CUA 2023 Annual Meeting Abstracts – Poster Session 7: Oncology – Bladder

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MP 7.1

Multi-institutional comparison of radical cystectomy to trimodality therapy for muscle-invasive bladder cancer

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Introduction: Prior randomized controlled trials comparing bladder preservation to radical cystectomy (RC) for muscle-invasive bladder cancer (MIBC) closed due to lack of accrual. Given that none are foreseen, we used propensity scores to compare trimodality therapy (TMT, maximal transurethral resection of bladder tumor followed by concurrent chemoradiation) to RC.

Methods: This retrospective analysis included 722 patients with clinical stage T2-T4N0M0 MIBC urothelial carcinoma of the bladder (440RC/282TMT) who would have been eligible for both approaches, treated at three university centers from 2005–2017. All patients had solitary tumors <7 cm, no or unilateral hydronephrosis, and no extensive/multifocal carcinoma in situ. Differences in survival outcomes by treatment were evaluated using propensity scores incorporated in: 1) propensity score-matching (PSM) using logistic regression and 3:1 matching with replacement; and 2) inverse probability treatment weighting (IPTW).

Results: A total of 440/1492 (29.5%) of all MIBC surgical candidates were also candidates for TMT. The matched cohort comprised of 1119 patients (837 RC vs. 282 TMT). After matching, age (71.4 vs. 71.6), cT2 stage (90.2 vs. 90.4%), hydronephrosis (11.6 vs. 9.6%), and (neo)-adjuvant chemotherapy (60.4 vs. 56.4%) were similar between groups. Salvage cystectomy was performed in 38 (13%) TMT patients. There was no difference in five-year metastatic-free survival probabilities for RC and TMT either with IPTW (74% vs. 75%,p=0.40) or PSM (78%vs. 76%, p=0.62), respectively. The five-year cancer-specific survival probabilities for RC and TMT using IPTW and PSM were 81% vs. 84%, (p=0.07) and 83% vs. 85% (p=0.06), respectively. Overall survival favored TMT (IPTW 66% vs. 73%, p=0.007; PSM 72% vs. 77%, p=0.005). Outcomes for RC and TMT were not statistically different among centers for CSS and MFS (p=0.22–0.90).

Conclusions: This multi-institutional study provides the best evidence to date demonstrating similar oncological outcomes between RC and TMT for select MIBC patients.

Acknowledgements: Alexandre R. Zlotta and Jason A. Efstathiou are equal contributing authors. Andrzej Niemierko and Katherine Lajkosz are equal contributing authors.

MP 7.2

Microbiome may fill the sex gap in urothelial bladder cancer

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Introduction: Sex-specific discrepancies in bladder cancer (BCa) have been reported. Next-generation sequencing (NGS) has enabled researchers to study the genomes of entire microbial communities. We aimed to provide the first characterization of bladder microbiome in both sexes diagnosed with urothelial BCa with specific insight into the cancer grade in patients subjected to transurethral resection of non-muscle-invasive bladder cancer (TURBT).

Methods: 16S NGS and shotgun metagenomics were performed on midstream urine, bladder tumor tissue, and healthy bladder mucosa from patients subjected to TURBT. Metagenomic analysis was performed using hypervariable fragments of the 16S rRNA gene on the Ion Torrent Personal Genome Machine platform. The metagenomes were compared between the sexes and respective sample types. Separate analysis concerned low-grade (LG) and high-grade (HG) tumors.

Results: Bacterial DNA was isolated from BC patients, of which 41 tumor biopsies, 38 normal bladder mucosa, and 41 urine samples were obtained. There were no statistically significant differences between male and female patients in Shannon diversity index. Chao1 indices values differentiated male and female tumor samples, with women having a smaller taxa richness. As far as tumor grades are concerned, patients with HG tumors present with lower bacterial diversity and richness in urine. Taking into account both sex and grade, women with HG tumors present with significantly lower diversity and richness than men. Significant differences in relative abundance of community at the family level between sexes in HG tumors were observed. Among the abundant bacteria overrepresented in female tissues are Salmonella (bladder and tumor), Peptostreptococcus (bladder only), and Howardella (tumor only). Those overrepresented in male urine include 45 (46%) taxa, specifically genera Peptostreptococcus, Campylobacter, Sphingobium, and Haemophilus. No significant differences in relative abundance between sexes were present in LG tumors in tumor tissue and urine, with only minimal differences in bladder tissue (two taxa).

Conclusions: Our study provides the first characterization of bladder microbiome in both sexes diagnosed with non-muscle-invasive BCa with insight into the cancer grade. There is a robust and consistent compositional difference in the urinary microbiome between sexes in HG BCa.

Acknowledgements: This research was funded by the National Science Center (NCN), grant number 2019/33/B/NZ5/02447.

MP 7.3

Development of NIMBLE – an artificial intelligence-based prediction tool for tumor progression of non-muscle-invasive bladder cancer using the WHO 2004/2016 grading system

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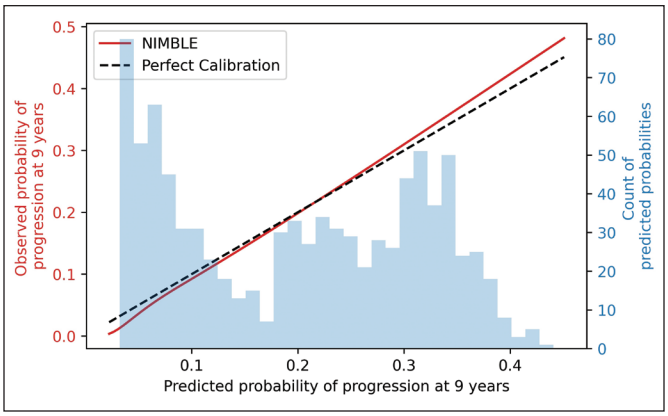
Introduction: Several predictive models have been developed to estimate the risk of tumor progression in non-muscle-invasive bladder cancer (NMIBC); however, they do not reflect current practice, perform poorly, and are based on the World Health Organization (WHO) 1973 grading system. We aimed to develop NIMBLE — an artificial intelligence (AI)-based tool to better predict progression in NMIBC patients using the more widely used WHO 2004/2016 grading system in North America.

Methods: NIMBLE was trained on patients treated from January 2005 to October 2014 at the University Health Network, Toronto (n=564). Predictors included age, sex, history of urothelial cancer, stage, grade (WHO 2004/2016), concomitant carcinoma-in-situ (CIS), tumor burden and size, type of intravesical therapy, European Association of Urology (EAU) total progression score, and number of intermediate risk factors. Internal validation was performed on patients treated from October 2014 to December 2020 at the same institution (n=142). External validation was performed on a publicly available dataset of patients treated from October 2004 to December 2013 at Seoul National University, South Korea (n=198). Primary outcome was progression, defined as relapse of pT2 disease or higher. NIMBLE hyperparameters were tuned using a tree-structured Parzen estimator algorithm to optimize concordance index.

MP 7.3. Table 1. Performance of all models based on concordance index and integrated Brier score

Concordance Index (higher is better)			
Cohort	**NIMBLE**	**AI-EUR[a]**	**EAU risk groups[b]**
Training	0.81 (0.77–0.85)	0.67 (0.58–0.76)	0.54 (0.50–0.57)
Internal validation	0.79 (0.61–0.93)	0.60 (0.51–0.80)	0.77 (0.60–0.90)
External validation[c]	0.78 (0.68–0.87)	0.62 (0.51–0.74)	0.63 (0.54–0.73)
Integrated Brier Score (lower is better)			
Cohort	**NIMBLE**	**AI-EUR[a]**	**EAU risk groups[b]**
Training	0.08 (0.07–0.10)	0.08 (0.05–0.10)	0.09 (0.07–0.11)
Internal validation	0.05 (0.02–0.08)	0.07 (0.05–0.11)	0.06 (0.03–0.09)
External validation[c]	0.08 (0.05–0.11)	0.10 (0.08–0.12)	0.09 (0.05–0.12)

NIMBLE was compared against a previously published AI model trained on a multi-institutional European cohort (AI–EUR) and the European Association of Urology (EAU) risk groups. [a]https://doi.org/10.1016/j.euo.2021.05.006 (Extended model). [b]https://doi.org/10.1016/j.eururo.2020.12.033. [c]https://doi.org/10.1371/journal.pone.0189354.



MP 7.3. Figure 1. Calibration of NIMBLE at 9 years.

NIMBLE was compared against the EAU risk groups and a previously published AI model trained on a multi-institutional European cohort.

Results: Mean age of the total cohort was 68 years and 23% were female; 52% of patients had pTa, 43% pT1, 5% primary CIS, 42% low-grade, and 58% high-grade disease. Median followup was 4.7 years (IQR 2.2–8.3). NIMBLE had the best performance in all cohorts (Table 1) and demonstrated excellent calibration (Figure 1).

Conclusions: Using the WHO 2004/2016 grading system, NIMBLE performed favorably compared to contemporary prediction tools. Ongoing work is being conducted to evaluate the safety and generalizability of NIMBLE in larger NMIBC cohorts.

Acknowledgements: This study was supported by the Canadian Urological Association Scholarship Foundation Bladder Cancer Canada Research Grant. Jethro Kwong was supported by the University of Toronto Clinician Investigator Program and Hold'em for Life Oncology Fellowship.

MP 7.4 – Prize essay winner

The effect of cisplatin-based neoadjuvant chemotherapy on the renal function of patients undergoing radical cystectomy

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Introduction: Cisplatin-based neoadjuvant chemotherapy (NAC) is the standard of care for patients with muscle-invasive bladder cancer undergoing radical cystectomy (RC). Cisplatin, however, is known to cause renal injury. Furthermore, RC is an independent risk factor for renal injury, with decreases in estimated glomerular filtration rate (GFR) of up to 6 mL/min/1.73 m2 reported at one year postoperatively. Our objective was to evaluate the effect of cisplatin-based NAC and RC on the renal function of patients undergoing both.

Methods: We analyzed a multicenter database of patients with muscle-invasive bladder cancer, all of whom received cisplatin-based NAC prior to RC. GFR values were collected at time points T1 (before NAC), T2 (after NAC but before RC), and T3 (one year post-RC). GFR and proportion of patients with GFR <60 ml/min/1.73m2 (CKD stage ≥3) were compared between these time points. As all patients in this dataset had received NAC, we identified a retrospective cohort of patients from our institution who had undergone RC during the same time period without NAC for comparison.

Results: We identified 234 patients with available renal function data. From T1 to T3, there was a mean decline in eGFR of 17% (13 mL/min/1.73 m2) in the NAC cohort and an increase in proportion of patients with stage ≥3 CKD from 27% to 50%. Our parallel cohort of patients who did not receive NAC was comprised of 236 patients. The mean GFR decline in the non-NAC cohort from T1 to T3 was 6% (4 mL/min/1.73 m2), and the proportion of those with stage ≥3 CKD increased from 37% to 51%. No statistical comparison was performed between the NAC and non-NAC groups.

Conclusions: Administration of NAC prior to RC was associated with a 17% decline in GFR and a nearly doubled incidence of stage ≥3 CKD at one year after RC. Control patients who underwent RC without NAC had a higher rate of stage ≥3 CKD at baseline but appeared to have less renal function loss at one year.

MP 7.5

CDKN2a expression and response to interferon alpha gene therapy in bladder cancer cell lines

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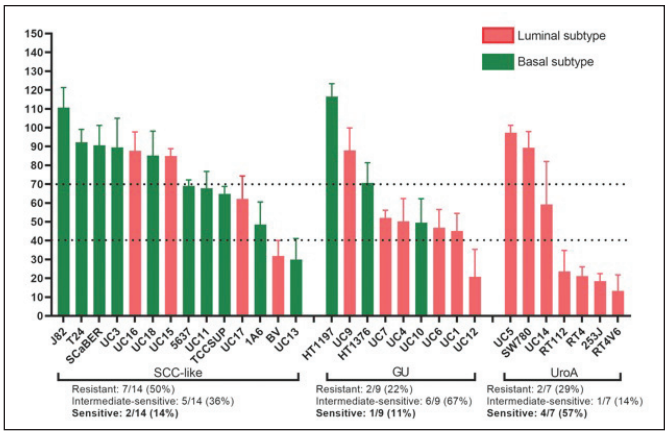
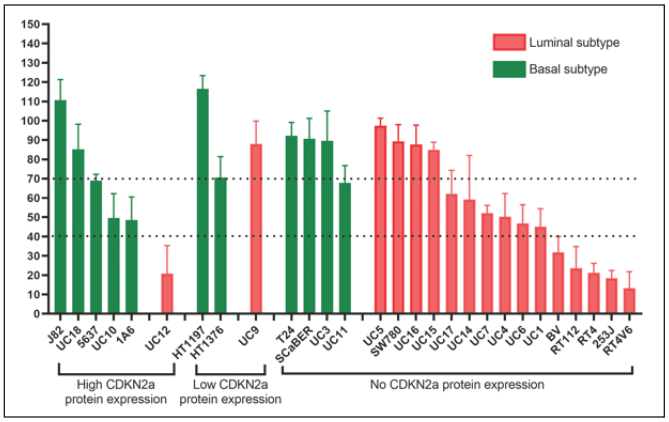
Introduction: Interferon alpha (IFNα) gene therapy with adstiladrin for bladder cancer (BCa) is emerging as a promising therapeutic option in patients with BCG-unresponsive BCa. Identification of biomarkers that can reliably predict response is of utmost importance. In many malignancies, CDKN2a homozygous deletions are often accompanied by deletion in IFN genes, located in close proximity to the CDKN2a locus. Herein, we investigated the relationship between CDKN2a and response to IFNα.

Methods: Thirty BCa cell lines were treated with adenoviral IFNα and response to gene therapy was evaluated by CellTiter-Glo® assay. Cell lines were categorized as sensitive (viability <40% compared to control), intermediate-sensitive (viability from 40–70%), or resistant (viability >70%). This was correlated with the molecular subtype and CDKN2a expression of each cell line. CDKN2a expression was evaluated by western blotting.

Results: Seven cell lines were sensitive, 12 were moderately sensitive, and 11 were resistant to gene therapy (Figure 1). Molecular subtype analysis according to Lund classifier revealed UroA subtype to be the most sensitive (57%). GU and SCC-like subtypes had poor response rates (11% and 14%, respectively).



MP 7.5. Figure 1. CDKN2α Lund subtypes.



MP 7.5. Figure 2. CDKN2α expression.

Most basal cell lines were intermediate-sensitive (38%) or resistant (54%), while 35% of luminal cell lines were sensitive to IFNα. CDKN2a was undetectable in the majority of luminal cell lines, including for all of UroA subtype (Figure 2). On the contrary, the resistant UroA cell lines (UC5 and SW780) showed high EGFR expression, highlighting a potential resistance mechanism.

Conclusions: We confirmed our hypothesis, whereby IFNα therapy enhances response in case of lack of expression of CDKN2a. Homozygous deletion of CDKN2a appears to be a predictor of response in most UroA subtype tumors, while some cell lines are inherently resistant, possibly from elevated EGFR expression. Identifying gene signatures that are predictive of response is crucial to determine patients more likely to respond to IFNα gene therapy.

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MP 7.6

Impact of frailty on postoperative outcomes of radical cystectomy for bladder cancer

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Introduction: Frailty has been associated with poor postoperative outcomes; however, there is a lack of quantitative evidence on the impact of frailty in urological procedures, such as radical cystectomy (RC).

Methods: Adult patients who underwent RC for bladder cancer from 2015–2019 were identified from the NSQIP database using CPT and ICD-10 codes.

Patient frailty was assessed using the modified five-item Frailty Index (mFI-5), which is assessed as 0–5 for increasing frailty (not frail [NF] 0, slightly frail [SF] 1, and frail [F]>2). The primary outcome was 30-day postoperative complications. Secondary outcomes were total hospital length of stay, unplanned readmission, reoperation, and non-home discharge. Odds ratios (OR) with 95% confidence intervals (CI) were estimated using multivariate regression.

Results: From a total of 9804 RC patients (68.8±9.7 years, 82.2% male) included for analysis, 33.6% (n=3294) were not frail, 45.3% (n=4440) were slightly frail, and 21.1% (n=2070) were frail. After controlling for covariates, frail patients and slightly frail patients were associated with a higher likelihood for 30-day complications (F: OR 1.56, 95% CI 1.38–1.75, p<0.001; SF: OR 1.14, 95% CI 1.04–1.26, p=0.006), reoperation (F: OR 1.32, 95% CI 1.02–1.70, p=0.036; SF: OR 1.25, 95% CI 1.01–1.56, p=0.040), and unplanned readmission (F: OR 1.80, 95% CI 1.57–2.07, p<0.001; SF: OR 1.24, 95% CI 1.10–1.40, p<0.001). Frail patients, but not slightly frail patients were more likely to be discharged to somewhere other than their home (F: OR 1.60, 95% CI 1.32–1.94, p<0.001) and stay longer in hospital (F: 9.2±6.7 vs. SF: 8.5±6.0 vs. NF: 8.0±5.4, p<0.001), with a mean difference between frail and non-frail patients of 1.2 days.

Conclusions: Frailty in RC patients is associated with 30-day postoperative complications and increased healthcare utilization through readmission, reoperation, and non-home discharge. The mFI-5 may be a simple screening tool to manage patient expectations and optimize for surgery.

MP 7.7

Assessing health inequity in non-muscle-invasive bladder cancer using the Ontario Marginalization Index

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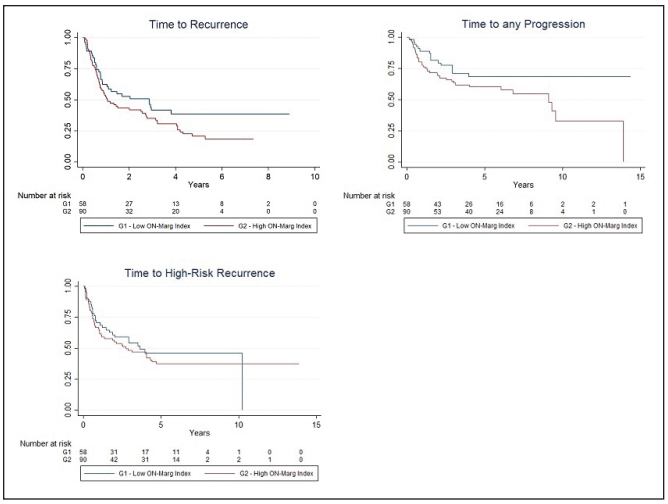
Introduction: The Ontario Marginalization Index (ON-Marg) is a tool for studying health inequality using four dimensions: residential instability, material deprivation, dependency, and ethnic concentration. This study aimed to assess the association between marginalization and non-muscle-invasive bladder cancer (NMIBC) outcomes for patients treated at Trillium Health Partners (THP), which serves one of the most diverse communities worldwide, with >50% of its constituents identifying as immigrants.

Methods: An ongoing retrospective THP chart review (2005–2022) of NMIBC patients was conducted, with preliminary analysis of 154 patients. Marginalization status, clinical and disease features, treatment compliance, recurrence, progression, and overall survival (OS) were collected. Marginalization status was calculated using ON-Marg. Grouping occurred as follows: G1=low marginalization (ON-MARG levels 1–2); G2=high marginalization (ON-Marg level 3–5). Differences in tumor stage at diagnosis and treatment compliance were assessed using Chi-squared tests. Time-to-event analysis was assessed by Kaplan-Meier curve analysis.

Results: Sixty-one patients (40%) were G1 and 93 (60%) were G2. pT1 was present in 36% and 41% of G1 and G2 (p=0.8), respectively. High-grade tumor diagnosis was as follows: G1=71% vs. G2=80% (p=0.2). Rates of recurrence were 53% vs. 71% (p=0.09), high-risk recurrence 48% vs. 56% (p=0.5), and any progression 28% vs. 42% (p=0.08) for G1 vs. G2, respectively (Figure 1). No differences were observed in treatment compliance, OS, or cancer-specific survival.

Conclusions: Higher grade and stage tumors were more common in the marginalized patient population, which may be associated with delayed presentation or other mitigating non-measured factors. These initial findings are compelling but further investigation with a larger cohort is ongoing at THP to fully understand the relationship between marginalization, social determinants of health, and prognosis in NMIBC patients.



MP 7.7. Figure 1. Time from first treatment to recurrence, high-risk recurrence, and any specific progression, stratified by ON-Marg Index groups.

MP 7.8

FOXF1: A novel regulator of metastasis in urothelial carcinoma of the bladder

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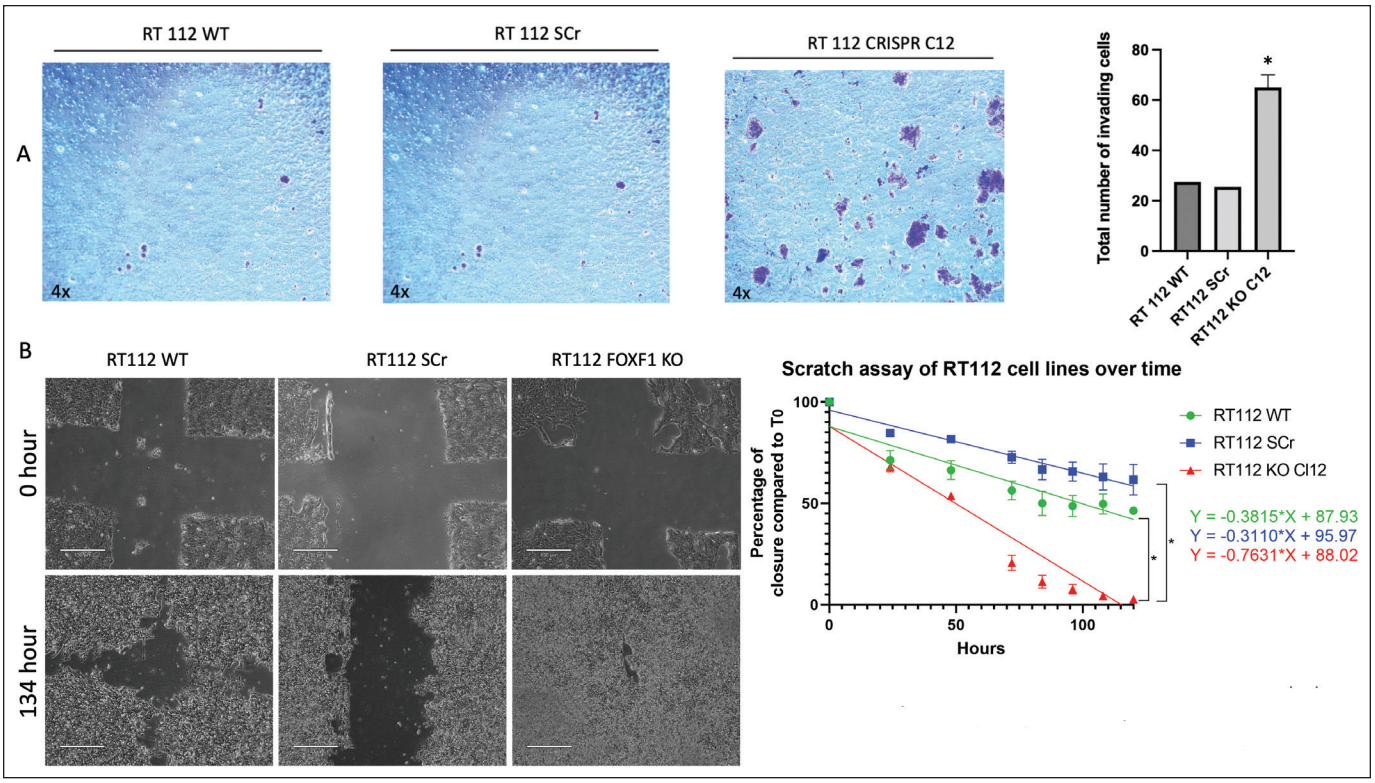
Introduction: FOXF1 is a transcription factor that may act as a tumor suppressor gene by interaction with p53. We had previously identified FOXF1 to be highly differentially expressed in matched bladder cancer (BCa) primary tumors and nodal metastases. Our objective was to further investigate the mechanistic role of FOXF1 in BCa metastasis.

Methods: Whole-genome mRNA gene expression profiling was performed on paired primary tumors and nodal metastases from radical cystectomy cohorts. Among the top differentially expressed genes, FOXF1 was identified as a candidate regulator of cancer cell invasion. Association between FOXF1 expression and survival after cystectomy was assessed. Quantitative PCR (qPCR) and Western blot analysis was performed to determine FOXF1 expression in parental BCa cell lines. Targeted genomic editing to knockout (KO) FOXF1 was achieved with CRISPR-Cas 9 system. Successful KO was validated using Western blot and qPCR analysis. To measure impact of gene KO on in vitro invasion and migration, we conducted the gelatin-coated Boyden chamber assay and scratch assay.

Results: In the initial discovery set, FOXF1 expression was 3.6-fold lower in nodal metastases than paired primary tumors (n=33, p<0.001). In two clinical cohorts (MDA Discovery n=73, GSE13507 n=55), high FOXF1 expression was associated with improved cancer-specific survival (HR 0.35, p=0.046) and overall survival (HR 0.45, p=0.006). Using the high FOXF1 expressing luminal RT112 cell line, CRISPR-Cas 9 genomic editing resulted in complete KO of FOXF1. After 72 hours, the modified Boyden chamber assay showed significant increase in invasion among RT112 KO clone compared to RT112 wild-type and scramble (p≤0.05). Similarly, using simple linear regression, RT112 KO clone demonstrated significant increase in migration over time (p<0.001) (Figure 1).

Conclusions: FOXF1 is differentially expressed between primary and metastatic BCa lesions. FOXF1 appears to regulate cellular invasion and migration in vitro. In vivo animal studies using orthotopic implantation are underway to validate these findings.

Acknowledgements: This research was supported, in part, by A.I. Virtanen Institute for Molecular Sciences (Kuopio, Finland) and MD Anderson CCSG program (P30 016672).



MP 7.8. Figure 1. Invasion and migration of RT112 clones. (A) Gelatin-coated Boyden chamber assay showing significant increase invasion in RT112 FOXF1 KO clone compared to wild-type (WT) and scramble (SCr). (B) Linear regression of wound scratch assay closure over time with representative pictures showing significant increase migration of RT112 FOXF1 KO clone.

MP 7.9

Association of clinical practice pattern with genitourinary tract malignancies in patients presenting with microscopic hematuria in Northwestern Ontario

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Introduction: Microscopic hematuria (MH) can be the earliest sign of genitourinary (GU) cancers. Therefore, the early detection of GU cancers hinges on patient flow in the healthcare system. The goal of this study was to investigate the association of clinical practice patterns (i.e., time to access health services) with GU cancer in patients referred for MH.

Methods: We conducted a retrospective chart review of patients who presented with MH from 2017–2022 to the urology service at Thunder Bay Regional Health Science Centre. The differences between the time points in the patient evaluation were reported as follows: T1=date of first UA-date of consultation received, T2=date of urology first visit-date of consultation received, and T3=date of cystoscopy-date of urology first visit.

Results: Retrospective analysis included 2545 patients referred for urology service, with 1102 (43.3%) males and a mean age of 66.48 (SD 12.82) years. Statistically significant factors with associated GU cancer detection rate were age (OR 1.03, p<0.01), male gender (OR 2.42, p<0.01), cytology results (OR 3.25, p<0.01), urinalysis high-grade MH (OR 2.80, p<0.01), and other imaging (OR 7.97, p<0.01). For the grade of cancer outcomes, associated factors included male sex (OR 15.9, p<0.01), number of ordered cytology (OR 6.10, p=0.04), cytology results (OR 8.03, p<0.01), and urinalysis showing very high-grade MH (OR 0.05, p=0.04). We found that time points in patient evaluation, longer T1, T2, and T3 were associated with more cancer detection rates and worse outcomes (Tables 1, 2). When it comes to the grade of cancer, those who were living further had higher grades of cancer.

Conclusions: Both patient- and system-level factors interact to provide high-quality care in GU cancers among patients with MH. Our findings highlight that primary care practice, in tandem with urology healthcare services, can affect the detection rate and grade of GU cancers in MH patients.

MP 7.10

Salvage therapy for BCG failure with intravesical sequential gemcitabine and docetaxel in patients with recurrent non-muscle-invasive bladder cancer who are not candidates or declined cystectomy

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Introduction: Bacillus Calmette-Guérin (BCG) has been the standard adjuvant treatment following complete transurethral resection of bladder cancer (BC) for more than 40 years to reduce recurrence and progression of high-risk non-muscle-invasive bladder cancer (NMIBC); however, whether from intolerance, unresponsiveness, or recurrence, around 40% of patients will fail BCG within two years. Studies have proposed sequential intravesical gemcitabine and docetaxel (Gem/Doce) as salvage therapy in BCG failure patients with NMIBC. We aimed to measure the treatment efficiency defined as the progression-free survival (PFS) of BC in heavily treated patients who were not candidates or declined cystectomy in our institution.

Methods: We retrospectively reviewed BCG failure patients with NMIBC who were not eligible or refused cystectomy and had been treated with Gem/Doce from April 2019 through April 2022 at the CHU de Quebec-Laval University. Patients had received at least six weekly intravesical instillations after complete transurethral resection of NMIBC as described by Steinberg et al. Patients who responded had maintenance monthly for two years. The primary outcome

MP 7.9. Table 1. Results for logistic regression of total GU cancer outcome

Explanatory variable	OR	L95	U95	p
Basic characteristics				
Age (years)	1.0330	1.0155	1.0514	0.0002
Gender (male)	2.4222	1.5356	3.9135	0.0002
Urine analysis MH grade (high)	2.8055	1.4919	5.1035	0.0010
Cytology results	3.2517	2.1561	4.8984	0.0000
Other pre-consult imaging	7.9705	4.5916	13.9047	0.0000
Pre-consult number urine analysis	1.2951	0.8562	1.9448	0.2156
Pre-consult cytology	1.1416	0.7494	1.7404	0.5371
Number of ordered cytology	0.6462	0.3805	1.0666	0.0958
Urine analysis MH grade (low)	0.8811	0.5376	1.4141	0.6067
Pre-consult ultrasound	1.5018	0.8642	2.7404	0.1653
Access to healthcare factors				
T1	1.0065	1.0033	1.0095	0.0000
T2	1.0042	1.0002	1.0076	0.0264
T3	0.9932	0.9902	0.9964	0.0000
Distance to provider per km	0.9987	0.9971	1.0001	0.0893

T1=date of consult received-date of first urine analysis. T2=date of urology consult-date of consult received. T3=date of cystoscopy-date of urology consult.

MP 7.9. Table 2. Results for logistic regression of grade of genito-urinary cancer outcome

Explanatory variable	OR	L95	U95	p
Basic characteristics				
Gender (male)	15.9576	3.2077	115.2898	0.0021
Cytology results	8.0392	2.2811	33.8156	0.0021
Age (years)	0.9962	0.9379	1.0593	0.9016
Pre-consult number urine analysis	0.3676	0.0849	1.3806	0.1539
Pre-consult cytology	1.0365	0.2991	3.5817	0.9543
Number of ordered cytology	6.1966	1.1165	40.2067	0.0432
Urine analysis MH grade (low)	1.1354	0.2494	5.0737	0.8668
Urine analysis MH grade (high)	1.8787	0.3306	11.0405	0.4743
Pre-consult ultrasound	2.8575	0.6216	14.9659	0.1898
Other imaging	1.9452	0.4532	9.2840	0.3802
Access to healthcare factors				
T1	1.0841	1.0491	1.1350	0.0000
T2	1.0714	1.0409	1.1150	0.0001
T3	0.9209	0.8790	0.9523	0.0000
Distance to provider per km	0.9952	0.9904	0.9995	0.0372

T1=date of consult received-date of first urine analysis. T2=date of urology consult-date of consult received. T3=date of cystoscopy-date of urology consult.

was PFS at two years. Survival was assessed with the Kaplan-Meier method. Recurrence-free survival, progression to cystectomy, overall survival, and reported adverse events were analyzed.
Results: Thirty-four patients received the treatment during that time and three were excluded. Thirty-one patients were included in the analysis, with a median followup time of 17 months (IQR 7–27). Thirty percent had received two or more prior BCG inductions, 48% of the patients had recurrence within two years, and 26% had progression, as defined by Lamm et al. PFS was 90% at six months, 86% at one year, and 57% at two years after the first induction. Forty-two percent of patients experienced adverse events, but only two patients were unable to complete the treatment due to intolerance. Three patients underwent cystectomy due to progression. No patient died of BC and the overall survival was 94%.
Conclusions: In our small cohort of heavily treated NMIBC, less than 50% of BC progressed at two years. Overall, sequential intravesical Gem/Doce is a safe and well-tolerated option for heavily treated patients whit recurrent NMIBC. Long-time effectiveness, time to progression, and survival still need to be analyzed in a larger cohort to determine the safety to delay cystectomy.

MP 7.11
Longitudinal analyses of mutational subclonal architecture and tumor subtypes in recurrent bladder cancers

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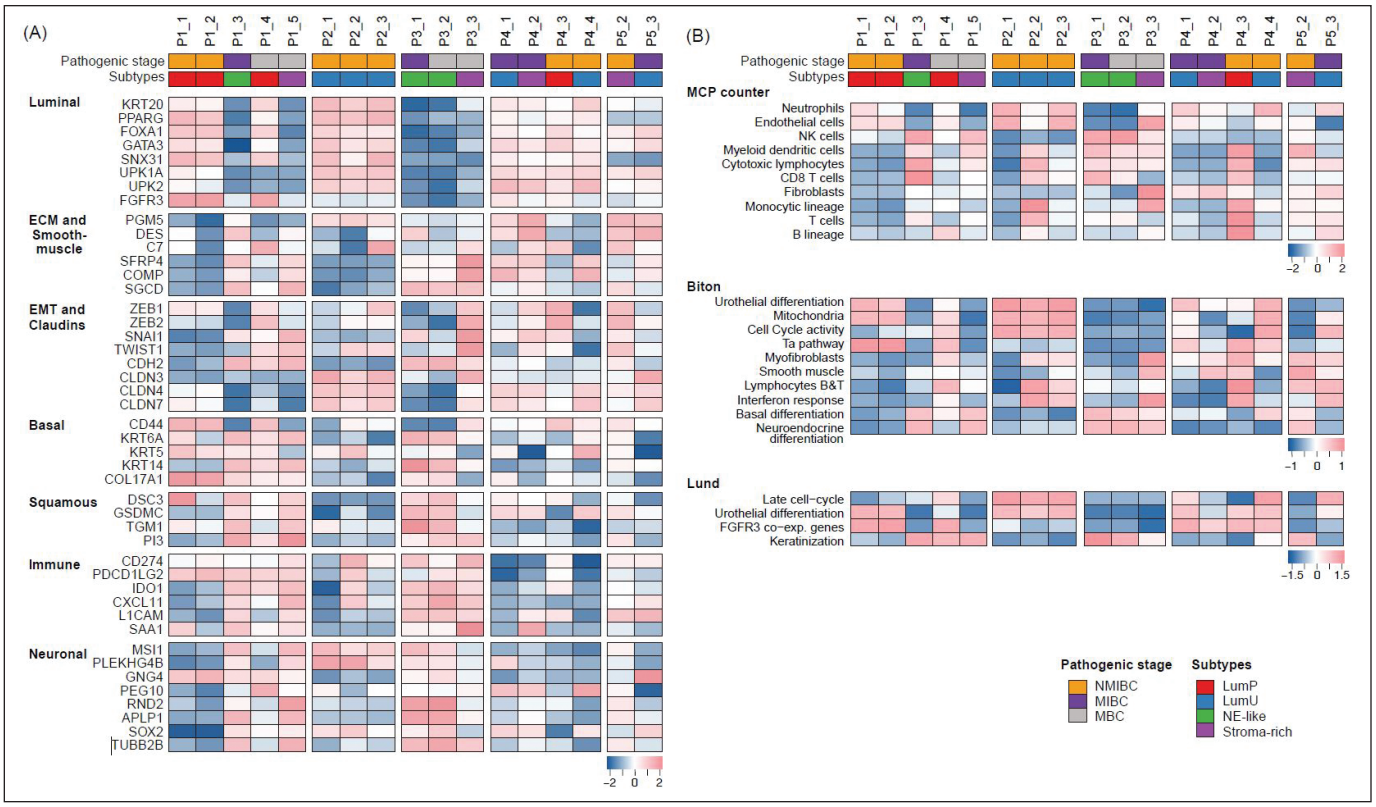
Introduction: Longitudinal tumor biopsies of recurrent bladder cancers (BC) can facilitate the investigation of BC progression-associated genomic and transcriptomic alterations.

Methods: In this study, we analyzed 18 tumor specimens, including distant and locoregional metastases, obtained along the tumor progression for five BC patients with whole-exome and transcriptome sequencing.
Results: Along with the substantial level of intratumoral mutational heterogeneity across the cases, we observed that clonal mutations were enriched with known BC driver genes and APOBEC-associated mutation signatures compared to subclonal mutations, suggesting the genetic makeup for BC tumorigenesis associated with APOBEC deaminase activity has been accomplished early in the cancer evolution. Mutation-based phylogenetic analyses also revealed temporal dynamics of mutational clonal architectures, where the number of mutational clones varies along the BC progression and notably, was often punctuated by clonal sweeps associated with chemotherapy. The bulk-level transcriptome sequencing revealed frequent subtype switching where transcriptionally defined BC subtypes may vary during the tumor progression (Figure 1).
Conclusions: Taken together, the whole-exome and transcriptome sequencing of longitudinal BC biopsies may advance our understanding of the BC heterogeneity in terms of somatic mutations, cell clones, and transcriptome-based tumor subtypes along the disease progression.
Acknowledgements: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Ministry of Science and ICT (MSIT) of South Korea (No. 2018R1D1A1B07049542).



MP 7.11. Figure 1.

MP 7.12

Urinary human papilloma virus infection and bladder cancer risk: A systematic review and a PRISMA-compliant meta-analysis

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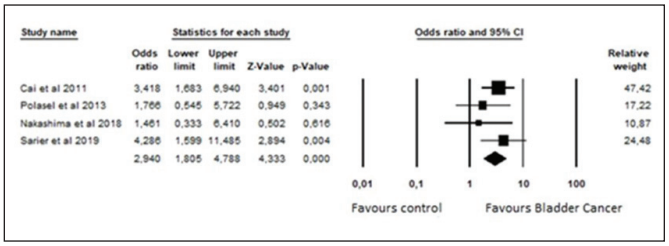
Introduction: The association between human papillomavirus (HPV) infection and the risk of bladder cancer (BCa) remains inconclusive. We carried out a systematic review and a PRISMA-compliant meta-analysis of the available case-control studies in order to verify possible differences in the occurrence of HPV infection in urine samples in patients with BCa and normal subjects.

Methods: A systematic review of the literature and a PRISMA-compliant meta-analysis was performed using the PICO method, with the aim of answering the following clinical question: Is urinary infection with HPV a risk factor for the development of a BCa? PubMed was used to search for articles published from January 1965 to December 2022 using the keywords "bladder cancer" and "human papillomavirus". Case-control studies reporting odds ratio (OR) for HPV infection in urine samples in patients with BCa and normal subjects were analyzed. The quality of the studies was evaluated by the New Castle Ottawa scale. Data were combined using random effect models. The Cochrane $\chi 2$ (Cochrane Q) statistic and the I2 test were used to analyze heterogeneity. The publication bias was graphically explored through funnel plot, and Duval and Tweedie's "trim-and-fill" test was used to correct possible publication bias.

Results: Among 320 articles, 47 were selected to be fully read. The selection process yielded four case-control studies with eligibly criteria for analysis that gave information on 150 patients with HPV infection in urine and 1259 patients without HPV infection in urine. The quality scores according to the New Castle Ottawa scale of all included studies were nine, suggesting that all included studies were eligible for synthesized analysis. The pooled OR estimate showed that patients with HPV infection in urine exhibit a significantly higher prevalence in BCa than patients without HPV infection (OR 2.94, 95% CI 1.805, 4.788, p=0.002). We obtained a heterogeneity $\chi 2$ value Q exp=2.317 (p=0.509) (I2=0%) (Figure 1). Funnel plot did not suggest a possible publication bias in the analysis.



MP 7.12. Figure 1.

Conclusions: The pooled OR value showed a moderate relationship between urinary HPV infection and BCa risk. HPV infection in the urine may have a role in carcinogenesis of the bladder tumor.

UP 7.1

Association of patient characteristics (basic and clinical) with genitourinary tract malignancies in patients presenting with microscopic hematuria: A single Canadian center experience

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UP 7.1. Table 1. Results for logistic regression of total genitourinary cancer outcome

Explanatory variable	OR	95% CI (min max)	p
Age (years)	1.033	(1.017–1.051)	<0.001
Gender (male)	2.958	(1.922–4.666)	<0.001
Previous gross hematuria	3.469	(2.101–5.607)	<0.001
Personal history of GU cancer	4.533	(2.562–7.855)	<0.001
High-grade MH (>25 RBC/HPF)	2.977	(1.592–5.380)	<0.001
Lower urinary tract symptoms	0.081	(0.004–0.380)	0.014
Smoking status	1.048	(0.682–1.582)	0.824
Analgesic use	1.099	(0.238–3.502)	0.887
Previous abdominopelvic radiation	0.620	(0.212–1.609)	0.350
Previous chemotherapy	2.473	(0.734–6.933)	0.108
Family history of GU cancer	1.149	(0.510–2.318)	0.715
Distance to provider per km	0.999	(0.997–1.000)	0.227
Low-grade MH (<25 RBC/HPF)	1.052	(0.656–1.655)	0.828

UP 7.1. Table 2. Results for logistic regression of grade of genitourinary cancer outcome

Explanatory variable	OR	95% CI (min-max)	p
Gender (male)	5.662	(2.071–17.641)	0.001
Previous gross hematuria	3.871	(1.431–11.042)	0.004
Family history of GU cancer	6.540	(1.387–35.378)	0.020
Age (years)	1.037	(0.990–1.090)	0.177
Smoking status	0.702	(0.253–1.847)	0.539
Analgesic use	0.000	(NA–6.049)	0.989
Previous abdominopelvic radiation	1.847	(0.281–13.982)	0.528
Previous chemotherapy	2.439	(0.178–22.576)	0.448
Lower urinary tract symptoms	0.535	(0.020–4.925)	0.633
Personal history of GU cancer	0.569	(0.149–1.956)	0.383
Distance to provider per km	0.997	(0.993–1.001)	0.173
Low-grade MH (<25 RBC/HPF)	1.115	(0.377–3.238)	0.129
High-grade MH (>25 RBC/HPF)	2.796	(0.738–1.089)	0.220

Introduction: The aim of our study was to investigate the characteristics of patients with and without genitourinary malignancy who were referred to the urology service with microscopic hematuria.
Methods: We conducted a retrospective data analysis for all patients who presented with microscopic hematuria (MH) over the last five years to the urology service of Thunder Bay Regional Health Science Centre. Inclusion criteria were patients over 40 years old with microscopic urine analysis at referral (>3 RBCs/HPF) that had at least a single cystoscopy and imaging to the upper urinary tract at or before the first urology visit and were followed for at least six months with repeat microscopic urine analysis. Low- and high-grade MH was described as <25 RBCs/HPF and >25 RBC/HPF, respectively. Logistic regression models were fit for baseline clinical characteristics and care level characteristics with reporting in odds ratios and 95% confidence intervals. Outcome measures were binary occurrences of any genitourinary malignancy, and a separate analysis was performed on the outcome of malignancy grade (low/high).
Results: The retrospective analysis included 2545 patients referred for urology services included in the study, with 1102 (43.3%) males and a mean age of 66.48 (SD 12.82) years. Genitourinary cancers were detected in 129 (5.1%) of patients, with 43 (29.9%) patients with high-grade cancer. Covariates that reached statistical significance for increased odds of genitourinary cancers in logistic regression models were age (OR 1.03, p<0.01), gender (male) (OR 2.96, p<0.01), previous gross hematuria (OR 3.46, p<0.01), lower urinary tract symptoms (OR 0.08, p=0.013), and high-grade of MH (>25RBC/HPF) (OR 2.97, p<0.01) (Table 1). For grade of cancer outcome, male gender (OR 5.66, p<0.01), previous gross hematuria (OR 3.87, p<0.01), and family history of GU cancer (OR 6.54, p=0.02) were associated with increased odds of high-grade GU cancers (Table 2).
Conclusions: The prevalence of genitourinary malignancy in patients presenting with microscopic hematuria is currently underestimated. Along with age, male gender, previous family history of GU cancer, and previous history of gross hematuria, we highlight the association of high grade of microscopic hematuria (RBC>25 RBC/HPF).

UP 7.2

Phase I study of safety and immunogenicity of DPX-based products with or without intermittent low-dose cyclophosphamide in patients with non-muscle-invasive bladder cancer

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Introduction: Intravesical chemotherapy or immunotherapy to prevent recurrences fail in a significant proportion of patients with non-muscle-invasive bladder cancer (NMIBC) and therefore more effective therapies are needed. The DPX platform is a versatile, non-aqueous, lipid-based delivery platform that produces sustained T-cell responses against specific peptide antigens. In ovarian cancer and DLBCL, it has been shown to induce and maintain immune responses, leading to tumor regressions. DPX-based immunotherapies targeting survivin and MAGE-A9, two tumor-associated antigens expressed by NMIBC, could provide a novel way to treat these tumors.
Methods: This Phase 1, multicenter study assesses the effect of three sc injections, prior to transurethral resection (TUR), of 0.25 ml of DPX-based products (Q3 weeks) ± intermittent low-dose cyclophosphamide (CPA) as treatment for subjects with NMIBC who failed intravesical therapy. The primary objectives are to assess the safety and to evaluate induction of antigen-specific T-cell responses in ELISPOT assays. Additional objectives include measurement of T-cell infiltration changes using multiplex assays and number of patients achieving pT0 at TUR. Currently, arms using MVP-S (targeting survivin) and DPX-SurMAGE (targeting survivin and MAGE-A9) are enrolling subjects.
Results: As of January 2023, seven subjects have been enrolled, five have received MVP-S ± CPA, one has received DPX-SurMAGE without CPA, and four have completed TUR. Treatment has been well-tolerated, with observations of grade 1 fatigue and injection site reactions. H&E staining of baseline and post-treatment TUR tumor samples has shown a marked increase in immune cell infiltration in 2/3 post-MVP-S treatment specimens analyzed to date, suggesting local immune activity of MVP-S.
Conclusions: Ongoing recruitment with more participating centers will allow more subjects to confirm these early observations with more complete analyses of the anti-tumor activity of DPX products to be presented at the meeting.
Acknowledgements: This study was supported by with a SynergiQc grant funded jointly by the Fondation du CHU de Québec, IMV Inc. and the Consortium Québécois pour le Développement du Médicament (CQDM) with funds from the Ministère de l'Économie et de l'Innovation (MEI) du Gouvernement du Québec.

UP 7.3

Contemporary description of short-term perioperative outcomes after radical cystectomy for bladder cancer

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Introduction: Radical cystectomy is a surgery with a high percentage of morbidity, and bladder cancer is usually diagnosed in elderly patients, which means that comorbidities in this age group increase the risks of perioperative complications. Our objective was to carry out a contemporary review of the complications of radical cystectomy. To answer our question, we used the American College of Surgeons National Surgery Quality Improvement Program (NSQIP) database.

Methods: This is a retrospective analysis of 5908 patients with radical cystectomy using the NSQIP database from 2017–2019. Data on demographic, clinical, and surgical treatment information, postoperative complications, operative time, length of stay, blood transfusions, and readmission within 30 days from surgery were collected.

Results: We included 5908 patients in the final analysis, all with radical cystectomy secondary to bladder cancer; 4850 were male (82.1%), the mean age was 69 years, 1811 patients (30.7%) were 75 years or older. The majority (4283, 72.5%) were white. The most common procedure was cystectomy with ileal conduit in 4788 (81%), radical cystectomy with neobladder in second place with 887 (15%), 1% with ureterostomy, and 3% without specification of the type of reconstruction. Mean hospitalization time was 8.1 days. Overall complications occurred in 3092 (52.3%); the most common were infections (urinary tract infections, wound infections, pneumonia, sepsis, septic shock, and Clostridium difficile) in 2310 patients (39.1%), transfusion in 1762 (29.8%), readmission 1307 (22.1%), cardiovascular events (cardiac arrest, myocardial infarction, deep vein thrombosis, and pulmonary embolism) in 390 (6.6%), and reoperation in 333 (5.6%). In multivariate analysis, being 75 years or older, diabetes, hypertension, and female gender were significant independent predictors for overall complications.

Conclusions: This information represents a contemporary profile of complications related to cystectomy, with infectious complications being the most frequent, followed by transfusions and readmissions. This information could give rise to new projects for the prevention and treatment of infections in postoperative cystectomy patients since these have an important incidence and could have a significant impact on the morbidity of this surgery.

UP 7.4

Genitourinary malignancy among patients presenting with microscopic hematuria in Northwestern Ontario

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Introduction: This study aimed to determine the incidence and characteristics of genitourinary (GU) malignancy in patients that presented with microscopic hematuria (MH) at our tertiary center. Our institution is the only facility providing urological care to the region of Northwestern Ontario (land area=526 417.35 km2, population=232 299).

Methods: We conducted a retrospective cohort study of all patients that presented to our center with MH from March 2017 to March 2021. The inclusion criteria included patients aged >40 years, with two microscopic urine analyses at referral showing (>3 RBCs/HPF), that had at least a single cystoscopy and imaging of the upper urinary tract at or before the first urology visit. All patients were followed for a minimum of six months with repeat microscopic urine analyses. Low- and high-grade MH were defined as <25 RBCs/HPF and >25 RBC/HPF, respectively

Results: A total of 2545 patients (49.1% males) aged 63.1±17.4 years were included (Table 1). During the entire study period, the incidence of GU malignancy was 5.2%, including bladder (4.3%), kidney (0.7%), and ureteric (0.2%) cancers. During the initial evaluation, the incidence of GU cancer was 4.2%. Forty patients (1.7%) underwent ureteroscopy after initial evaluation due to positive urine cytology and/or suspicious upper tract imaging, of which, five patients (0.2%) were found to have ureteric tumors. When stratified by the grade of MH at initial evaluation, 3.1% and 10.3% of patients in the low- and high-grade MH groups, respectively, were found to have GU malignancy, (p=0.0006). Our study identified 1812 patients that were followed up for three years. The rate of GU malignancy among this cohort was 4.5% and 12.5% in patients with low- and high-grade MH, respectively. Interestingly, only two-thirds (59 patients) of individuals in the low-grade MH group that were cancer-positive had a GU malignancy diagnosis during the initial workup

Conclusions: The prevalence of GU malignancy in patients with MH is currently underestimated in the Canadian guidelines. Among our patients, 5.2% were diagnosed with GU malignancy over the study period. Repeat workup is specifically recommended for individuals with low-grade MH, as we found that one-third of cancer-positive patients had a missed cancer diagnosis during the initial workup.

UP 7.6

Adverse events associated with electromotive drug administration of mitomycin

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Introduction: The gold standard treatment of high-risk non-muscle-invasive bladder cancer (NMIBC) includes induction and maintenance intravesical bacillus Calmette-Guérin (BCG) therapy; however, one prospective trial has demonstrated improved outcomes with electromotive drug administration of mitomycin-C (EMDA-MMC) in conjunction with BCG, compared to BCG alone. In this study, we report the safety and efficacy of EMDA-MMC with BCG.

Methods: This retrospective, observational study from two centers included patients who received EMDA-MMC and BCG for high-risk NMIBC after January 1, 2011. High-risk was defined as high-grade Ta, CIS, T1, or all of: multifocal, recurrent, >3 cm tumors. Time to recurrence was defined as the time from diagnostic TURBT showing high-risk disease preceding the initiation of intravesical therapy, to pathological confirmation of recurrent high-grade bladder cancer. Adverse effects were defined as CTCAE v5.0 grade ≥3.

Results: Among the 62 patients included, 37 (60%) were from Vancouver, 8 (13%) were female, and the median age was 68.5 years. The median followup was 61 months and a high-grade recurrence was observed in 29 (47%) patients. The mean time to recurrence was 26 months. Nine (15%) patients progressed to T≥2 disease and 12 (24%) underwent cystectomy. Eighteen (29%) patients experienced adverse effects following treatment, while 38 (61.3%) patients demonstrated some evidence of long-standing bladder injury on cystoscopy, including erythema, necrosis, or inflammation. An additional 11 patients who received EMDA-MMC alone without BCG were assessed for adverse effects. Six of these patients experienced an adverse event, and 10 had evidence of chronic bladder injury.

Conclusions: Treatment with EMDA-MMC and BCG results in outcomes comparable to historical outcomes of BCG alone. This treatment is, however, associated with a high rate of long-term local bladder toxicity resulting in chronic lower urinary tract symptoms. The incidence of bladder toxicity appears to be even higher in those that were treated with EMDA-MMC alone. Additional prospective evaluation of EMDA-MMC is required before widespread adoption.

UP 7.7

A scoping review and thematic analysis of artificial intelligence in urothelial cancer

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Introduction: The use of artificial intelligence (AI) in urology is gaining significant traction. While reviews of AI applications in various urological subspecialties

UP 7. 4. Table 1. Cohort basic clinical criteria, initial MH workup, and followup results

Parameter		n (%)
Total study participants		2545 (100)
Gender	Male	1103 (43.3)
	Female	1443 (56.7)
Total cancer cases		129 (5.1)
Anticoagulant use		519 (20.4)
Personal and family history	History of chronic analgesic abuse	51 (2.0)
	History of abdominopelvic radiation	49 (1.9)
	History of chemotherapy	46 (1.8)
	Previous history of gross hematuria	191 (7.5)
	Family history of GU cancers	147 (5.8)
	Smoking	348 (47.1)
	Personal history of GU cancers	107 (4.2)
Past medical history	HTN	880 (34.6)
	Renal disease	43 (1.7)
Presence of lower tract urinary symptoms	Storage	572 (22.5)
	Voiding	22 (0.9)
Initial MH workup procedure		
Referral to nephrology after primary workup		42 (1.7)
Ultrasound ordered before urology consult		2107 (82.8)
Number of UA ordered before urology consult	Less than two	1706 (67)
	Two or more	840 (37)
Urine cytology ordered before Urology consult by family physician		1375 (54.0)
Number of urine cytology ordered before urology consult	One	1586(72.9)
	Two or more	589 (27.1)
Cytology results	Negative	1753 (81)
	Atypia	370 (17.1)
	Suspicious	15 (0.7)
	Positive	28 (1.3)
Severity of hematuria in primary UA (RBC #)	Chemical analysis	1212 (61.1)
	<10	445 (22.4)
	10–25	92 (4.6)
	3–25	540 (27.2)
	>25	119 (6.0)
	Negative (0, 1, or 2)	115 (5.8)
Other imaging ordered after urology consult	None	2275 (89.6)
	CT renal colic	92 (3.6)
	CT urogram	152 (6.0)
	MRI	20 (0.8)

UP 7. 4. Table 1 (cont'd). Cohort basic clinical criteria, initial MH workup, and followup results

Parameter		n (%)
Initial MH workup results		
Modality which led to detect the most probable cause during primary MH workup	Imaging	206 (34.9)
	Cystoscopy	376 (63.7)
	Ureteroscopy	6 (1.0)
	PSA	2 (0.3)
Most probable cause of hematuria discovered after initial workup	No pathology	1956 (76.8)
	Non-cancer pathology	482 (18.9)
	Bladder tumor	88 (3.5)
	Kidney cancer	11 (0.4)
	Ureteric urothelial carcinoma	6 (0.2)
	Prostate cancer	3 (0.1)
Ureteroscopy done due to the findings of initial evaluation		40 (1.6)
6 months F/U		
Most probable cause of MH discovered at 6 months F/U	Bladder tumor	3 (50.0)
	Stones GU tract	1 (16.7)
	Prostate cancer	1 (16.7)
	Other benign causes	1 (16.7)
12 months F/U		
Most probable cause of MH discovered at 12 months F/U	Bladder tumor	5 (25.0)
	Stones GU tract	5 (25.0)
	Other benign causes	10 (50.0)
24 months F/U		
Most probable cause of MH discovered at 24 months F/U	Bladder tumor	9 (15.3)
	Kidney cancer	1 (1.7)
	Stones GU tract	10 (16.9)
	Other benign causes	31 (67.1)
36 months F/U		
Most probable cause of MH discovered at 36 months	Bladder tumor	1 (5.9)
	Kidney cancer	2 (11.8)
	Stones GU tract	8 (47.1)
	Prostate cancer	1 (5.9)
	Other benign causes	3 (17.7)
Beyond 36 months F/U		
Most probable causes of MH discovered beyond 36 months	Bladder tumor	2 (15.3)
	Stones GU tract	4 (30.7)
	Other benign causes	7 (54)
Total number of cancers discovered during followups		25 (1)

UP 7.7. Table 1. Summary of characteristics of included studies

Study characteristics	n (% or ± SD)
n	227
Disease state	
Bladder cancer (unspecified)	83 (36.6%)
MIBC	40 (17.6%)
NMIBC	20 (8.8%)
Metastatic urothelial carcinoma	29 (12.8%)
Metastatic bladder cancer	4 (1.8%)
Upper tract urothelial carcinoma	2 (0.9%)
Other	50 (22.0%)
Outcomes of interest	
Diagnosis	107 (47.1%)
Detection	59 (26.0%)
Staging	33 (14.5%)
Grading	26 (11.5%)
Segmentation	19 (8.4%)
Other	6 (2.6%)
Prognosis	102 (44.9%)
Survival	58 (25.6%)
Recurrence	29 (12.8%)
Treatment response	27 (11.9%)
Progression	23 (10.1%)
Others	4 (1.8%)
Diagnosis & prognosis	4 (1.8%)
Areas of research	
Radiomics	36 (15.9%)
Genomics	59 (26.0%)
Clinicopathological	32 (14.1%)
Image analysis	74 (32.6%)
Other	26 (11.5%)
Journal of publication	
Healthcare	120 (52.9%) IF: 4.86±1.02
Physics & engineering	43 (18.9%) IF: 2.86±0.67
Basic science	33 (14.5%) IF: 5.16±0.83
Computer science	31 (13.7%) IF: 3.36±0.76

UP 7.8. Table 1. Correlation between intravesical BCG/ infantile BCG and COVID-19 infection

		No COVID	COVID	p
Infantile BCG	No	58	17	0.3
	Yes	79	34	
Intravesical BCG	No	161	35	0.1
	Yes	135	17	
Infantile and/or intravesical BCG	No	31	13	0.7
	Yes	106	38	
Infantile and intravesical BCG	No	105	38	0.8
	Yes	32	13	

UP 7.8. Table 2. Correlation between the number of BCG doses and the occurrence of COVID-19 infection in patients received intravesical BCG

	No COVID	COVID	p
Median number of BCG doses	12	12	0.9

exist, there have been few attempts to synthesize existing literature on urothelial cancer. This review aimed to summarize bibliometric trends and conduct a thematic analysis on AI in urothelial cancer literature.

Methods: This review was prospectively registered on PROSPERO (CRD4202232691 4). Comprehensive searches based on the key words "artificial intelligence" and "urothelial cancer" were conducted. Study selection and data abstraction was conducted by two independent reviewers and disagreements were resolved by a third. A quantitative descriptive analysis and a qualitative theme-based analysis by area of research was performed. Moreover, two independent raters assessed papers from each theme with the Prediction Model Risk of Bias Assessment Tool (PROBAST) and the Standardized Reporting of Machine Learning Applications in Urology (STREAM-URO) framework as an indicator of study quality.

Results: Of 4581 articles from the initial search, 227 were included. Study characteristics are summarized in Table 1. Bibliometric review highlighted an increasing rate of publication of selected studies in 2019–2022 compared to previous years. Only 19% (n=42) of studies compared the performance of AI models to non-AI models, including statistical approaches and clinician judgement. Bias assessment identified high risk of bias and concern on PROBAST, with k=0.68. Studies also under-reported items related to methodology and results on STREAM-URO, with k=0.78.

Conclusions: This review synthesizes existing literature on AI applications in urothelial cancer and catalogs study purpose, AI models, features commonly extracted, and relevant performance metrics for future investigation. Moreover, it points to a need for improved standardized reporting given the high risk of bias and low methodological quality in selected studies.

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UP 7.8

Intravesical BCG and/or infantile BCG vaccination in patients with non-muscle-invasive bladder cancer did not affect the incidence or severity of COVID-19 infection

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Introduction: COVID-19 infection was a pandemic causing uncertainty among healthcare professionals. During early periods, many urologists were concerned about the possible risk of introducing a live micro-organism like BCG to patients at risk for having COVID respiratory infection. This was later changed into a belief that BCG may be playing a protective role by ameliorating the immune system to help it fight COVID-19 infection. Few reports were published claiming that intravesical BCG for non-muscle-invasive bladder cancer (NMIBC) may be protecting these patients from having the disease or having a milder form of infection.

Methods: We undertook retrospective data collection of patients with high-risk NMIBC from two Canadian centers. Data collection included history of BCG instillation, infantile immunization, and the development of COVID-19 infection. Admission because of COVID-19 was reported.

Results: We included data from 348 patients: 188 and 160 patients from Ontario and British Columbia, respectively. The mean age was 74±10. COVID-19 affected 15% of these patients. Intravesical BCG was used in 44% of these patients. History of infantile BCG vaccination could be only obtained from the Ontario group. Intravesical BCG and/or infantile BCG immunization did not correlate with the incidence of COVID-19 infection. There was a single case of mortality due to COVID-19 and that patient did not receive intravesical BCG nor had infantile BCG. There were another three cases that had hospital admission, including two patients that received both infantile and intravesical BCG and one patient that did not receive any of them. The three cases recovered well. Table 1 illustrates the correlation between BCG and COVID-19. The median number of doses of BCG was 12 for patients that did/did not get infected with COVID-19. Table 2 shows the results.

Conclusions: Intravesical BCG with/without history of infantile BCG vaccination did not correlate with the incidence or severity of COVID-19 infection.