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ROBOT-ASSISTED RADICAL PROSTATECTOMY WITH DA VINCI XI- OUR INITIAL EXPERIENCE

Introduction: The last two decades have seen a dramatic change in the surgical treatment of most urological diseases with the advent of robotic surgical platforms. Technical improvements over the years have led to improved results in terms of oncological and functional outcomes. In fact, surgical treatment of prostate cancer has undergone the most dramatic change, with most cases now performed with a robot. Robotic surgery is also used for the surgical treatment of bladder cancer, kidney cancer, ureteral reconstruction, and other benign conditions. With the accumulation of additional experience and the realization of longer-term results, robotic surgery plays a growing role in the surgical treatment of many urological conditions.

In this abstract, we report our initial experience with the use of the da Vinci Xi system in prostate cancer.

Material and Methods: For the period from 01.01.2020 to 01.05.2021, 137 robot-assisted radical prostatectomies were performed in our clinic on patients with prostate cancer.

Results: All patients were operated on with the da Vinci Xi robotic system. The operations were performed transperitoneally using 6 ports, 4 for the robot and 2 for the assistant. The average operative time for the performed operations was 160 minutes, with minimal blood loss. In two patients we performed transfusion, no conversion of operations was required in other patients. About half of the patients underwent extended pelvic lymph node dissection due to the high risk of the patients.

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Conclusion: The Da Vinci robotic system achieves a minimally invasive technique with the lowest levels of trauma and postoperative pain. Recovery is significantly faster than with open surgery, and patients can return to their normal routine as soon as possible.

Keywords: Robotic surgery, oncological, functional, robotic surgical platform

Introduction

Prostate cancer is the most common cancer in men and second leading cause of cancer-related deaths (C. J. Magnani *et al*., 2021). It represents the most frequent cancer diagnosed in men in Germany and Europe (N. Westhoff *et al*., 2021).

According to the International Agency for Research on Cancer GLOBOCAN, which provides cancer statistics for the year 2020 from 185 countries or territories worldwide and is based on the best available data of cancer incidence from population-based cancer registries, prostate cancer, with an incidence rate of 1,41 comes in second after lung cancer with an incidence rate of 2,21 (J. Ferlay *et al.*, 2021).

According to an update on the global cancer burden using the GLOBOCAN 2020, estimates of cancer incidence produced by the International Agency for Research on Cancer, there are 1,414,259 newly-diagnosed prostate cancer cases or 7.3% of all estimated 19,292,789 new cancer cases in 185 countries worldwide (H. Sung *et al.*, 2021). Efforts to build a sustainable infrastructure for the dissemination of cancer prevention measures and provision of cancer care in transitioning countries is critical for global cancer control.

The most recent annual dynamics of age-adjusted (world standard) incidence rates per 100,000 by year of prostate cancer diagnosis in Bulgaria is illustrated in Fig. 1 (Cancer Incidence in Bulgaria, 2017). After a stable increase until 2012, there is a decrease in the subsequent years, based on available information.

Figure 1 – Annual dynamics of age-adjusted (world standard) incidence rates per 100,000 by year of prostate cancer diagnosis in Bulgaria

According to an update on the global cancer burden using the GLOBOCAN 2020, estimates of cancer mortality rates, produced by the World Health Organization mortality database with information from 185 countries or territories worldwide, there are a total of 375,304 deaths of prostate cancer and 3.8% of all estimated 9,958,133 cancer deaths in 185 countries worldwide (H. Sung *et al.*, 2021).

The most recent annual dynamics of age-adjusted (world standard) mortality rates per 100,000 by year of prostate cancer diagnosis in Bulgaria is illustrated in Fig. 2 (Cancer Incidence in Bulgaria, 2017). It remains relatively high during the last five years of registration available.

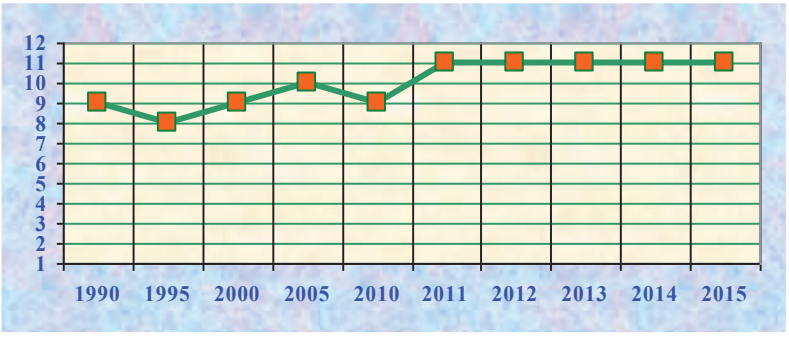

Figure 2 –. Annual dynamics of age-adjusted (world standard) mortality rates per 100,000 by year of prostate cancer diagnosis in Bulgaria

In the past, the European and American societies have not recommended prostate cancer screening with a prostate specific antigen, allowing physicians to make this decision themselves (C. Juliá-Romero *et al.*, 2021). In 2012, the American United States Preventive Task Force recommended to abandon the use of the prostate-specific antigen. This resulted in an increased incidence rate of the metastatic prostate cancer and its mortality rate as well. For the first time in 2018, the European Association of Urology released new recommendations in favour of screening, based on the prostate-specific antigen. In 2019, guidelines were updated with no changes in their recommendations.

Results of the largest screening trials reveal that prostate-specific antigen testing reduces the incidence rate of locally advanced and metastatic prostate cancer and shows an effect on cancer-specific mortality as well (N. Westhoff *et al*., 2021). Early diagnosis results in overdiagnosis and overtreatment of insignificant cancer cases with comorbidity, and thus a more individualized and risk-tailored modern strategy is needed. The German Federal Joint Committee declines the financial coverage of this testing by health insurance firms. Available validated instruments should accompany the baseline prostate-specific antigen to optimize detection of clinically significant prostate cancer.

Changes in screening guidelines, adoption of active surveillance, and implementation of high-cost technologies have changed treatment costs of prostate cancer.

The real-world costs of first-line prostate cancer management over 24 or 60 months following diagnosis using clinical electronic health records for 2008-2018 linked with the California Cancer Registry and the Medicare Fee Schedule are assessed in C. J. Magnani *et al*. (2021). In 3433 patients, surgery (54.6% of cases) is more common than radiation (22.3% of cases) or active surveillance (in 23% of cases). Two years following diagnosis, active surveillance ($2.97 per day) is cheaper than surgery ($5.67 per day) or radiation ($0.34 per day) in a favourable disease, while surgery ($7.17 per day) is less expensive than radiation ($16.34 per day) for unfavourable prostate cancer.

The health care costs and use one year after open radical prostatectomy (in 9853 patients) and robotic-assisted radical prostatectomy (in 1604 patients) are comparatively assessed within a retrospective cohort study of a US commercial claims database from January 1, 2013, to December 31, 2018 (K. E. Okhawere *et al*., 2021). The patients with robotic-assisted radical prostatectomy have a statistically significantly higher cost at the index hospitalization ($p<0.001$) but similar total cumulative costs observed within 180 days and one year after discharge. In these patients, one-year post discharge health care use is statistically significantly lower for mean numbers of emergency department visits ($p<0.001$) and hospital outpatient visits as well visits ($p<0.001$). The reduced use of health care services among these patients translates into additional savings of $2,929 ($p<0.001$) and approximately 1.69 fewer days ($p<0.001$) missed from work for health care visits.

Robot-assisted radical prostatectomy (RARP) is indicated for men with prostate cancer with an acceptable lifetime expectancy. Historically, the primary indication for RARP has been localized disease, but there has been recent evidence that men with non-localized disease will likely experience significant improvement in survival and, as such, are an indication as long as a complete discussion of risks, benefits, and complications has been completed. Contraindications that may impact the decision for RARP include a history of extensive abdominal or pelvic surgery, morbid obesity, or extremely large prostates.

Materials and methods

For the period from 01.01.2020 to 01.05.2021, 137 robot-assisted radical prostatectomies were performed in our clinic on patients with prostate cancer.

Clinicodemographic information of our patient cohort is presented in Table 1.

n = 137	
Median age, yrs.(range)	62(50-78)
PSA ng/ml, n% <5 5-10 >10	 17(12.4) 97(71) 23(16.5)
Median BMI kg/m^2 (range)	22.65 (18.14- 30.08)
ASA score, n (%) 1 2 3 4	 37 (27%) 70 (51%) 15 (11%) 15 (11%)
Previous abdominal or pelvic surgery, n. Repair of bowel perforation Herniorrhaphy Laparoscopic cholecystectomy	 12 14 9
IIEF-5, n (%) 22-25 15-21	 92 (67%) 24 (17.5%)
pGScore, n (%) 3+3 3+4 4+3 4+4 3+5 >4+5	 48(35%) 31(23%) 30 (22%) 18 (13%) 2 (0.8%) 8 (21.2%)
P- stage, n (%) pT2 pT3/T4	 98 (71.5%) 49 (28.5%)

All patients were operated with the robotic da Vinci Xi system. The operations were performed transperitoneally using 6 ports, 4 for the robot and 2 for the assistant. (Fig.1).

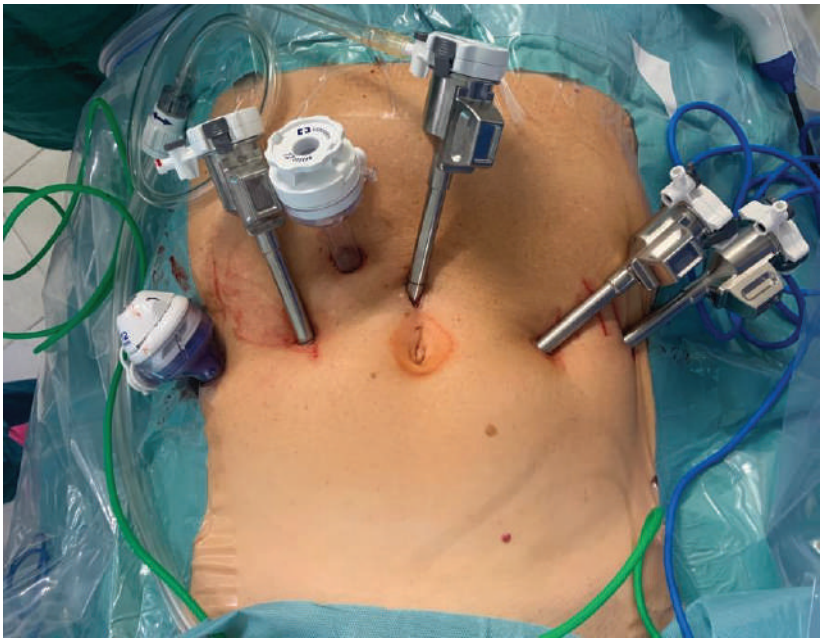

Fig. 1 – Patient position and port placement

All procedures are performed under general anaesthesia. After the patient is prepped and draped and a standard "time-out" completed, a Foley catheter is gently placed. Next, a Veress needle is placed in Palmer's point in the left upper quadrant. Once the needle reaches the peritoneal cavity, carbon dioxide is pumped into the abdomen via tubing from an insufflator, creating a pneumoperitoneum at 20 mm Hg. As the pressure slowly rises to 20, the port sites are prepared. Once at 20 mm Hg, the first port, the camera port is placed through a transverse incision just above the navel followed by the remaining five ports all under direct vision. Once all ports are positioned, AirSeal is installed and activated and the pneumoperitoneum is reduced to 10 mm Hg for the procedure, and in some cases to 8 mm Hg. Patients are then positioned in the Trendelenburg position, allowing gravity to gently pull the abdominal contents out of the pelvis, facilitating access to the bladder and prostate, and reducing the risk of injury to abdominal organs.

The legs are separated to facilitate docking of the da Vinci robot. Once the patient is positioned, the robot is docked.

The main Surgical Steps are:

1. Releasing the bladder
2. Endopelvic fascia
3. Anterior and posterior bladder neck
4. Seminal vesicles and rectum
5. "Clipless" transection of the prostatic pedicles and the NVBs
6. DVC and urethral transection
7. Rocco and Van Velthoven anastomosis

Results

The average operative time for the performed operations was 160 minutes, with minimal blood loss. In two patients we performed transfusion, no conversion of operations was required in other patients. About half of the patients underwent extended pelvic lymph node dissection due to the high risk of the patients.

Discussion

A. Nathan *et al*. (2021) state that robot-assisted radical prostatectomy is associated with fewer intraoperative adverse events, reduced blood loss and lower complication rates in localized prostate cancer patients than open and laparoscopic surgery but delivers comparable oncological and functional outcomes. The use of enhanced recovery after surgery pathways improves patient's recovery and experience, reduces costs and maintains patient's safety. New recommendations to reduce unnecessary postoperative blood tests are suggested.

According to E.F. Faria *et al*. (2021), robot-assisted radical prostatectomy for localized/locally advanced prostate cancer is comparable to open radical prostatectomy in terms of cancer control and complication rates while new evidence suggests that the robot-assisted radical prostatectomy

may have better functional outcomes, especially with respect to patient's urinary incontinence and erectile dysfunction.

The differences in perioperative characteristics, surgical complications as well as in oncological and functional control between the extraperitoneal and transperitoneal robot-assisted radical prostatectomy are evaluated using contemporary systematic review and meta-analysis of a total of 16 studies including 3,897 prostate cancer patients (M. Uy *et al*., 2021). The extraperitoneal robot-assisted radical prostatectomy offers faster operative time (mean difference of 14.4 min.); shorter postoperative stay length (mean difference of 0.9 days) as well as decreased postoperative ileus rates (relative risk of 0.2; between 0.1 and 0.7 at a confidence interval of 95%) and inguinal hernia formation (relative risk of 0.2; between 0.1 and 0.5 at a confidence interval of 95%).

J. U. Stolzenburg *et al*., (2021) compare a multicentre, randomized, patient-blinded controlled trial in Germany, focusing on the functional and oncological outcomes between robot-assisted and laparoscopic radical prostatectomy at a follow-up of 3 months of 718 prostate cancer patients. The difference in continence rates is 8.7% in favour of robot-assisted radical prostatectomy (54% versus 46%; p=0.027). Robot-assisted radical prostatectomy remains superior to the laparoscopic radical prostatectomy even after adjustment for the randomization stratum nerve sparing and age >65 years (hazard ratio of 1.40; between 1.09 and 1.81; p=0.008). A significant benefit in early potency recovery is also identified.

Within a prospective, single-center, single-surgeon cohort of 70 consecutive prostate cancer patients undergoing robot-assisted radical prostatectomy between January and December 2019, 35 patients operated on with the urethral fixation technique in which the urethral stump is fixed to the dorsal median raphe posteriorly and to the medial portion of the *m. levator ani* posterolaterally are compared with a control group of 35 patients receiving standard vesicourethral anastomosis only (V. Ficarra *et al*., 2021). There is urinary continence recovery at three months after catheter removal in 34 patients (in 97.14%) in group one and in 28 patients (in 80% of the cases) in the control group (p=0.02). The patients in group one report statistically significantly higher urinary continence rates even at one week

and one month after catheter removal than those in the control group (68.6% versus 45.7%; p=0.04 and 80% versus 54.3%; p=0.04, respectively). Ninety-day postoperative complications are observed in one patient in group one (in 2.86%) and in four patients (in 11.43% of the cases) in the control group.

The anatomy and concepts of the nerve-sparing radical prostatectomy are first conceptualized by P. C. Walsh & P. J. Donker in 1982. These authors conclude that impotence after radical prostatectomy results from injury to the pelvic nerve plexus that provides autonomic innervation to the corpora cavernosa (P. C. Walsh & P. J. Donker, 2017). The various mechanisms of injury to the neurovascular bundle lying in proximity to the prostate have further compounded the concept of nerve-sparing in radical prostatectomy.

The nerve-sparing techniques can be intrafascial or interfascial based on fascial dissections as well as antegrade or retrograde based on the surgical approach (A. Kumar *et al*., 2021).

A. Kumar *et al*. (2021) list the following nerve-sparing techniques: veil of Aphrodite technique (high anterior release), super veil technique, early retrograde release, hypothermic nerve-sparing robot-assisted laparoscopic prostatectomy, modified clipless antegrade nerve-sparing robot-assisted laparoscopic prostatectomy, flexible carbon dioxide laser fibre guided nerve-sparing robot-assisted laparoscopic prostatectomy, potassium titanyl phosphate laser nerve-sparing radical prostatectomy, laparoscopic Doppler ultrasound probe in nerve-sparing robot-assisted laparoscopic prostatectomy, and transrectal ultrasound-guided energy-free nerve-sparing laparoscopic radical prostatectomy.

A. Kumar *et al*. (2021) review the introduction of nerve-sparing to standard robot-assisted radical prostatectomy, which has positive results in terms of functional outcomes in addition to the oncological outcomes. A. Kumar *et al*. (2021) also review the current perspectives of nerve-sparing robot-assisted radical prostatectomy in terms of applied anatomy of the prostatic fascial planes, the neurovascular bundle, various nerve-sparing techniques and postoperative functional outcomes. Variables such as preoperative risk assessments, baseline potency, surgical anatomy of individual patients and surgeons' expertise play a major role in the outcomes. A tailored approach for each patient is required for applying the nerve-sparing approach during robot-assisted radical prostatectomy.

E. A. Sokolov *et al*. (2021) compare the efficacy and safety of unilateral or bilateral nerve-saving technique of radical prostatectomy between 117 prostate cancer patients aged ≥65 years and with 333 control patients from January 2012 to December 2019. There are minimal differences between both groups in erectile function 24 months after radical prostatectomy with bilateral nerve-saving technique (84.2% towards 87.9%), and more relevant differences with unilateral nerve-saving technique (53.8% towards 66.7%) (p=0.033). The performance of radical prostatectomy with nerve-saving technique in elderly patients is not associated with additional oncological risks. The bilateral nerve-saving technique provides high potency recovery results regardless of age.

Conclusion

RARP has shown to be an easily acquired laparoscopic technique, with shorter learning curves that rival the open procedure as best practice. We have witnessed a paradigm shift from open to robotic radical prostatectomy as the procedure of choice worldwide. When compared with the open approach, early studies indicate that robotic prostatectomy has equal outcomes in short-term oncologic control, continence, and potency with potentially favourable perioperative outcomes such as blood loss and transfusion rates, minor complications, narcotic use, convalescence, and length of hospital stay. Initial long-term oncologic and quality-of-life outcomes have also demonstrated similar outcomes to open radical prostatectomy.

REFERENCES

1. Al-Monajjed R, Arsov C, Albers P. Risikoadaptierte Früherkennung des Prostatakarzinoms - Update 2021. Urologe A. 2021 Apr 1. doi: 10.1007/s00120-021-01505-9.
2. Alves MR, Galvão ND, Souza RAG, Andrade ACS, Oliveira JCS, Souza BDSN, Azevedo EFS. Spatial and temporal distribution of cancer mortality in a Brazilian Legal Amazon State between 2000 and 2015. Rev Bras Epidemiol. 2021; 24(suppl 1): e210009.

3. Atere-Roberts J, Gray SC, Hall IJ, Smith JL. Racial and ethnic disparities in health status, chronic conditions, and behavioral risk factors among prostate cancer survivors, United States, 2015. Prev Chronic Dis. 2021 Apr 22; 18: E39. doi: 10.5888/pcd18.200523.
4. Bosland MC, Nettey OS, Phillips AA, Anunobi CC, Akinloye O, Ekanem IA, Bassey IE, Mehta V, Macias V, van der Kwast TH, Murphy AB. Prevalence of prostate cancer at autopsy in Nigeria - A preliminary report. Prostate. 2021 Apr 27. doi: 10.1002/pros.24133.
5. Bygrave A, Whittaker K, Paul C, Fradgley EA, Varlow M, Aranda S. Australian experiences of out-of-pocket costs and financial burden following a cancer diagnosis: a systematic review. Int J Environ Res Public Health. 2021 Mar 2; 18(5): 2422. doi: 10.3390/ijerph18052422.
6. Callender T, Emberton M, Morris S, Pharoah PDP, Pashayan N. Benefit, harm, and cost-effectiveness associated with magnetic resonance imaging before biopsy in age-based and risk-stratified screening for prostate cancer. JAMA Netw Open. 2021 Mar 1; 4(3): e2037657.
doi: 10.1001/jamanetworkopen.2020.37657.
7. Cancer Incidence in Bulgaria, 2014 & 2015. Sofia, National Oncological Hospital and Bulgarian National Cancer Registry, 2017. Vol. 25.
8. Choi HG, Bang WJ, Jo JK, Oh CY, Shim M, Cho JS. The association between family history of prostate cancer and development of prostate cancer among Korean population: A prospective cohort study using KoGES data. Medicine (Baltimore). 2021 Feb 19; 100(7): e24757.
doi: 10.1097/MD.0000000000024757.
9. Coughlin SS, Ayyala DN Luque JS, Moore JX. Predictors of prostate cancer screening among African American men treated at an Academic Medical Center in the Southern United States. Curr Cancer Rep. 2021; 3(1): 81-94.
10. de Oliveira RAR, Guimarães GC, Mourão TC, Favaretto RL, Santana TBM, Lopes A, Zequi SC. Prostate cancer screening in Brazil: a single center experience in the public health system. Int Braz J Urol. 2021; 47(3): 558-565.
11. Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Piñeros M, Znaor A, Bray F. Cancer statistics for the year 2020: An overview. Int J Cancer. 2021 Apr 5. doi: 10.1002/ijc.33588.
12. Georgantopoulos P, Eberth JM, Cai B, Rao G, Bennett CL, Emrich CT, Haddock KS, Hébert JR. A spatial assessment of prostate cancer mortality-to-incidence ratios among South Carolina veterans: 1999-2015. Ann Epidemiol. 2021 Apr 6:S1047-2797(21)00054-5.
doi: 10.1016/j.annepidem.2021.03.010.

13. Gutiérrez-Pérez MI, González-Sagrado M, Conde-Vicente R, Amón-Sesmero JH. Influence of the diagnostic protocol and age on the prostate cancer incidence rate in Castilla y León according to the national registry 2010. Actas Urol Esp. 2021 Feb 17:S0210-4806(21)00005-X.
doi: 10.1016/j.acuro.2020.11.007.
14. Hamano T, Li X, Sundquist J, Sundquist K. Neighborhood social capital and incidence and mortality of prostate cancer: a Swedish cohort study. Aging Clin Exp Res. 2021 Apr 22. doi: 10.1007/s40520-021-01852-9.
15. Hippisley-Cox J, Coupland C. Predicting the risk of prostate cancer in asymptomatic men: a cohort study to develop and validate. Br J Gen Pract. 2021; 71(706): e364-e371.
16. Huynh-Le MP, Karunamuni R, Fan CC, Thompson WK, Muir K, Lophatananon A, Tye K, Wolk A, Håkansson N, Mills IG, Andreassen OA, Dale AM, et al.; PRACTICAL Consortium. Common genetic and clinical risk factors: association with fatal prostate cancer in the cohort of Swedish men. Prostate Cancer Prostatic Dis. 2021 Mar 15.
doi: 10.1038/s41391-021-00341-4.
17. Ibarrondo O, Lizeaga G, Martínez-Llorente JM, Larrañaga I, Soto-Gordoa M, Álvarez-López I. Health care costs of breast, prostate, colorectal and lung cancer care by clinical stage and cost component. Gac Sanit. 2021 Feb 18:S0213-9111(21)00009-1. doi: 10.1016/j.gaceta.2020.12.035.
18. Ikeda S, Sobue T, Kitamura T, Ishihara J, Kotemori A, Zha L, Liu R, Sawada N, Iwasaki M, Tsugane S, On behalf of the JPHC Study Group. Dietary acrylamide intake and the risks of renal cell, prostate, and bladder cancers: a Japan Public Health Center-Based prospective study. Nutrients. 2021 Feb 27;13(3):780. doi: 10.3390/nu13030780.
19. Iyer HS, Gomez SL, Chen JT, Trinh QD, Rebbeck TR. Trends in mortality among Black and White men with prostate cancer in Massachusetts and Pennsylvania: race and neighborhood socioeconomic position. Cancer. 2021 Apr 2. doi: 10.1002/cncr.33506.
20. Jochems SHJ, Wood AM, Häggström C, Orho-Melander M, Stattin P, Stocks T. Waist circumference and a body shape index and prostate cancer risk and mortality. Cancer Med. 2021; 10(8): 2885-2896.
21. Juliá-Romero C, Rechi-Sierra K, Juan-Escudero JU. Nuevas recomendaciones en el screening de cáncer de próstata mediante PSA. Semergen. 2021 Apr 7:S1138-3593(21)00062-9. doi: 10.1016/j.semerg.2020.12.009.
22. Karlsson AA, Hao S, Jauhiainen A, Elfström KM, Egevad L, Nordström T, Heintz E, Clements MS. The cost-effectiveness of prostate cancer scre-

ening using the Stockholm3 test. PLoS One. 2021 Feb 25; 16(2): e0246674. doi: 10.1371/journal.pone.0246674.

23. Lagacé F, Ghazawi FM, Le M, Savin E, Zubarev A, Powell M, Moreau L, Sasseville D, Popa I, Litvinov IV. Incidence and mortality of prostate cancer in Canada during 1992-2010. Curr Oncol. 2021; 28(1): 978-990.
24. Laroche E, L'Espérance S. Cancer incidence and mortality among firefighters: an overview of epidemiologic systematic reviews. Int J Environ Res Public Health. 2021 Mar 3; 18(5): 2519. doi: 10.3390/ijerph18052519.
25. Lécuyer L, Victor Bala A, Demidem A, Rossary A, Bouchemal N, Triba MN, Galan P, Hercberg S, Partula V, Srour B, Latino-Martel P, Kesse-Guyot E, et al. NMR metabolomic profiles associated with long-term risk of prostate cancer. Metabolomics. 2021 Mar 11; 17(3): 32.
doi: 10.1007/s11306-021-01780-9.
26. Lee EJ, Suh JD, Cho JH. The incidence of prostate cancer is increased in patients with obstructive sleep apnea: Results from the national insurance claim data 2007-2014. Medicine (Baltimore). 2021 Feb 12; 100(6): e24659. doi: 10.1097/MD.0000000000024659.
27. Lima CA, da Silva BEB, Hora EC, Lima MS, Brito EAC, Santos MO, da Silva AM, Nunes MAP, Brito HLF, Lima MMM. Trends in prostate cancer incidence and mortality to monitor control policies in a northeastern Brazilian state. PLoS One. 2021 Mar 25;16(3):e0249009.
doi: 10.1371/journal.pone.0249009.
28. Magnani CJ, Bievre N, Baker LC, Brooks JD, Blayney DW, Hernandez-Boussard T. Real-world evidence to estimate prostate cancer costs for first-line treatment or active surveillance. Eur Urol Open Sci. 2021; 23: 20-29.
29. Meissner VH, Jahnen M, Herkommer K. Familiäres Prostatakarzinom und genetische Prädisposition. Urologe A. 2021 Mar 15. doi: 10.1007/s00120-021-01491-y.
30. Michaeli T, Michaeli D. Prostate cancer follow-up costs in Germany from 2000 to 2015. J Cancer Surviv. 2021 Mar 1. doi: 10.1007/s11764-021-01006-w.
31. Ngcamphalala C, Ostensson E, Hlongwa M, Ginindza TG. Mapping evidence on the distribution of the costs associated with cancer of prostate, cervix, and female breast in the sub-Saharan Africa: protocol for a scoping review. Syst Rev. 2021 Apr 17; 10(1): 113.
doi: 10.1186/s13643-021-01672-y.
32. Ni Raghallaigh H, Eeles R. Genetic predisposition to prostate cancer: an update. Fam Cancer. 2021 Jan 24. doi: 10.1007/s10689-021-00227-3.

33. Okhawere KE, Shih IF, Lee SH, Li Y, Wong JA, Badani KK. Comparison of 1-year health care costs and use associated with open vs robotic-assisted radical prostatectomy. JAMA Netw Open. 2021 Mar 1; 4(3): e212265. doi: 10.1001/jamanetworkopen.2021.2265.
34. Plym A, Penney KL, Kalia S, Kraft P, Conti DV, Haiman C, Mucci LA, Kibel AS. Evaluation of a multi-ethnic polygenic risk score model for prostate cancer. J Natl Cancer Inst. 2021 Apr 1:djab058. doi: 10.1093/jnci/djab058.
35. Prizment AE, McSweeney S, Pankratz N, Joshu CE, Hwang JH, Platz EA, Ryan CJ. Prostate cancer mortality associated with aggregate polymerphisms in androgen-regulating genes: The Atherosclerosis Risk in the Communities (ARIC) Study. Cancers (Basel). 2021 Apr 19; 13(8): 1958.
36. Roshandel G, Ferlay J, Ghanbari-Motlagh A, Partovipour E, Salavati F, Aryan K, Mohammadi G, Khoshaabi M, Sadjadi A, Davanlou M, Asgari F, Abadi H, et al. Cancer in Iran 2008 to 2025: Recent incidence trends and short-term predictions of the future burden. Int J Cancer. 2021 Apr 21. doi: 10.1002/ijc.33574.
37. Sattayapiwat O, Wan P, Hernandez BY, Le Marchand L, Wilkens L, Haiman CA. Anthropometric measures and risk of prostate cancer in the multi-ethnic cohort. Am J Epidemiol. 2021 Mar 6:kwab054. doi: 10.1093/aje/kwab054.
38. Novara G, Ficarra V, Mocellin S, et al. Systematic review and meta-analysis of studies reporting oncologic outcome after robot-assisted radical prostatectomy. Eur Urol 2012; 62: 382–404.
39. Box GN, Ahlering TE. Robotic radical prostatectomy: Long- term outcomes. Curr Opin Urol 2008; 18: 173–179.
40. Skarecky D, Morales CA, Ahlering TE. Simple method to predict return of continence after robot-assisted radical prostatectomy. J Endourol 2011; 9: 1451–1455.