

## NSUA 2022 Annual Meeting Abstracts – Basic Science/Education

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### Poster #102

#### Involvement of Hippo/TAZ pathway in metabolic alterations during renal fibrosis

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**Introduction:** Chronic kidney disease (CKD) affects 10–15% of the world population, and 30–40 million people in the U.S. alone, posing an enormous medical and financial burden. We recently published that Hippo pathway nuclear effector, TAZ, is highly upregulated in renal tubules of the injured kidneys and promotes fibrotic tubular dysfunction. Renal tubules primarily depend on fatty acid oxidation to maintain homeostasis under normal conditions; however, renal injury and hypoxia trigger metabolic alterations (e.g., glycolysis activation). Although upstream controls are not clear, induction of glycolysis contributes to CKD in kidney injury. We tested the hypothesis that TAZ is a novel inducer of pathogenic renal glycolysis.

**Methods:** We created HK-2 human renal epithelial cells stably expressing either a TAZ expression construct or control vector (driven by a CMV promoter) to mimic persistent TAZ induction during renal injury. Western blot analysis was utilized to confirm TAZ upregulation and examine changes in glycolytic enzymes between the transgenic cell types. To determine the involvement of Rac-GTPase pathway in TAZ-induced metabolic alterations, CMV-TAZ cells were treated with a Rac-Inhibitor, EHT1684 or vehicle control (water) for 1–2 days prior to western blot assessments for metabolic and fibrotic markers.

**Results:** Renal tubular TAZ overexpression leads to robust upregulation of enzymes involved in the non-reversible steps of glycolysis (e.g., hexokinase, phosphofructokinase, and pyruvate kinase) and fibrotic factors (e.g., fibronectin, collagen-1 and CTGF induction). Sustained TAZ expression also promotes constitutively active Rac-1 isoform, Rac-1b, compared to control (vector) cells. TAZ-mediated induction of glycolytic enzyme/s and fibrotic molecules can be dramatically attenuated by pharmacologic inhibition of Rac activation with EHT1684.

**Conclusions:** We demonstrated that TAZ expression promotes fibrotic and glycolytic reprogramming, identifying TAZ as a novel regulator of renal glycolysis. Rac activation downstream of TAZ is critical for both fibrotic and glycolytic reprogramming. Thus, TAZ and Rac may be attractive targets to suppress metabolic shifts and the prevalence of CKD (for which there are limited therapies).

### Poster #103

#### Folliculin (FLCN)-mediated inhibition of lactate dehydrogenase-a regulates the Warburg effect in renal cell carcinoma

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**Introduction:** Germline mutations in the tumor suppressor folliculin (FLCN) lead to development of Birt-Hogg-Dubé syndrome, which predisposes patients to the development of renal cell carcinoma (RCC). Despite the implication of FLCN in regulation of many signaling pathways, the exact mechanism of its tumor suppressive function remains elusive. RCC is characterized by reliance on aerobic glycolysis, a phenomenon known as the Warburg effect. This process is driven by hyperactivity of the glycolytic enzyme lactate dehydrogenase-A (LDHA). Previously, FLCN loss had been shown to lead to increased LDHA activity. The objective of this study was to investigate whether FLCN regulates LDHA activity within cells and therefore subsequently regulates the Warburg effect in RCC.

**Methods:** FLCN-LDHA interaction and FLCN-mediated inhibition of LDHA activity were examined using a variety of in vitro and cell-based binding and enzymatic activity assays. Synthetic FLCN peptides were generated to identify the required interacting region and mechanism of inhibition. Extracellular acidification was measured to determine the effect of FLCN on glycolysis. The ability of FLCN peptide to accumulate in tumor tissue and inhibit LDHA was examined in ex vivo treated tumor samples from a patient with BHD. FLCN peptide treatment induced apoptosis was also analyzed in RCC cell lines using flow cytometry and Western blot analysis.

**Results:** FLCN protein binds to and specifically inhibits LDHA both in vitro and in vivo. A ten amino acid peptide region of FLCN was identified that alone is capable of inhibiting LDHA and can thereby regulate glycolysis. Even when expressed, endogenous FLCN was dissociated from LDHA in RCC cells, and these cells demonstrated hyperactive LDHA. Hyperactive LDHA present in primary renal tumor tissue from a patient with BHD was inhibited following ex vivo treatment with FLCN peptide. Furthermore, treatment with FLCN peptide led to induction of apoptosis in RCC cells.

**Conclusions:** The tumor suppressor FLCN functions as an endogenous protein inhibitor of the glycolytic enzyme LDHA. Loss of this inhibition leads to LDHA hyperactivation and metabolic shift in RCC. FLCN peptide can effectively inhibit LDHA and lead to apoptosis in RCC cells. FLCN-mediated inhibition of LDHA provides a new paradigm for the regulation of glycolysis.

**Funding:** This work was supported by the funds from SUNY Upstate Medical University, Upstate Cancer Center and the Upstate Foundation (MM)

### Poster #104

#### Nitric oxide in overactive bladder: From clinical observations to in vitro understanding of molecular pathways

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**Introduction:** In the urine samples of patients with overactive bladder syndrome (OAB), low levels of the neurotrophin NGF and stable concentrations of its precursor proNGF were found, linked to hyperglycemia and elevated levels of nitric oxide (NO). We investigated how NO might control the ratio NGF/proNGF in bladder cells in culture.

**Methods:** Primary cultures of urothelial (UROs) and smooth muscle cells (SMCs) were extracted from rat bladders. Using the Griess reaction, NO levels were measured. ELISA kits were used to measure NGF, proNGF, and cyclic GMP (cGMP). Expression of NGF, proNGF, and MMP-9 mRNA were quantified by RT-qPCR. Immunoblotting was used to semi-quantify intracellular MMP-9 content. Enzymatic kits were used to assess activity of proteases involved in NGF metabolism (i.e., MMP-9, MMP-7, plasmin). Genomic MMP-9 deletion was done by Crispr-Cas9.

**Results:** Hyperglycemic medium led to increased NO secretion, decreased NGF and stable proNGF levels in both UROs and SMCs. Preincubation with L-NAME (1 mM), the NOS inhibitor, prevented increase of NO in hyperglycemic conditions and partially reversed the decrease in NGF

secretion. Incubation with the NO generator sodium nitroprusside (SNP) (300  $\mu$ M) resulted in a decrease in NGF secretion and stable proNGF levels, similar to what we observed in hyperglycemic conditions. SNP potentially decreased cGMP levels in UROs and increased them in SMCs. Stable permeable analogs of cGMP, 8-(4-Chlorophenylthio)-cGMP (3 mM) and N2,2'-O-Dibutyl-yl-cGMP (1 mM), and ODQ (100  $\mu$ M), a cyclic GMP synthetase inhibitor respectively decreased NGF secretion in SMCs and UROs, mimicking the changes observed in cGMP and NGF by SNP. Crispr-cas9 transfected SMCs treated with SNP showed a similar decrease in NGF levels compared to controls with the empty plasmid, implying that SNP acts independently of MMP-9; however, in UROs, transfection with Crispr-cas9 only partially inhibited the effect of SNP on NGF secretion, pointing out the essential role of MMP-9 in these cells. Finally, activity of MMP-7 decreased in SNP-treated SMCs, while plasmin levels remained unchanged, linking decrease in NGF by SNP in these cells.

**Conclusions:** Release of NO is increased by hyperglycemia and leads to decreased NGF through a cGMP pathway. MMP-9 and MMP-7 are central in the control of NGF secretion, with different regulation patterns between bladder cell types (UROs vs. SMCs). This data is consistent with our clinical results, suggesting that hyperglycemia, through enhanced synthesis of NO, could be part of OAB pathology.

**Funding:** Canadian Urological Association

## Poster #105

### P75<sup>NTR</sup> receptor antagonism reduces bladder contractions and improves voiding behavior in 12-month-old mice

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**Introduction:** Nerve growth factor (NGF) regulates homeostasis and supports tissue health. Urine NGF levels were shown to be low in elderly people with overactive bladder syndrome (OAB). This was related to increased activity of the enzyme metalloproteinase-9 (MMP-9), which digests NGF. In rat urothelial cell culture, we previously discovered that THX-B, an antagonist of the proinflammatory receptor p75<sup>NTR</sup>, raised NGF levels by lowering MMP-9 activity. We used THX-B to test the functional benefit of p75<sup>NTR</sup> antagonism on the bladder in aging mice.

**Methods:** Sixteen 18-month, sixteen 12-month, and sixteen 6-month old male C57BL/6J mice were injected once weekly for four weeks with either PBS (control) or THX-B (50 microg). The voiding spot test was used to measure urination behaviors and patterns, including total urine volume, volume of urine, and frequency of urination. Organ baths assessed bladder contractility with regards to different stimuli, including KCl, electrical field stimulation, and carbachol.

**Results:** Compared to controls, voiding behavior and bladder contractility was improved only in the 12-month-old mice treated with THX-B. Specifically, total urine volume and volume per micturition were reduced following four weeks of treatment, whereas voiding frequency was reduced following two and four weeks of treatment. Bladder contractility was reduced in the same mice following four weeks of treatment with KCl, electrical field stimulation at maximum frequency (32 Hz), and with carbachol at high concentrations.

**Conclusions:** Our findings show that p75<sup>NTR</sup> antagonism has an age-specific effect, with improvements in bladder behavior and activity only shown in 12-month-old treated mice. Our prior research, which found enhanced NGF expression in treated urothelial cell cultures from mice, can explain the therapeutic actions of THX-B. Our findings suggest that p75<sup>NTR</sup> antagonism might be used as a therapeutic tool to improve age-related bladder dysfunction.

**Funding:** Quebec Research Network on Aging

## Poster #106

### Antagonism of the p75<sup>NTR</sup> receptor increases secretion of nerve growth factor by decreasing extracellular matrix metalloproteinase-9 activity and $\alpha$ 2-macroglobulin levels in mouse urothelial cell culture

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**Introduction:** Overactive bladder syndrome (OAB) was reported to be characterized by low levels of the nerve growth factor (NGF) in the urine of aging female patients, with stable levels of proNGF and a decrease in the NGF/proNGF ratio. This was linked to a high activity of matrix metalloproteinase-9 (MMP-9) that digests NGF. P75 neurotrophin receptor (p75<sup>NTR</sup>) antagonism with THX-B restored normal NGF levels in bladders of type 1 diabetic mice with voiding dysfunction. Separate studies in non-bladder cells have identified that p75<sup>NTR</sup> antagonism reduced the expression of  $\alpha$ 2-macroglobulin ( $\alpha$ 2m), a protein that prevents MMP-9 degradation. Here, we characterize expression patterns of bladder cells and determine the in vitro effect of THX-B on MMP-9 activity and  $\alpha$ 2m levels and the consequences on secreted NGF.

**Methods:** Primary culture of urothelial cells (UCs) and smooth muscle cells (SMCs) were grown from rat bladders. RT-qPCR assessed NGF and MMP-9 gene expression. Immunohistochemistry and immunoblotting assessed protein expression. NGF and proNGF secretion was measured by ELISA and MMP-9 activity by enzymatic assays.

**Results:** NGF and MMP-9 mRNAs were expressed in UCs and SMCs at similar levels. At the intracellular protein level, NGF and proNGF were abundant in UCs, while SMCs produced a limited amount. Intracellular MMP-9 was 7 times higher in SMCs than in UCs. The opposite patterns were observed extracellularly; secretion of active MMP-9 was 40 times higher in UC medium and was paralleled with lower extracellular NGF and proNGF compared to SMCs. THX-B treatment decreased the synthesis and secretion of active MMP-9 and doubled the NGF concentration in UC medium. ProNGF secretion was unaffected. Reduced MMP-9 was paralleled with decreased intracellular and extracellular  $\alpha$ 2m. THX-B had little effects on SMCs, both at the level of NGF and MMP-9.

**Conclusions:** UCs secrete most of the active MMP-9 and appear to be the primary target of p75<sup>NTR</sup> antagonism. The reduction MMP-9 expression and secretion by THX-B may be explained by reduced  $\alpha$ 2m in the same cells. Our results suggest that THX-B could be a therapeutic tool to improve OAB by targeting the urothelium to increase NGF.

**Funding:** Canadian Urological Association

## Poster #107

### Gut microbiota-derived uremic toxins enhance calcium oxalate stone formation in vitro and in vivo

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**Introduction:** Approximately 1 in 10 people will develop a kidney stone in their lifetime, with most stones containing either calcium oxalate (CaOx, ~80%) or calcium phosphate (~20%) as the primary constituent. While significant advances to mitigate and treat stones have been made in the clinical setting, the inadequacies in our understanding of the disease etiology are reflected by the increasing prevalence of renal calculi. The mechanisms behind vascular and renal calcification are highly similar; and interestingly, the gut microbiota of stone formers is primed with bacterial species that produce uremic toxins associated with chronic kidney disease and atherosclerosis. The microbiota-derived uremic toxins indoxyl sulfate, p-cresyl sulfate, and their precursors enhance the production of reactive oxygen species (ROS) in the kidneys and can lead to increased calcium concentrations in the blood of humans. Thus, we believe that by increasing amounts of circulating calcium and oxidative stress, renal cells damaged by these uremic toxins act as crystal nucleation sites for

kidney stone production. We therefore sought to determine if uremic toxins and their precursors enhance CaOx stone formation in both in vitro and in vivo models.

**Methods:** The direct effect of uremic toxins on CaOx crystallization was assessed using a standard high-throughput gel-based assay and artificial urine. Next, a *Drosophila melanogaster* model of nephrolithiasis was used to determine if the uremic toxins promote CaOx crystallization and renal ROS in vivo. To enhance translatability of these findings, uremic toxin exposure was investigated for the ability to induce oxidative stress and the adherence of CaOx crystals to mammalian kidney cells.

**Results:** Indoxyl sulfate, p-cresyl sulfate, and their precursors directly promoted CaOx crystal production in vitro. *D. melanogaster* exposed to uremic toxins demonstrated a drastically increased stone burden within the Malpighian tubules (i.e., fly kidney). Increased stone burden was associated with greater ROS production in the Malpighian tubules of exposed flies. Our results also indicate uremic toxins alter crystallization in cell culture, but further investigation is required.

**Conclusions:** This is the first study to investigate the role of uremic toxins in kidney stone disease and it demonstrated that microbiota-derived uremic toxins directly promote CaOx crystallization. By promoting ROS, uremic toxins may bolster the production of stones even further. Given that chronic kidney disease is a common comorbidity in stone formers, this work will be of particular interest to clinicians for the development of novel therapeutic and preventative measures against kidney stone disease.

## Poster #108

### Efficacy and safety of lumasiran in patients with primary hyperoxaluria type 1: 24-month analysis of the ILLUMINATE-A trial

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**Introduction:** Lumasiran is a subcutaneously administered RNA interference therapeutic indicated for the treatment of primary hyperoxaluria type 1 (PH1) to lower urinary oxalate (UOx) levels in pediatric and adult patients. Here, we report efficacy and safety data from the 24-month analysis of the Phase 3 ILLUMINATE-A trial.

**Methods:** ILLUMINATE-A (ClinicalTrials.gov: NCT03681184) is an ongoing, phase 3, randomized, placebo-controlled trial in patients  $\geq 6$  years old with genetically confirmed PH1 and an estimated glomerular filtration rate (eGFR)  $\geq 30$  mL/min/1.73 m<sup>2</sup>. During the 6-month primary analysis period, patients receive either lumasiran or placebo. This is followed by an extension period of up to 54 months during which all patients receive lumasiran.

**Results:** Of 39 patients enrolled, 24/26 patients in the lumasiran/lumasiran group and 13/13 patients in the placebo/lumasiran group entered the extension period. Mean 24h UOx reduction at month 24 relative to baseline was 58% in the lumasiran/lumasiran group and 49% in the placebo/lumasiran group. The proportion of patients achieving 24h UOx excretion  $\leq 1.5 \times$  ULN at month 24 was 83% in the lumasiran/lumasiran

group and 62% in the placebo/lumasiran group; mean reductions from baseline in plasma oxalate at month 24 were 56% and 61%, respectively. eGFR remained stable in both groups. Kidney stone event rates decreased from 3.19/person-year during the 12 months prior to consent to 0.80 in the lumasiran/lumasiran group and from 0.54/person-year to 0.28 in the placebo/lumasiran group. The most common lumasiran-related adverse events were mild, transient injection-site reactions.

**Conclusions:** Long-term lumasiran treatment resulted in sustained reduction in UOx through month 24, with an acceptable safety profile in patients with PH1 and encouraging results on clinical outcomes.

**Funding:** Alnylam Pharmaceuticals

## Poster #109

### Graduating resident and fellow readiness for general urologic practice: A survey-based assessment of trainees and program directors

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**Introduction:** Our objective was to compare the perceived readiness of graduating urologic residency and fellowship trainees to program directors (PDs) in U.S. postgraduate training programs. We additionally set out to assess impacts of COVID-19 on postgraduate decisions to complete training.

**Methods:** Graduating residents, fellows, and PDs of ACGME-accredited residency/fellowship programs were invited to complete an online survey in 2021. Ranked preparedness of trainees to perform common urologic surgical procedures were measured using a Likert scale (1–5, from not comfortable to fully proficient). Perceived impact of COVID-19 data was collected using a dichotomous scale (yes or no) and 3-point Likert scale. SPSS was used to conduct Chi-squared and Kruskal Wallis analyses between all four groups surveyed. A p-value of 0.05 was considered significant.

**Results:** A total of 93 responded to the survey: 21 residents, 19 fellows, 24 resident PDs, and 29 fellowship PDs (Table 1). Mean Likert scoring for comfort level with surveyed urologic procedures are noted in Table 2. Statistically significant differences between trainees and PDs regarding trainees' comfort performing procedures were found for TURP, hydrocelectomy, vasectomy, urethral sling, penile prosthesis, hypospadias repair, and orthotopic neobladder. Although significant, median comfort for TURP, hydrocelectomy, vasectomy, and urethral sling were at or above the median (Likert=3, moderately comfortable) for all groups. PDs reported above the median for hypospadias repair (27/45, 60%), penile prosthesis (17/44, 39%), and orthotopic neobladder (25/44, 57%) compared to trainees reporting under the median (15/38, 39%; 10/38, 26%; and 7/38, 18%; respectively). Nineteen of 24 (79.2%) residency PDs overall felt residency graduates were below the median Likert score; 11/21 (52.4%) of residents felt they were below the median. Additionally, 2/29 (6.9%) fellowship directors reported their trainees were below the median Likert score compared to 10/19 (52.6%) of fellows. The majority surveyed (53/93, 57.0%) felt that COVID-19 did not impact graduating trainees' comfort performing general urologic procedures. Respondents did, however, report a significant difference as to whether COVID-19 impacted trainees' decision to pursue fellowship or general practice (p=0.002) (Figure 1).

**Conclusions:** Our study may suggest there is a self-reported discrepancy between graduating trainees and their program directors regarding trainees' comfort levels performing general urologic practices on training completion.



<b>Race, N (%)</b>	
White or Caucasian	28 (68.3)
Black or African American	0 (0)
Hispanic or Latino	4 (9.8)
Asian or Asian American	5 (12.2)
Native Hawaiian or other Pacific Islander	0 (0)
Another Race	1 (2.4)
Prefer not to answer	3 (7.3)
<b>Gender, N (%)</b>	
Male	30 (73.2)
Female	9 (22)
Non-binary	1 (2.4)
Prefer not to answer	1 (2.4)
<b>AUA section affiliation, N (%)</b>	
Western	12 (12.6)
South Central	9 (9.5)
North Central	21 (22.1)
Southeastern	12 (12.6)
Mid-Atlantic	5 (5.3)
New York	7 (7.4)
Northeastern	12 (12.6)
New England	11 (11.6)
Not affiliated with AUA section	6 (6.3)
<b>Age at time of training completion, N (%)</b>	
20-30	4 (9.8)
30-35	27 (65.9)
35-40	9 (22)
40-45	1 (2.4)
<b>Length of time in program director position, N (%)</b>	
1-5 years	20 (21.1)
5-10 years	18 (18.9)
10-15 years	23 (24.2)
15-20 years	10 (10.5)
>20 years	4 (4.2)
Unanswered	20 (21.1)
<b>Fellowship subspecialties represented, N (%)</b>	
Female pelvic medicine and reconstructive	3 (6.3)
Pediatrics	6 (12.5)
Oncology	11 (23)
Endourology	18 (37.5)
Infertility	2 (4.2)
Male reconstructive	6 (12.5)
Fertility	1 (2.1)
Voiding Dysfunction	1 (2.1)

Poster #109. Table 1. Survey respondent demographics.

## Poster #110

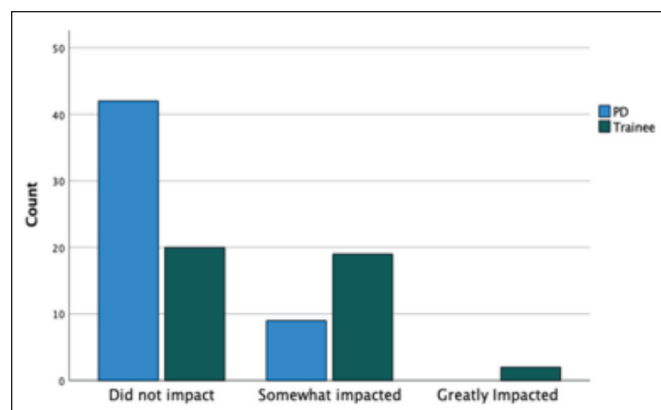
### Feedback methods, structure, and satisfaction of urology trainees and program directors

Kyle Waisanen<sup>1</sup>, Ellen Lutnick<sup>2</sup>, Kiana Saade<sup>2</sup>, Finn Hennig<sup>2</sup>, Daniel Salib<sup>2</sup>, Matthew Peterson<sup>1</sup>, Nader Nader<sup>3</sup>, K. Kent Chevli<sup>1</sup>

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**Introduction:** Formal feedback requirements for postgraduate urology training programs exist through the ACGME guidelines. In practice, however, feedback provided during advanced medical training varies. We aimed to determine the different methods by which urology trainees are assessed, the perceived frequency of feedback, overall satisfaction, and recommendations for improvement.

**Methods:** A survey was disseminated to U.S. urology residency and fellowship programs in 2021, and completed by graduating residents, fel-



Poster #109. Figure 1. Results for question, "Do you feel COVID-19 had an impact on you or your trainee's decision between fellowship or entering practice immediately after graduation?"

lows (trainees), and program directors (PDs). Multiple choice responses were collected using a Likert scale. SPSS was used to compare trainees and PDs, and free response answers were collected for consideration.

**Results:** Ninety-two respondents answered our survey. Feedback mechanisms were reported as predominantly verbal (38%) or written (30%). There was a significant difference in perspectives of PDs and trainees with respect to frequency of feedback regarding surgical training ( $p=0.038$ ) (Figure 1A); however, there was no significance in frequency feedback was provided, ranging from every case to only annually ( $p=0.061$ ) (Figure 1B), nor in reported satisfaction of feedback methods and structure, collected via Likert scale from very satisfied to very dissatisfied ( $p=0.060$ ) (Figure 1C). Open responses found common suggestions for improving feedback from PDs included increased standardized structure and the use of electronic applications, as mentioned by 10 respondents. Answers from trainees included more structured feedback and instruction in real-time, and feedback delivery in the clinical settings without sacrificing autonomy.

**Conclusions:** Despite formal documentation requirements through the ACGME, verbal feedback remains the most common delivery method for providing feedback to urology trainees. This study revealed a significant overestimation of the perception of the frequency of adequate feedback regarding surgical training by PDs compared to trainees. While we found no significance in satisfaction with current feedback mechanisms between PDs and trainees, our analysis is limited by the survey response rate. A more nuanced study with increased power may reveal further significant limitations with the current mechanisms of feedback during urology post-graduate training.

## Poster #111

### Moving away from in-person didactic teaching during the COVID-19 pandemic: What is the effect of virtual education on clinical clerk academic performance

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**Introduction:** In-person training sessions have been a key part of medical education and have recently been changed to a virtual format during the COVID-19 pandemic. Virtual education has shown promising results in exam settings, but the resultant clinical performance is unknown. At Dalhousie University in Nova Scotia, Canada, clinical clerks in their third year of medical education may undergo a two-week elective in urology. Prior to the pandemic, staff urologists would dedicate 13, one-hour in-person seminars to educate and recruit future residents to urology. Social distancing mandates have led to these seminars being replaced

	Fellowship PD: Mean ± SD (n)	Residency PD: Mean ± SD (n)	Fellow: Mean ± SD (n)	Resident: Mean ± SD (n)	Total: Mean ± SD (n)	P-value
Preparedness entering fellowship on graduation	4.79±0.412 (29)	4.72±0.458 (25)	4.42±0.692 (19)	-	4.67±0.528 (73)	0.097
Preparedness entering general urology practice on graduation	<b>3.31±1.105 (29)</b>	<b>4.79±0.415 (24)</b>	<b>4.32±1.003 (19)</b>	<b>4.48±0.602 (21)</b>	<b>4.16±1.025 (93)</b>	<b>&lt;0.001</b>
TURP	<b>4.31±1.050 (26)</b>	<b>4.95±0.213 (22)</b>	<b>4.83±0.383 (18)</b>	<b>4.90±0.308 (20)</b>	<b>4.72±0.680 (86)</b>	<b>0.003</b>
TURBT	4.58±0.643 (26)	4.90±0.310 (21)	4.78±0.428 (18)	4.90±0.308 (20)	4.78±0.472 (85)	0.087
Ureteroscopy	4.85±0.368 (26)	5.00±0.000 (22)	4.89±0.323 (18)	5.00±0.000 (20)	4.93±0.256 (86)	0.094
PCNL	4.08±1.055 (26)	4.52±0.512 (21)	4.11±1.132 (18)	4.30±0.657 (20)	4.25±0.885 (85)	0.599
Circumcision	4.62±0.898 (26)	5.00±0.000 (21)	4.83±0.383 (18)	4.95±0.224 (20)	4.84±0.553 (85)	0.061
Hydrocelectomy	4.60±0.913 (25)	4.95±0.218 (21)	4.94±0.236 (18)	5.00±0.000 (20)	4.86±0.541 (84)	<b>0.027</b>
Orchiectomy	4.60±0.913 (25)	5.00±0.000 (21)	4.83±0.514 (18)	4.95±0.224 (20)	4.83±0.577 (84)	0.051
Vasectomy	<b>4.00±1.251 (24)</b>	<b>4.71±0.561 (21)</b>	<b>4.56±0.984 (18)</b>	<b>4.80±0.410 (20)</b>	<b>4.49±0.929 (83)</b>	<b>0.024</b>
Urethral Sling	<b>2.96±1.581 (23)</b>	<b>4.43±0.676 (21)</b>	<b>2.78±1.353 (18)</b>	<b>4.30±0.865 (20)</b>	<b>3.62±1.385 (82)</b>	<b>&lt;0.001</b>
Penile prosthesis	<b>2.91±1.649 (23)</b>	<b>4.43±0.598 (21)</b>	<b>3.00±1.572 (18)</b>	<b>4.10±0.788 (20)</b>	<b>3.61±1.394 (82)</b>	<b>0.002</b>
Hypospadias repair	<b>2.52±1.442 (23)</b>	<b>3.43±1.248 (21)</b>	<b>2.28±1.364 (18)</b>	<b>2.20±1.281 (20)</b>	<b>2.62±1.402 (82)</b>	<b>0.016</b>
Radical Nephrectomy (Open)	4.13±0.968 (23)	4.10±0.944 (21)	4.11±0.900 (18)	3.60±1.046 (20)	3.99±0.975 (82)	0.266
Radical Nephrectomy (Robotic)	4.25±1.189 (24)	4.33±0.856 (21)	4.33±1.414 (18)	4.30±0.979 (20)	4.30±1.101 (83)	0.666
Radical Nephrectomy (Laparoscopic/Hand Assist)	4.35±0.832 (23)	4.33±0.796 (21)	4.33±0.970 (18)	3.95±1.317 (20)	4.24±0.988 (82)	0.794
Partial Nephrectomy (Any technique)	4.24±0.879 (25)	4.10±0.889 (21)	4.17±1.200 (18)	3.68±1.108 (19)	4.06±1.016 (83)	0.261
Radical Cystectomy (Open)	3.78±1.380 (23)	3.86±1.153 (21)	3.17±0.985 (18)	3.20±1.281 (20)	3.52±1.240 (82)	0.097
Radical Cystectomy (Robotic)	3.41±1.532 (22)	3.48±1.327 (21)	2.67±1.328 (18)	3.00±1.522 (20)	3.16±1.444 (81)	0.258
Ureteral Reimplant (Open)	3.87±1.180 (23)	4.36±0.790 (22)	4.44±0.705 (18)	4.15±0.933 (20)	4.19±0.943 (83)	0.337
Ureteral Reimplant (Robotic)	3.64±1.350 (25)	3.82±1.140 (22)	3.78±1.478 (18)	4.15±1.040 (20)	3.84±1.252 (85)	0.644
Ileal Conduit	4.00±1.285 (24)	4.05±1.214 (22)	3.72±1.227 (18)	3.95±0.999 (20)	3.94±1.176 (84)	0.726
Orthotopic Neobladder	<b>3.22±1.313 (23)</b>	<b>3.57±1.248 (21)</b>	<b>2.33±1.188 (18)</b>	<b>1.80±1.196 (20)</b>	<b>2.77±1.408 (82)</b>	<b>&lt;0.001</b>
Endoscopic surgical skills	<b>4.67±0.480 (27)</b>	<b>5.00±0.000 (24)</b>	-	-	<b>4.82±0.385 (51)</b>	<b>0.002</b>
Open surgical skills	4.12±0.726 (25)	4.23±0.612 (22)	-	-	4.17±0.670 (47)	0.637
Laparoscopic surgical skills	4.16±0.800 (25)	3.95±0.999 (22)	-	-	4.06±0.895 (47)	0.532
Robotic surgical skills	4.15±1.287 (26)	4.39±0.656 (23)	-	-	4.27±1.036 (49)	0.947

\*Likert scale (1 to 5) was used to evaluate level of comfort (1 = not comfortable, 2 = somewhat comfortable, 3 = moderately comfortable, 4 = mostly comfortable, 5 = fully proficient)

\*Question regarding endoscopic, open, laparoscopic and robotic surgical skills evaluation was only posited to program directors

**Poster #109. Table 2.** Perceived comfort level of graduating trainees performing urology procedures: Fellowship PDs, residency PDs, graduating fellows, and graduating residents.

by prerecorded lectures. At the end of the rotation, clerks are assigned a clinical score and an independent exam score. The goal of this study was to determine if the use of prerecorded seminars negatively affected the academic abilities of medical students.

**Methods:** Subjective clinical scores and post-rotation exam scores have been stored on a secure database at Dalhousie University since 2014. Clinical scores, post-rotation exam scores, and total scores (sum of the total and clinical score) of urology clerks were collected from 2014 to present. The convenience sample was analyzed with descriptive statistics to determine the mean and standard deviations using IBM SPSS Statistics, version 27. A Pearson correlation analysis was used to analyze the relationship between the pre-COVID and post-COVID exam and clinical scores. A significance level of  $p < 0.05$  was used.

**Results:** The total number of clinical clerks in the pre-COVID cohort and post-COVID cohort was 110 and 47, respectively. The mean clinical score of the pre-COVID cohort was  $69.1 \pm 5.0$  while the mean clinical score post-COVID was  $70.7 \pm 4.8$  ( $p = 0.127$ ;  $r = -0.226$ ). The mean exam scores pre-COVID were  $15.4 \pm 2.3$ , while the post-COVID mean exam scores were  $16.5 \pm 9.0$  ( $p = -0.096$ ,  $r = -0.246$ ). Cumulative score of the pre-COVID cohort was  $84.4 \pm 5.5$  but the cumulative score for the post-COVID cohort was  $85.6 \pm 5.3$  ( $p = 0.064$ ;  $r = -0.273$ ).

**Conclusions:** Prior to the pandemic, staff urologists dedicated 13 one-hour seminars every three weeks, which meant taking time away from clinical and surgical duties. This study comparing clinical and exam scores of clinical clerks who received in-person seminars (pre-COVID) and virtual prerecorded seminars (post-COVID) suggests no significant difference. Practical implications of this study might be that urology education continues to be virtual or a combination of virtual and in-person teaching that focuses on practical, hands-on urology skills.

## Poster #112

### Knowledge gaps of graduating Canadian urology residents

Nicolas Vanin Moreno, Naji Touma

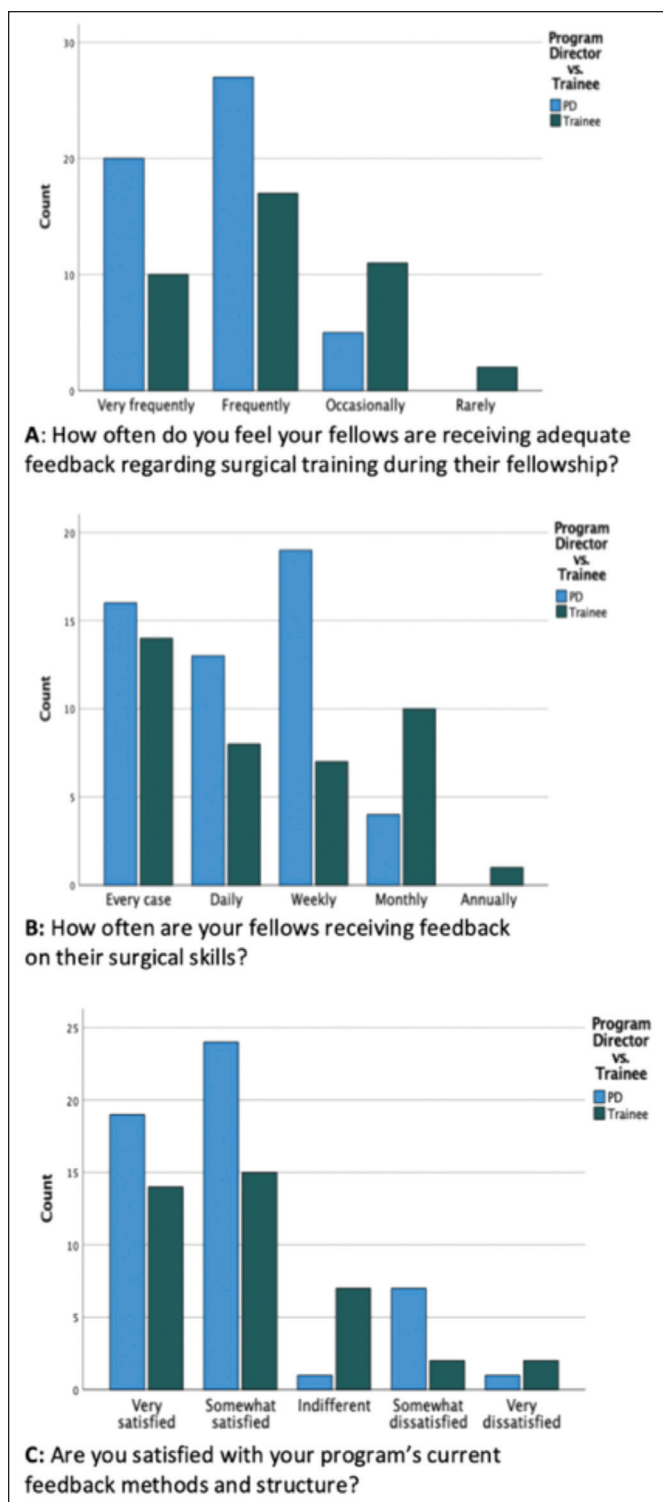
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**Introduction:** Urology residency training encompasses a broad spectrum of subspecialty training. There is an expectation of competency in all aspects of practice upon certification; however, there is variability in exposure to subspecialty care, as well as heterogeneity in teaching sessions offered by different training programs. The objective of this study is to assess whether knowledge gaps exist among graduating Canadian urology residents.

**Methods:** A retrospective review of graduating residents' performance on an annual mock exam (QUEST) held a few months before the Royal College exam was conducted for three graduating years: 2020, 2021, and 2022. The written exam, consisting of multiple-choice questions, was itemized under 8 separate topics: oncology, andrology/BPH, physiology/anatomy, female/neurourology, pediatrics, infections, nephrolithiasis, and trauma/reconstruction. A 1-way ANOVA, a post-hoc Tukey, and non-parametric Kruskal-Wallis tests were conducted.

**Results:** The exams of 115 participants from all 3 years were reviewed. The distribution of questions was as follows: oncology ( $n = 60$ ), andrology/BPH ( $n = 39$ ), physiology/anatomy ( $n = 54$ ), female/neurourology ( $n = 39$ ), pediatrics ( $n = 48$ ), infections ( $n = 23$ ), nephrolithiasis ( $n = 21$ ), and trauma/reconstruction ( $n = 16$ ). Overall, there was a statistically significant difference in performance on the various topics ( $p < 0.001$ ). On post-hoc Tukey, residents perform better on female/neurourology compared to andrology/BPH ( $p = 0.004$ ), and female/neurourology compared to pediatrics ( $p = 0.001$ ).

**Conclusions:** Graduating Canadian urology residents appear to have knowledge gaps in andrology/BPH and pediatrics. Future Canadian Urological Association courses in these topics should be considered to address these gaps.



**Poster #110. Figure 1.** Perceptions regarding feedback by trainees and program directors. **(A)** How often do you feel your fellows are receiving adequate feedback regarding surgical training during their fellowship? **(B)** How often are your fellows receiving feedback on their surgical skills? **(C)** Are you satisfied with your program's current feedback methods and structure?

## Poster #113

### Medical student usage of third-party study resources: What does it mean for urology education?

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**Introduction:** Current literature has shown urology to be underrepresented in medical school curricula. As medical education evolves, traditional medical school lectures are increasingly supplemented by third-party resources (TPRs) marketed to students as USMLE Step 1 and 2 preparatory materials. The purpose of this study is to investigate how well urological topics are covered by the most used TPRs to better characterize medical students' exposure to urology.

**Methods:** The American Urological Association Medical Student Curriculum (AUA-MSC) was chosen as the standard, as it is defined by the AUA as "the core principles and practices in urology that are important for every practicing physician." The AUA-MSC was referenced to generate two topic lists. The first contained topics within the scope of Step 1, such as anatomy and pathophysiology. The second contained topics within the scope of Step 2, namely disease workup and treatment options. TPRs were chosen based on literature documenting the most commonly used resources. TPRs included were: First Aid Step 1, First Aid Step 2, UWorld Step 1, UWorld Step 2, the Anking crowdsourced Anki deck (Anking), and Pathoma. Each TPR was then searched and compared to the AUA-MSC topic lists. If a topic was covered, it was marked as complete on the respective list.

**Results:** Regarding Step 1 material, use of all four resources covered 73.3% of the AUA-MSC topics. Broken down by resource, First Aid Step 1 covered 49.5%, UWorld Step 1 58.6%, Pathoma 28.1%, and Anking 61.8%. For Step 2, the use of all three resources covered 81.9%. Broken down by resource, First Aid Step 2 covered 58.4%, UWorld Step 2 67.9%, and Anking 58.8%.

**Conclusions:** These results reveal a large gap in the coverage of urological topics by TPRs. This further raises the concern that medical students are not being adequately exposed to the field of urology. With the decision to change Step 1 to pass/fail, the usage of these resources by new medical students has also come into question in recent literature. Additional research will be needed to fully understand the potential impact of this change on the urology exposure in medical school.

## Poster #114

### Closing the gender gap in the urology residency match

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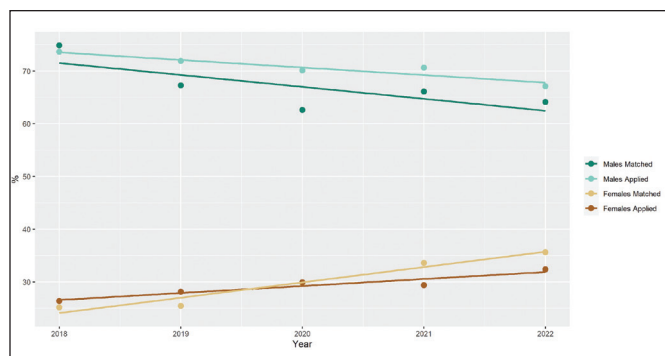
**Introduction:** The number of women entering the field of urology has been steadily increasing since 2014. The 2020 AUA annual census reported 10.3% of practicing urologists were female, an increase from 7.7% in 2014. The primary objective of this study was to compare the rate of females matching into urology to the rate of females applying into urology using AUA residency match statistics from the past 5 years. Additionally, this study identifies the first match rate of transgender/non-binary (TGNB) applicants reported by the AUA in 2022.

**Methods:** Data was collected through the AUA residency match statistics available online from the years 2018–2022. Chi-squared, linear regression, and ANCOVA analyses were run using R. P-value <0.05 was considered significant.

**Results:** There were significantly less female applicants matching into urology than males between the years 2018–2022 ( $p=0.017$ ). There was a significant linear increase in the percent of females both applying and matching into urology from the years 2018–2022 ( $p=0.004$  and  $p=0.016$ , respectively) (Figure 1). When compared to the rate of females applying to urology, the rate of females matching into urology was significantly higher over the past 5 years (1.3 % per year vs. 2.9% per year, respectively) ( $p=0.014$ ). There was no significant difference between the rate of male applicants matching when compared to the rate of males applying (-2.3% vs. -1.4% respectively,  $p=0.508$ ). The 2022 match cycle also represents the



first reported year a TGNB applicant has matched since the AUA began reporting this demographic in 2021. The TGNB match rate was 33% (1/3). **Conclusions:** There has been a steady increase in the percentage of matched urology applicants who identify as female from 2018–2022. The most recent 2022 match data reported the highest proportion of matched females (35.6%). The rate of increase is higher than the increasing number of females applying into urology. Additionally, in 2022, the AUA recorded the first ever TGNB matched applicant. Both noted observations could be the first evidence of successful initiatives by residency programs to close the current gender gap and support equity, diversity, and inclusion among urologists. Future studies are needed to evaluate the factors driving these changes.



Poster #114. Figure 1.

## Poster #115

### Charting outcomes in the 2021–2022 urology match years

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**Introduction:** The urology residency application and match processes have undergone rapid evolution in recent years, with innovation spurred in part by COVID-related challenges. Amid these changes, the match rate continues to decline, and applicants have a dire need for transparent data so that they can make educated and strategic plans to maximize their chances of a successful match. Our aim was to chart the characteristics and outcomes of matched urology applicants across the 2021 and 2022 AUA matches, including the newly implemented waitlist and preference signaling features.

**Methods:** We reviewed the popular online Urology Match Google spreadsheet in March 2022 and abstracted data from the 2021 and 2022 match years. These data include anonymous, crowd-sourced, self-reported characteristics and outcomes of matched applicants. The spreadsheet also features the only known publicly accessible match list for all residency programs. Results were compared to historical data published by the AUA and other entities to confirm the generalizability of the study population.

**Results:** In total, 104 (2022) and 83 (2021) matched urology applicants self-reported thorough data regarding their application characteristics and match outcomes. Nearly all applicant characteristics were stable over the two years (Table 1). Of note, applicants received fewer interview offers this year (15 vs. 18) but accepted an equal number (15). Applicants continued to convert waitlist spots into interview offers, and a stable 11.5% matched at a program where they moved off the waitlist this year, further validating the utility of this new system. With limitations on in-person away rotations lifted in 2022, the rate of students matching at their home program actually increased (20.4% vs. 17.6%). Just four of 143 (3%) programs matched all home students in 2022, a stable rate compared to 2021's six (4%) programs. Of particular interest is the preference signaling system introduced in the 2022 application cycle, with 57.5% of applicants receiving an interview offer at a program that they signaled and 29.3% matching at one such program.

**Conclusions:** Urology applicants remain highly competitive despite the challenges posed by the COVID-19 pandemic. These findings provide strong support for the newly implemented waitlist and preference signaling features in the AUA's urology match process.

### Poster #115. Table 1. Self-reported characteristics and outcomes of matched urology applicants in the 2021–2022 AUA match years

Characteristic, mean (IQR)	2021 (n=83)	2022 (n=104)
Step 1 score	247 (18.5)	248 (14.5)
Step 2 CK score	253 (17)	257 (14)
Class quartile <sup>a</sup>	1 (1)	1 (1)
Peer-reviewed publications <sup>b</sup>	4 (3)	3 (4.5)
Posters, podiums, other publications	7 (6)	7 (7)
Urology sub-I rotations completed <sup>c</sup>	2 (2)	2 (1)
Programs applied to	77 (38.5)	80 (28.3)
Total interview offers received	18 (12)	15 (11.5)
Interview offers from waitlist	2 (3)	1 (2)
Interviews attended	15 (8)	15 (8)
Programs ranked	15 (8.5)	15 (8.3)
Rank list position matched	2 (3)	2 (4)

#### Characteristic, %

Member of AOA <sup>d</sup>	38.6%	42.5%
Step 2 CK score sent to programs	72.3%	69.2%
No home residency program	19.8%	18.3%
Matched from waitlist interview offer	10.8%	11.5%
Matched at home program	17.6%	20.4%
Matched below home/sub-I <sup>e</sup>	20.7%	35.0%
Interviewed where preference signal sent	N/A	57.5%
Matched where preference signal sent	N/A	29.3%

AOA: Alpha Omega Alpha; AUA: American Urological Association; CK: clinical knowledge; sub-I: sub-internship. <sup>a</sup>Quartile 1 indicates top 25% of class rank, 4 indicates bottom 25%. <sup>b</sup>Includes only full articles, excluding published abstracts. <sup>c</sup>Includes both home program and away rotations, for those eligible to complete them. <sup>d</sup>5.7% and 22.3% of respondents did not have an AOA designation offered by their medical school in 2021 and 2022, respectively. <sup>e</sup>Indicates that applicant matched at a program which they ranked lower than all programs where they rotated, including both their home residency program and any away rotations completed.

## Poster #116

### A brief history of significant events in the urology residency match

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**Introduction:** The American Urological Association (AUA) match has been the first step in urology resident education since its inception in 1985. Amid recent innovations related to the COVID-19 pandemic, it is pertinent to revisit the history of the AUA match, including two oft-forgotten errors.

**Methods:** Literature review and an internet search were performed to compile a body of evidence, including peer-reviewed articles, online blogs, community discussion boards, and expert opinion.

**Results:** Prior to the AUA match, programs and applicants engaged in a “wild west” of offers and counteroffers with variable adherence to suggested guidelines. In 1985, urology followed other specialties by insti-

tuting a centralized matching program to improve fairness and optimize outcomes. The AUA match has successfully operated ever since, with only two known major errors occurring. Primarily, 2005 marks the only time the AUA match has ever been rerun. Human error led the match algorithm to inappropriately prioritize program preferences over applicant preferences, generating a match that initially appeared valid; however, multiple prestigious programs, including Johns Hopkins and Cleveland Clinic, notified the AUA that they had unfilled positions, prompting an investigation that uncovered the mistake. Four days later, results from the corrected “re-match” were released: 153 applicants remained matched without change, 61 moved to a higher preference program, and 10 went unmatched after initially matching. The second error occurred in 2020. Dubbed “UroLeak 2020,” it was not an error in the algorithm but in the release of results, with applicants gaining access to their matches one day early by manipulating the AUA website’s URL. A frenzy ensued online, with applicants debating whether the results were accurate. Once aware, the AUA deactivated this webpage and acknowledged the error in an emailed statement without specifically commenting on the leak’s accuracy. Match Day followed, and with it confirmation that the actual, accurate match data had indeed leaked early. More recently, facing challenges related to COVID-19 and application inflation, the match process was updated to include virtual rotations, virtual interviews, and a synchronized interview offer release day in 2020, as well as a preference signaling system in 2021.

**Conclusions:** Historical advancements in the urology resident selection process focused on transparency, fairness, and unity, while recent innovations aimed to optimize the system and reduce burdens. Whenever new changes are implemented, quality control remains essential. As history has taught us, even the smallest errors can send rippling shockwaves throughout the AUA match.

## Poster #117

### Simulation-based prostate enucleation training: A first experience using 3D-printed organ phantoms

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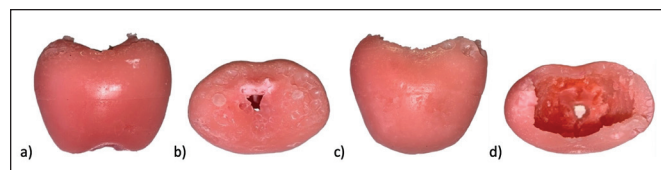
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**Introduction:** Anatomical endoscopic enucleation of the prostate (AEEP) is an effective treatment for benign prostatic hyperplasia (BPH), but it is a urological surgery with a steep learning curve. Simulator-based training is designed to mimic real-life AEEP, and ideally should help surgeons develop skills they can transfer to the operating room. This study aimed to evaluate the validity of a novel organ phantom for first-time use in AEEP simulation training.

**Methods:** Participants practiced AEEP on simulators during a MasterClass hosted by the Canadian Urological Association using one of three lasers: holmium, thulium, and bipolar. The organ phantom is composed of hydrogels and uses 3D molds to recreate prostatic tissue and anatomy (Figure 1). Participants completed a questionnaire assessing content and face validity, as well as feasibility and acceptability of using the organ phantom in training.

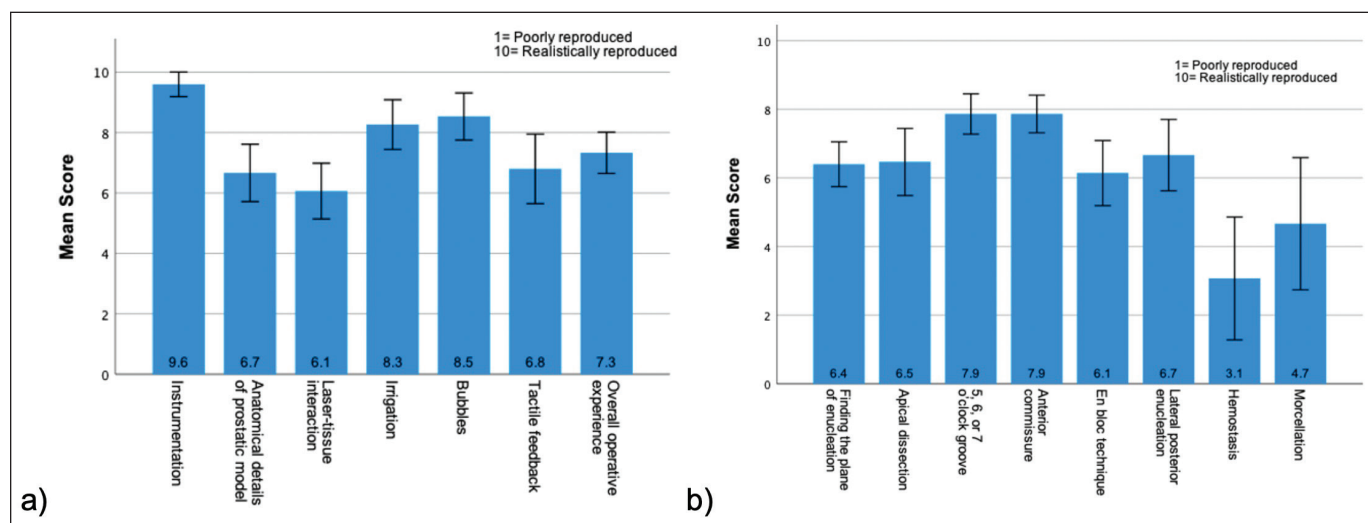
**Results:** The novice group consisted of 12 urologists with an average of 11.7 years of practice and one urology resident. The median number of prior AEEP performed by trainees was 0 (IQR 0–2). Two experts in AEEP, defined as having performed at least 100 cases, also participated. All participants agreed or strongly agreed that there is a role for simulators in general surgical training and specifically in AEEP training. Participants positively rated the overall operative experience (7.3/10). Creating the 5, 6, or 7 o’clock groove and the anterior commissure (7.9/10) were the most realistic steps of enucleation, but morcellation (4.7/10) and hemostasis (3.1/10) were the least (Figure 2). All participants considered it feasible to incorporate this organ phantom in training programs and 92.9% agreed that it teaches skills transferrable to the operating room (Figure 3).

**Conclusions:** This study has established content and face validity for AEEP with three different energy sources on an organ phantom. Participants considered its use both feasible and acceptable for AEEP training purposes.

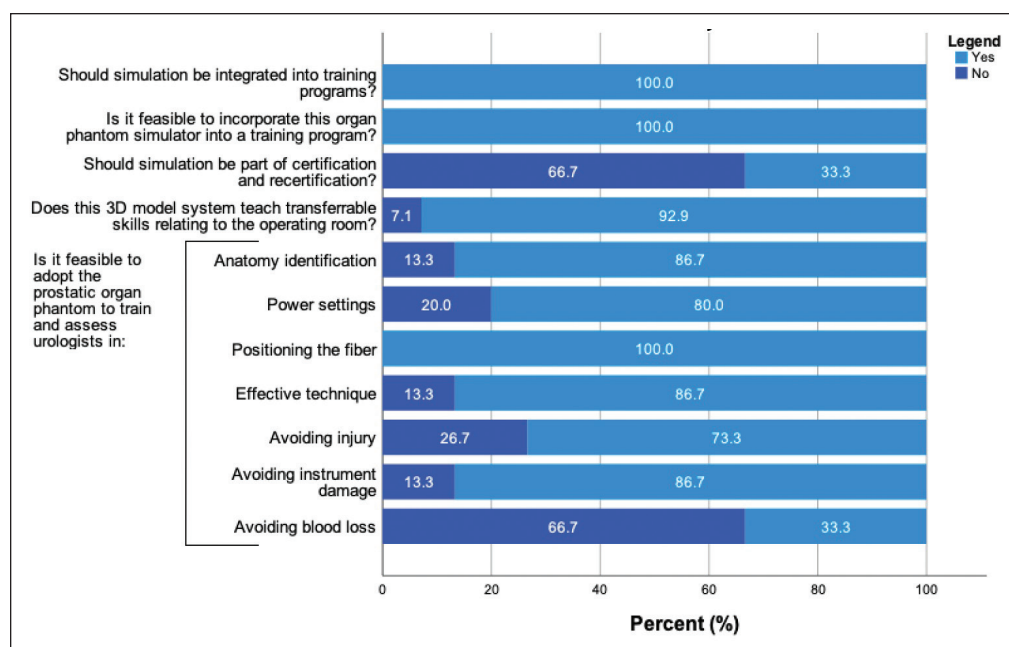


**Poster #117. Figure 1.** Organ phantom before (a, anterior view; b, base view) and after complete enucleation (c, anterior view; d, base view).





Poster #117. Figure 2. Face validity of (a) the operative experience; and (b) each step of enucleation using the simulator.



Poster #117. Figure 3. Feasibility and acceptability of the organ phantom in training.

## Poster #118

### From Berlin to Brady: Tracing the origins of urology residency

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**Introduction:** Urology was one of the first specialties to employ the training model known today as residency. These events are rarely taught in formal urologic curricula, yet it is imperative that tomorrow's urologists understand how today's system came to be.

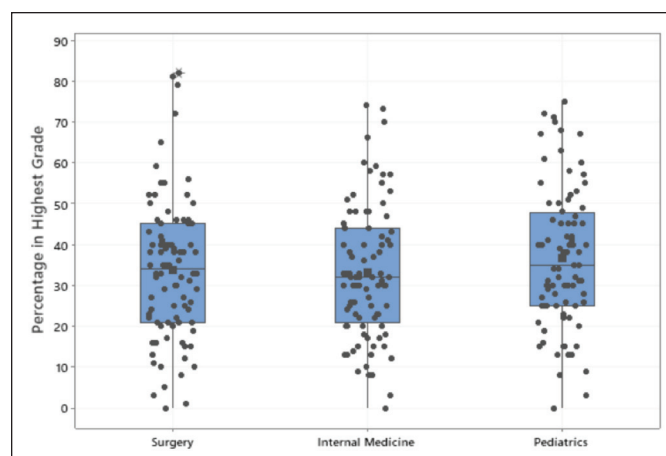
**Methods:** We performed a review of the literature, including journal articles, book chapters, and transcribed talks, to compile sufficient evidence to inform this historical review.

**Results:** The residency training model first appeared in the mid-1800s, when German surgeon Bernhard von Langenbeck devised a system where

medical graduates would live at the hospital and undertake graduated responsibility in the care of surgical patients. One of his residents — known then as house officers — was Theodor Billroth, who later mentored American surgeon William Halsted in Vienna while he trained throughout Europe from 1878–1880. In 1889, Johns Hopkins Hospital opened and Halsted became one of the founding “Big Four” doctors. As Chief of Surgery, he drew on Billroth's methods and established the earliest form of surgical residency as we now know it. Halsted's model was “pyramidal,” with only one of eight residents advancing each year, and produced a single outstanding surgeon at the unintentional expense of the others. This remained the gold standard until 1931, when Edward Churchill at Massachusetts General Hospital introduced the more balanced “rectangular” structure, which remains the backbone of residency training today. Halsted hired Hugh Hampton Young to his surgical staff in 1895 and

quickly made him Chair of the Department of Genitourinary Diseases in 1897, which he helmed through 1941. In response to the appointment, Young is noted to have said, "This is a great surprise. I know nothing about genitourinary surgery," to which Halsted replied, "We believe you could learn." He did indeed learn, and is now widely regarded as the Father of Modern Urology. From 1897–1915, Young was allowed to recommend aspiring urologists to Halsted for appointment in the surgical residency, spawning the beginnings of the urologic specialty as we know it today. In 1915, thanks to a donation from his patient James Buchanan Brady, the Brady Urological Institute opened at Hopkins, and Young designed a 7-year training program to begin alongside it. With this, the first formal urology residency was born.

**Conclusions:** Urology residency shares deep roots with the history of surgery itself. Recognizing where this model originated is critical context for all who seek to improve how the urologists of tomorrow are trained.



Poster #119. Figure 1. Variations in clerkship grading.

## Poster #119

### Variations in 3rd-year student grades in surgery

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**Introduction:** With USMLE scores becoming pass/fail, 3<sup>rd</sup>-year clerkship grades have become more important as an objective measure of student performance. We have anecdotally noticed differences in the percent of students that receive the top clerkship grade between medical schools. We sought to understand the variability in clerkship grading between different medical schools to provide more insight on the urology application process.

**Methods:** We reviewed our institution's residency applications from the 2021–22 interview cycle, specifically looking at each medical school's percentage of students with the highest clerkship grade. Using one-way ANOVA and Tukey pairwise comparisons, we compared the percentage of top grades at each medical school between surgery, internal medicine (IM), and pediatrics (peds) clerkships. With these statistical tests and two sample T-tests, we also investigated whether American Urological Association (AUA) geographic region, MD vs. DO school, private vs. public school, or clerkship type affects the percentage of students in the highest-grade range. Finally, we investigated the correlation between medical school NIH grant ranking and U.S. News ranking for their effect on the percentage of students in the highest-grade category.

**Results:** We reviewed 294 applications from 90 medical schools. We found that among the represented medical schools, the percent of students with the highest grade for surgery clerkship varied from 0–82% (Figure

1). At each school, there was no statistical difference in the percent of students receiving the top grade between surgery, IM, and peds clerkships. Furthermore, there was a high degree of correlation between rotations for a given school (surgery to IM  $r=0.805$ , surgery to peds  $r=0.796$ , IM to peds  $r=0.838$ ). There was a weak correlation between schools with a higher percent of students in highest grade range and more NIH grants or a higher U.S. News ranking ( $R^2=18.7\%$  and  $9.96\%$ , respectively). There was no difference when comparing public to private schools, by geography (AUA section), or whether the school was a DO or MD school in the percentage in the highest-grade category.

**Conclusions:** There is large variability in the percent of medical students receiving top grades in surgery clerkships, and residency programs should remember to evaluate their applicants' grades within this context.

## Poster #120

### Clinical applications of machine learning for urolithiasis and benign prostatic hyperplasia: A systematic review

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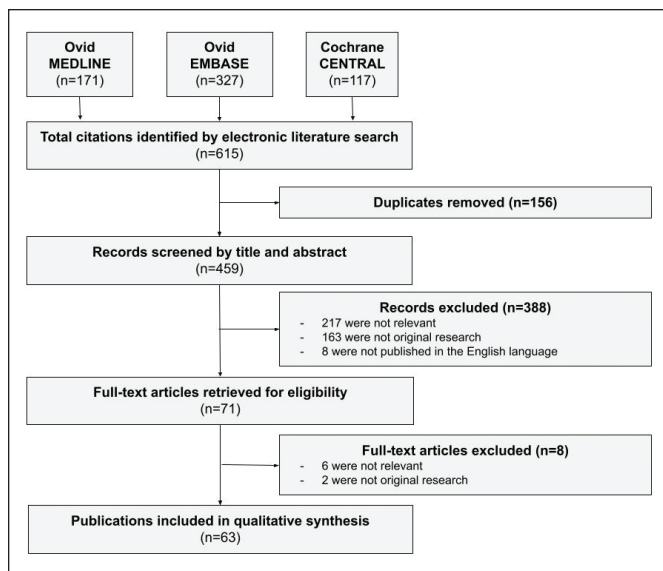
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**Introduction:** Recent studies have sought to evaluate the use of machine learning (ML) in facilitating clinical diagnoses, predicting treatment outcomes, and guiding management. Previous systematic reviews related to ML in urology often overlooked the literature related to endourology. Therefore, we aim to conduct a more focused systematic review examining the use of ML algorithms for the management of benign prostatic hyperplasia (BPH) or urolithiasis. In addition, we are the first group to evaluate the quality of these articles using the newly developed STREAM-URO framework, which is a 26-item checklist that is designed to promote the development of standardized and high-quality ML studies within urology.

**Methods:** Searches of MEDLINE, Embase, and the Cochrane CENTRAL databases were conducted from inception through July 12, 2021. Keywords included those related to ML, endourology, urolithiasis, and BPH. Original research articles were included without any language restrictions. Two reviewers screened the citations that were eligible for title, abstract, and full-text screening, with conflicts resolved by a third reviewer. Two reviewers extracted information from the studies, with discrepancies resolved by a third reviewer. The data collected was then qualitatively synthesized by consensus. Two reviewers evaluated each article according to the STREAM-URO checklist with discrepancies resolved by a third reviewer.

**Results:** After identifying 459 unique citations, 63 articles were retained for data extraction (Figure 1). Most articles consisted of tabular ( $n=32$ ) and computer vision ( $n=23$ ) tasks. The two most common problem types were classification ( $n=40$ ) and regression ( $n=12$ ). In general, most studies used neural networks as their ML algorithm ( $n=36$ ). Among the 63 studies retrieved, 58 were related to urolithiasis and five focused on BPH. The urolithiasis studies were designed for outcome prediction ( $n=21$ ), diagnostics ( $n=19$ ), stone classification ( $n=15$ ), and therapeutics ( $n=3$ ). The BPH studies were designed for outcome prediction ( $n=2$ ), diagnostics ( $n=2$ ), and therapeutics ( $n=1$ ). On average, the urolithiasis and BPH articles met 13.76 (SD 2.58) and 13.40 (4.10) of the 26 STREAM-URO criteria, respectively.

**Conclusions:** The majority of the studies helped with outcome prediction, diagnostics, and therapeutics for both urolithiasis and BPH. While ML shows great promise in improving patient care, it is important to adhere to the recently developed STREAM-URO guidelines to ensure the development of high-quality ML studies.



Poster #120. Figure 1. PRISMA flowchart.

## Poster #121

### Relative medullary thickness and urine osmolality in kidney stone formers

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**Introduction:** The prevalence of kidney stones has increased from 3.2% in 1980 to 10.1% in 2016, with up to 50% of individuals experiencing a recurrent stone if left untreated. Urine osmolality is one risk factor that has previously been correlated with stone development. Maximum concentrating ability of an individual is dictated primarily by the renal medulla. The metric of relative medullary thickness has previously been correlated with urine concentration across hundreds of mammalian species. The objective of this study is to review the relationship between relative medullary thickness and urine osmolality in a population of stone formers.

**Methods:** We completed a retrospective cohort study of kidney stone formers who underwent metabolic analysis of 24-hour urine collection at SUNY Upstate Medical University from 2013–2020. Relative medullary thickness was calculated as:  $RMT = 10 \times \text{medullary thickness} \div \sqrt[3]{(\text{renal length} \times \text{breadth} \times \text{width})}$ . 24-hour urine osmolality was calculated as:  $U_{\text{osm}} = (2 \times \text{sodium (mmol)} + \text{potassium (mmol)} + 35.7 \times \text{urea nitrogen (g)}) / \text{urine volume (L)}$ . Ultrasounds within 1 year of 24-hour urine collection were assessed.

**Results:** Across 93 stone formers, mean relative medullary thickness was 1.38 (SD 0.29) and mean urine osmolality was 591.2 mOsm/kg (SD 175.8) (Table 1). Relative medullary thickness had a weak, negative correlation with 24-hour urine osmolality ( $r = -0.316$ ,  $p = 0.002$ ), urine sodium ( $r = -0.264$ ,  $p = 0.011$ ), urine chloride ( $r = -0.272$ ,  $p = 0.008$ ), and urine urea nitrogen ( $r = -0.221$ ,  $p = 0.034$ ) (Table 2).

**Conclusions:** Results of this study demonstrate a larger relative medullary thickness of the kidney is associated with decreased urine osmolality and increased retention of sodium, chloride, and urea nitrogen. The negative correlation found here between relative medullary thickness and urine osmolality is in contrast to the positive correlation previously seen across hundreds of mammalian species. Therefore, increased solute retention coupled with reduced urine concentration in this population of stone formers may be a function of renal papillae in poor health.

**Poster #121. Table 1. Relative medullary thickness and 24-hour urine osmolality**

Factor	Mean (SD)
Relative medullary thickness	
Average	1.38 (0.29)
Left kidney	1.37 (0.31)
Right kidney	1.38 (0.33)
24-hour urine osmolality	
Urine osmolality (mOsm/kg)	591.20 (175.77)
Sodium (mmol)	154.89 (65.66)
Potassium (mmol)	56.46 (25.34)
Urea nitrogen (g)	9.66 (3.55)
Volume (L)	1.72 (0.80)

**Poster #121. Table 2. Relative medullary thickness and urine electrolytes**

Parameter (mg/day)	Pearson's correlation coefficient	p
Calcium	-0.0335	0.7501
Oxalate	-0.0247	0.8142
Citrate	-0.019	0.8569
Uric acid	-0.1661	0.1116
Sodium	-0.2635	0.0107*
Potassium	-0.1936	0.063
Magnesium	0.0347	0.7415
Phosphorous	-0.1125	0.2831
Ammonium	-0.0869	0.4074
Chloride	-0.2721	0.0083*
Sulfur	-0.1355	0.1952
Urea nitrogen	-0.2206	0.0336*
Creatinine	-0.0787	0.4532

## Poster #122

### Microsurgical testicular sperm extraction (micro-TESE) sperm retrieval rate (SRR) post-testicular sperm aspiration (TESA)

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**Introduction:** Studies have shown that microsurgical testicular sperm extraction (micro-TESE) outcome may be adversely influenced by a prior surgical sperm retrieval (performed in the preceding 6 months). We sought to evaluate the micro-TESE sperm retrieval rate (SRR) post-testicular sperm aspiration (TESA) in a cohort of infertile men with nonobstructive azoospermia.

**Methods:** We conducted a retrospective review of infertile men who underwent micro-TESE for non-obstructive azoospermia (NOA) between 2007 and 2020 and recorded micro-TESE SRR in these men. We included men with and without a history of TESA prior to micro-TESE. We further categorized the men with a prior TESA according to the time interval between TESA and micro-TESE. In all cases, the prior TESA was unsuccessful (no sperm recovered). We compared SRR in patients with and without TESA prior to micro-TESE. We also compared SRR in men who underwent TESA less than or more than 6 months before micro-TESE. Chi-squared analysis was performed to compare SRR in each subgroup.

**Results:** We identified 25 men that underwent a TESA prior to micro-TESE and 146 men with no intervention prior to micro-TESE. The micro-



TESE SRR was 64% (16/25) in the men with a history of TESA prior to micro-TESE and 46% (71/146) in men with no prior intervention ( $p=0.22$ ); however, men with a prior TESA had more favorable parameters (lower FSH and greater testicular volume). The micro-TESE SRR were 60% (6/10) and 66% (10/15) when performed  $\leq 6$  months and  $>6$  months post-TESA, respectively ( $p=0.973$ ), and we did not identify any significant differences between these groups in terms of age, testicular volumes, or hormonal parameters.

**Conclusions:** The data suggest that micro-TESE sperm retrieval rate is not influenced by a prior TESA, whether recent ( $\leq 6$  months) or remote ( $>6$  months). The data also indicate that the salvage micro-TESE SRR in patients with a prior negative TESA is comparable to the SRR in men undergoing primary micro-TESE for NOA.

## Poster #123

### Clomiphene citrate treatment response of semen parameters and testosterone levels in hypogonadal men over time

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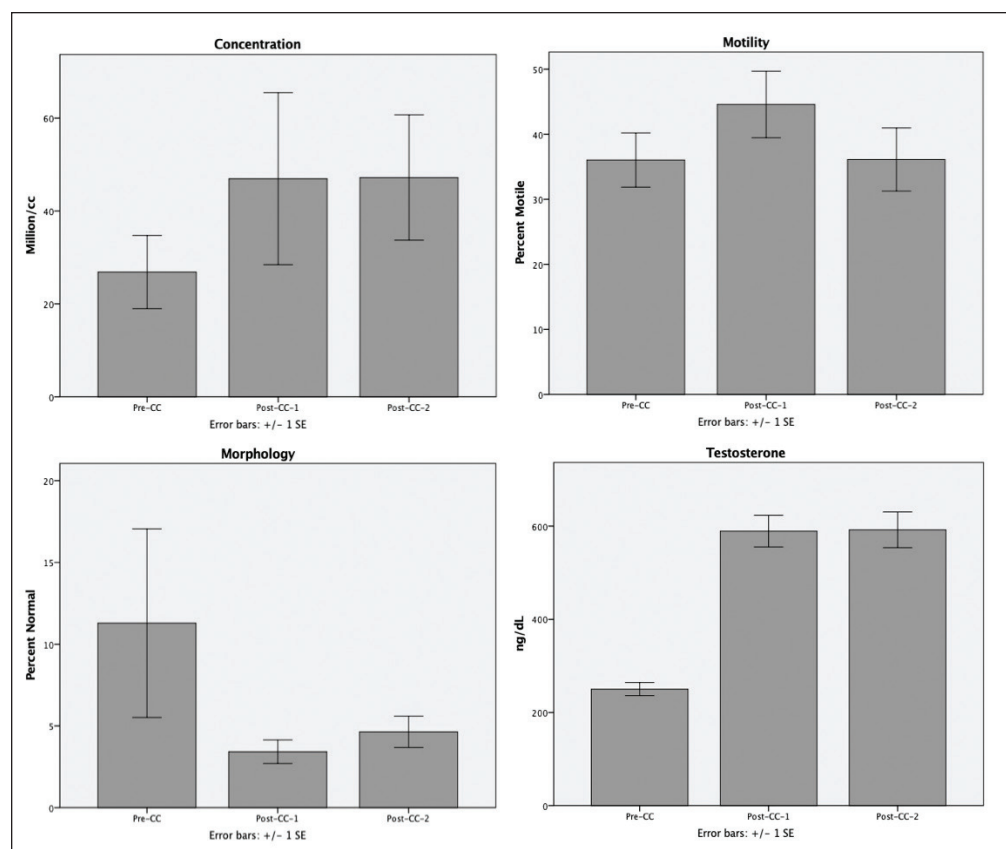
**Introduction:** Clomiphene citrate (CC) has been shown to improve total testosterone (TT) and sperm parameters in hypogonadal men; however, duration of treatment with CC until peak effect is unknown. Since timing until optimal results after CC treatment is unclear, we sought to evaluate TT levels and semen parameters in hypogonadal men treated with CC over time.

**Methods:** We performed a retrospective review of consecutive hypogonadal men with idiopathic infertility treated with CC from 2015–2021. Men were included if pre-treatment and at least two post-treatment semen

analyses (SA) and TT levels were available. Patients with coexisting endocrine disorders, azoospermia, secondary infertility, prior testicular disorders, and T supplementation were excluded. Statistical analysis was performed using repeated measures ANCOVA with Bonferroni correction for pairwise analysis and Huynh-Feldt correction for sphericity.

**Results:** Twenty-one patients were included. Median age was 33 (25–44) years and mean body mass index (BMI) was 34.8 (SD 8.4). Mean pre-treatment TT was 250.1 (SD 64.5). Mean time between initiation of CC and first post-treatment analysis was 3.7 months (SD 1.1), while mean time between first and second post-treatment analysis was 6.1 months (SD 5.3) (Figure 1). On pairwise analysis, TT levels significantly increased following initiation of CC to post-CC-1 (250.1 vs. 589.3,  $p<0.0001$ ) and post-CC-2 (250.1 vs. 593.2,  $p<0.0001$ ). Yet, TT levels remained stable between post-CC-1 and post-CC-2 ( $p=1.0$ ). Increase in semen concentration did not reach significance on pairwise analysis; however, on repeated measures ANCOVA, controlling for age, BMI, smoking status, letrozole use, and varicoceles, semen concentration was significantly improved ( $p=0.032$ ) and there was no significant change in serum testosterone ( $p=0.312$ ).

**Conclusions:** For this cohort, optimal response to CC in hypogonadal men with idiopathic infertility occurred at three months. Statistically significant TT improvement was noted after 3 months, with significant sperm concentration improvement taking more time, likely due to the smaller sample size and larger standard deviation. Larger studies are warranted to evaluate if a 3-month time interval yields the optimal TT and sperm concentration response rates for most men treated with CC.



Poster #123. Figure 1.

**Poster #124****Differences in sexual adverse events of premature ejaculation medications recommended by the American Urological Association in the federal adverse events reporting system database***Michael Tram, Brian Meyerson, Charles Welliver, Brian Inouye*

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**Introduction:** Premature ejaculation (PE) affects 5% of men. American Urological Association (AUA) guidelines recommend daily selective serotonin reuptake inhibitors (SSRI) or clomipramine as first-line pharmacotherapy for PE; however, the non-ejaculatory, sexual adverse events (AE) of these drugs are not well-studied in urologic literature, especially among recommended SSRIs. This study investigated the incidence of sexual AEs in case reports of SSRIs reported to the Federal Adverse Events Reporting System (FAERS) database.

**Methods:** We identified case reports of monotherapy use of fluoxetine, sertraline, paroxetine, and clomipramine in males from January 2004 to June 2021 in the FAERS database. After extracting case reports, we post-hoc excluded medication and dosage combinations with under 200 total reports from our analysis. Frequencies of each reported sexual, physical,

and mental AE out of all case reports were compared using Pearson's Chi-squared test. Continuous variables, such as average patient age and total AEs per case report, were compared using one-way ANOVA. We considered  $p < 0.05$  to be significant.

**Results:** After excluding low reported medication/dosages, there were 2608 total case reports (Table 1). The average age of patients taking each medication was significantly different ( $p < 0.01$ ), with fluoxetine 20 mg having the lowest average age. Libido, erection, ejaculatory disorder, and sexual dysfunction were the most reported sexual AEs. Among sexual AEs, rates of libido, erection, orgasm disorder, testes, and sexual dysfunction were significantly different across medications; however, rates of ejaculatory disorder were not significantly different. There was also a significant difference in the frequency of fatigue, ear/hearing, headache, movement, and psychological AEs.

**Conclusions:** While there were similar rates of ejaculatory disorder between SSRIs recommended by AUA guidelines for PE, there were significant differences in other sexual and physical side effects that warrant future randomized controlled studies to determine if there are true differences that require specific patient counselling.

**Poster #124. Table 1. Selective serotonin reuptake inhibitors and dose in patients in the FAERS database**

	Fluoxetine 20 mg (n=450)	Paroxetine 20 mg (n=666)	Sertraline 50 mg (n=1034)	Sertraline 100 mg (n=458)	p
Average age (mean $\pm$ std yr)	36.5 $\pm$ 18.7	36.7 $\pm$ 20.8	42.0 $\pm$ 21.9	41.1 $\pm$ 19.3	<0.01*
Average number of reported AEs (mean $\pm$ std)	3.5 $\pm$ 3.5	5.1 $\pm$ 6.2	2.8 $\pm$ 2.3	3.3 $\pm$ 3.1	<0.01*
<b>Specific adverse event (% of overall reports [n])</b>					
<b>Sexual AEs</b>					
Libido	6.7 (30)	4.2 (28)	7.2 (74)	2.8 (13)	<0.01*
Erection	6.2 (28)	3.5 (23)	4.7 (49)	1.1 (5)	<0.01*
Orgasm disorder	2.9 (13)	1.2 (8)	1.2 (12)	3.9 (18)	<0.01*
Ejaculatory disorder	1.8 (8)	2 (13)	1.8 (19)	3.1 (14)	0.44
Penis	0.9 (4)	0.2 (1)	0.3 (3)	0 (0)	0.074
Testes	0 (0)	0.6 (4)	0.1 (1)	0 (0)	0.044*
Genital	1.6 (7)	0.2 (1)	1 (10)	1.3 (6)	0.069
Sexual dysfunction	5.1 (23)	2.3 (15)	2.7 (28)	1.1 (5)	<0.01*
<b>Physical AEs</b>					
Fatigue	3.1 (14)	5.7 (38)	3.1 (32)	4.8 (22)	0.032*
Musculoskeletal	8.9 (40)	5.6 (37)	7.9 (82)	6.8 (31)	0.14
Skin	8.9 (40)	9 (60)	9.8 (101)	6.8 (31)	0.32
Ear and hearing	0.2 (1)	4.7 (31)	2 (21)	1.3 (6)	<0.01*
Self-harm	2 (9)	1.8 (12)	1.7 (18)	0.2 (1)	0.089
<b>Mental and neurological AEs</b>					
Headache	2.2 (10)	8.3 (55)	2.4 (25)	5.9 (27)	<0.01*
Mental	5.8 (26)	7.1 (47)	4.4 (45)	5.2 (24)	0.12
Movement	10 (45)	9.5 (63)	6.6 (68)	7 (32)	0.049*
Sleep	0 (0)	0.5 (3)	0.5 (5)	0 (0)	0.23
Psychological	44 (198)	47.7 (318)	34.6 (358)	37.6 (172)	<0.01*

**Poster #125****The effects of distance on fertility preservation utilization**

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**Introduction:** Fertility preservation (FP) is underused in adult, young adult, and adolescent males with cancer or other diseases requiring gonadotoxic therapies. Two possible contributing reasons for low referral rates are perceived lack of access or patient unwillingness to travel to distant FP centers. We sought to evaluate whether patient distance from FP center affected rates of providing a semen analysis after referral.

**Methods:** We performed a retrospective analysis of all males who were referred for FP at a single institution between 2013 and 2021. Patient zip codes, demographic data, and reason for referral were obtained. Number of semen samples provided and number of vials frozen were additionally collected. Distance from patient residence to our institution was calculated using R. A multiple logistic regression model was conducted with semen sample submission as the variable of interest. Predictor variables were age, disease type, distance, and payment method. Secondary outcomes were number of semen samples submitted and number of vials collected.

**Results:** A total of 470 males referred to our center had a valid zip code on file. The average age was 25.8±8.9 years. Of these patients, 331 (70 %) provided a semen sample after referral and 139 (30%) did not. Further distance from our fertility center was associated with decreased odds of submitting at least one semen sample (OR 0.85, 95% CI 0.75–0.98,  $p<0.05$ ) (Table 1). For patients who submitted at least one sample, distance had no effect on the number of total samples or number of vials collected.

**Conclusions:** Further distance from fertility preservation center was associated with decreased odds to provide semen sample after referral. Our model estimated a 15% decrease in odds of collection with every doubling of distance from our center. Further efforts must be made to improve fertility preservation use in patients travelling far distances.

**Poster #125. Table 1.**

Variable	Odds ratio	Confidence interval	p
Age, y	0.996	0.96–1.03	
Distance, log	0.85	0.74–0.98	<0.05
Disease type			
Leukemia	0.45	0.18–1.13	
MSK	1.12	0.48–2.65	
NHL	0.23	0.09–0.59	<0.05
Testis	1.17	0.59–2.3	
Other cancers	1.16	0.52–2.57	
Benign diseases	0.56	0.14–2.40	
Payment type			
Not specified	0.11	0.01–0.57	<0.05
CHP fund	0.99	0.05–6.7	
Livestrong	3.4	0.15–39.58	
Sharing hope	0.4	0.01–12.27	

**Poster #126****Risk factors and causative organisms associated with modern inflatable penile prosthesis infection**

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**Introduction:** The advent of antibiotic-coated devices has reduced the rate of penile prosthesis infections; however, this may have altered microbial profiles when infections do occur. The purpose of this study is to describe the timing and causative agents implicated in inflatable penile prosthesis (IPP) infections in the era of modern penile prosthetics.

**Methods:** A retrospective chart review was performed of patients undergoing IPP placement at a single institution from January 2014 to January 2022. Cases involving prosthesis infection were identified, and variables were extracted from the medical record. Descriptive and comparative statistics were tabulated, including patient comorbidities, symptom onset, and causative organism. Previously reported increased risk of infection with 5% betadine irrigation was taken into considerations and the results were stratified accordingly.

**Results:** A total of 1071 patients underwent IPP placement over eight years. Overall infection rate was 2.6% (28/1071). After discontinuation of betadine use, the infection rate was significantly lower: 0.9% (8/919; RR 16.9 with betadine,  $p<0.0001$ ). Primary IPP procedures comprised 46.4% (13/28) of cases. Of 28 infected patients, only one patient had no identified risk factors; the remainder included betadine 71% (20/28), revision/salvage procedure 53.6% (15/28), and diabetes 50% (14/28). Median time to symptoms was 36 days (IQR 26–52), and nearly 30% of patients had systemic symptoms. Virulent organisms were found in 90.5% (19/21) of positive cultures. Virulent organisms included multidrug-resistant *E. coli*, *Enterococcus*, *Pseudomonas*, and fungus. Culture-specific susceptibility profiles demonstrated 21% and 53% of cultures to be sensitive to anti-fungals and fluoroquinolones, respectively.

**Conclusions:** IPP infections risk is greater with 5% betadine irrigation, history of diabetes, and revision/salvage cases. Modern IPP infections tend to present in a delayed fashion. Over 90% causative organisms were virulent, demonstrating a microbial profile trend since antibiotic coating development. These findings may highlight areas for improvement in perioperative protocols in the contemporary prosthetics era.

**Poster #127****Multicenter assessment of single vs. multicomponent IPP revision**

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**Introduction:** For single-component malfunction for inflatable penile implants (IPPs) in the absence of infection, the surgeon must decide to replace the single malfunctioning component or the entire device. We want to determine whether single-component revision vs. replacement of the entire device has an impact on infectious complications. Additionally, we want to assess if time since the original implant has any role in infectious outcomes when changing one out vs. multiple components. This study is part of a larger, multicenter investigation.

**Methods:** The study included patients who underwent revision of penile prosthesis between November 1, 2016, and November 30, 2021, at Albany Medical Center and partnered institutions. We assessed single vs. multicomponent revision. We queried department operative records for patients who underwent penile prosthesis revision for non-infectious causes during this time period. These men were identified by CPT codes for IPP revisions. We obtained relevant deidentified demographic, past medical, and procedural information from the EMR at each institution.



**Results:** Combined with rest of the multicenter data, 466 patients were identified; 377 men received revisions involving all components, with 89 only requiring single-component revision. The average age of all patients was 63 years. A total of 294 patients were treated using a modified salvage technique, with the majority not requiring drain placement during the case. Of the entire cohort, only 14 infections occurred. Multicomponent revisions had a lower total percentage of infections (2.1%) compared to single-component revision (6.7%,  $p=0.0334$ ).

**Conclusions:** The overwhelming majority of patients surveyed in this project did not suffer infection following their IPP revision. These findings demonstrated that the more extensive component revisions appear to be protective for postsurgical infectious complications. This is contrary to the previous beliefs that minimizing number of components revised would lead to fewer infections. Surgeons should consider these results when deciding how to proceed with IPP revision.

### Poster #128

#### Penile rehab, length, and progression to IPP placement in patients with ED

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**Introduction:** Erectile dysfunction (ED) affects about 30 million men in the U.S. While a variety of treatment options exist for ED, inflatable penile implant (IPP) remains the gold standard and maintains a high satisfaction rate. Among the most common reason for dissatisfaction with IPP is penile length concerns. Stretched penile length (SPL) has been correlated with penile length after IPP. SPL is frequently used by implanters to set expectations for postoperative length. Penile rehabilitation may be used both for post-prostatectomy return of function and to maintain/improve penile length. Some reports suggest improvements in IPP length in men who have done penile rehabilitation in preparation for IPP. In this study, we looked at patients with ED who were interested in proceeding to IPP. Men had their SPL assessed and if they did not find this length satisfactory, they were referred to penile rehabilitation before proceeding to surgery.

**Methods:** The study included patients at Albany Medical Center from 2021 and 2022 who were seen for a diagnosis of ED, had failed conservative treatment options, and were now considering IPP placement. Men had their stretched penile length assessed at a potential pre-IPP visit and at 3 and 6 months after they started penile rehabilitation. Men were prospectively identified by retrospectively reviewed. Followup, changes in SPL, and whether or not men ultimately advanced to surgery were captured, along with basic demographic information.

**Results:** Twelve men were identified. The age of the patients ranged from 46–77 (mean 61 years). Of these 12 men, 2 were lost to followup and were not undergoing penile rehabilitation. One patient had completed rehab and two patients were awaiting penile implant. Average stretch penile length before the procedure was 9.3 cm (range 7–12.1). In men who had completed penile rehabilitation, an increase in SPL of 0.76 cm was obtained (range 0.3–1).

**Conclusions:** This study is early in its data capture but reports improvements in SPL in men who performed penile rehabilitation. Many men either do not complete penile rehabilitation or do not followup. These findings are important in that they show improvements in penile length with penile rehabilitation in men considering IPP. Further study will examine how frequently men proceed to IPP along with patient satisfaction.

### Poster #129

#### WATER vs. WATER II 3-year update: Comparing Aquablation therapy for benign prostatic hyperplasia in 30–80 cc and 80–150 cc prostates

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**Introduction:** Surgical options are limited when treating large (>80 cc) prostates for lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH). Despite its increased risk of bleeding, transfusions, and longer hospitalization stay, open simple prostatectomy (OSP) is still considered the international gold standard for large prostates. In order to fill this gap, Aquablation therapy, a waterjet ablative procedure combining image guidance and robotics, is emerging as a safe and effective procedure with a short learning curve. The objective of this study was to compare the outcomes of Aquablation for small-to-moderate (30–80 cm<sup>3</sup>) prostates with the outcomes for large (80–150 cm<sup>3</sup>) prostates at 3-year followup.

**Methods:** WATER is a prospective, double-blind, multicenter, international clinical trial comparing the safety and efficacy of Aquablation and TURP in the treatment of LUTS/BPH in men 45–80 years with a prostate of 30–80 cc. WATER II is a prospective, multicenter, single-arm international clinical trial of Aquablation in men with a prostate of 80–150cc. We compared 36-month outcomes among 116 WATER and 101 WATER II study subjects undergoing Aquablation (Table 1).

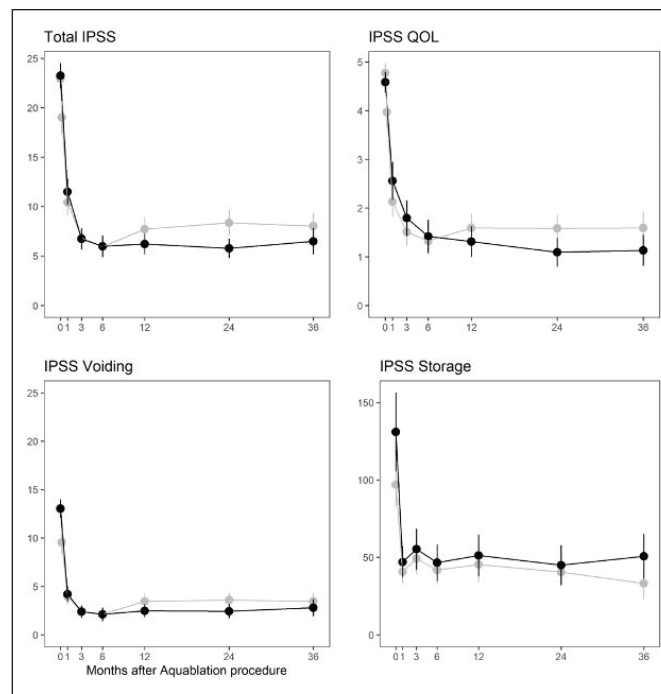
**Results:** International Prostate Symptom Score (IPSS) scores improved from 22.9 and 23.2 at baseline in WATER and WATER II, respectively, to 8.0 and 6.5 at 36-months, with 36-month reductions of 14.4 and 16.3 points, respectively ( $p=0.247$ ) (Figure 1). At baseline, urinary flow rate (Q<sub>max</sub>) was 9.4 and 8.7 cc/sec in WATER and WATER II, improving to 20.6 and 18.5 cc/sec, respectively ( $p=0.552$ ) at 36 months (Figure 2). Improvements in both IPSS and Q<sub>max</sub> were immediate and sustained throughout followup (Figure 3). At 3 years, 98% and 94% of treated patients were BPH medication-free in WATER and WATER II, respectively ( $p=0.038$ ). At three years, 96% and 97% of treated patients were free from surgical retreatment in WATER and WATER II, respectively ( $p=0.613$ ).

**Conclusions:** Three-year followup demonstrates that Aquablation therapy leads to sustained outcomes, few irreversible complications, and low retreatment rates for the treatment of LUTS/BPH independently of prostate volume.

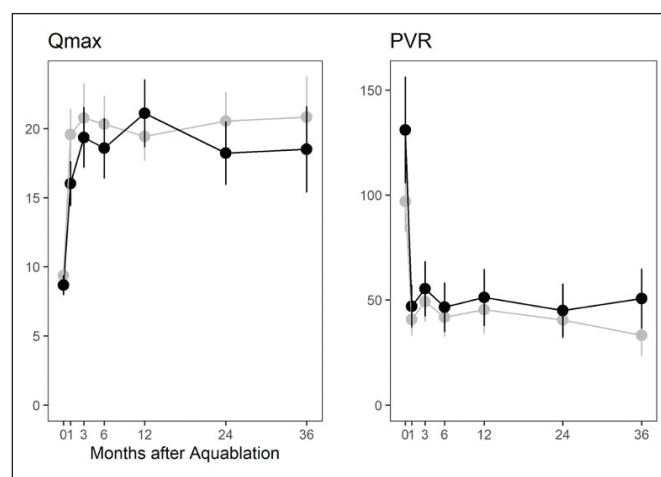
**Poster #129. Table 1. Baseline characteristics by study**

Characteristic	WATER (n=116)	WATER II (n=101)	p
Mean age, yr (SD)	65.9 (7.3)	57.4 (6.6)	0.085
Mean body mass index, kg/ m <sup>2</sup> (SD)	28.4 (4.1)	28.3 (4.1)	0.823
Mean PSA, g/dl (SD)	3.7 (3.0)	7.1 (5.9)	<0.001
Mean prostate size, cc (SD)	54.1 (16.3)	107.4 (20.2)	<0.001
Median lobe present, n (%)	58 (50)	84 (83.2)	0.004
Intravesical component (%)	42/58 (72)	81/84 (96)	-
Use of catheter within 45 d before consent, n (%)*	-	16 (16)	-
Qmax	9.4 (3)	8.7 (3.4)	0.007
PVR	97.0 (78.6)	131.0 (125.0)	0.007
Baseline questionnaires			
Mean IPSS (SD)	22.9 (6.9)	23.2 (6.3)	0.693
IPSS QoL (SD)	4.8 (1.1)	4.6 (1.0)	0.181
MSHQ-EjD** (SD)	8.1 (3.7)	8.1 (3.9)	0.916
IIEF-5 (SHIM)** (SD)	17.2 (6.5)	15.1 (7.4)	0.050
BPH medication			
Alpha blocker, n (%)	48 (41)	41 (41)	1.000
5-ARI, n (%)	2 (2)	4 (4)	0.385
Combination alpha- blocker/5-ARI, n (%)	23 (20)	29 (29)	0.123
Other medication			
Anticoagulant, n (%)	2 (2)	4 (4)	0.385
Antiplatelet/NSAID, n (%)	15 (13)	21 (21)	0.116
Aspirin ( $\leq 100$ mg), n (%)	24 (21)	19 (19)	0.714
Any of above, n (%)	41 (35)	43 (43)	0.223

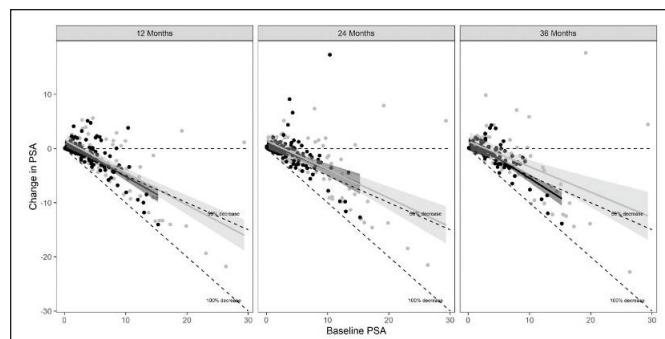
\*Patients reporting urinary catheter use in the 14 d before evaluation or with history of intermittent self-catheterization were excluded from WATER. \*\*Questionnaire completed only by sexually active patients.



**Poster #129. Figure 1.** IPSS, IPSS QoL, and IPSS storage and voiding subscale scores by month after Aquablation in WATER (grey line) and WATER II (black line).



**Poster #129. Figure 2.** Uroflowmetry parameters by month after Aquablation in WATER (grey line) and WATER II (black line).



**Poster #129. Figure 3.** WATER (black line) and WATER II (grey line) change in PSA at 12, 24, and 36 months. The regression line CIs overlap with the 50% reduction line for all time points.

### Poster #130

#### Modern evaluation of same-day discharge of transurethral resection of prostate and postoperative hospital utilization

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**Introduction:** We aimed to evaluate the safety, feasibility, and office burden of same-day discharge of transurethral resection of prostate (TURP) patients compared to standard postoperative hospital admission.

**Methods:** We retrospectively reviewed the charts of 130 patients who had undergone a TURP conducted by four surgeons operating out of a large academic tertiary care center. Patients were identified based on medical record review within a 15-year period. The same-day discharge (SD=43) group was compared to a control group (Control=87) from two surgeons who do not discharge patients on the same day. We analyzed patient and provider-focused outcomes, including emergency department visits, hospital readmission, unplanned office visits, and communications with office. Published hospital room rates were obtained from Pennsylvania Department of Health. The Student T-test and Chi-squared test were used to compare the differences between postoperative events.

**Results:** Patients in the SD and admitted groups did not differ with respect to age, ethnicity, smoking, or prior TURP (Table 1); however, patients in the SD group were more likely to have type II diabetes. In the control group, patients were discharged on average postoperative day 1. Patients in the SD group were significantly more likely to be discharged with a catheter. A subset of patients in the SD group removed their catheters at home without difficulty. No difference was found in time to catheter removal between groups. All cases used Cytus® PK™ bipolar resectoscope and there was no significant difference in EBL between groups. No significant difference was found in rates of postoperative communications, unplanned clinic visits, emergency room visits, or hospital readmissions between groups at 3-, 30-, and 90-day time points (Table 2). Rates of postoperative retention, bleeding, and infection at 30 days were similar between groups. The base hospital room rate per day where patients were treated ranged from \$2450–3990.

**Conclusions:** We confirm that SD discharge of TURP is safe and does not increase emergency department use, hospital readmission, office visits, or communication with the office. Shorter hospital stays among SD TURP patients are especially important considering the COVID-19 epidemic and increased emphasis on limiting length of hospitalization and patient exposure with elective surgery.

**Poster #130. Table 1. Comparison of baseline patient characteristics between groups undergoing same-day and standard admission TURP**

Variable	Same-day (n=43)	Admitted (n=87)	p
Mean age in years (STD error)	66.5 (1.26)	66.2 (1.02)	0.44
Caucasian (%)	91	93	0.48
BMI (IQR)	29.6 (25.9–32.4)	28.5 (24.8–31.2)	0.15
Diabetes (%)	11 (26)	9 (10)	<b>0.02</b>
CVA (%)	4 (9)	2 (2)	0.07
CAD (%)	12 (28)	20 (23)	0.54
Anticoagulation (%)	21 (49)	45 (52)	0.76
Smoking (%)	5 (12)	22 (25)	0.07
Prior TURP (%)	10 (23)	15 (17)	0.41
POD discharge (IQR)		1 (1–1)	
Discharged w/ catheter (%)	40 (93)	24 (28)	<b>&lt;0.01</b>
POD catheter removal (IQR)	5 (3–7)	4 (1–6)	0.38
EBL (IQR)	22 (20–25)	32 (10–50)	0.12
Bipolar resection (%)	100	100	
Complications (30 days)			
Retention (%)	4 (10)	6 (7)	0.60
Bleeding (%)	0	1 (1)	0.49
Sepsis (%)	2 (5)	4 (5)	0.97

**Poster #130. Table 2. Comparison of emergency room visits, unplanned clinic visits, phone calls, and hospital readmission within the first 3, 30, and 90 days after surgery between same-day and admitted cohorts**

3-day events	Same-day (n=43)	Admitted (n=87)	p
Emergency room visits (%)	3 (7)	3 (3)	0.37
Unplanned clinic visits (%)	1 (2)	3 (3)	0.73
Phone calls (%)	12 (28)	15 (17)	0.16
Readmission (%)	1 (2)	0 (0)	0.15
30-day events	Same-day (n=42)	Admitted (n=87)	p
Emergency room visits (%)	9 (21)	17 (20)	0.80
Unplanned clinic visits (%)	6 (14)	15 (17)	0.67
Phone calls (%)	22 (52)	43 (49)	0.75
Readmission (%)	3 (7)	5 (6)	0.76
90-day events	Same-day (n=38)	Admitted (n=85)	p
Emergency room visits (%)	12 (32)	25 (29)	0.81
Unplanned clinic visits (%)	7 (18)	17 (20)	0.84
Phone calls (%)	21 (55)	49 (57)	0.81
Readmission (%)	7 (18)	15 (17)	0.92



**Poster #131****Does a 5-item Frailty Index predict surgical outcomes of endoscopic surgical management for benign prostatic obstruction?**

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**Introduction:** The 5-item Frailty Index (5i-FI) is an index of reduced physiological reserve. We sought to assess whether the 5i-FI is a predictor of surgical complications of endoscopic surgery for benign prostatic obstruction (BPO) and examine whether the type of endoscopic surgery predicts complications.

**Methods:** The National Surgical Quality Improvement Program was queried for patients who underwent transurethral resection of the prostate (TURP), photovaporization of the prostate (PVP), and laser enucleation of the prostate (LEP) from 2009–2019. The 5i-FI was calculated by giving a point for each of 1) chronic obstructive pulmonary disease or pneumonia; 2) congestive heart failure; 3) dependent functional status; 4) hypertension; and 5) diabetes. The endpoints were any complication, major complications (Clavien-Dindo 3), length of stay (LOS)  $\geq 2$  days, and readmission within 30 days of surgery. A multivariable logistic regression assessed the outcome predictors adjusting for surgical approach, 5i-FI, and demographics. A multinomial logistic regression examined which patient demographics predicted surgical approach. Significant predictors were included in the inverse probability treatment weighting (IPTW) propensity score to evaluate the independent effect of surgical approach on complications.

**Results:** The cohort included 38 399 (62.6%) TURP, 19 121 (31.2%) PVP, and 3797 (6.2%) LEP. Baseline characteristics and outcomes are reported in Table 1. 5i-FI  $\geq 2$  was associated with 50%, 63%, 31%, and 65% increased risk for any complication, major complication, LOS  $\geq 2$ , and readmission, respectively (Table 1). In comparison to TURP, PVP and LEP were safer (Table 2). Despite decreased odds of surgical complications with LEP, frail patients were less likely to receive LEP (OR 0.83, 95% CI 0.75–0.92,  $p < 0.01$ ) (Table 3). Age, race, obesity, 5i-FI, history of bleeding diathesis (including anticoagulation within 30 days of surgery), among others, predicted the type of BPO surgery received (Table 3). After IPTW adjustment, LEP had the lowest risk for any complication (6.29, 95% CI 5.48–7.20), major complication (2.30, 95% CI 1.83–2.89), and readmission (3.80, 95% CI 3.18–4.53) (Table 4). PVP had the lowest risk of LOS  $\geq 2$  (5.98, 95% CI 5.63–6.34).

**Conclusions:** The 5i-FI is an independent predictor of surgical complications after endoscopic BPO surgery. LEP had the lowest risk of complications after adjusting for baseline characteristics including 5i-FI. Preoperative frailty assessment could improve risk stratification prior to BPO surgery.

**Poster #132****Functional and surgical outcomes of Aquablation in elderly men**

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**Introduction:** As benign prostatic hyperplasia (BPH) is an age-related process, growing interest in surgical management for elderly men has emerged. Recently, Aquablation was approved for treatment of BPH-associated lower urinary tract symptoms (LUTS). This novel technology uses robotic, ultrasound-guided, surgeon-controlled waterjet ablation to accurately target prostate tissue. We assessed the differences in functional and surgical outcomes between elderly and young men undergoing Aquablation for LUTS/BPH.

**Methods:** We retrospectively assessed prospectively collected patient data from the pivotal WATER (NCT02505919) and WATER II (NCT03123250) clinical trials reporting safety and efficacy of Aquablation in the treatment of LUTS/BPH in men 45–80 years old with a prostate between 30–80 cc and 80–150 cc, respectively. Baseline demographics and clinical variables were carefully recorded in an independently monitored database. Men  $\geq 65$  years old were defined as elderly while men  $< 65$  years old were defined as young.

**Results:** Of 217 patients included, 83 (38.2%) were young men and 134 (61.8%) were elderly men. Mean age (SD) was 59.3 ( $\pm 3.4$ ) years and 71.2 ( $\pm 4.2$ ) years for young and elderly men, respectively. Baseline demographics and clinical variables were similar for both cohorts (Table 1). At 3 years of followup compared to baseline, elderly men showed similar reductions in total IPSS (7.68 points vs. 7.12 points,  $p > 0.05$ ), IPSS QoL (1.38 points vs. 1.38 points,  $p > 0.05$ ), and PVR (39.9 mL vs. 42.3 mL,  $p > 0.05$ ), as well as similar increases in Qmax (20.6 mL/s vs. 19.3 mL/s,  $p > 0.05$ ) compared to young men (Figure 1). The ejaculatory dysfunction rate was similar for both cohorts (12.0% vs. 9.7%,  $p > 0.05$ ). Elderly men experienced similar annual retreatment rates compared to young men (1.5% vs. 0.8%,  $p > 0.05$ ).

**Conclusions:** Elderly men undergoing Aquablation have similar functional and surgical outcomes as young men. Elderly patient BPH surgical counselling should therefore consider Aquablation as a treatment option for LUTS/BPH.

**Poster #131. Table 1. Comparison of baseline characteristics and surgical outcomes across BPO treatment modalities (TURP, PVP, LEP)**

Variables	Treatment			p
	TURP (38 399)	PVP (19 121)	LEP (3797)	
Baseline characteristics				
5i-FI score				<0.001
Score 0	12 894 (33.8%)	6330 (33.1%)	1454 (38.3%)	
Score 1	16 708 (43.5%)	8492 (44.4%)	1628 (42.9%)	
Score ≥2	8707 (22.7%)	4299 (22.5%)	715 (18.8%)	
Age				<0.001
<60	4081 (10.6%)	1981 (10.4%)	445 (11.7%)	
60–69	12 558 (32.7%)	6073 (31.8%)	1432 (37.1%)	
70–79	14 361 (37.4%)	7160 (37.4%)	1403 (36.9%)	
≥80	7398 (19.3%)	3907 (20.4%)	517 (13.6%)	
Race				<0.001
White	22 608 (58.9%)	13 011 (68.1%)	3008 (79.2%)	
Black	2309 (6%)	943 (4.9%)	185 (4.9%)	
Hispanic	2354 (6.1%)	811 (4.2%)	125 (3.3%)	
Other	11 128 (29%)	4356 (22.8%)	479 (12.6%)	
ASA classification				<0.001
1–2	18 158 (47.4%)	9004 (47.2%)	2037 (53.7%)	
≥3	20 132 (52.6%)	10 088 (52.8%)	1759 (46.3%)	
Obesity				<0.001
No	26 097 (68%)	12 931 (67.6%)	2462 (64.8%)	
Yes	12 302 (32%)	6190 (32.4%)	1335 (35.2%)	
Bleeding diathesis				<0.001
No	37 335 (97.2%)	18 301 (95.7%)	3684 (97%)	
Yes	1064 (2.8%)	820 (4.3%)	114 (3%)	
Surgical outcomes				
Total operative time				<0.001
<60 min	24 392 (63.5%)	12 470 (65.2%)	965 (25.4%)	
60–120 min	12 198 (31.8%)	5868 (30.7%)	1749 (46.1%)	
>120 min	1809 (4.7%)	783 (4.1%)	1083 (28.5%)	
Length of stay				<0.001
0 day	7478 (19.5%)	13 274 (69.4%)	1105 (29.1%)	
1 day	20 938 (54.3%)	4642 (24.3%)	2116 (55.7%)	
>2 days	9983 (26%)	1205 (6.30)	576 (15.2%)	
Clavien-Dindo				<0.001
Grade 1–2	2060 (5.4%)	956 (5%)	153 (4%)	
Grade 3	639 (1.7%)	205 (1.1%)	53 (1.4%)	
Grade 4	519 (1.3%)	317 (1.7%)	34 (0.9%)	
Grade 5	104 (0.3%)	45 (0.2%)	4 (0.1%)	
Readmission	1877 (4.9%)	906 (4.7%)	148 (3.9%)	0.023

**Poster #131. Table 2. Predictors of complications (any complication, major complication, extended LOS, and readmission) adjusting for baseline characteristics, frailty index, and endoscopic surgical modality (TURP, PVP, and LEP)**

Predictors	Outcomes							
	Any complication		Major complication		LOS $\geq 2$ days		Readmission	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Treatment	Ipsium							
TURP	Ref	–	Ref	–	Ref	–	Ref	–
PVP	0.92 (0.86–0.98)	0.01	0.90 (0.81–0.99)	0.05	0.18 (0.17–0.19)	<0.01	0.98 (0.91–1.07)	0.69
LEP	0.66 (0.57–0.75)	<0.01	0.65 (0.52–0.82)	<0.01	0.50 (0.45–0.55)	<0.01	0.81 (0.68–0.97)	0.02
FI score								
0	Ref	–	Ref	–	Ref	–	Ref	–
1	1.15 (1.07–1.24)	<0.01	1.16 (1.03–1.31)	0.02	1.03 (0.97–1.08)	0.38	1.20 (1.09–1.33)	<0.01
$\geq 2$	1.50 (1.37–1.63)	<0.01	1.63 (1.42–1.85)	<0.01	1.31 (1.23–1.39)	<0.01	1.65 (1.48–1.85)	<0.01
Race								
White	Ref	–	Ref	–	Ref	–	Ref	–
Black	1.15 (1.02–1.30)	0.03	1.16 (0.96–1.40)	0.13	1.14 (1.04–1.25)	<0.01	1.16 (0.99–1.36)	0.07
Hispanic	1.05 (0.93–1.20)	0.43	0.87 (0.70–1.09)	0.24	1.01 (0.92–1.12)	0.81	0.97 (0.81–1.17)	0.78
Others	1.14 (1.06–1.22)	<0.01	1.13 (1.01–1.25)	0.03	2.48 (2.36–2.60)	<0.01	1.27 (1.16–1.38)	<0.01
Age								
<60	Ref	–	Ref	–	Ref	–	Ref	–
60–69	0.98 (0.88–1.10)	0.76	0.96 (0.80–1.15)	0.66	1.14 (1.05–1.24)	<0.01	0.83 (0.72–0.97)	0.02
70–79	1.10 (0.98–1.22)	0.11	1.17 (0.98–1.41)	0.08	1.39 (1.28–1.51)	<0.01	1.02 (0.88–1.17)	0.84
$\geq 80$	1.50 (1.33–1.69)	<0.01	1.47 (1.21–1.78)	<0.01	1.92 (1.76–2.10)	<0.01	1.40 (1.20–1.63)	<0.01
Obesity								
No	Ref	–	Ref	–	Ref	–	Ref	–
Yes	0.98 (0.92–1.05)	0.61	0.98 (0.89–1.09)	0.73	0.91 (0.86–0.95)	<0.01	0.93 (0.86–1.02)	0.11
ASA score								
ASA $\leq 2$	Ref	–	Ref	–	Ref	–	Ref	–
ASA $\geq 3$	1.28 (1.20–1.37)	<0.01	1.41 (1.27–1.57)	<0.01	1.25 (1.19–1.31)	<0.01	1.70 (1.55–1.86)	<0.01
Operative time								
<60 minutes	Ref	–	Ref	–	Ref	–	Ref	–
60–120 minutes	1.22 (1.15–1.30)	<0.01	1.10 (0.99–1.22)	0.07	1.43 (1.36–1.50)	<0.01	1.01 (0.93–1.10)	0.73
>120 minutes	1.73 (1.54–1.94)	<0.01	1.74 (1.46–2.08)	<0.01	2.35 (2.15–2.56)	<0.01	1.23 (1.04–1.44)	0.01
Bleeding diathesis								
No	Ref	–	Ref	–	Ref	–	Ref	–
Yes	1.87 (1.65–2.11)	<0.01	1.94 (1.61–2.32)	<0.01	1.59 (1.42–1.78)	<0.01	1.98 (1.70–2.30)	<0.01
Year of operation	1.02 (1.01–1.03)	<0.01	1.04 (1.02–1.06)	<0.01	0.92 (0.90–0.92)	<0.01	1.07 (1.06–1.09)	<0.01



**Poster #131. Table 3. Multinomial logistic regression to assess the predictors of receipt of different BPO surgery modalities (TURP vs. PVP vs. LEP) in function of baseline patient characteristics**

Baseline Characteristics	BPO treatment modalities				
	TURP	PVP		LEP	
		RRR (95% CI)	p	RRR (95% CI)	p
Frailty Index					
1	Reference	1.02 (0.98–1.07)	0.29	0.92 (0.85–0.99)	0.04
≥2	Reference	1.00 (0.95–1.06)	0.86	0.83 (0.75–0.92)	<0.01
Race/ethnicity					
Black	Reference	0.73 (0.67–0.79)	<0.01	0.59 (0.50–0.69)	<0.01
Hispanic	Reference	0.60 (0.56–0.66)	<0.01	0.38 (0.32–0.46)	<0.01
Others	Reference	0.70 (0.68–0.73)	<0.01	0.31 (0.28–0.34)	<0.01
Age					
60–69	Reference	0.98 (0.92–1.05)	0.60	1.07 (0.96–1.20)	0.22
70–79	Reference	1.01 (0.95–1.08)	0.69	0.96 (0.86–1.08)	0.51
≥80	Reference	1.06 (0.99–1.34)	0.12	0.74 (0.65–0.86)	<0.01
Obesity					
Yes	Reference	1.02 (0.98–1.06)	0.29	1.12 (1.04–1.39)	<0.01
ASA score					
ASA ≥3	Reference	0.96 (0.92–0.99)	0.03	0.78 (0.72–0.84)	<0.01
Bleeding diathesis					
Yes	Reference	1.51 (1.37–1.66)	<0.01	1.12 (1.04–1.21)	<0.01
Year of surgery					
	Reference	0.94 (0.94–0.95)	<0.01	1.10 (1.09–1.12)	<0.01

**Poster #131. Table 4. Unadjusted and weighted proportions for any complications, major complications, extended LOS, and readmission with endoscopic BPO surgeries (TURP, PVP, and LEP)**

Surgical outcomes	TURP		PVP		LEP	
	Unadjusted	Weighted	Unadjusted	Weighted	Unadjusted	Weighted
Any complications	8.65 (8.37–8.94)	8.63 (8.34–8.91)	8.0 (7.59–8.36)	8.0 (7.58–8.40)	6.28 (5.52–7.14)	6.29 (5.48–7.20)
Major complications	3.28 (3.11–3.47)	3.28 (3.11–3.47)	2.97 (2.73–3.22)	2.93 (2.69–3.20)	2.45 (1.98–3.02)	2.30 (1.83–2.89)
LOS ≥2	26.0 (25.6–26.4)	25.6 (25.2–26.0)	6.30 (5.97–6.66)	5.98 (5.63–6.34)	12.9 (11.8–14.0)	12.4 (11.3–13.7)
Readmission	4.89 (4.68–5.11)	4.83 (4.62–5.04)	4.74 (4.44–5.05)	4.52 (4.22–4.84)	3.86 (3.27–4.56)	3.80 (3.18–4.53)

**Poster #132. Table 1. Baseline demographics and clinical variables of young and elderly men from WATER I/II clinical trials undergoing Aquablation for treatment of LUTS/BPH**

	Young men (n= 83)	Elderly men (n= 134)	p
Age (yr), mean ( $\pm$ SD)	59.3 ( $\pm$ 3.4)	71.2 ( $\pm$ 4.2)	<0.0001
Prostate TRUS volume (mL), mean ( $\pm$ SD)	75.6 ( $\pm$ 36.1)	83.4 ( $\pm$ 38.0)	0.1276
Middle lobe (%)	68.7	67.2	0.8803
IPSS (points), mean ( $\pm$ SD)	22.7 ( $\pm$ 5.7)	23.3 ( $\pm$ 6.4)	0.4435
IPSS QOL (points), mean ( $\pm$ SD)	4.6 ( $\pm$ 1.0)	4.7 ( $\pm$ 1.1)	0.4244
Qmax (mL/s), mean ( $\pm$ SD)	9.2 ( $\pm$ 3.4)	8.9 ( $\pm$ 3.0)	0.5088
PVR (mL), mean ( $\pm$ SD)	99.5 ( $\pm$ 86.2)	120.5 ( $\pm$ 112.5)	0.1282
MSHQ (points), mean ( $\pm$ SD)	8.7 ( $\pm$ 3.7)	7.7 ( $\pm$ 3.8)	0.0858
MSHQ bother (points), mean ( $\pm$ SD)	1.9 ( $\pm$ 1.6)	2.2 ( $\pm$ 1.6)	0.2434
IIEF-5 (points), mean ( $\pm$ SD)	17.3 ( $\pm$ 7.2)	15.4 ( $\pm$ 6.8)	0.0810

### Poster #133

#### Safety and efficacy of GreenLight PVP in octogenarians: Evaluation of the global GreenLight group database

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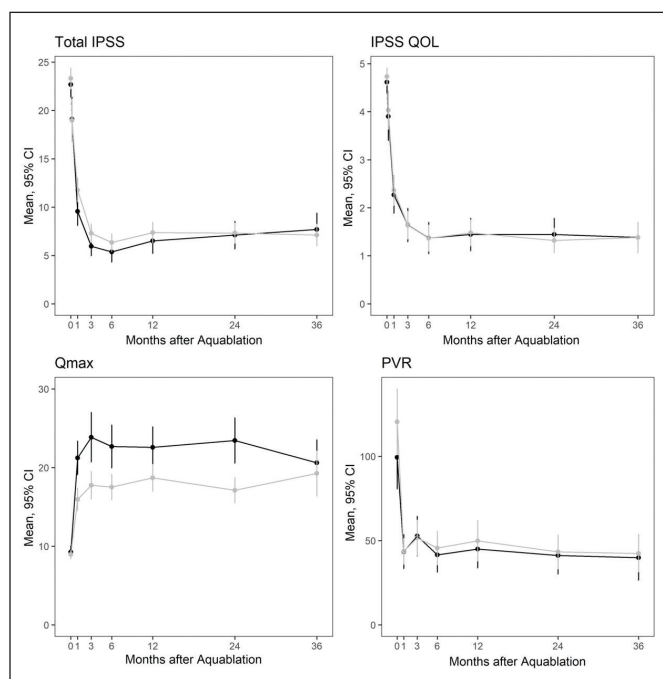
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**Introduction:** GreenLight photoselective vaporization of the prostate (PVP) is a surgical treatment for benign prostatic hyperplasia (BPH) that yields comparable results to transurethral resection of the prostate while optimizing safety outcomes, yet granular data is lacking for patients above the age of 80. The present study analyzed the largest international GreenLight database, the Global GreenLight Group, to evaluate the functional and safety profile of GreenLight PVP in octogenarians.

**Methods:** The Global GreenLight Group is a database comprised of patients that underwent GreenLight PVP from 2011–2019 performed by 8 experienced urologists at 7 different international hospitals. Patients 80 years or older at the time of surgery were categorized as octogenarians and were compared to all other PVP patients, labelled as the control group.

**Results:** Among 3648 patients, 586 men were above the age of 80. Compared to the control, octogenarians had larger prostates (76.0 vs. 71.9 ml,  $p=0.02$ ) and a lower BMI (25.6 vs. 26.7,  $p=0.045$ ). They also had higher ASA scores: 61.0% were considered high-medical-risk, i.e., had an ASA of 3 or greater, compared to 22.7% in the control group. Operative time was not significantly longer. The change in outcomes between 80-year-old patients and control patients was not significantly different one-year postoperatively, with the exception of maximum urinary flow (Qmax) that favored younger patients (Table 1). The odds of transfusion were greater for older patients (OR 8.2, 95% CI 3.6–18.9,  $p<0.01$ ), but they were not at increased risk of hematuria. Octogenarians had higher readmission rates (23.0% vs. 11.9%,  $p<0.01$ ).

**Conclusions:** GreenLight PVP is an effective surgical option for treating symptomatic BPH in octogenarians and achieves similar functional outcomes compared to younger patients. The odds of transfusion were higher in patients over 80, but the absolute risk remains low. The 30-day hospital readmission rate was also higher in octogenarians.



**Poster #132. Figure 1.** Change in IPSS, IPSS QoL, Qmax, and PVR for young (black) and elderly (grey) men undergoing Aquablation for LUTS/BPH at 3 years' followup.

**Poster #134****Thulium fiber laser compared to holmium:YAG Laser with Moses technology for enucleation of the prostate: A prospective study***Claudia Deyirmendjian<sup>1</sup>, Malek Meskawi<sup>2</sup>, Naeem Bhojani<sup>3</sup>*<sup>1</sup>Faculty of Medicine, Université de Montréal, Montreal, QC; <sup>2</sup>Department of Surgery, Division of Robotic Urology, Hôpital du Sacré Cœur de Montréal, Montreal, QC; <sup>3</sup>Division of Urology, Centre Hospitalier de l'Université de Montréal (CHUM), Montreal, QC**Introduction:** Holmium laser enucleation of the prostate (HoLEP) is a longstanding surgical treatment for benign prostatic hyperplasia (BPH). The thulium fiber laser is the newest laser currently available, and possibly offers better hemostatic properties; however, there is a paucity of data on outcomes in BPH treatment. This prospective study aims to compare the safety profile, intraoperative, and clinical outcomes between HoLEP with Moses technology (mHoLEP) and thulium fiber laser enucleation of the prostate (TFLEP).**Methods:** Twenty patients have been included in this prospective study after obtaining IRB approval. Two experienced surgeons are involved in this study: one performed 10 mHoLEP procedures, while the other performed 10 TFLEP procedures. Demographic information of patients was collected, as well as intraoperative variables and complications. Statistical analyses were performed on SPSS Statistics version 27.**Results:** TFLEP and mHoLEP patients were similar in age (72.3 vs. 75.4 years, respectively,  $p=0.45$ ) and prostate size (131.3 vs. 123.3 cc, respectively,  $p=0.67$ ). There was no difference in ASA score ( $p=0.50$ ) and anticoagulant usage ( $p=0.54$ ) between both groups. The duration of morcellation was similar in both groups ( $p=0.44$ ). Hemoglobin reduction was similar in mHoLEP compared to TFLEP (18.0 vs. 17.3g/L, respectively,  $p=0.67$ ). Length of hospitalization was comparable in both study arms ( $p=0.16$ ). There was no difference in mean duration ( $p=0.23$ ) or rate ( $p=0.54$ ) of enucleation between both laser modalities. Complications such as urosepsis, readmission, and transfusion did not vary between mHoLEP and TFLEP groups.**Conclusions:** Although preliminary, the results of this study demonstrate similar perioperative and clinical outcomes for TFLEP and mHoLEP. This study is ongoing, with a total recruitment of 50 per arm planned and an anticipated followup period of one year.**Poster #135****Prostatic urethral lift (PUL) in the treatment of obstructive median lobes demonstrates consistent results in controlled trial and real-world settings***Ronald Kaufman<sup>1</sup>, Daniel Rukstalis<sup>2</sup>, Gregg Eure<sup>3</sup>, Christian Gratzke<sup>4</sup>, Claus Roehrborn<sup>5</sup>*<sup>1</sup>Albany Medical College, Albany, NY; <sup>2</sup>Prisma Health USC Medical Group, Columbia, SC; <sup>3</sup>Urology of Virginia, Virginia Beach, VA; <sup>4</sup>University Hospital Freiburg, Freiburg, Germany; <sup>5</sup>UT Southwestern Medical Center, Dallas, TX**Introduction:** Randomized and controlled clinical trials (RTC and CCTs) have established PUL as a safe and effective treatment for BPH-associated LUTS. This comparison serves as the first detailed analysis of RCT, CCT, and real-world outcomes of patients with obstructive median lobes (OML) treated with PUL.**Methods:** Outcomes for subjects treated in controlled PUL studies were compared through 12 months: 36 men in the BPH6 RCT randomized to TURP, 66 men in the L.I.F.T. pivotal RCT with lateral lobe obstruction randomized to sham, and 45 men with OML in MedLift, the FDA-approved IDA extension of the L.I.F.T. trial. MedLift results were compared with 187 OML patients from the large RWR study after filtering according to baseline characteristics to approximate the MedLift population.**Results:** MedLift subjects experienced significantly better improvement in QoL, Qmax, and BPHII at 3 months compared to sham; IPSS improvement was 170% greater for MedLift subjects than sham over the same period. Compared to TURP, MedLift subjects experienced significantly better improvement in IPSS and QoL at 1 and 3 months post-PUL; patients treated with PUL also demonstrated superior ejaculatory function scores at all timepoints after the procedure. MedLift and RWR OML groups were found to have equivalent IPSS, QoL, Qmax, and PVR outcomes at 3, 6, and 12 months post-PUL; RWR OML patients did not experience elevated overall adverse events.**Conclusions:** PUL is an effective, safe treatment for BPH-associated LUTS in patients with or without obstructive median lobes in controlled trial and real-world settings.**Funding:** Neotract, Inc./Teleflex**Poster #136****Perioperative outcomes after laser enucleation of the prostate: Comprehensive analysis of 1693 NSQIP patients***Zafardjan Dalimov<sup>1</sup>, Finn Hennig<sup>2</sup>, Guillaume Farah<sup>2,3</sup>, Ali Houjaij<sup>2,3</sup>, Nader D. Nader<sup>2,4</sup>, Oussama M. Darwish<sup>2,3</sup>*<sup>1</sup>Einstein Healthcare Network, Department of Urology, Philadelphia, PA; <sup>2</sup>Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY; <sup>3</sup>Department of Urology; <sup>4</sup>Departments of Anesthesiology and Surgery**Introduction:** Laser enucleation of the prostate (LEP) is a size-independent surgical treatment option for enlarged prostate with bothersome lower urinary tract symptoms. Recent studies demonstrated increased adoption of LEP for surgical management of benign prostatic hyperplasia. In this study, we aimed to analyze perioperative outcomes of LEP.**Methods:** ACS-NSQIP data was queried for patients who underwent LEP between the January 2015 and December 2017, which identified a total of 1693 patients. Descriptive statistics were used to analyze patient characteristics and perioperative outcomes. Multivariate analysis (MVA) was used to identify variables associated with any complication, return to operative room, and hospital readmission.**Results:** Of the 1693 cohort, only 86 (4.8%) patients experienced postoperative complications within 30 days following LEP (Table 1). Postoperative urinary tract infection (2.9%) and bleeding requiring transfusion (0.9%) were the two most common complications following LEP. On MVA, BMI (OR 1.05, 95% CI 1.01–1.09,  $p=0.008$ ) and increased bleeding risk (OR 5.27, 95% CI 2.53–10.97,  $p<0.001$ ) were associated with 30-day complications (Table 2). Thirty-seven (2.2%) patients required return to OR within 30 days following LEP. The ASA 3 and above (OR 2.26, 95% CI 1.11–4.65,  $p=0.026$ ) and being on dialysis pre-op (OR 11.25, 95% CI 2.16–58.64,  $p=0.004$ ) were associated with return to OR. There were 82 (4.2%) readmissions after the LEP. The non-Caucasian race (OR 1.82, 95% CI 1.08–3.07,  $p=0.026$ ), ASA 3 and above (OR 2.37, 95% CI 1.43–3.92,**Poster #134. Table 1. Functional outcomes**

	Control group (n=3062)	Octogenarians (n=586)	p
IPSS, mean (SD)			
Change at 6 months	16.5 (7.3)	15.9 (8.3)	0.28
Change at 12 months	18.0 (7.4)	17.7 (8.3)	0.62
QoL, mean (SD)			
Change at 6 months	3.5 (1.6)	3.4 (1.5)	0.67
Change at 12 months	3.6 (1.6)	3.7 (1.8)	0.71
PSA, ng/ml, mean (SD)			
Change at 6 months	1.6 (33.8)	1.8 (26.8)	0.95
Change at 12 months	1.6 (18.7)	2.3 (7.4)	0.72
PVR, ml, mean (SD)			
Change at 6 months	-236.8 (312.4)	-314.8 (316.2)	<b>0.02</b>
Change at 12 months	-245.3 (323.7)	-306.5 (286.9)	0.10
Qmax, ml/s, mean (SD)			
Change at 6 months	12.5 (7.1)	9.9 (6.1)	<b>&lt;0.01</b>
Change at 12 months	12.6 (7.0)	10.3 (6.6)	<b>0.02</b>

Boldface print indicates  $p<0.05$ .



$p=0.001$ ), increased bleeding risk (OR 3.26, 95% CI 1.49–7.14,  $p=0.003$ ), and preoperative steroid use (OR 3.27, 95% CI 1.37–7.80,  $p=0.008$ ) were associated with increased risk of readmissions following the LEP.

**Conclusions:** LEP is relatively safe surgical treatment option for enlarged prostate with bothersome lower urinary tract symptoms. Urinary tract infection and bleeding that requires transfusion are most common complications within 30 days. Chronic anticoagulation use or history of bleeding disorders is associated with increased risk of complications and readmissions.

**Poster #136. Table 1. Descriptive analysis of preoperative characteristics and perioperative outcomes of laser enucleation of the prostate from 2015–2017**

	Laser enucleation of the prostate, n=1693
<b>Preoperative patient characteristics</b>	
Age, median [IQR]	69 [63–75]
BMI, median [IQR]	28 [25–32]
Non-Caucasian race, n (%)	285 (17)
ASA 3 and above, n (%)	842 (50)
Emergent procedure, n (%)	5 (0.3)
Comorbidities, n (%)	
Bleeding risk	51 (3.0)
Congestive heart failure <sup>a</sup>	7 (0.4)
Severe COPD	64 (3.8)
Disseminated cancer	10 (0.6)
Diabetes mellitus	318 (19)
Dyspnea <sup>c</sup>	70 (4.1)
End stage renal disease <sup>b</sup>	8 (0.5)
Hypertension	986 (58)
Sepsis <sup>a</sup>	2 (0.1)
Current smoker	161 (9.5)
Functionally dependent	43 (2.5)
Steroid use <sup>d</sup>	44 (2.6)
Weight loss of >10 <sup>*</sup>	3 (0.2)
Transfusion <sup>^</sup>	1 (0.1)
<b>Perioperative outcomes</b>	
Total operative time, min, median [IQR]	94 [59–128]
Length of total hospital stay, days, median [SD]	1 [1–1]
30-day readmission, n (%)	82 (4.8)
Return to operating room, n (%)	37 (2.2)
30-day complications, n(%)	86 (4.8)
Respiratory complications	4 (0.2)
Pulmonary embolism	3 (0.2)
Deep vein thrombosis	5 (0.3)
Acute renal failure	3 (0.2)
Sepsis	8 (0.5)
Bleeding transfusions	15 (0.9)
Cardiovascular complications	8 (0.5)
Urinary tract infections	49 (2.9)

<sup>a</sup>Within 30 days prior to surgery. <sup>b</sup>On dialysis. <sup>c</sup>With mild exertion or more. <sup>d</sup>For chronic condition. <sup>\*</sup>Within last 6 months. <sup>^</sup>Within 48 hrs of surgery.

**Poster #136. Table 2. Multivariate analysis of complications, return to operating room, and readmission**

	OR [95% CI]	p
<b>Any complication</b>		
BMI	1.05 [1.01–1.09]	0.008
Bleeding risk	5.27 [2.53–10.97]	<0.001
<b>Return to operating room</b>		
ASA 3 and above	2.26 [1.11–4.65]	0.026
End-stage renal disease	11.25 [2.16–58.64]	0.004
<b>Readmission</b>		
Non-Caucasian race	1.82 [1.08–3.07]	0.026
ASA 3 and above	2.37 [1.43–3.92]	0.001
Bleeding risk	3.26 [1.49–7.14]	0.003
Steroid use	3.27 [1.37–7.80]	0.008

### Poster #137

#### Most men shift to lower IPSS symptoms severity after treatment with prostatic urethral lift (PUL) in pooled outcomes of over 300 controlled subjects

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**Introduction:** The adoption of minimally invasive surgical techniques (MIST) continues to expand, with 300 patients treated in a controlled trial setting making the prostatic urethral lift (PUL) the most well-studied MIST. This combined analysis of 5 PUL controlled studies examined the proportion of subjects who experienced a decrease in IPSS symptom severity grade from high to low following treatment with PUL, as well as the meta-effect of the procedure.

**Methods:** The following 5 controlled studies of PUL were analyzed: L.I.F.T. (RCT; PUL vs. sham, n=140), sham patients from the LIFT trial who crossed over to treatment with PUL (n=51), MedLift (single-arm OML trial, n=45), BPH6 (RCT; PUL vs. TURP, n=44), and LOCAL (single-arm study of PUL performed in an office setting under local anesthesia, n=51). Outcome measures, including symptom improvement, sexual function, adverse events, and BPH medication usage, and retreatment rates were evaluated through 12 months post-PUL.

**Results:** Baseline characteristics for the 331 subjects treated with PUL across 5 studies were largely similar. Mean IPSS improved at least 11.1 points from baseline at 1, 3, 6, and 12 months post-PUL; Qmax increased by at least 4.3 mL/sec and QoL improved up to 52.8% ( $p<0.01$ ). Sexually active patients (n=266) noted improvements in MSHQ-EjD and SHIM of 30% and 13%, respectively at 12 months post-PUL ( $p<0.01$ ). IPSS response was seen in 79% (261/331) subjects, with 66% moving into a lower IPSS symptom severity grade. Factors associated with a shift in symptom severity included a higher baseline Qmax, lower baseline QoL, and treatment with more implants. Thirty-three percent of void-trial-tested patients required catheterization following the procedure, with a mean catheter duration of 3.7 days. Most AEs resolved within 2 weeks after the procedure and were mild to moderate in severity. Seven subjects required BPH medication through 12 months post-PUL; 15 subjects underwent surgical retreatment.

**Conclusions:** PUL facilitates a shift from higher to lower IPSS symptom severity grade in this comprehensive analysis of controlled trial PUL subjects.

**Funding:** Neotract Inc./Teleflex

**Poster #138****A comparative propensity score-matched analysis of perioperative outcomes of laser enucleation vs. simple prostatectomy for BPH: Will approach affect morbidity and mortality post-prostatectomy?**Oussama M. Darwish<sup>1,2</sup>, Zafardjan Dalimov<sup>3</sup>, Ellen Lutnick<sup>1</sup>, Ali Houjaij<sup>1,2</sup>, Finn Hennig<sup>1</sup>, Nader D. Nader<sup>1,4</sup><sup>1</sup>Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY; <sup>2</sup>Department of Urology, Buffalo, NY; <sup>3</sup>Einstein Healthcare Network, Department of Urology, Philadelphia, PA; <sup>4</sup>Departments of Anesthesiology and Surgery, Buffalo, NY**Introduction:** Open simple prostatectomy (SP) and laser enucleation of the prostate (LEP) remain recommended surgical treatment options for the large prostates with bothersome lower urinary tract symptoms. LEP offers endoscopic approach for simple prostatectomy. In this study, we aimed to assess perioperative outcomes of SP vs LEP.**Methods:** ACS-NSQIP data was queried for patients who underwent SP and LEP between January 2015 and December 2017. A total of 2321 patients were identified, of which 628 underwent SP and 1693 underwent LEP. After propensity score (1:1) matching for all confounding variables, LEP was compared to SP for operative time, perioperative complications, blood transfusions, risk of mortality and morbidity, and total length of stay. Chi-squared and t-tests were used for statistical analysis for categorical and continuous variables, respectively.**Results:** LEP patients had fewer overall complications (4.1% vs. 25.8%,  $p<0.001$ ). They experienced fewer respiratory complications (0.2% vs. 1.5%,  $p=0.021$ ), pulmonary embolisms (0.3% vs. 2%,  $p=0.012$ ), acute renal failures (0.2% vs. 1.4%,  $p=0.038$ ), urinary tract infections (2.6% vs. 4.9%,  $p=0.045$ ), and sepsis (2.7% vs. 6.7%,  $p=0.002$ ). There was no significant difference in cardiac complications. LEP patients required less perioperative blood transfusions (0.7% vs. 14.8%,  $p<0.001$ ) and had shorter hospital stay (1.2 days vs. 4 days,  $p<0.001$ ). NSQIP estimated probability of mortality (0.2% vs. 0.3%,  $p<0.001$ ) and morbidity (3% vs. 9.2%,  $p<0.001$ ) were lower for LEP (Tables 1, 2).**Conclusions:** LEP is associated with fewer complications, shorter hospital stay, and lower risk of morbidity and mortality after surgical treatment of enlarged prostate with bothersome lower urinary tract symptoms.**Poster #139****Holmium laser enucleation of the prostate (HoLEP) vs. simple prostatectomy: A cost analysis and comparison of practice trends**Matthew Beamer<sup>1</sup>, Valmic Patel<sup>2</sup>, Michael Iorga<sup>1</sup>, Thomas Sanford<sup>1</sup>, Scott Wiener<sup>1</sup><sup>1</sup>Department of Urology, SUNY Upstate Medical University, Syracuse, NY; <sup>2</sup>Norton College of Medicine, SUNY Upstate Medical University, Syracuse, NY**Introduction:** Holmium laser enucleation of the prostate (HoLEP) and simple prostatectomy (SP) are both surgical BPH treatment options for large-volume prostates (>80 ml). While multiple publications compare these two procedures, there is limited data available analyzing costs. Here we present current practice trends and a cost analysis, comparing these procedures on a national level.**Methods:** The Healthcare Cost and Utilization Project National Inpatient Sample and Nationwide Ambulatory Surgery Sample databases from the year 2018 were queried. CPT codes and ICD-10PCS codes were used to identify patients undergoing HoLEP or SP. Data was examined to compare practice settings, total cost, and payer information. Categorical data was compared with Chi-squared test. Continuous data was compared with Mann-Whitney U/Krystal-Wallis. Nonparametric ANCOVA with post-hoc Mann-Whitney U was used to further evaluate cost in relation to demographic and practice data. SPSS version 28 was used for all statistical analysis.**Results:** More HoLEPs (5782) were performed than SP (973). Most procedures were performed at teaching institutions (HoLEP 76.7%; SP 80.0%). Medicare was the primary payer for both procedures (HoLEP 66.3%; SP 64.3%). Most HoLEP procedures were completed in the outpatient setting (87.8%), while most SPs were performed in the inpatient setting (94.3%),**Poster #138. Table 1. Pre- and post-propensity score matching characteristics of patients undergoing laser enucleation of the prostate and open simple prostatectomy**

	Pre-propensity score matching			Post-propensity score matching		
	Laser enucleation of the prostate n=1693	Open simple prostatectomy n=628	p	Laser enucleation of the prostate n=586	Open simple prostatectomy n=586	p
Age, mean [SD]	69 [9.0]	69 [7.9]	0.002	69 [9.4]	70 [8.0]	0.02
Non-Caucasian race, n (%)	229 (14)	188 (31)	<0.001	174 (30)	177 (30)	0.8
Elective surgery, n (%)	1632 (96)	583 (93)	<0.001	551 (94)	552 (94)	1.0
ASA 3 and above, n (%)	841 (50)	314 (50)	0.9	309 (53)	290 (49.5)	0.2
Comorbidities, n (%)						
Bleeding disorders	51 (3.0)	7 (1.1)	0.007	7 (1.2)	7 (1.2)	1
Congestive heart failure <sup>a</sup>	7 (0.4)	1 (0.2)	0.7	2 (0.3)	1 (0.2)	1
Severe COPD	64 (3.8)	18 (2.9)	0.3	16 (2.7)	16 (2.7)	1
Disseminated cancer	10 (0.6)	2 (0.3)	0.5	4 (0.7)	1 (0.2)	0.4
Diabetes mellitus	318 (19)	124 (20)	0.6	111 (19)	112 (19)	0.9
Dyspnea <sup>c</sup>	70 (4.1)	16 (2.4)	1	22 (3.7)	15 (2.6)	0.2
End-stage renal disease <sup>b</sup>	8 (0.5)	3 (0.5)	1	3 (0.5)	2 (0.3)	1
Hypertension	986 (58)	365 (58)	1	344 (59)	340 (58)	0.9
Sepsis <sup>a</sup>	2 (0.1)	1 (0.2)	1	1 (0.2)	1 (0.2)	1
Current smoker	161 (9.5)	56 (8.9)	0.7	57 (9.7)	55 (9.4)	0.9
Functionally dependent	43 (2.5)	15 (2.4)	1	16 (2.7)	12 (2.0)	0.6
Steroid use <sup>d</sup>	44 (2.6)	3 (0.5)	0.001	3 (0.5)	3 (0.5)	1
Weight loss of >10*	3 (0.2)	3 (0.5)	0.4	1 (0.2)	2 (0.3)	1

<sup>a</sup>Within 30 days prior to surgery. <sup>b</sup>On dialysis. <sup>c</sup>With mild exertion or more. <sup>d</sup>For chronic condition. \*Within last 6 months.

$p < 0.001$ ). Median length of stay was longer for SP (HoLEP 0, IQR 0; SP 3, IQR 2–4,  $p < 0.001$ ). The median cost for HoLEP was \$26 689 (IQR \$19 292–35 491) and SP was \$51 250 (IQR \$34 683–82 979,  $p < 0.001$ ). Payer type did not significantly affect cost. Median cost of inpatient procedures (HoLEP \$43 303, IQR \$30 124–69 237; SP \$52 351, IQR \$35 337–84,079) was higher than outpatient procedures (HoLEP \$25 568, IQR \$18 755–32 963; SP \$35 108, IQR \$26 108–59,586,  $p < 0.001$ ); however, even when inpatient status was controlled for, SP remained more expensive ( $p < 0.001$ ). HoLEPs were least commonly performed in the West (Northeast 20.3%, Midwest 38.9%, South-37.6%, West 3.2%). HoLEPs were also most expensive in the West (\$43 960, IQR \$29 848–69 924,  $p < 0.001$ ) and had a significantly longer median hospital stay (2, IQR 0–3,  $p < 0.001$ ).

**Conclusions:** HoLEPs were performed more frequently and were significantly less expensive than SP. Most HoLEP procedures were completed as an outpatient procedure, while SP was more commonly an inpatient procedure; however, SP remained more costly even when inpatient status was controlled for. A regional analysis suggests that HoLEPs performed at low-volume centers are more costly and have longer hospital stays. HoLEP should be considered a cost-effective alternative to SP and referral to high-volume centers may be considered.

**Poster #138. Table 2. Perioperative outcomes of laser enucleation of the prostate and open simple prostatectomy**

	Laser enucleation of the prostate n=586	Open simple prostatectomy n=586	p
30-day mortality, n (%)	0	0	-
30-day complications, n (%)	24 (4.1)	151 (25.8)	<b>&lt;0.001</b>
Respiratory complications	1 (0.2)	9 (1.5)	<b>0.021</b>
Pulmonary embolism	2 (0.3)	12 (2.0)	<b>0.012</b>
Acute renal failure	1 (0.2)	8 (1.4)	<b>0.038</b>
Sepsis	16 (2.7)	39 (6.7)	<b>0.002</b>
Bleeding transfusions	4 (0.7)	87 (14.8)	<b>&lt;0.001</b>
Cardiac complications	0	3 (0.5)	0.2
Urinary tract Infections	15 (2.6)	29 (4.9)	<b>0.045</b>
Total operative time, min [SD]	96 [54]	141 [65]	<b>&lt;0.001</b>
Length of total hospital stay, days [SD]	1.2 [21]	4.0 [3.4]	<b>&lt;0.001</b>
Estimated probability of mortality, mean [SD]	0.002 [0.004]	0.003 [0.006]	<b>&lt;0.001</b>
Estimated probability of morbidity, mean [SD]	0.030 [0.016]	0.092 [0.034]	<b>&lt;0.001</b>

## Poster #140

### Collagenase clostridium histolyticum for Peyronie's disease: No need to postpone, but no need to rush

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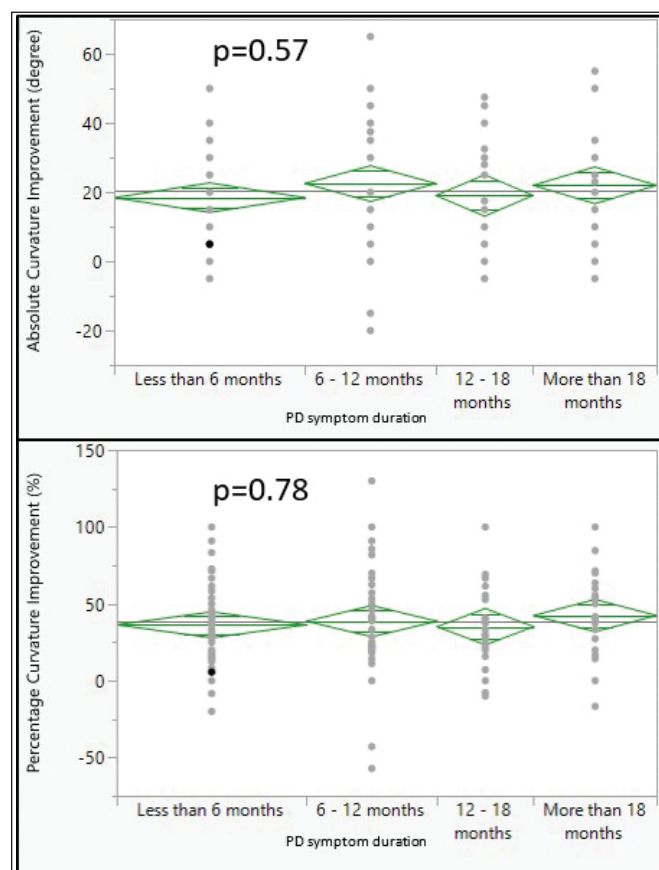
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**Introduction:** There is no agreed-upon definition for acute/chronic phases of Peyronie's disease (PD). Collagenase clostridium histolyticum (CCH) is the only FDA-approved treatment for PD, but original phase 3 trials included patients with symptom duration >12 months ("chronic phase"). Here, we sought to evaluate the influence of time between symptom onset and starting CCH on treatment outcomes.

**Methods:** Men receiving CCH from 2014–2021 were included in an IRB-approved database. Pertinent data was reviewed, including demographics and curvature assessments. Duration between symptom onset and starting treatment with CCH was assessed to determine if time from symptom onset to treatment impacted objective outcomes.

**Results:** A total of 145 patients completed the full series of 8 injections and had complete data for review. Mean baseline curvature 53.2° (SD 18). Mean time between symptom onset and CCH was 14.8 months (SD 18). Mean absolute and percentage improvements were 20.3° (SD 16) and 39.4% (SD 35). Symptom duration did not significantly impact curvature improvement (Figure 1). Similarly, symptom duration did not significantly impact the risk for CCH-related side effects.

**Conclusions:** The time between symptom onset and treatment did not significantly impact outcomes with CCH. Our findings support the utility of using CCH early in the course of PD, and also emphasize the opportunity to delay if necessary without compromising efficacy.



Poster #140. Figure 1.