Introduction

The urinary bladder is the organ that collects urine excreted by the kidneys before disposal by means of urination. It is a hollow muscular, and distensible (elastic) organ. The bladder is situated on the pelvic floor. Urine enters the bladder via the ureters and exits via the urethra.

Bladder Cancer

Bladder cancer is cancer that forms in tissues of the bladder. Most bladder cancers are transitional cell carcinomas (cancer that begins in cells that normally make up the inner lining of the bladder). Other types include squamous cell carcinoma (cancer that begins in thin, flat cells) and adenocarcinoma (cancer that begins in cells that make and release mucus and other fluids).

PATIENTS AND METHODS: Data from the Surveillance, Epidemiology and End Results registries were linked with Medicare Health Outcomes Survey (MHOS) data. Medicare beneficiaries aged ≥65 years in the period 1998-2013, who were diagnosed with bladder cancer between baseline and follow-up through the MHOS, were matched with control subjects without cancer using propensity scores. Linear mixed models were used to estimate predictors of HRQoL changes.

RESULTS: After matching, 535 patients with bladder cancer (458 non-muscle-invasive bladder cancer [NMIBC] and 77 with muscle-invasive bladder cancer [MIBC]) and 2 770 control subjects without cancer were identified. Both patients with NMIBC and those with MIBC reported significant declines in HRQoL scores over time vs controls: physical component summary -2 and -5.3 vs -0.4, respectively; bodily pain -1.9 and -3.6 vs -0.7; role physical -2.7 and -4.7 vs -0.7; general health -2.4 and -6.1 vs 0; vitality -1.2 and -3.5 vs -0.1; and social functioning -2.1 and -5.7 vs -0.8. All scores ranged from 0 to 100. When stratified by time since diagnosis, HRQoL improved over 1 year for some domains (role physical), but remained lower across most domains.

CONCLUSIONS: After diagnosis, patients with bladder cancer experienced significant declines in physical, mental and social HRQoL relative to controls. Decrements were most pronounced among individuals with MIBC. Methods to better understand and address HRQoL decrements among patients with bladder cancer are needed.

Incidence of Bladder Cancer in South Africa
According to the outdated National Cancer Registry (2014), known for under reporting, the following number of bladder cancer cases was histologically diagnosed in South Africa during 2014:

<table>
<thead>
<tr>
<th>Group - Males 2014</th>
<th>Actual No of Cases</th>
<th>Estimated Lifetime Risk</th>
<th>Percentage of All Cancers</th>
</tr>
</thead>
<tbody>
<tr>
<td>All males</td>
<td>942</td>
<td>1:152</td>
<td>2.56%</td>
</tr>
<tr>
<td>Asian males</td>
<td>44</td>
<td>1:93</td>
<td>4.70%</td>
</tr>
<tr>
<td>Black males</td>
<td>164</td>
<td>1:597</td>
<td>1.48%</td>
</tr>
<tr>
<td>Coloured males</td>
<td>143</td>
<td>1:76</td>
<td>3.41%</td>
</tr>
<tr>
<td>White males</td>
<td>591</td>
<td>1:60</td>
<td>2.87%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group - Females 2014</th>
<th>Actual No of Cases</th>
<th>Estimated Lifetime Risk</th>
<th>Percentage of All Cancers</th>
</tr>
</thead>
<tbody>
<tr>
<td>All females</td>
<td>337</td>
<td>1:654</td>
<td>0.89%</td>
</tr>
<tr>
<td>Asian females</td>
<td>14</td>
<td>1:480</td>
<td>1.19%</td>
</tr>
<tr>
<td>Black females</td>
<td>121</td>
<td>1:283</td>
<td>0.73%</td>
</tr>
<tr>
<td>Coloured females</td>
<td>42</td>
<td>1:470</td>
<td>1.03%</td>
</tr>
<tr>
<td>White females</td>
<td>160</td>
<td>1:256</td>
<td>0.97%</td>
</tr>
</tbody>
</table>

The frequency of histologically diagnosed cases of bladder cancer in South Africa for 2014 was as follows (National Cancer Registry, 2014):

<table>
<thead>
<tr>
<th>Group - Males 2014</th>
<th>0 – 19 Years</th>
<th>20 – 29 Years</th>
<th>30 – 39 Years</th>
<th>40 – 49 Years</th>
<th>50 – 59 Years</th>
<th>60 – 69 Years</th>
<th>70 – 79 Years</th>
<th>80+ Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All males</td>
<td>4</td>
<td>2</td>
<td>15</td>
<td>59</td>
<td>152</td>
<td>282</td>
<td>288</td>
<td>131</td>
</tr>
<tr>
<td>Asian males</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>18</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Black males</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>21</td>
<td>37</td>
<td>50</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Coloured males</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>30</td>
<td>42</td>
<td>36</td>
<td>18</td>
</tr>
<tr>
<td>White males</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>26</td>
<td>75</td>
<td>169</td>
<td>208</td>
<td>964</td>
</tr>
</tbody>
</table>
According to Bruni, et al., (2019), the burden of Bladder cancer for South Africa for 2018 is estimated as (based on Globocan estimates):

- Annual number of Bladder cancer cases: 1 701
- Annual number of Bladder cancer deaths: 848

Risk Factors for Bladder Cancer
The following are risk factors for bladder cancer:

- Use of tobacco products
- Obesity
- Increasing age
- Being white
- Being a male
- Exposure to certain chemicals
- Previous cancer treatment
- Chronic bladder inflammation
- Schistosomiasis (Bilharzia)
- Personal or family history of cancer
- Bladder birth defects
- Inherited gene mutations
- Low fluid consumption

Xu, Y., Wu, G., Li, J., Ruan, N., Ma, L., Han, X., Wei, Y., Li, L., Zhang, H., Chen, Y. & Xia, W. 2020. "Bladder cancer (BLCA) is a common malignant cancer, and it is the most common genitourinary cancer in the world. The recurrence rate is the highest of all cancers, and the treatment of BLCA has only slightly improved over the past 30 years. Genetic and environmental factors play an important role in the development and progression of BLCA. However, the mechanism of cancer development remains to be proven. Therefore, the identification of potential oncogenes is urgent for developing new therapeutic directions and designing novel biomarkers for the diagnosis and prognosis of BLCA. Based on this need, we screened overlapping differentially expressed genes (DEG) from the GSE7476, GSE13507, and TCGA BLCA datasets. To identify the central genes from these DEGs, we performed a protein-protein interaction network analysis. To investigate the role of DEGs and the underlying mechanisms in BLCA, we performed Gene Ontology (GO) and Kyoto Gene and Genomic Encyclopedia (KEGG) analysis; we identified the hub genes via different evaluation methods in cytoHubba and then selected the target genes by performing...
survival analysis. Finally, the relationship between these target genes and tumour immunity was analysed to explore the roles of these genes. In summary, our current studies indicate that both cell division cycle 20 (CDC20) and abnormal spindle microtubule assembly (ASPM) genes are potential prognostic biomarkers for BLCA. It may also be a potential immunotherapeutic target with future clinical significance.”

**Signs and Symptoms of Bladder Cancer**

People with bladder cancer may experience the following symptoms or signs:

- blood in urine (haematuria) — urine may appear dark yellow, bright red or cola coloured.
- frequent urination
- urgent need to urinate
- bladder spasm
- painful urination (dysuria)
- inability to urinate
- reduced bladder capacity
- back pain
- pelvic pain

Symptoms of advanced bladder cancer may include:

- pain
- unexplained appetite loss
- weight loss

**Diagnosis of Bladder Cancer**

Bladder cancers are usually found when a person goes to the doctor because of signs or symptoms they are having. If bladder cancer is suspected, tests will be needed to confirm the diagnosis.

- blood in the urine
- changes in bladder habits or irritating symptoms such as:
  - having to urinate more often than usual
  - feeling pain or burning during urination
  - feeling as if one needs to go right away, even when the bladder is not full
- medical history and physical exam
- urine culture
- urine tumour marker test
- biopsy
- intravenous pyelogram
- retrograde
- computed tomography (CT) scan
- magnetic resonance imaging (MRI) scan - Like CT scans but MRI scans use radio waves and strong magnets instead of x-rays
- ultrasound - uses sound waves to create pictures of internal organs
Background: Bladder cancer is the fourth most commonly diagnosed cancer among males worldwide. Current treatment strategies established for bladder cancer mainly consist of cystectomy yet advances in radiation therapy have pointed to the value of organ-preserving strategies in preserving patients' quality of life.

Aim: To study and compare the radiosensitivity in two-dimension (2D) and physiologically-relevant three-dimension (3D) in vitro culture of three human bladder cancer cell lines, RT4, T24, and UM-UC-3.

Materials and Methods: Clonogenic assay was performed to assess cells' radiosensitivity in 2D. Employing the 3D Matrigel™-based cultures to enrich for cancer stem cells (CSCs) allowed us to assess the survival of this subpopulation of cells via evaluating the number, i.e., sphere forming unit (SFU), and the sizes of cultured spheres, formed from cells exposed to different radiation doses compared to non-irradiated cells.

Results: Irradiating cells with increasing radiation doses revealed highest survival rates with RT4 cells in 2D, followed by T24 and UM-UC-3. In 3D, however, UM-UC-3 cells were shown to be the most radio-resistant as evidenced by the number of spheres formed, yet they displayed the least efficient volume reduction/regression (VR), whilst the volume decreased significantly for both RT4 and T24 cells. Sphere VR and sphere ratio (SR) values were then plotted against each other demonstrating a linear correlation between volume and number with RT4 and UM-UC-3 cell lines, but not T24. Lastly, multiple regression model was employed to evaluate the possibility of obtaining a function combining both 3D parameters, SR and VR, with the surviving fraction (SF) in 2D, and showed a linear regression for T24 cells only, with a correlation coefficient of 0.97 for the combined parameters.

Conclusion: We were able to radiobiologically characterize 3 human bladder cancer cell lines showing differential effects of radiation between 2D and 3D culture systems, paving the way for achieving better assessment of radiosensitivity of bladder cancer in vitro.
CONCLUSIONS: Our external validation results suggest that although the COBRA score is not perfectly accurate, it shows a reasonable level of discriminative ability, adequate calibration, and meaningful net benefit gain for predicting CSS after RC in a Korean UCB cohort.

Types of Bladder Cancer
Types of bladder cancer include:
Transitional cell bladder cancer
- Non muscle invasive (superficial) bladder cancer
- Invasive bladder
- Squamous cell bladder cancer
- Adenocarcinoma of the bladder
- Small cell cancer of the bladder - it is very rare

Reducing the Risk for Bladder Cancer
Bladder cancer cannot be prevented altogether, but one can reduce the risk for getting it:
- Do not smoke
- Avoid exposure to industrial chemicals
- Drink water throughout the day
- Limit the intake of smoked or cured meats
- Limit the intake of other processed foods

Staging of Bladder Cancer
The TNM staging system is used.
TNM is an abbreviation for tumour (T), node (N), and metastasis (M). Doctors look at these three factors to determine the stage of cancer:
- How large is the primary tumour and how deeply has it invaded the tissue? (Tumour, T)
- Has the tumour spread to the lymph nodes? (Node, N)
- Has the cancer spread (metastasised) to other parts of the body? (Metastasis, M)

Where Bladder Cancer Spreads to
Should bladder cancer spread to other parts of the body, it would most probably spread as indicated below:

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Main Sites of Metastasis (Spread)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder</td>
<td>Bone, liver, lung</td>
</tr>
<tr>
<td>Breast</td>
<td>Bone, brain, liver, lung</td>
</tr>
<tr>
<td>Colon</td>
<td>Liver, lung</td>
</tr>
<tr>
<td>Colorectal</td>
<td>Liver, lung, peritoneum (lining of abdomen)</td>
</tr>
<tr>
<td>Kidney</td>
<td>Adrenal gland, bone, brain, liver, lung</td>
</tr>
<tr>
<td>Lung</td>
<td>Adrenal gland, bone, brain, liver, other lung</td>
</tr>
</tbody>
</table>
Melanoma | Bone, brain, liver, lung, skin, muscle
---|---
Ovary | Liver, lung, peritoneum (lining of abdomen)
Pancreas | Liver, lung, peritoneum (lining of abdomen)
Prostate | Adrenal gland, bone, liver, lung
Stomach | Liver, lung, peritoneum (lining of abdomen), ovaries
Thyroid | Bone, liver, lung
Uterus | Bone, liver, lung, peritoneum (lining of abdomen), vagina
Non-melanoma skin cancer | Very rare: lymph nodes, lung, bone (if in head/neck region)

### Melanoma
- Bone, brain, liver, lung, skin, muscle
- Liver, lung, peritoneum (lining of abdomen)
- Liver, lung, peritoneum (lining of abdomen)
- Adrenal gland, bone, liver, lung
- Liver, lung, peritoneum (lining of abdomen), ovaries
- Bone, liver, lung
- Bone, liver, lung, peritoneum (lining of abdomen), vagina
- Very rare: lymph nodes, lung, bone (if in head/neck region)

### Treatment of Bladder Cancer
The following comprises standard treatment for bladder cancer:

- **Surgery** - one of the following types of surgery may be done:
  - Transurethral resection (TUR) with fulguration
  - Radical cystectomy (surgical removal of the bladder)
  - Segmental cystectomy (surgical removal of part of the bladder)
  - Urinary diversion - surgery to make a new way for the body to store and pass urine
- **Radiation therapy**
- **Chemotherapy**
- **Biologic therapy**
- **Photodynamic therapy**
- **Immunotherapy**


“Median age at bladder cancer (BC) diagnosis is older than for other major tumours. Age should not determine treatment, and patients should be fully involved in decisions. Patients should be screened with Mini-Cog™ for cognitive impairment and the G8 to ascertain need for comprehensive geriatric assessment. In non-muscle invasive disease, older adult patients should have standard therapy. Age does not contraindicate intravesical therapy. Independent of age and fitness, patients with muscle-invasive BC should have at least cross-sectional imaging. Data suggest extensive undertreatment in older adult patients, leading to poor outcomes. Standard treatment for a fit patient differs between countries. Radical cystectomy and trimodality therapy are first-line options. Radical cystectomy patients should be referred to an experienced centre and prehabilitation is mandatory. Older adult patients should be considered for neoadjuvant and adjuvant therapy, according to guidelines. In urinary diversion, avoiding bowel surgery for reconstruction of the lower urinary tract significantly reduces complications. If a patient is unfit for or refuses standard treatment, RT alone, or TURBT in selected cases should be considered. In metastatic BC, older adult patients should receive standard systemic therapy, depending on fitness for cisplatin and prognosis. Efficacy and tolerability of immunotherapy (IO) appears similar to younger patients. Second line IO is standard in platinum pretreated patients, with benefit and tolerability in the older adult similar to younger patients. The toxicity profile seems to favour IO in the older adult but more data are needed. Patients progressing on IO may respond to further systemic treatment. In metastatic disease, palliative care should begin early.”
PURPOSE: We sought to identify the method that could obtain the best survival rate for AJCC stage IV bladder cancer (BCa) patients.
METHODS: Patients with AJCC stage IV BCa diagnosed between 2004 and 2015 were identified using the Surveillance, epidemiology and end results (SEER) database. Kaplan-Meier curves and log-rank test were used for overall survival (OS) and cancer-specific survival (CSS). Multivariable Cox regression was used to determine factors associated with all-cause mortality (ACM) and cancer-specific mortality (CSM).
RESULTS: We found that among the 11824 patients, the number of patients who received chemotherapy (CT), radiotherapy (RT) and radical cystectomy (RC) was 6243 (52.8%), 2005 (17.0%) and 4987 (42.2%), respectively. Patients who received CT or RC had improved OS (26.4% vs. 11.7%, p < 0.001 and 27.3% vs. 13.7%, p < 0.001, respectively), but patients who underwent RT alone had lower OS (14.4% vs. 20.5%, p < 0.001). Furthermore, CT combined with RC was associated with the lowest ACM (hazard ratio (HR) = 0.26, 95% CI 0.24-0.28, p < 0.001) and the lowest CSM (HR = 0.24, 95% CI 0.22-0.26, p < 0.001). Patients who only received RT had the highest ACM (HR = 0.84, 95% CI 0.77-0.92, p < 0.001) and the highest CSM (HR = 0.85, 95% CI 0.77-0.94, p = 0.002).
CONCLUSIONS: We concluded that CT combined with RC was the best method with the highest survival rate for patients with AJCC stage IV BCa and that CT combined with RC had more benefits in improving OS and CSS than did RT alone.

AIM: Investigate the effectiveness of chemotherapy for first-line (1L) treatment of metastatic bladder cancer (mBC).
METHODS: Retrospective cohort study evaluating treatment patterns/outcomes in 1155 mBC patients receiving initial treatment in the community practice setting from January 2010 to June 2014, and followed through July 2016.
RESULTS: The most commonly utilized 1L and second-line (2L) regimens were platinum-based and taxane-based, respectively. Median (95% CI) OS for all patients from 1L initiation was 12.8 months (11.7-14.6), and median OS for all 2L regimens was 9.4 months (8.2-11.1).
CONCLUSION: mBC patients eligible for and who received cis-based regimens experienced better OS results. Poor renal function was a key driver of cis-ineligibility. The various monotherapy and combination chemotherapy regimens in 2L produce relatively short OS outcomes.

BACKGROUND: Studies of survival comparing radical cystectomy (RC) and radiotherapy for muscle-invasive bladder cancer have provided inconsistent results and have methodological limitations. The aim of the study was to investigate risk of death after radiotherapy as compared to RC.
METHODS: We selected patients with muscle-invasive urothelial carcinoma without distant metastases, treated with radiotherapy or RC from 1997 to 2014 in the Bladder Cancer Data Base Sweden (BladderBaSe) and estimated absolute and relative risk of bladder cancer death and all-cause death. In a group of patients, theoretically eligible for a trial comparing radiotherapy and RC, we calculated risk difference in an instrumental variable analysis. We have not investigated chemoradiotherapy as this treatment was not used in the study time period.
RESULTS: The study included 3,309 patients, of those 17% were treated with radiotherapy and 83% with RC. Patients treated with radiotherapy were older, had more advanced comorbidity, and had a higher risk of death as compared to patients treated with RC (relative risks of 1.5-1.6). In the "trial
population," all-cause death risk difference was 6 per 100 patients lower after radiotherapy at 5 years of follow-up, 95% confidence interval -41 to 29.

**CONCLUSION(S):** Patient selection between the treatments make it difficult to evaluate results from conventionally adjusted and propensity-score matched survival analysis. When taking into account unmeasured confounding by instrumental variable analysis, no differences in survival was found between the treatments for a selected group of patients. Further clinical studies are needed to characterize this group of patients, which can serve as a basis for future comparison studies for treatment recommendations.

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**About Clinical Trials**

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The **South African National Clinical Trials Register** provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: [www.sanctr.gov.za/](http://www.sanctr.gov.za/)

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**Medical Disclaimer**

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**Sources and References consulted or Utilised**


Canadian Cancer Society

Cancer Council Victoria

Cancer.Net
http://www.cancer.net/cancer-types/bladder-cancer/staging-and-grading

Cancer Research Institute
https://www.cancerresearch.org/we-are-cri/home/cancer-types/bladder-cancer

Cancer Research UK

Cancer Treatment Centers of America

European Association of Urology

Female Urinary Tract


Genetic Reference


MacMillan Cancer Support
http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Bladder/Bladdercancer.aspx
Male Urinary Tract


Medscape Reference
http://emedicine.medscape.com/article/2006834-overview

Memorial Sloan-Kettering Cancer Center

MD Anderson Cancer Center


Pubmed Health

Renal & Urology News
http://www.renalandurologynews.com/bladder-cancer-obesity-link-confirmed/article/405908/?DCMP=EMC-RENALUROLOGY_TODAYUPDATE&cpn=&hmSubId=&hmEmail=OdsiBxRYPdkldpZ00Ap-a5dX4uYpY0&spMailingListId=11028228&spUserID=MzM4ODk3NTcxNTcS1&spJobID=520047546&spReportId=NTIwMDQ3NTQ2S0


TNM Classification Help

Weill Cornell Medical College

Winchester Hospital
http://www.winchesterhospital.org/health-library/article?id=32653
