (OR 0.68, 95% CI 0.59–0.78, p<0.0001) and favorable intermediate-risk (OR 0.17, 95% CI 0.08–0.36, p<0.0001) were less likely to receive AS. Recommendations for AS by community urologists (from 32% to 47%) and the LPCC (57% to 72%) (p>0.05) increased over time. The uptake of AS increased significantly (from 45% to 72%, p<0.005) (Figure 1).

Conclusions: Among eligible patients, 40% were recommended AS by community urologists vs. 66% by LPCC, and 62% received AS. NCCN favorable intermediate and higher number of positive biopsy cores were associated with lower odds of receiving AS, while older patients and more recent LPCC era were more likely to receive it.



Poster #3. Figure 1.

Poster #4

High-grade prostate cancer outcomes using the ExoDx prostate test: A 2.5-year analysis

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Introduction: The ability to accurately predict high-grade prostate cancer (PC) using PSA is often unreliable. The ExoDx Prostate IntelliScore (EPI) test is a noninvasive, urine-based biomarker assay validated for risk assessment of high-grade PC based on a formerly established risk threshold of 15.6. A prospective, randomized, blinded, multipractice clinical utility study performed at Chesapeake Urology previously determined that the EPI test influenced clinical management to reduce or defer biopsy (Bx) in men with low-risk scores. Here, we present an interim analysis at 2.5 years of a planned 5-year followup to assess patient outcomes with their individual EPI scores.

Methods: First-catch, pre-Bx urine was collected from men with no history of PC, aged ≥50 years, with a PSA 2–10 ng/mL, who were scheduled for an initial prostate Bx. Patients were randomized to EPI and standard of care (SOC) arms. Urine samples and EPI tests were performed on both arms; however, only the EPI arm received the results as part of the Bx decision process. Clinical outcomes were collected and Bx pathology was assessed for patients from both trial arms according to risk for PC: low (EPI<15.6) or high (EPI≥15.6).

Results: Of the 1094 patient samples collected from both arms, 942 had complete data, and 833 had available follow up after 2.5 years with 177 and 656 having low-risk and high-risk EPI scores, respectively. At 2.5 years, patients were more likely to defer a biopsy in the EPI arm with a low-risk EPI result (55.4% vs. 21.0%, p<0.001) vs. the SOC arm (40.4% vs. 41.2%). Patients were also more likely to delay biopsy by 6 months in the EPI arm if they had a low-risk EPI result (216 vs. 68.7 days, p<0.001). Regardless of the study arm, the low-risk EPI group had more than 3x lower rates of high-grade PC with ≥GG2 (7.9%), and 4x lower rates of ≥GG3 (3.4%) than the high-risk EPI group with ≥GG2 (26.8%), ≥GG3 (13.6%), respectively.

Conclusions: The current interim analysis provides longer-term evidence that men with low-risk EPI scores are at a much-reduced risk of having higher-grade prostate cancer including clinically significant ≥GG3.

Funding: *Exosome Diagnostics, Waltham, MA*

Poster #5

A retrospective analysis of the performance of the ExoDx prostate cancer test in predicting clinically significant prostate cancer in western New York

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Introduction: Prostate cancer (PC) is the most diagnosed cancer in men and accounts for the second highest rate of death due to cancer in men. While the use of prostate-specific antigen (PSA) has been able to increase the detection of PC, it has a low specificity for the detection of PC when measured between 2–10 ng/mL. The ExoDx Prostate test is a novel, non-invasive, urine-based predictive marker that calculates a risk score to assess the likelihood a prostatic biopsy (BXP) will detect cancer in patients with a PSA in the ambiguous 2–10ng/ml range. A risk score of 15.6 suggests higher risk for PC and a biopsy is recommended. While ExoDx has been previously used to assess the likelihood of a BXP detecting PC, we sought to further investigate the likelihood of detecting clinically significant prostate cancer (CSPC).

Methods: We performed a retrospective analysis of consecutive Medicare patients with a PSA score between 2–10 ng/ml and without a previous PC diagnosis. Each of these patients underwent the ExoDx test prior to receiving a prostatic biopsy. We then assessed the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the ExoDx test in detecting CSPC, defined by grade group 3 and above. Furthermore, we compared the PPV of the ExoDx test to multiparametric MRI (mpMRI) in detecting CSPC.

Results: A total of 82 patients met the inclusion criteria for this study. The sensitivity, specificity, PPV, and NPV of ExoDx identifying CSPC was 82.60%, 22.03%, 29.23%, and 76.47% (19/23, 13/59, 19/65, 13/17, p<0.00001), respectfully. The PPV of mpMRI resulting in PI-RADS 3 or greater detecting clinically significant prostate cancer was found to be 35.71% (15/42, p<0.00001). The PPV of a combination of mpMRI, PI-RADS 3 or greater, and positive ExoDx in detecting CSPC was 39.3% (13/33, p<0.00001).

Conclusions: The findings of this study indicate that the use of ExoDx to screen for CSPC is limited given its lower PPV and sensitivity below standard oncologic screening tools. Comparing the PPV of ExoDx vs. mpMRI vs. the combination of both shows that mpMRI is superior, while a combination shows minimal improvement of PPV. Future studies should be performed analyzing how variations in the value of the ExoDx risk score would influence the test's effectiveness in detecting CSPC. We recognize this cohort remains small and larger studies should clarify the validity of these findings.

Poster #6

A head-to-head comparison between an exosomal biomarker signature and PSA density to access clinically significant prostate cancer risk

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Introduction: PSA's relative lack of specificity for prostate cancer (PC) has led to the over-diagnosis of low-grade PC and led to the ongoing exploration of potentially more useful biomarkers, such as PSA density (PSAD) or ExoDx Prostate (EPI). EPI is a validated, noninvasive, urine gene-expression biomarker that informs prostate biopsy decisions.

Methods: Patients had no history of PC, >50 yrs, PSA 2–10 ng/mL, and were scheduled for prostate biopsy (Bx). First-catch, pre-Bx urine was collected and analyzed with EPI as previously described. PSAD was calculated from PSA and prostate volume for multiple PSAD thresholds. Performance metrics on the last biopsy conducted include sensitivity, specificity, negative predictive value (NPV), and positive predictive

value (PPV) for discriminating clinically significant (≥GG2) from GG1 and benign disease.
Results: Samples were collected from patients in a clinical utility study (NCT03235687). A subset of cases (n=141) had EPI results, biopsy pathology, and prostate volume allowing for the calculation of PSAD; 57.4%, 31.2%, and 11.3% had benign tissue, GG1, or >GG2, respectively. Regardless of PSAD threshold employed, the EPI exosomal classification provided better sensitivity and significantly higher NPV (Table 1).
Conclusions: In a preliminary direct comparison, the EPI biomarker assay provides superior sensitivity and NPV for assessing the risk of clinically significant cancer prior to biopsy.

Poster #7

COVID-19-driven development and utilization of at-home urine ExoDx prostate collection (EPI) test kit to support shared decision-making in prostate cancer/urologic telehealth diagnosis

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Introduction: COVID-19 led to paradigm shifts in telemedicine due to patients' fear of office visits and travel avoidance. With widespread cancellation of office visits and reduction of diagnostic biopsy procedures in men with elevated PSAs, the need for a noninvasive/non-DRE at-home collection kit for assessing risk of aggressive prostate cancer and to prioritize biopsy procedures became apparent. The objective of this study was an adaptation and development of the existing ExoDx Prostate (EPI) office liquid biomarker kit into a patient-centric, at-home collection kit for prostate cancer risk assessment. This is now a viable tool to support urology telehealth and shared decision-making imperatives in prostate cancer.
Methods: A 2-stage program for an at-home collection testing kit program for the ExoDx test was initiated in April 2020 at the onset of the COVID-19 pandemic. The phase 1 pilot study (100 patients, 6 sites) was completed in June 2020. The findings in the pilot helped streamline the program based on feedback from physicians, patients, and office mangers before making it available in phase 2 to all urologists in the U.S. The satisfaction and utilization of the at-home collection kits have been measured via physician and patient feedback.
Results: Extensive feedback from the pilot program (100 test kits) was obtained from the ordering urologists, their office managers, and the patients and the Exosomes Diagnostics Client Services team responsible for shipping the test kits. This feedback led to improvements and streamlining the electronic ordering system, animated video instructions (via QR code scanning), kit shipping instructions, and patient instructions (English and Spanish) before the phase 2 rollout. As of January 31, 2022, 30% of all the ExoDx prostate tests are at-home collection kits and patient and physician satisfaction exceeds 97%.
Conclusions: The COVID-19 pandemic accelerated major shifts to telehealth and increased use of at-home testing. The ExoDx prostate at-home collection kit was successfully developed and employed to help men (>50 years old) with elevated PSAs (2–10 ng/ml) considering initial or repeat diagnostic biopsy but with pandemic-related fears of visiting offices/hospitals or wanting to avoid long distance travel from rural areas. The at-home collection kit provides an easy, noninvasive, non-DRE urine test for genomic risk assessment of aggressive cancer. At-home urology testing is poised to be increasingly used in urology (cancer biomarkers, benign urology diseases) and become a permanent and essential adjunct to urologic telehealth.
Funding: *Exosome Diagnostics, Waltham, MA*

Poster #6. Table 1.

Classifier	Sensitivity	Specificity	NPV	PPV
EPI≥15.6	0.98	0.21	0.96	0.30
PSAD≥0.1	0.56	0.56	0.78	0.30
PSAD≥0.11	0.51	0.66	0.80	0.34
PSAD≥0.13	0.42	0.76	0.79	0.37
PSAD≥0.15	0.31	0.85	0.78	0.42

Poster #9

Development of a novel risk stratification nomogram for PI-RADS 4 and 5 prostate cancer on MRI-fusion biopsy

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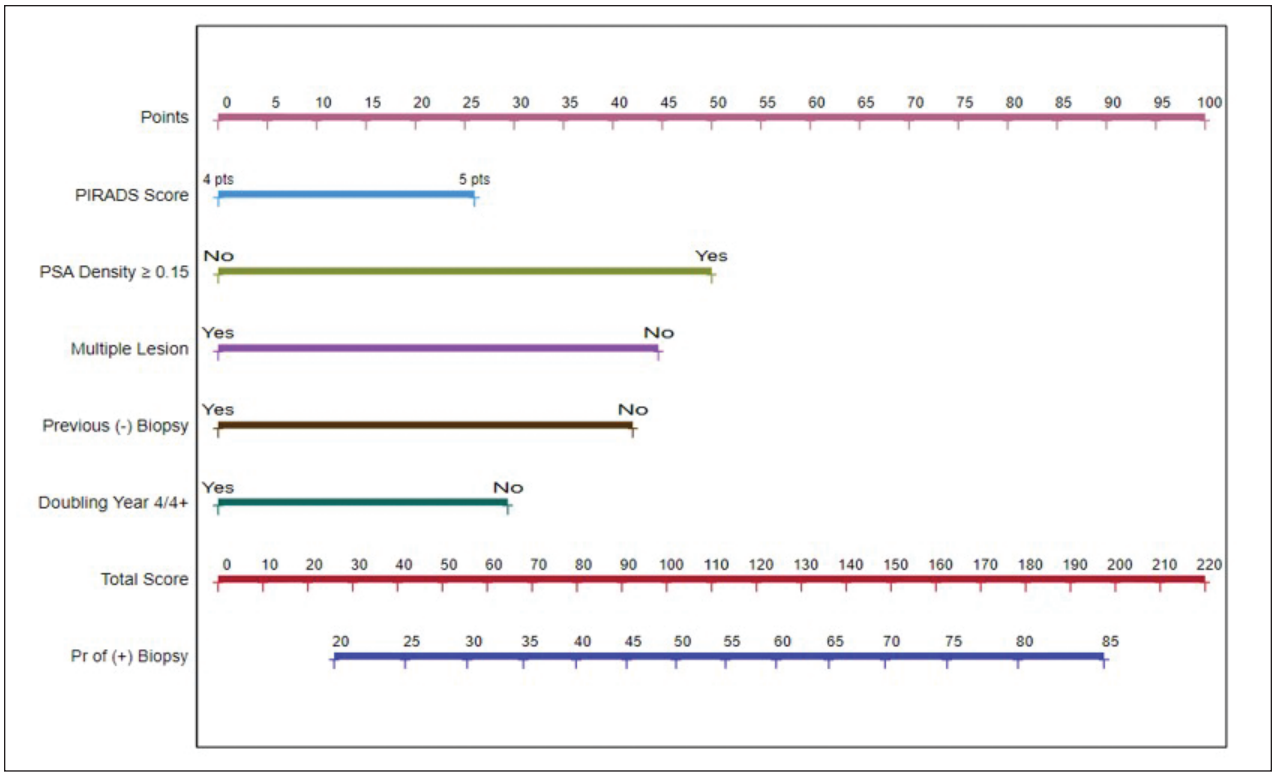
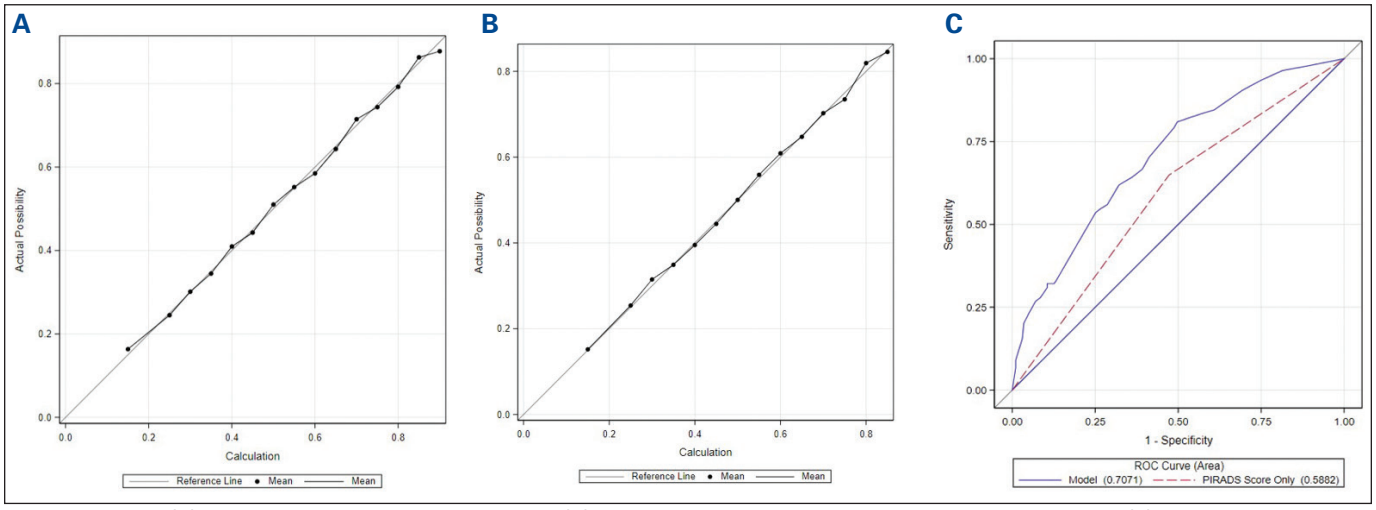
Introduction: We sought to identify clinical variables associated with clinically significant (CS) prostate cancer on fusion biopsy of Prostate Imaging Reporting and Data System (PI-RADS) 4 or 5 lesions and attempted to develop a novel risk stratification nomogram.
Methods: A retrospective review was conducted of patients who underwent MRI/US-guided fusion prostate biopsy for PI-RADS 4 or 5 lesions using the UroNav® system between 2017 and 2021. Patients were divided into those with CS disease (grade group 2 or higher) vs. those without. Multivariable analysis (MVA) was used to identify variables associated with CS disease. A 100-point nomogram was created based on the MVA that was validated internally using 500 bootstrap. Receiver operating characteristic (ROC) curve was generated to compare the nomogram to the PI-RADS scoring system.
Results: A total of 425 lesions (348 patients) were identified; 239 (56%) were PI-RADS 4 and 186 (44%) were PI-RADS 5. Of these, 33% of PI-RADS 4 and 67% of PI-RADS 5 were CS disease. Patients without CS disease on biopsy had larger prostate volume on MRI (52 vs. 42 cm^3, p<0.01), lower PSA density (0.15 vs. 0.21ng/mL^2, p<0.01), >1 PI-RADS 4/5 lesions (53% vs. 35%, p<0.01), prior negative biopsy (29% vs. 18%, p=0.02), slower PSA velocity (0.97 vs. 1.42 ng/mL/year, p<0.01), and longer PSA doubling time (5.6 vs. 3.8 years, p<0.01). On MVA, absence of CS disease was associated with longer PSA doubling time (OR 1.71, 95% CI 1.07–2.71, p=0.02), prior negative biopsy (OR 2.15, 95% CI 1.25–3.70, p<0.01), presence of multiple lesions (OR 2.25, 95% CI 1.42–3.57, p<0.01), higher PSA density on MRI (OR 0.40, 95% CI 0.25–0.65, p<0.01), and PI-RADS score 5 vs. 4 (OR 0.62, 95% CI 0.40–0.98, p=0.04) (Table 1). Nomogram was constructed (Figure 1). Area under ROC curve was 70% for nomogram compared to 59% for PI-RADS score alone (Figure 2).
Conclusions: We developed and validated a nomogram that may improve specificity of PI-RADS scoring system and improve patient counselling.

Poster #9. Table 1. Multivariate analysis of insignificant prostate cancer on UroNav fusion biopsy for PI-RADS 4 and 5 lesions

	Odds Ratio	Lower CI	Upper CI	p
PSA doubling time ≥4 years	1.71	1.07	2.71	0.02
Prior negative biopsy	2.15	1.25	3.70	<0.01
Multiple lesions	2.25	1.42	3.57	<0.01
MRI PSA density ≥15 ng/mL^2	0.40	0.25	0.65	<0.01
PI-RADS 5 vs. 4	0.62	0.40	0.98	0.04



Poster #9. Figure 1. 100-point nomogram assessing individual risk of clinically significant disease from UroNav fusion biopsy of PI-RADS 4 and 5 lesions.



Poster #9. Figure 2. (A) Internal validation of 100-point nomogram. **(B)** Internal validation of 100-point nomogram using 500 bootstrap. **(C)** ROC curve for nomogram and PI-RADS scoring system.

Poster #10

Diagnostic accuracy of multiparametric MRI for the detection of cribriform, intraductal, ductal, and small cell prostate cancer

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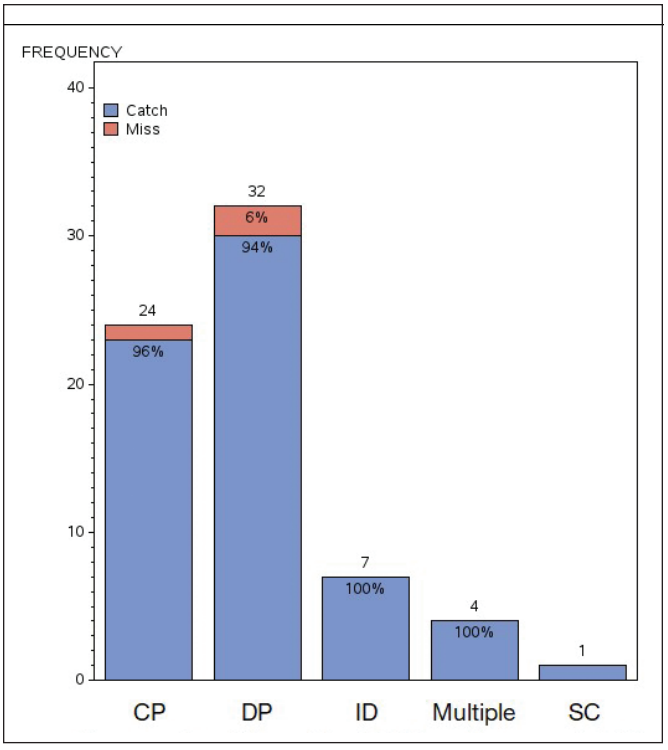
Introduction: We sought to evaluate the diagnostic accuracy of multiparametric MRI (mpMRI) prior to radical prostatectomy for the detection of histologic subtypes of prostate cancer: cribriform pattern (CP), intraductal (ID), ductal (DP), and small cell carcinoma (SC).

Methods: A retrospective review of our robot-assisted radical prostatectomy (RARP) database of 2056 patients was performed. Patients who had preoperative mpMRI and CP, ID, DP, or SC on the final specimen were identified. Prostate mpMRI was considered positive for Prostate Imaging-Reporting and Data Systems (PI-RADS) scores 3–5 or Likert scale scores 3–5. Data were reviewed for demographics, perioperative and postoperative variables.

Results: A total of 68 patients were identified. Median age was 65 years, median PSA was 6.99 ng/ml, and median prostate volume was 36 cc. Gleason scores (GS) were 3+3=6, 3+4=7, 4+3=7, and 4+4=8 or higher in 3, 18, 24, and 22 patients, respectively. At RARP, CP, ID, DP, SC, or multiple subtypes were found in 35%, 10%, 47%, 2%, and 6% of specimens, respectively. MpMRI accurately detected clinically significant prostate cancer in 65 patients (CP: 23/24, ID: 7/7, DP: 30/32, SC: 1/1, multiple subtypes: 4/4) with a calculated sensitivity of 96%. PI-RADS score was 3 in 7%, 4 in 21%, 5 in 44% and positive on Likert scale in 28% of patients (Figure 1). MpMRI was insignificant in two patients with DP and in 1 patient with CP.

Conclusions: MpMRI demonstrated sensitivity of 96% for the detection of CP, ID, DP, and SC prostate cancer.



Poster #10. Figure 1. Sensitivity of pre-RARP multiparametric MRI for the detection of CP, DP, ID, and SC prostate cancer.

Poster #11

A combined biomarker/mpMRI approach provides enhanced clinical information prior to prostate biopsy

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Introduction: The ExoDx Prostate (EPI) test has been well-validated for prostate cancer (PC) biopsy decisions.[1] Here, we investigate combining MRI with EPI from patients prestaged by MRI prior to biopsy (Bx).

Methods: EPI is risk assessment assay based on ERG, PCA3, and SPDEF RNA expression in urine exosomes. Pre-Bx urine was collected from men with no history of PC, with a PSA of 2–10 ng/ml, who were previously staged with MRI due to clinical suspicion of PC. All biopsies were performed as MRI-guided fusion biopsies, including targeted, as well as systematic cores at a single site. MRI, EPI scores, and multiparametric models using standard clinical parameters were compared for predicting unfavorable tissue pathology. For the subset of men who proceeded to radical prostatectomy (RP), the RP tissue result was used as the gold-standard tissue status.

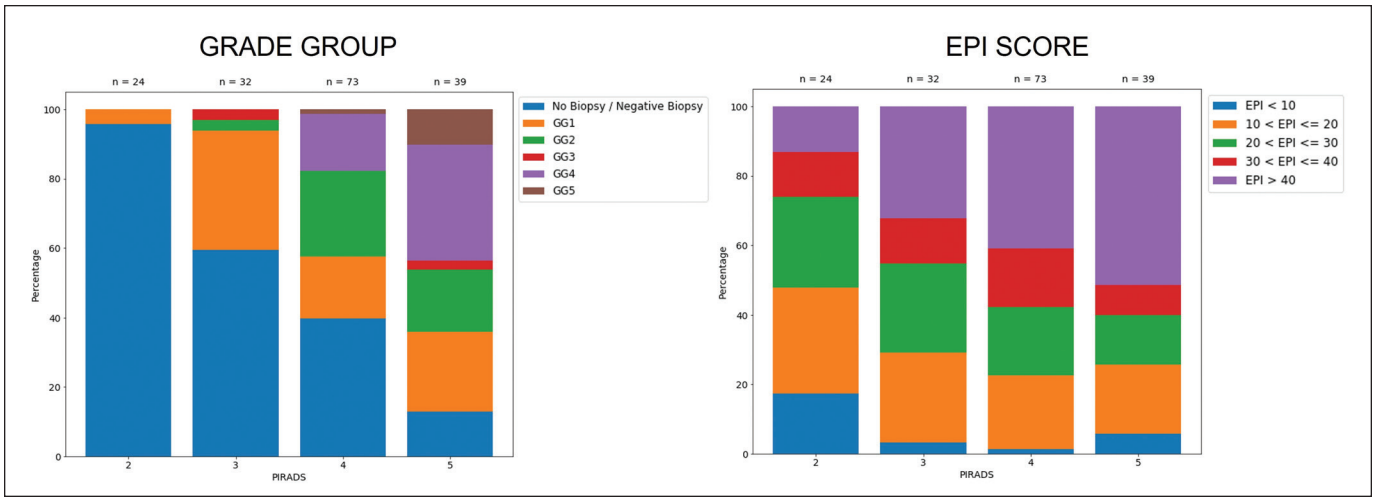
Results: Of the 170 patient samples collected, MRI status was available for 168 patients, 160 had an EPI result, 143 underwent Bx, and 40 men proceeded to RP. PI-RADS scores encompassed PI-RADS 1/2 in 24 (14%) patients, PI-RADS 3 in 32 (19%), and PI-RADS 4/5 in 112 (67%). Bx pathology indicated 35.2% ≥GG2 and 72.5% in the RP group. Both higher Gleason grade groups and higher EPI scores increased with higher PI-RADS score (Figure 1). A new model was generated by combining the EPI score and MRI result (training n=116) and test (n=29), resulting in an increased AUC (0.88) compared to either EPI (0.68) or MRI alone (0.75).

Conclusions: The combination of MRI and EPI is better than either alone and suggests that this combined approach is more clinically useful when conducted before the Bx decision.

Funding: *Exosome Diagnostics, Waltham, MA, USA*

Reference

1. Margolis E, Brown G, Partin A, et al. Predicting high-grade prostate cancer at initial biopsy: clinical performance of the ExoDx (EPI) Prostate Intelliscore test in three independent prospective studies. *Prostate Cancer Prostatic Dis* 2022;25:296-301. https://doi.org/10.1038/s41391-021-00456-8



Poster #11. Figure 1.

Poster #12

Disparities regarding shared decision-making in prostate cancer screening

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Introduction: Urologic prostate cancer screening guidelines universally recommend shared decision-making regarding prostate-specific antigen (PSA) testing. The objective of this study is to examine sociodemographic differences in shared decision-making for prostate cancer screening in the U.S.

Methods: A retrospective, cross-sectional study among men undergoing PSA screening was conducted using the 2018 National Health Interview Survey database in the U.S. Outcomes included self-reported PSA testing and whether respondents had a discussion regarding its advantages with their healthcare provider. Multivariable logistic regression analyses were used to evaluate sociodemographic predictors of undergoing PSA screening and having a discussion regarding PSA testing advantages.

Results: A total of 118 859 men were identified, of whom 1550 (1.3%) had reported undergoing PSA testing and 7401 (6.2%) were asked whether PSA testing advantages were discussed. The mean age of the cohort was 63.7 years (SD 10.8); 6029 (81.5%) were white, 765 (10.3%) were black, and 603 (8.1%) were other or multiple races. Only 37.3% (n=2758) of men discussed advantages of PSA testing. On multivariable analysis, older (OR 1.079, 95% CI 1.073–1.086, p<0.001), black (OR 1.324, 95% CI 1.117–1.570, p=0.001), and homosexual (OR 1.701, 95% CI 1.223–2.236, p=0.002) men were significantly more likely to undergo PSA testing (Table 1); however, on multivariable analysis, the same group of older (OR 0.962, 95% CI 0.956–0.967, p<0.001), black (OR 0.614, 95% CI 0.524–0.720, p<0.001), and homosexual (OR 0.532, 95% CI 0.390–0.726, p<0.001) men were significantly less likely to have a discussion regarding PSA testing advantages.

Conclusions: Disparities exist in shared decision-making in prostate cancer screening. Only about a third of men underwent discussion on PSA testing. Older men and minorities, including black and homosexual men, were less likely to have a discussion regarding advantages of PSA testing despite being more likely to undergo PSA testing.

Poster #13

High-intensity focused ultrasound hemigland (HIFU) ablation for prostate cancer: Our initial experience

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Introduction: Partial gland ablation for prostate cancer has emerged as an organ-sparing treatment with the benefits of low morbidity and maintained quality of life. Here, we report our outcomes of our initial experience with high-intensity focused ultrasound (HIFU) hemigland ablation.

Methods: A retrospective review of the first 20 consecutive patients who underwent HIFU hemigland ablation for unilateral grade group (GG) <2 prostate cancer at a single institution was performed. Primary endpoint was treatment failure, defined as GG≥2 on followup prostate biopsy, the need for radical treatment or systemic therapy, the presence of metastases, or prostate cancer-specific mortality. Urinary and sexual side effects were recorded, as well as 90-day complications.

Results: The baseline characteristics of the study cohort are provided in Table 1. All patients had intermediate-risk prostate cancer: 60% favorable-risk and 40% unfavorable. Median followup was 9 months (range 3–35 months). To date, 10 patients have undergone post-treatment biopsy with no GG≥2 identified. Four patients had GG1 found on biopsy, 2 in-field and 2 out-of-field recurrences. Of these 4 patients, 2 elected for whole-gland radiation therapy, while the other 2 elected for surveillance. Continence (zero pad) was maintained in 100% of patients. Eighty-five percent of patients had erections sufficient for intercourse prior to HIFU and 94% of patients maintained this postoperatively. Two patients developed urinary retention requiring TURP (Clavien IIIb). No patient developed a rectal fistula.

Conclusions: HIFU hemigland ablation is a safe procedure that maintains patient quality of life. No clinically significant cancer was found on post-procedure biopsy; however, longer followup is needed. Appropriate patient selection and followup remain key to safely offer HIFU hemigland ablation as definitive treatment for prostate cancer.

Poster #12. Table 1. Multivariable analysis of PSA testing and whether advantages of PSA testing were discussed

Variable	PSA tested		Discussed PSA testing advantages	
	OR (95% CI)	p	OR (95% CI)	p
Race				
White	Reference		Reference	
Black	1.324 (1.117–1.570)	0.001	0.614 (0.524–0.720)	<0.001
American Indian/Alaska Native	0.494 (0.301–0.812)	0.005	0.935 (0.581–1.502)	0.780
Asian	0.591 (0.464–0.752)	<0.001	1.015 (0.805–1.281)	0.897
Multiple races	1.116 (0.759–1.642)	0.576	1.076 (0.737–1.571)	0.705
Age				
Age (continuous)	1.079 (1.073–1.086)	<0.001	0.962 (0.956–0.967)	<0.001
Sexual orientation				
Heterosexual	Reference		Reference	
Homosexual	1.701 (1.223–2.366)	0.002	0.532 (0.390–0.726)	<0.001
Bisexual	1.047 (0.457–2.397)	0.914	0.966 (0.424–2.198)	0.934
Other/don't know	0.682 (0.418–1.112)	0.125	1.144 (0.714–1.833)	0.575
Smoking status				
Never smoker	Reference		Reference	
Current everyday smoker	0.700 (0.598–0.820)	<0.001	1.413 (1.203–1.661)	<0.001
Current some days smoker	0.899 (0.677–1.192)	0.458	1.006 (0.757–1.336)	0.967
Former smoker	0.957 (0.849–1.079)	0.474	1.075 (0.962–1.201)	0.205
Working status				
Not working	Reference		Reference	
Working	1.169 (1.028–1.330)	0.017	0.814 (0.720–0.921)	0.001
Cancer status				
No personal history of cancer	Reference		Reference	
Personal history of cancer	2.633 (2.182–3.176)	<0.001	0.679 (0.589–0.783)	<0.001
Marital status				
Not married	Reference		Reference	
Married	1.515 (1.357–1.690)	<0.001	0.697 (0.628–0.774)	<0.001

Poster #13. Table 1.

Median age (IQR)	66 (60–72)
Median PSA ng/ml (IQR)	6.34 (5.18–7.45)
Median prostate volume, cc (IQR)	29.3 (25.5–31.9)
Median PSA density (IQR)	0.21 (0.17–0.28)
MRI findings, highest PI-RADS score, n (%)	
0	1 (5)
1	0 (0)
2	0 (0)
3	4 (20)
4	6 (30)
5	9 (45)
Lesion volume (cc) median (IQR)	0.9 (0.48–1.38)
Lesion location, n (%)	
Anterior	9 (45)
Posterior	11 (55)

Poster #14

Machine learning prediction of continence recovery of robotic-assisted radical prostatectomy

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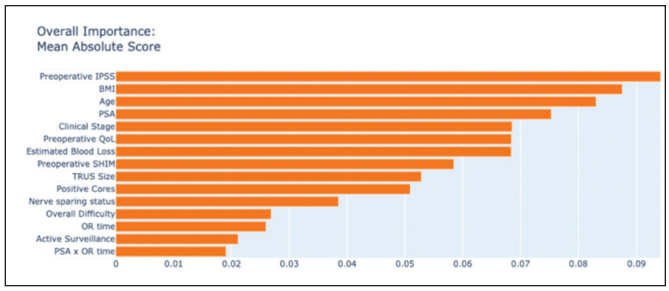
Introduction: Benign prostate hyperplasia affects more than 70% of patients aged 80 years old and older and has significant implications, both social and economic, on the current healthcare system. The primary aim of this study was to develop a machine learning model to predict continence recovery at 100 days after undergoing RARP.

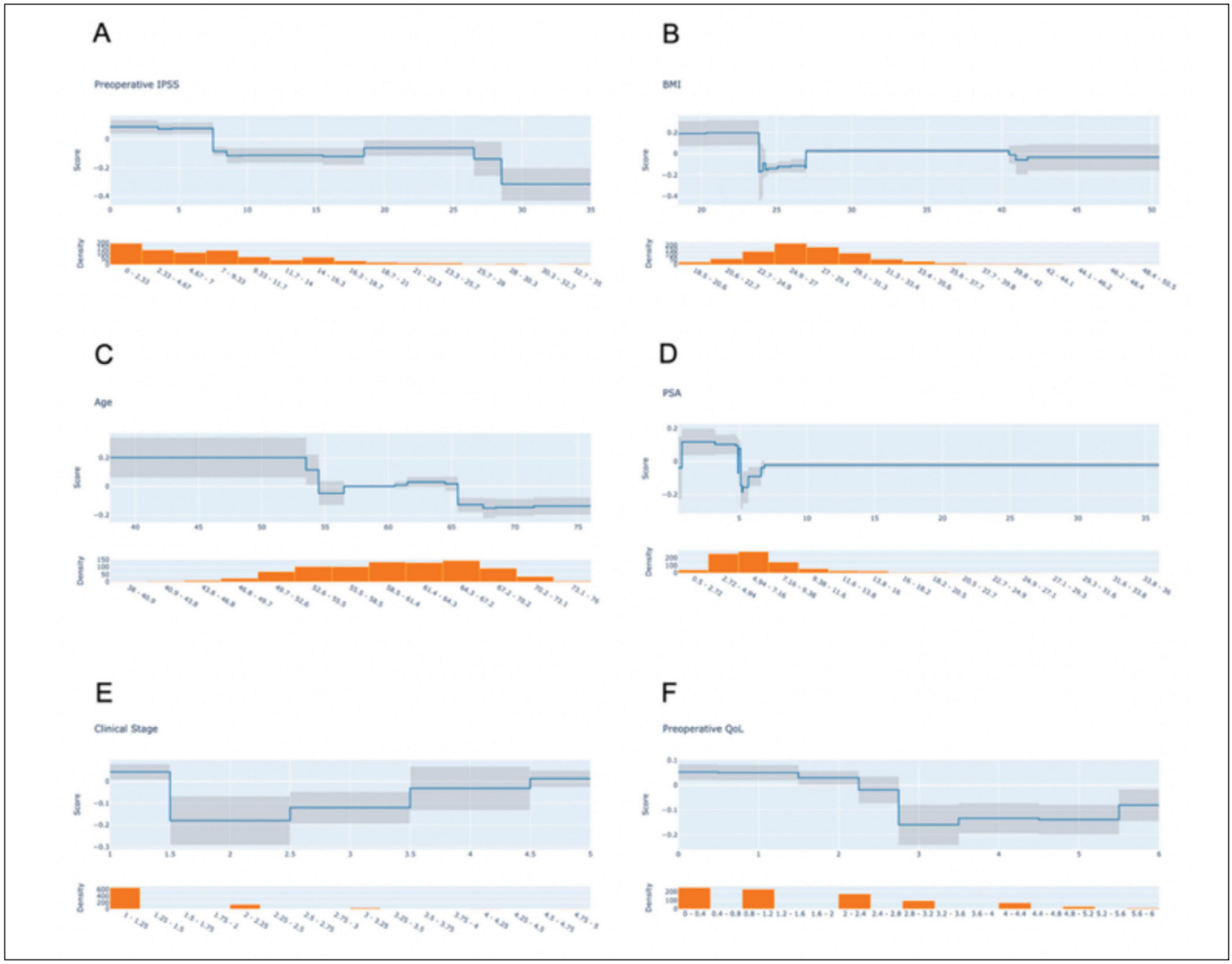
Methods: A retrospective review was performed on a prospectively maintained database of 1737 patients who underwent RARP for localized prostate cancer between 2007 and 2019. Different machine learning and non-machine learning approaches, including logistic regression (LR), classification tree (CT), and support vector machine (SVC), were used to build prediction models. Each method was then evaluated for their accuracy and interpretability.

Results: A total of 1376 patients were included in the Explainable Boosting Machine model. The area under precision-recall curve (PR-AUC) prediction using this method outperformed other methods, such as logistic regression (PR-AUC=0.5873), classification tree (PR-AUC=0.5668), and support vector machine (PR-AUC=0.5607). Preoperative IPSS score, BMI, age, preoperative PSA, score as well as clinical stage, were, in order, the

most significant factors in continence recovery at 100 days (Figures 1, 2). **Conclusions:** Using Explainable Boosting Machine analysis confirmed and quantified the contribution to several previously described factors for continence recovery. Furthermore, we showed in this study that EBM outperforms other commonly used models, such as support vector machine and logistic regression.



Poster #14. Figure 1. EBM prediction model showing the most significant factors for 100 days continence recovery.



Poster #14. Figure 2. EBM prediction model showing the top significant factors for continence recovery: **(A)** preoperative IPPS; **(B)** BMI; **(C)** age; **(D)** PSA; **(E)** clinical stage; **(F)** preoperative QoL.

Poster #15

Deep forests and neural networks can accurately predict the training size to achieve desired accuracy in medical computer vision problems

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Introduction: Computer vision through machine learning (ML) has shown promise in predicting disease states with medical imaging and digital pathology. Neural networks are the most common computer vision techniques and often require large training sets to achieve acceptable accuracy for medical use. Since collecting labeled medical images is both time-consuming and expensive, there is a need to accurately predict the number of training images required for a given use case and desired accuracy.

Methods: We trained 45 learning curves distinguishing between two handwritten digits (e.g., 1 or 5) collected in a large publicly available dataset (MNIST). A learning curve plots the accuracy of prediction vs. the number of training images. Training is done with a popular pretrained convolutional neural network, ResNET50. The training and accuracy are repeated 50 times at each training size to generate confidence intervals. We trained a deep forest and a tabular neural network on these non-medical curves to predict the number of images required to reach 80% accuracy. We allowed the model to see the accuracy at 5 training sizes (10, 20, . . . 50 images). We tested both tools on a digital pathology dataset with images of either normal prostate or prostate cancer. Both tools estimated the number of prostate images required to predict cancer with 80% accuracy.

Results: The deep forest algorithm, trained on 45 nonmedical learning curves, predicted that 80% accuracy would require 96 prostate images, 110 actual images (13.2% error). The neural network trained on the same dataset predicted 103 images (6.2% error).

Conclusions: We can predict the number of images required to solve medical ML problems by training models on learning curves from free datasets. Accuracy would likely improve if these models were trained on hundreds or thousands of binary problems. Having such a model allows medical researchers to estimate the cost of data collection, the accuracy improvement from collecting more images, and the stopping point, a size such that a larger training set would not make better predictions.

Poster #18

Effect of nearness to cancer center on prostate cancer outcomes and patient's choice for the type of intervention

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Introduction: Accessibility to the cancer center and the urology service may be crucial in the diagnosis and management of prostate cancer while in curable stage. All urology referrals are sent to our tertiary care center that covers an area of 526 000 km^2. We aimed to investigate the relationship between proximity to treatment center to presentation and treatment choice.

Methods: A cohort of 959 patients who diagnosed as prostate cancer between 2010 and 2017 were retrospectively reviewed. The baseline demographics, postal code, round trip time to cancer center, availability of, clinical staging, PSA at diagnosis, pathological data at biopsy, staging investigations, selected treatment option, and followup data were reported. Urology, radiation oncology, and medical oncology services are only available in our center. The cohort was
split into two groups: >300 km and ≤300 km depending on distance from our center due to geographical distribution of our patients. The correlation between distance from patient location to the hospital and clinical stage, Gleason score, PSA, pathological staging, and selected treatment modality were statistically analyzed.

Results: The mean distance from patient residence to hospital was 115.7 km. There was a significant correlation between PSA at diagnosis and distance to the hospital (p<0.001, correlation coefficient=0.16) (Table 1). The median PSA at diagnosis was 8.8 ng/dl vs. 13.6 ng/dl between patient group ≤300 km compared to patient group >300 km. The percentage of Gleason 6 patients was significantly lower in the group that lived >300 km (13.6% vs. 21.4%, p=0.002) (Table 2). The initial diagnosis of metastatic prostate cancer was found to be significantly higher in the group that lived >300 km from treatment center (22.3% vs. 15.3%, p=0.02). The choice of radical prostatectomy as a treatment modality was found to be significantly higher in the group that lived >300 km away from treatment center (69.9% vs. 54.4%, p=0.0005).

Conclusions: Distance from urologists and cancer center plays a significant role in the presentation and treatment of prostate cancer. PSA was found to increase for every km the patient is away from the urologist. Distance was a factor in the choice of radical prostatectomy compared to radiation, likely secondary to the reduction in travelling.

Poster #18. Table 1. Correlation between distance and PSA

	PSA at diagnosis		Number of positive cores	
	Correlation coefficient (r)	p	Correlation coefficient (r)	p
Distance	0.163	**<0.001***	0.075	0.059

Spearman's rank correlation coefficient. *Statistically significant at p≤0.05.

Poster #18. Table 2. Relation between PSA, Gleason, DRE, number of positive cores, and distance

Characteristics	Distance		
	≤300 km	>300 km	p
PSA at diagnosis, ng/dl median (range)	8.8 (0.4–2704.0)	13.6 (2.3–5901.0)	**<0.0001***
Gleason grade, n (%)			**0.02***
G6	144 (21.4)	22 (13.6)	
>G6	528 (78.6%)	140 (86.4)	
Clinical stage, n (%)			0.3
T1c	295 (75.4)	43 (69.4)	
>T1c	96 (24.6)	19 (30.6)	
Diagnosis, n (%)			**0.02***
Localized	625 (84.7)	153 (77.7)	
Metastatic	113 (15.3)	44 (22.3)	
RP for localized PCa, n (%)			**0.0005***
No	340 (54.4)	107 (69.9)	
Yes	285 (45.6)	46 (30.1)	

*Statistically significant at p≤0.05.

Poster #19

Trends in urologic cancer surgical volume and postoperative length of stay during the COVID-19 pandemic

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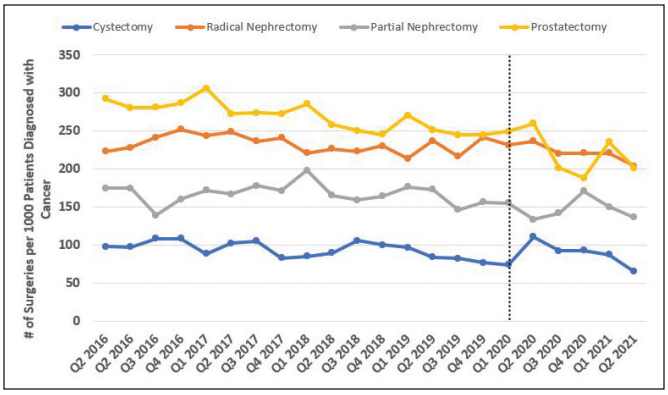
Introduction: At the peak of the COVID-19 pandemic, a significant number of cancer surgeries were postponed or cancelled due to lockdown measures and redistribution of hospital assets to address emerging outbreaks. Additionally, hospitals and surgeons triaged which surgeries to schedule and prioritized reducing postoperative length of stay in order to minimize nosocomial COVID-19 infection and maximize bed availabilities. We sought to describe patterns in surgical volume and postoperative length of stay among patients receiving urologic cancer surgery during the COVID-19 pandemic.

Methods: Using the Pennsylvania Health Care Cost Containment Council database, we identified 24 768 cancer patients ≥18 years of age who received a prostatectomy, radical or partial nephrectomy, or radical cystectomy using ICD-9 and ICD-10 codes between Q1 2016 and Q2 2021. We compared rates of surgery and postoperative length of stay before and during the COVID-19 pandemic, adjusting for surgical approach (open vs. minimally invasive) and patient factors (age, sex, race/ethnicity, Elixhauser comorbidity index, insurance status, and urban/rural status).

Results: Compared to pre-COVID-19 surgical volumes, prostatectomy and partial nephrectomy rates decreased by as much as 30.2% in Q4 2020 ($p<0.001$) and 20.1% in Q2 2020 ($p<0.01$), respectively (Figure 1). The rates of radical cystectomy ($p=0.22$) and radical nephrectomy ($p=0.07$) did not significantly change (Figure 1). In our adjusted analysis, median postoperative length of stay after partial nephrectomy was 0.7 days shorter during COVID-19 ($p<0.01$). Open surgery, age, comorbidity index, Medicaid insurance, and Black race were associated with longer length of stay.

Conclusions: The rates of high-priority urologic cancer surgery (radical cystectomy and radical nephrectomy) in Pennsylvania did not change during the COVID-19 pandemic, whereas lower-priority surgeries (prostatectomy and partial nephrectomy) decreased in the first and second COVID-19 waves. Postoperative management patterns were affected by COVID-19, as length of stay following partial nephrectomy was shorter.



Poster #19. Figure 1. Rates of cystectomy, radical nephrectomy, partial nephrectomy, and prostatectomy performed by quarter (adjusted per 1000 patients with a diagnosis of that cancer). The dotted black line indicates the beginning of the COVID-19 pandemic (Q1 2020).

Poster #21

Impact of genitourinary pathologist review as part of National Comprehensive Cancer Network-compliant multidisciplinary conference on Gleason score and risk stratification for localized prostate cancer

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Introduction: We aimed to examine the impact of pathology review by dedicated genitourinary (GU) pathologist, as part of National Comprehensive Cancer Network (NCCN)-compliant Multidisciplinary Conference on Gleason score (GS) and risk stratification for patients with localized prostate cancer.

Methods: A retrospective review of Localized Prostate Cancer Conference (LPCC) database between 2009 and 2019 was performed. Patients who presented for a second opinion at our NCCN-compliant institution were presented to the LPCC (urologists, radiation oncologists, GU pathologists, and patient advocates). Outside pathology was reviewed by dedicated GU pathologists. The discrepancy between outside pathology and internal review and subsequent change in NCCN risk stratification was identified and described. Cochrane Armitage test was used to assess discrepancy over time.

Results: A total of 1228 patients were included. Upon review by GU pathologist, discordance was identified in 11% (6% upgraded and 5% downgraded). Among the upgraded, 57% changed from GS≤6 to 3+4, 10% to 4+3 and 2% to GS≥8. Fourteen percent changed from GS 3+4 to 4+3 and 5% to ≥8. Thirteen percent changed from GS 4+3 to GS≥8. Of those who were downgraded, 14% changed from GS 3+4 to ≤6. Twenty five percent changed from GS 4+3 to 3+4. Nine percent changed from GS ≥8 to 3+4 and 52% to 4+3 (Table 1). Consequently, NCCN risk re-classification occurred in 54% of patients with discordant GS (20% were in a higher and 34% were placed in a lower risk group) (Table 2). Discrepancy in pathology between LPCC review and community did not significantly change over time ($p=0.99$).

Conclusions: Overall, discordance in pathology upon review by a dedicated GU pathologist occurred in 11% of patients, with subsequent risk reclassification and treatment decisions in over half of these patients.

Funding: *Roswell Park Alliance Foundation*

Poster #21. Table 1. Description of discordance in pathology between community results and LPCC review

Outside GS vs. LPCC GS	Patients (%)
No discrepancy (all)	1004 (89)
Discrepancy (all)	119 (11)
Downgraded	56 (5)
GS 3+4: GS ≤6	8 (14)
GS 4+3: GS 3+4	14 (25)
GS ≥8: GS 3+4	5 (9)
GS ≥8: GS 4+3	29 (52)
Upgraded	63 (6)
GS ≤6: GS 3+4	36 (57)
GS ≤6: GS 4+3	6 (9.5)
GS ≤6: GS ≥8	1 (1.5)
GS 3+4: GS 4+3	9 (14)
GS 3+4: GS ≥8	3 (5)
GS 4+3: GS ≥8	8 (13)

Poster #21. Table 2. Change in NCCN risk stratification due to change in GS (n=119)

NCCN risk before review vs. after review	Patients (%)
Total unchanged	55 (46)
Total changed	64 (54)
Downgraded	40 (34)
High: Low	1 (3)
High: Intermediate	34 (85)
Intermediate: Low	5 (13)
Upgraded	24 (20)
Low: Intermediate	14 (58)
Intermediate: High	10 (42)

Poster #22

Patient-reported outcomes after transperineal vs. transrectal biopsy with local anesthesia: Advances in pain control and areas for improvement

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Introduction: The current mainstay for prostate cancer diagnosis is biopsy using either ultrasound-guided transperineal (TPBx) or ultrasound-guided transrectal approach (TRBx). While TPBx mitigates infectious risk, it is reportedly associated with higher pain levels, while TRBx is associated with increased risk of sepsis. Recent efforts have been made to minimize pain of the TPBx in hopes of increasing its usage. The aim of this study is to better understand pain control in a TPBx population compared to a standard TRBx population with a novel anesthetic technique.

Methods: Using the surgeon's discretion, patients were biopsied through the transrectal or transperineal approach. Over a one-year period, patients were given a postprocedure survey using a visual analogue scale (VAS) of 0–10 to rate pain prior to the biopsy, highest pain level during the biopsy, and highest pain level after the biopsy. They were asked to pick the most painful part of the procedure. Additionally, patients choose none, mild, moderate, severe, or extreme for questions such as: how much pain was involved preparing for the biopsy?; how much fear/anxiety they had prior to biopsy? and how much pain and embarrassment experienced during the biopsy?

Results: A total of 287 patients were identified: 48 TRBx and 239 TPBx. Demographics, including age, BMI, race, and comorbidities (including chronic pain, opioid use, and steroid use), were similar between the two groups except for patients with atrial fibrillation having a higher representation in the TRBx group. Levels of pain during biopsy were low for both groups but was minimally higher in the transperineal group (TPBx: 3.5, TRBx: 1.7, $p<0.01$); however, the level of pain immediately after biopsy was not significantly different between the two groups (TPBx: 0.6, TRBx: 0.0.4, $p=0.20$). The most reported painful part for the transrectal group was probe insertion (23%), and injection of numbing medication for the transperinineal group (38%). Levels of embarrassment during the biopsy were significantly higher for TPbx ($p=0.01$), and levels of fear were slightly higher but not significantly different ($p=0.06$)

Conclusions: The levels of pain associated with both the TRBx and TPBx are low. While the transperineal biopsy was associated with higher levels of pain during the procedure, immediately after the procedure, there was no difference in pain rating. Our local anesthetic method appears to be an effective way to reduce patient pain to tolerable levels; however, further advances can be made to make TPBx comparable to TRBx.

Poster #23

Quality of life of men at risk of prostate cancer: Results of the biomarkers and prostate cancer prevention and environment (BIOCaPPE) study

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Introduction: Prostate cancer is the most common cancer among Canadian men. Men diagnosed with prostate cancer usually live with an indolent disease for many years. Unfortunately, prostate cancer treatments lead to important side effects, like urinary and erectile symptoms, and have a major impact on quality of life. Many studies have evaluated quality of life of men diagnosed with prostate cancer and quality of life related to treatments; however, only few studies addressed the quality of life from men at risk of prostate cancer, and none was performed in Canada. Here, we aim to conduct a comprehensive descriptive analysis of quality of life in a Canadian cohort of men at risk of developing prostate cancer, and to assess the impact of urinary and erectile symptoms on general quality of life.

Methods: Quality of life was collected for 2053 men at risk for prostate cancer participating in a prospective, multicenter, observational study called BIOCaPPE aiming at evaluating the impact of various biomarkers associated with lifestyle habits on prostate cancer incidence. Participants had either 1) a first negative biopsy in the past 6 months; or 2) a prostatic-specific antigen level between 2.5≤10 ng/mL but no previous biopsy. Participants completed several validated questionnaires to assess their general quality of life (Hospital Anxiety and Depression Scale [HADS] and 36-item Medical Outcomes Study Short Form Health Survey [SF-36]) and prostate cancer-specific quality of life (International Prostate Symptom Score [IPSS] and Sexual Health Inventory for Men [SHIM]).

Results: Of all participants, 122 (6.1%) were definite cases of anxiety, 40 (2.0%) were definite cases of depression, and 154 (7.8%) had severe erectile dysfunction symptoms. Despite 1068 participants (53.9%) having moderate to severe urinary symptoms, the majority (55.6%) were satisfied with their quality of life in relation to their urinary function. Most participants had a quality of life similar to that of men from the general population. Finally, general quality of life was directly associated to the severity of urinary and erectile dysfunction symptoms.

Conclusions: Our results suggest that most participants perceived their quality of life as satisfactory, although most have moderate to severe urinary symptoms. Anxiety, depressive, and erectile symptoms are less common. Urinary and erectile dysfunction symptoms have a negative impact on the general quality of life. This is the first analysis of the quality of life in such a large Canadian cohort of men at risk of prostate cancer.

Funding: *Cancer Research Society of Canada, Ministère de l'enseignement supérieur, de la recherche, de la science, et de la technologie du Québec, and Fonds de Recherche du Québec - Santé (FRQ-S)*

Poster #25

Testosterone replacement therapy in men undergoing active surveillance for prostate cancer

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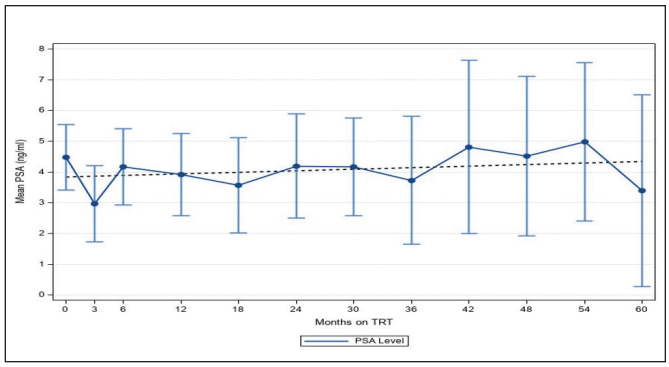
Introduction: We aimed to describe the effects of testosterone replacement therapy (TRT) on men undergoing active surveillance (AS) for prostate cancer.

Methods: We retrospectively reviewed our prostate cancer AS database of 1246 patients. Hypogonadal men on AS while receiving TRT were identified. Data were described in terms of demographics, disease characteristics (PSA, Gleason score at initiation of AS), duration of TRT, type of TRT, and change of PSA over time. Outcomes included conversion to treatment, progression to Gleason grade group (GG) 3 or higher, or development of metastasis.

Results: Twenty-four (2%) hypogonadal men receiving TRT while undergoing AS for prostate cancer were identified, 3 of which elected to discontinue TRT following diagnosis and 1 patient was lost to followup. Median age was 62 years (IQR 58–66). TRT included parenteral injections in 10 (50%), transdermal gel in 7 (35%), and subcutaneous implants in 3 (15%). At initiation of AS, 18 patients (90%) had Gleason grade 3+3=6 and 2 patients (10%) had Gleason grade of 3+4=7. Median number of positive cores was 2 (IQR 1–3) and median PSA was 4.15 ng/ml (IQR 2.75–6.25). Mean duration of TRT was 93 months and mean duration of TRT while on AS was 45 months. After a median followup of 46 months (IQR 28–107), the mean change in PSA was -0.7 (SD±2.36) ng/ml at 36 months (Figure 1). Three patients (13%) converted to treatment due to Gleason grade progression (two progressed from GG1 to GG2, both underwent radiation and the other from GG1 to GG3 and underwent radical prostatectomy). None of the patients developed biochemical recurrence after a median followup of 15 months after treatment. No patient experienced progression beyond GG3 or metastasis.

Conclusions: TRT among hypogonadal men undergoing AS for prostate cancer appears to be safe. Patients who converted to treatment did not exhibit adverse pathologic features or biochemical recurrence.



Poster #25. Figure 1. Mean PSA during TRT. Error bars represent 95% confidence intervals.