AJCC TNM Staging for Neoplasms of the Male Genitourinary System

2016-2017 FCDS Educational Webcast Series
Steven Peace, BS, CTR
November 17, 2016

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CDC & Florida DOH Attribution

“We acknowledge the Centers for Disease Control and Prevention, for its support of the Florida Cancer Data System, and the printing and distribution of the materials for the 2016-2017 FCDS Webcast Series under cooperative agreement DP003872-03 awarded to the Florida Department of Health. The findings and conclusions in this series are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.”

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Presentation Outline

- AJCC TNM Staging – NPCR Quick Reference
- Anatomy of the Male Genitourinary System
- Neoplasms of the Kidney
- Neoplasms of the Urothelium
- Neoplasms of the Prostate
- Neoplasms of the Testis
- Text Documentation

Manual Ordering Information

- COST: $64.95
- ISBN: 978-0-387-88440-0

- Required - Florida Mandate
  - FCDS will not purchase
  - Facility may purchase
  - Individual may purchase

- Also Required to Purchase 8th Edition in 2016-2017

- https://cancerstaging.org
- http://springer.com
- 1-800-SPRINGER

Chapter Outline and Contents

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| Rules for Classification | - Clinical  
|                     | - Pathologic |
| Prognostic Features | Identification and discussion of non-anatomic prognostic factors |
| Definitions of TNM  | T: Primary tumor  
|                     | N: Regional lymph nodes  
|                     | M: Distant metastasis |
| Anatomic Stage Prognostic Groups | |
| Prognostic Factors (SSFs) | a. Required for staging  
|                             | b. Clinically significant |
| Grade                 | |
| Histopathologic Type | |
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| Staging Form          | |

AJCC Cancer Staging Manual, 7th ed. – Chapter 1, Table 1.10, p.14

TNM Staging – Points in Time

Timing for Clinical Stage – Date of Diagnosis up to the 1st treatment... in the Absence of Disease Progression or within first 4 months after Diagnosis

Timing for Pathologic Stage – Date of Diagnosis through definitive surgery... in the Absence of Disease Progression or within first 4 months after Diagnosis

Timing for Post-Treatment Stage (Pathologic - yp) – Pathologic Stage following treatment with neoadjuvant therapy(s) and definitive surgery (can include progression after neo-TX)

Timing for Post-Treatment Stage (Clinical - yc) – Clinical Stage following treatment with neoadjuvant therapy(s) and before definitive surgery or no definitive surgery (can include progression after neo-TX)

Source: NPCR AJCC TNM 7th ed. Quick Reference
Clinical Stage – Pretreatment

Clinical Stage (Pre-TX Stage) is the extent of disease defined by diagnostic study before information is available from surgical resection or initiation of neoadjuvant therapy, or within 4 months after date of diagnosis, whichever is shorter.

- Patient Medical History
- Physical Examination
- Diagnostic Imaging Studies
- Endoscopy
- Biopsy of primary tumor
- Biopsy of single node or sentinel nodes
- Biopsy of metastatic sites
- Exploratory Surgery
- Other relevant lab tests, biomarker tests, or examinations

Source: NPCR AJCC TNM 7th ed. Quick Reference

Lymph Node Bx or Resection

A lymph node biopsy can be either clinical or pathologic. If the only assessment of the primary tumor is a clinical (cT) assessment, then a biopsy of a single lymph node or of a sentinel lymph node can also be included in the clinical (cN) stage. In this situation, there would have been no evaluation of the primary tumor that qualifies for the pT. This allows for the assignment of a clinical stage when a pathological stage is not applicable.

Generally a resection of the primary tumor that qualifies for the pT is required in order to assign the pN. If there is a resection that qualifies for the pathologic assessment of T (pT), then any microscopic evidence of regional node involvement is classified as pN. MUST have at least ONE node microscopically examined to assign a pN. This can be a FNA, biopsy or excision of a node as long as there is microscopic confirmation.

Source: NPCR AJCC TNM 7th ed. Quick Reference
Pathologic Stage

Pathologic Stage includes any information obtained about the extent of cancer through completion of definitive surgery as part of the first course of treatment or identified within 4 months after the date of diagnosis, whichever is longer, as long as there is no systemic or radiation therapy initiated or the cancer has not clearly progressed during that time frame.

Must meet chapter-specific criteria for surgical resection to assign

Includes all of the clinical stage information from clinical stage, plus
- Observations at time of surgical resection from operative report
- Pathologic Examination of surgically resected primary specimen
- Pathologic Examination of surgically resected regional lymph nodes
- Pathologic Examination of biopsy or resection of metastasis

Source: NPCR AJCC TNM 7th ed. Quick Reference
Pathologic Stage

If a biopsied tumor is not resected for any reason (e.g., when technically unfeasible) and if the highest T and N categories or the M1 category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer.

◦ To use the highest T and highest N to assign the pathologic stage, you have to have both microscopic confirmation of the highest T for a pT AND microscopic confirmation of the highest N for a pN.

◦ IMPORTANT: pT blank and pN3 is not enough for a pathologic stage so the pN will be used for the clinical stage.

Source: NPCR AJCC TNM 7th ed. Quick Reference

Post-Treatment Stage

Documents measured response to initial (neoadjuvant) therapy(s)
◦ Complete Response
◦ Partial Response
◦ No Response
◦ Progression

May be clinical measurement only – yc
◦ Based on post-treatment imaging, physical examination, biopsy

More often it is post-treatment pathologic stage – yp
◦ Based on post-treatment surgical resection of primary site and regional nodes
◦ Must meet chapter-specific criteria for surgical resection

What about pre-treatment that consisted of less than 1 month of endocrine therapy – hormone therapy (prostate, breast, thyroid)?
This is Not Neoadjuvant Tx...even though it begins before surgery

Source: NPCR AJCC TNM 7th ed. Quick Reference
AJCC 8th edition – Order Info

- COST: $119.99
- ISBN: 978-3-319-40617-6
- 1429 pages
- 512 illustrations
- 187 color illustrations
- Required - Florida Mandate
  - FCDS will not purchase
  - Facility may purchase
  - Individual may purchase
- https://cancerstaging.org
- http://springer.com
- 1-800-SPRINGER

Genitourinary System

| Source: Cancer Facts and Figures 2016 |

**Figure 3. Leading Sites of New Cancer Cases and Deaths – 2016 Estimates**

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Estimated New Cases</th>
<th>Estimated Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prostate</strong></td>
<td><strong>Prostate</strong></td>
<td>246,461 (29%)</td>
<td>14,320 (6%)</td>
</tr>
<tr>
<td><strong>Lung &amp; bronchus</strong></td>
<td><strong>Lung &amp; bronchus</strong></td>
<td>106,470 (13%)</td>
<td>24,520 (8%)</td>
</tr>
<tr>
<td><strong>Colon &amp; rectum</strong></td>
<td><strong>Colon &amp; rectum</strong></td>
<td>63,670 (8%)</td>
<td>13,430 (5%)</td>
</tr>
<tr>
<td><strong>Leukemia</strong></td>
<td><strong>Leukemia</strong></td>
<td>45,900 (6%)</td>
<td>7,890 (3%)</td>
</tr>
<tr>
<td><strong>Non-Hodgkin lymphoma</strong></td>
<td><strong>Non-Hodgkin lymphoma</strong></td>
<td>22,410 (3%)</td>
<td>6,720 (3%)</td>
</tr>
<tr>
<td><strong>Melanoma of the skin</strong></td>
<td><strong>Melanoma of the skin</strong></td>
<td>20,050 (3%)</td>
<td>6,040 (2%)</td>
</tr>
<tr>
<td><strong>Kidney &amp; renal pelvis</strong></td>
<td><strong>Kidney &amp; renal pelvis</strong></td>
<td>34,120 (4%)</td>
<td>5,890 (1%)</td>
</tr>
<tr>
<td><strong>Uterine cervix</strong></td>
<td><strong>Uterine cervix</strong></td>
<td>34,900 (4%)</td>
<td>5,690 (2%)</td>
</tr>
<tr>
<td><strong>Liver &amp; intrahepatic bile duct</strong></td>
<td><strong>Liver &amp; intrahepatic bile duct</strong></td>
<td>20,050 (3%)</td>
<td>4,120 (1%)</td>
</tr>
<tr>
<td><strong>Breast</strong></td>
<td><strong>Breast</strong></td>
<td>10,050 (1%)</td>
<td>790 (0%)</td>
</tr>
<tr>
<td><strong>Ovarian</strong></td>
<td><strong>Ovarian</strong></td>
<td>8,010 (1%)</td>
<td>690 (0%)</td>
</tr>
</tbody>
</table>

Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

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**Figure 1. Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2012**

*Per 100,000, age-adjusted to the 2000 US standard population. Mortality rates for pancreatic and liver cancers are increasing.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1910 to 1949 and US Mortality Data 1950 to 2012, National Center for Health Statistics, Centers for Disease Control and Prevention

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Kidney

Risk Factors/Screening

Risk Factors
- Cigarette Smoking
- Obesity (30% of cases)
- High Blood Pressure
- Chronic Kidney Disease
- Occupational Exposures
- Long-term Use of Medicines
- Family History of RCC

Screening
- None
- Incidental Finding
  - Ultrasound
  - CT Scan
Signs and Symptoms

1. Flank Pain
2. Hematuria
3. Abdominal Mass
4. Other
   - Weight Loss
   - Anorexia
   - Anemia
   - Polycythemia
   - Discolored Urine
   - Leg and Ankle Swelling

**Flank Pain**
- Pain in one side of the body between the abdomen or upper belly area and the back.
- Normally flank pain is a sign of kidney problems or kidney failure.
- Normally the flank pain is worse on one side of the body.
  - Flank pain could be kidney stone
  - Flank pain could be neoplasm
  - Flank pain could be polycystic

Kidney - Anatomy
Kidney - Anatomy

1. Parenchyma
2. Cortex
3. Medulla
4. Perirenal fat
5. Capsule
6. Ureter
7. Pelvis of kidney
8. Renal vessels
9. Hilum
10. Calyx

Source: http://training.seer.cancer.gov

Kidney - Histology

Renal Cell Carcinoma and Renal Cell Carcinoma Subtypes

8312 Renal cell carcinoma is a “generic” term – do not use highest code

- 8255 Adenocarcinoma with mixed subtypes
- 8260 Papillary (Chromophil)
- 8310 Clear Cell
- 8316 Cyst associated, cystic
- 8317 Chromophobe
- 8318 Sarcomatoid (Spindle cell)
- 8319 Collecting duct type (Bellini duct)
- 8320 Granular cell
- 8510 Medullary carcinoma, NOS; medullary adenocarcinoma
- 8959 Malignant cystic nephroma
AJCC TNM Staging - Kidney

Stage I
Tumor ≤7 cm in greatest dimension and limited to kidney; 5-year survival, 95%

Stage II
Tumor >7 cm in greatest dimension and limited to kidney; 5-year survival, 88%

Stage III
Tumor in major veins or adrenal gland, tumor within Gerota's fascia, or 1 regional lymph node involved; 5-year survival, 39%

Stage IV
Tumor beyond Gerota's fascia or >3 regional lymph nodes involved; 5-year survival, 20%

Primary Tumor – T Category

Primary Tumor (T)
T0 No evidence of primary tumor
T1a Tumor 7 cm or less in greatest dimension, limited to the kidney
T1b Tumor 4 cm or less in greatest dimension, limited to the kidney
T1c Tumor 4 cm or less in greatest dimension, limited to the kidney
T2a Tumor more than 4 cm but not more than 7 cm in greatest dimension, limited to the kidney
T2b Tumor more than 7 cm in greatest dimension, limited to the kidney
T2c Tumor more than 7 cm but less than or equal to 10 cm in greatest dimension, limited to the kidney
T3a Tumor extends into major veins or perinephric fat but not into the ipsilateral adrenal gland and not beyond Gerota's fascia
T3b Tumor invades the renal vein or its segmental (segmental or main renal vein) branch(es), or tumor invades perirenal and/or renal sinus fat but not beyond Gerota's fascia
T3c Tumor invades the inferior vena cava below the diaphragm
T3d Tumor invades the inferior vena cava above the diaphragm or invades the wall of the inferior vena cava
T4 Tumor invades beyond Gerota's fascia (including contiguous extension into the ipsilateral adrenal gland)
Primary Tumor – T Category


Regional Lymph Nodes – N Category

Source: http://www.laparoboticsurgery.com
Prognostic Factors (SSFs)

- **Required for Staging – NONE**

- **Clinically Significant**
  - Invasion Beyond Capsule Into Fat
  - Invasion Beyond Capsule Into Peri-Sinus Tissues
  - Venous Involvement
  - Adrenal Extension
  - Fuhrman Grade
  - Sarcomatoid Features
  - Histologic Tumor Necrosis
  - Extranodal Extension
  - Size of Metastasis in Lymph Nodes


AJCC Stage/Prognostic Group

- **Stage I**
  - T1
  - N0
  - M0

- **Stage II**
  - T2
  - N0
  - M0

- **Stage III**
  - T1 or T2
  - N1
  - M0

- **Stage IV**
  - T4
  - Any N
  - M0

Ablation or Embolization

“Ablation” is destruction of tumor by vaporization, chipping away (like chipping ice) or various other erosive processes. Ablation may be used when tumor(s) are small (<3cm), peripheral lesions, inferior pole or posterior location. Large (>5cm) or centrally located tumors or tumors in anterior location are generally not suitable for ablation as primary tx.

Thermal (heat) ablation used to be called “hyper-thermia”

Tumor Ablation is coded as Surgery – ablation directly destroys the tumor

Types of Ablation Include:
- Cryo-Ablation – Uses Cold
- Laser-Ablation – Uses Light
- Microwave-Ablation – Uses Heat
- PDT – photodynamic therapy is a type of laser ablation
- High-Intensity Ultrasound – Uses Sound Waves to create heat

Ablation or Embolization

“Embolization” is a procedure performed to create an embolus, a blocked or hardened blood vessel, to shut down blood flow and blood supply to the primary tumor/metastasis. This method of treatment indirectly kills tumor by cutting off the blood supply to tumor.

Embolization can also include injection of a chemical like alcohol or a chemotherapy agent that acts to sclerose or harden key blood vessel(s) OR the approach may even be designed to trap chemo behind the embolus using 2 approaches; or performed by injecting a foreign material or substance like coils or radioactive beads to block the artery and prevent any blood flow to the tumor. The chemotherapy agent(s) or radioactive beads directly treat the tumor but not the embolization...the embolization is still only indirectly killing tumor cells.

Treatment Code Will Depend on Type of Embolization - Code the type of treatment.

Types of Embolization Include:
- Chemo-Embolization – Uses Chemotherapy Agent(s) - TACE
- Alcohol-Embolization – Uses Alcohol
- Radioactive Beads/Spheres – Combines Radioisotopes / Mechanical Block
- Artificial Embolus – plastic or metal coils, foam, other plugs to Block
Neoplasms of the Urothelium

Includes:
- C65.9 - Renal Pelvis
- C66.9 - Ureter
- C67.0-C67.9 - Bladder
- C68.0-C68.9 - Urinary Other

Source: http://www.medicinenet.com
Male and Female Anatomy

Risk Factors/Screening

Risk Factors
- Cigarette Smoking
- Chemical Exposures: dyes, solvents, paints, rubber, benzene, etc.
- Cyclophosphamide
- Chronic Inflammation
- Schistosoma - blood fluke worm

Screening
- None
- Blood in Urine
- Incidental Finding
- Ultrasound
- Cystoscopy
**Urothelium**

The layer of transitional epithelium that lines the wall of the renal pelvis, ureters, the bladder, and parts of the urethra.

The urothelial lining may be exposed to urinary carcinogens derived from tobacco smoke, dietary, occupational or environmental chemicals while the lining is performing its usual function to collect, store, and transport urine.

Carcinogenic urine can sit in the bladder or collecting ducts for long periods of time – constantly exposing the urothelial lining to carcinogens.

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**Field Effect Theory**

The field effect theory suggests that the urothelium has undergone a widespread change, perhaps in response to a carcinogen, making it more sensitive to malignant transformations.

As a result, multiple tumors arise more easily.

Recent scientific evidence supported by molecular analysis of microsatellite alterations and X-chromosome inactivation status in cells examining coexisting tumors leads to the development of multiple, genetically unrelated tumors further supporting the field effect theory.
Implantation Theory

Implantation theory suggests that the multiple tumors are of monoclonal origin, arising from a single malignant transformed cell which proliferates and spreads throughout the urothelium either by intraluminal spread with secondary implantation at different sites within the urinary tract or by intraepithelial migration.

The implantation theory suggests that tumor cells in one location lose their attachments and float in the urine until they attach (implant) on another site.

Urothelial tumors may spread in a head-to-toe direction, for example from the renal pelvis to the ureter(s) to the bladder.

Source: 2007 MPH Rules Table 1 – Urothelial Tumors and www.nature.com/nrc/journal/v15/n1
Anatomy of Wall of Urothelium

Layers of Wall Lining the Urothelium

- **Mucosa**
  - Urothelium
  - Epithelium
  - Mucosal Surface
  - Transitional Mucosa
  - Tunica Mucosa
  - Vesicae Urinariae
- **Submucosa**
  - Lamina Propria
  - Muscularis Mucosa
  - Subepithelial Tissue
  - Suburothelial Connective Tissue
  - Stroma
- **Muscle / Muscularis**
  - Muscularis Propria
  - Muscularis Externa
  - Smooth Muscle

Sources: [http://www.cancer.org](http://www.cancer.org) and [http://topmedicaljournals.com](http://topmedicaljournals.com)
Histology

Histopathologic Type:
The histologic types are as follows:
- Urothelial (transitional cell) carcinoma
- Adenocarcinoma
- Squamous cell carcinoma
- Undifferentiated carcinoma

The predominant cancer is urothelial (transitional cell) carcinoma. Histologic variants include micropapillary and nested subtypes.


Urothelial Cancer Staging

TNM Classification: Renal Pelvis and Ureter Cancer

Staging Groups:
- T1a
- T1b
- T2a
- T2b
- T3a
- T3b
- T4a
- T4b

Primary Tumor – T Category

In Situ Neoplasm

- CIS definition
  - Has not involved any structures in primary organ that
  - Allows tumor cells to spread to regional nodes or distant sites

- CIS exception to stage group guidelines
  - Clinical stage
    - pTis cN0 cM0 clinical stage 0
  - Pathologic stage
    - pTis cN0 cM0 pathologic stage 0

- Caution for pathologic stage
  - Cannot use CIS rule in isolation
  - Must also meet pathologic stage resection criteria
    - Avoids sampling error when resection might show invasion
      - Example: TURB

Regional Lymph Nodes – N Category

Size of Node(s) and # Node(s)

Regional Lymph Nodes includes both Primary and Secondary Lymph Node Drainage Areas

https://www.researchgate.net/figure/278650442_fig2_Figure-2-2-Regional-lymph-nodes-of-the-urinary-bladder
Prognostic Factors (SSFs)

- Required for Staging – NONE

- Clinically Significant
  - Presence of Extranodal Extension
  - Absence of Extranodal Extension
  - WHO/ISUP Grade

<table>
<thead>
<tr>
<th>WHO/ISUP Grade</th>
<th>Stage</th>
<th>Tumor Grade</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low grade</td>
<td>Ga</td>
<td>Ta</td>
<td>No</td>
</tr>
<tr>
<td>High grade</td>
<td>Ga</td>
<td>Tis</td>
<td>No</td>
</tr>
<tr>
<td>Low grade</td>
<td>Ib</td>
<td>T1a</td>
<td>No</td>
</tr>
<tr>
<td>High grade</td>
<td>Ib</td>
<td>T1b</td>
<td>No</td>
</tr>
<tr>
<td>Low grade</td>
<td>Ic</td>
<td>T2a</td>
<td>No</td>
</tr>
<tr>
<td>High grade</td>
<td>Ic</td>
<td>T2b</td>
<td>No</td>
</tr>
<tr>
<td>Low grade</td>
<td>Ic</td>
<td>T3a</td>
<td>No</td>
</tr>
<tr>
<td>High grade</td>
<td>Ic</td>
<td>T3b</td>
<td>No</td>
</tr>
<tr>
<td>Low grade</td>
<td>Id</td>
<td>T4a</td>
<td>No</td>
</tr>
<tr>
<td>High grade</td>
<td>Id</td>
<td>T4b</td>
<td>No</td>
</tr>
<tr>
<td>Low grade</td>
<td>Id</td>
<td>T4c</td>
<td>No</td>
</tr>
<tr>
<td>High grade</td>
<td>Id</td>
<td>T4d</td>
<td>No</td>
</tr>
<tr>
<td>Low grade</td>
<td>Id</td>
<td>T4e</td>
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</tr>
<tr>
<td>High grade</td>
<td>Id</td>
<td>T4f</td>
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</tr>
<tr>
<td>Low grade</td>
<td>Ie</td>
<td>Any</td>
<td>N1, N2, N3, M0</td>
</tr>
<tr>
<td>High grade</td>
<td>Ie</td>
<td>Any</td>
<td>N1, N2, N3, M1</td>
</tr>
</tbody>
</table>


Tumor Grade and Behavior

Approximate Probability of Recurrence and Progression

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Approximately Probability of Recurrence of 5 years</th>
<th>Approximately Probability of Progression to Muscle Invasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ta, low grade</td>
<td>50%</td>
<td>Minimal</td>
</tr>
<tr>
<td>Ta, high grade</td>
<td>65%</td>
<td>Moderate</td>
</tr>
<tr>
<td>Ti, low grade</td>
<td>55%</td>
<td>Moderate</td>
</tr>
<tr>
<td>Ti, high grade</td>
<td>55-75%</td>
<td>Moderate-High</td>
</tr>
<tr>
<td>Tis</td>
<td>50-90%</td>
<td>High</td>
</tr>
</tbody>
</table>

Histologic Grade (G)

- Grade cannot be assessed
- Well differentiated
- Moderately differentiated
- Poorly differentiated
- Undifferentiated
Table 1. Principles of Pathology Management: Malignancy Grading of Bladder Carcinoma: Old and New Systems**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Papilloma grade 0</td>
<td>Papilloma</td>
<td>Papilloma</td>
<td></td>
</tr>
<tr>
<td>Papilloma with stypsa grade 1</td>
<td>TCC grade 1</td>
<td>Papillary urothelial neoplasm of low malignant potential</td>
<td></td>
</tr>
<tr>
<td>Urothelial carcinoma grade 2A</td>
<td>TCC grade 1</td>
<td>Urothelial carcinoma, low-grade</td>
<td></td>
</tr>
<tr>
<td>Urothelial carcinoma grade 2B</td>
<td>TCC grade 2</td>
<td>Urothelial carcinoma, low-grade or high-grade</td>
<td></td>
</tr>
<tr>
<td>Urothelial carcinoma grade 3</td>
<td>TCC grade 3</td>
<td>Urothelial carcinoma, high-grade</td>
<td></td>
</tr>
</tbody>
</table>

Source: 2015 NCCN Guidelines – Bladder

PUNLMP

Tumor Grade

Source: http://sciencedirect.com
Tumor Grade and Behavior

Histologic Grade (G)
- For urothelial neoplasms, a low- and high-grade designation is used to match the current World Health Organization/International Society of Urological Pathology (WHO/ISUP) recommended grading system:
  - LG: Low grade
  - HG: High grade
- If a grading system is not specified, generally the following system is used:
  - Gx: Grade cannot be assessed
  - G1: Well differentiated
  - G2: Moderately differentiated
  - G3: Poorly differentiated
  - G4: Undifferentiated

**Approximate Probability of Recurrence and Progression**

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Approximate Probability of Recurrence in 5 years</th>
<th>Approximate Probability of Progression to Muscle Invasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1a, low grade</td>
<td>60%</td>
<td>Minimal</td>
</tr>
<tr>
<td>T1a, high grade</td>
<td>66%</td>
<td>Moderate</td>
</tr>
<tr>
<td>T1b, low grade (tumors)</td>
<td>66%</td>
<td>Moderate</td>
</tr>
<tr>
<td>T1b, high-grade</td>
<td>66-70%</td>
<td>Moderate-High</td>
</tr>
<tr>
<td>Tis</td>
<td>60-80%</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: http://www.europeanurology.com and nccn.org

Tumor Grade and Treatment

**Principles of Intravesical Treatment**
- Indications: Based on probability of recurrence and progression to muscle-invasive disease, such as size, number, and grade.
- Immediate Intravesical Chemotherapy
  - Initiated within 24 hrs after resection
  - Used after TUR if there was recurrence in T1a low-grade tumors
  - Treatment should not be given if extensive TURBT or if suspected bladder perforation
- Induction Intravesical Chemotherapy
  - Initiated 3-4 wks after resection
  - Maximum of 2 inductions without complete response
  - Maintenance therapy is optional
- Induction Intravesical Immunotherapy
  - Initiated 3-4 wks after resection
  - Withhold if traumatic catheterization, bacteriuria, periaortic symptoms
  - Maximum of 2 inductions without complete response
  - Some data suggest benefit of maintenance therapy
  - Dose reduction is encouraged if there are substantial side effects

**Approximate Probability of Recurrence and Progression**

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Approximate Probability of Recurrence in 5 years</th>
<th>Approximate Probability of Progression to Muscle Invasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1a, low grade</td>
<td>50%</td>
<td>Minimal</td>
</tr>
<tr>
<td>T1a, high grade</td>
<td>60%</td>
<td>Moderate</td>
</tr>
<tr>
<td>T1b, low grade (tumors)</td>
<td>50%</td>
<td>Moderate</td>
</tr>
<tr>
<td>T1b, high-grade</td>
<td>50-70%</td>
<td>Moderate-High</td>
</tr>
<tr>
<td>Tis</td>
<td>50-80%</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: 2015 NCCN Guidelines - Bladder
### Stage/Prognostic Group

<table>
<thead>
<tr>
<th>American Joint Committee on Cancer (AJCC)</th>
<th>THM Staging System for Bladder Cancer (7th ed., 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Tumor (p)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>pT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>pT1</strong></td>
<td>Tumor invades urothelial lamina propria</td>
</tr>
<tr>
<td><strong>pT2</strong></td>
<td>Tumor invades lamina propria</td>
</tr>
<tr>
<td><strong>pT3a</strong></td>
<td>Tumor invades lamina propria (inner half)</td>
</tr>
<tr>
<td><strong>pT3b</strong></td>
<td>Tumor invades lamina propria (outer half)</td>
</tr>
<tr>
<td><strong>pT4</strong></td>
<td>Tumor invades perivesical fat</td>
</tr>
</tbody>
</table>

| **Regional Lymph Nodes (N)**             |                                           |
| **N0**                                   | No regional lymph node metastasis        |
| **N1**                                   | Single regional lymph node metastasis in the true pelvis |
| **N2**                                   | Multiple regional lymph node metastasis in the true pelvis, para-aortic, external iliac, or presacral lymph node metastasis |
| **N3**                                   | Lymph node metastasis to the common iliac lymph nodes |

| **Distant Metastasis (M)**               |                                           |
| **M0**                                   | No distant metastasis                     |
| **M1**                                   | Distant metastasis                        |

### Anatomic Stage/Prognostic Groups

<table>
<thead>
<tr>
<th>Stage</th>
<th>T</th>
<th>N</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>0a</td>
<td>Ta</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>0is</td>
<td>Tis</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>I</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>II</td>
<td>T2a</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>IIb</td>
<td>T2b</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>III</td>
<td>T3a</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>III</td>
<td>T3b</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>III</td>
<td>T4a</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>IV</td>
<td>T4b</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>N1-3</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
</table>


---

### Text Documentation – Renal Pelvis/Ureter

**Source:** NCRA Informational Abstracts – Improving Text
Neoplasms of the Prostate
Prostate Regional Anatomy

The prostate is a gland found ONLY in men.

It is located in front of the rectum and under the bladder.

The size of a healthy prostate gland is about the size of a walnut.

Source: http://www.abbottdiagnostics.com, U.S. National Cancer Institute

Prostate Regional Anatomy

Prostate Anatomy

Lateral lobes
Anterior lobe
Median lobe
Posterior lobe
Ejaculatory ducts
Prostate capsule
Urethra


Regional Lymph Nodes

Nodes of the True Pelvis
Sacral, Obturator, Hypogastric, Internal and External Iliac, Pelvis, NOS

Anatomy Related to Diagnosis

Patterns for Needle Biopsy of Prostate

Material provided by Prostate Cancer Research Institute (PCRI)

Anatomy Related to Stage - DRE

Material provided by Prostate Cancer Research Institute (PCRI)
Anatomy Related to Stage

Source: http://www.prostatecareqld.com.au

Prostate Cancer Staging

Source: AJCC Prostate Cancer Staging Poster and http://www.prostatecareqld.com.au
### AJCC TNM – Clinical/Pathologic

#### CLINICAL STAGE

**PRIOR TO PROSTATECTOMY**
- MUST HAVE DRE TO ASSIGN ‘T’
  - CANNOT ASSIGN ‘T’ with BX Only
  - IF NO DRE – MUST BE “TX”
- Physical Exam (DRE) if + cT2>
  - Clinically Not Apparent (cT1c)
  - Clinically Apparent (can be felt or seen)
- Bx for Elevated PSA – cT1c
- cN0 based on “nomograms”
  - Pre-Treatment PSA Required
  - Gleason Score Required

**NOTE:** There is no yp stage for Prostate except in Clinical Research Setting

#### PATHOLOGIC STAGE

**DO NOT COPY CLINICAL**

**MUST HAVE Total PROSTATECTOMY**

Pathologic Evaluation Includes
- Surgical Findings
- Prostatectomy Specimen
- Primary Tumor & Lymph Nodes
  - If no Nodes Removed - pNX
- Pre-Treatment PSA required
- Gleason Score Required

---

### Clinical Stage: Why Important?

- **Clinical T1a and T1b**
  - Incidentally detected during a TURP for BPH – no elevated PSA

- **Clinical T1c and T2**
  - PSA positive only T1c – not clinically evident
  - **IMPORTANT Note:** Tumor found in one or both lobes by needle biopsy, but not palpable or visible by imaging, is classified as T1c
  - DRE detects tumor T2 (palpable) – clinically evident – then you can determine if 1 or both lobes involved and level of involvement

- **Clinical T3**
  - DRE detects palpable disease sufficient to indicate the tumor has penetrated thru the prostate capsule including seminal vesicle
Clinical Stage Illustrations

**T1 (a,b,c)**
- Indicates local invasion of adjacent structures.

**T2 (a,b,c)**
- Tumor is fixed or invades adjacent structures other than seminal vesicles such as external sphincter, rectum, bladder, levator muscles, and/or pelvic wall.

**T3 (a,b)**

---

Clinical Stage: Why Important?

**Clinical T4**
- Indicates local invasion of adjacent structures.
- Tumor is fixed or invades adjacent structures other than seminal vesicles such as external sphincter, rectum, bladder, levator muscles, and/or pelvic wall.

---

Source: AJCC Prostate Cancer Staging Poster
Pathologic Stage Parameters

- NO pT1 Category allowed
- TURP – though stated a resection of prostate it is not a prostatectomy
- MUST HAVE Total Prostatectomy including lymph node dissection
- USE BOTH Operative Report and Pathology Report in pTNM
- Document Pathologic Staging Parameters from Radical Prostatectomy
- EXCEPTIONS (histologic evidence from bx of highest T category):
  - Positive biopsy of rectum is sufficient to stage pT4
  - Biopsy indicating spread to extra-prostatic soft tissue is sufficient to stage pT3
  - Biopsy indicating spread to seminal vesicles is sufficient to stage pT3

Prostatectomy Procedures

50  Radical prostatectomy, NOS; total prostatectomy, NOS
    Excised prostate, prostatic capsule, ejaculatory ducts, seminal vesicle(s) and may include a narrow cuff of bladder neck.

70  Prostatectomy WITH resection in continuity with other organs; pelvic exenteration
    Surgery code 70 are any prostatectomy WITH resection in continuity with any other organs.
    The other organs may be partially or totally removed. Procedures may include, but are not limited to, cystoprostatectomy, radical cystectomy, and prostatectomy.
    [NOTE: In continuity with or “en bloc” means that all of the tissues were removed during the same procedure, but not necessarily in a single specimen]. The Urinary prostatectomy would be coded as any other prostatectomy depending on the extent of the procedure codes 50-89 per CPT/DRG.
NOT A PROSTECTOMY

00 None: no surgery of primary site; autopsy ONLY
18 Local tumor destruction or excision, NOS
19 Transurethral resection (TURP), NOS
Unknown whether a specimen was sent to pathology for surgical events coded 18 or 19
10 Local tumor destruction, NOS
14 Cryoablation (Cryosurgery)
15 Laser ablation
16 Hyperthermia
17 Other method of local tumor destruction
No specimen sent to pathology from surgical events 10-17
(NOTE: Code Transurethral Microwave Thermotherapy (TUMT) as 15
Code High Intensity Focused Ultrasound (HIFU) as 17
Code Transurethral Needle Ablation (TUNA) as 17)
20 Local tumor excision, NOS
21 Transurethral resection (TURP), NOS
22 TURP cancer is incidental finding during surgery for benign disease
23 TURP patient has unsuspected known cancer
Any combination of 20-23
14 Cryosurgery
15 Laser
16 Hyperthermia

[NOTE: Codes 24 to 26 above combine 20 Local tumor excision; NOS; 21 TURP, NOS; 22 TURP incidental or 23 TURP unsuspected known cancer with 24 Cryosurgery, 25 Laser or 26 Hyperthermia]
Specimen sent to pathology from surgical events 20-26

NOT A PROSTECTOMY

30 Subtotal, segmental, or simple prostatectomy, which may leave all or part of the capsule intact

80 Prostatectomy, NOS
Specimen sent to pathology from surgical events 20-80.
90 Surgery, NOS
99 Unknown if surgery performed; death certificate ONLY
Prognostic Factors (SSFs)

- **Required for Staging**
  - Prostate-Specific Antigen (PSA)
  - Gleason Score at Biopsy/TURP
  - Gleason Score at Prostatectomy

- **Clinically Significant**
  - Gleason Primary and Secondary Patterns
  - Gleason Tertiary Pattern
  - Clinical Staging Procedures Performed
  - Number of Biopsy Cores Examined
  - Number of Biopsy Cores Positive for Cancer

---

**PSA Lab Value**

- Rapid change in PSA over 1 year\(^1\)
  - 0.75 ng/mL/year when PSA is 4-10 ng/mL
- High PSA value for age\(^{1,2}\)
  - 4.0 ng/mL was originally used to differentiate normal PSA level from pathologic elevation
- Age-specific references have been used to improve sensitivity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>40-49</th>
<th>50-59</th>
<th>60-69</th>
<th>70-79</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum PSA Concentration (ng/mL)</td>
<td>0-2.5</td>
<td>0-3.5</td>
<td>0-4.5</td>
<td>0-6.5</td>
</tr>
</tbody>
</table>
“Watch Your Decimal Point”

CS Tumor Size: XXX
6.5 mm = 0.007
1.4 mm = 0.001
8.0 mm = 0.008
2.5 cm = 25 mm = 0.025
4 cm = 40 mm = 0.040

Melanoma Breslow SSF 1: X.XX
0.02 mm = 0.002
0.50 mm = 0.050
0.74 mm = 0.074
1.07 mm = 0.107
1.50 mm = 0.150

Prostate PSA SSF 1: XXX
Colon/Rectum CEA SSF 3: XX.X
0.1 ng/ml or less = 0.01
0.08 ng/ml = 0.001
0.2 ng/ml = 0.002
4.8 ng/ml = 0.048
12.4 ng/ml = 0.124
98.0 or more = 9.8

PSA Monitoring Over Time

http://clinicalgate.com/testicular-cancer-4/
Gleason Pattern and Score

Gleason – Biopsy/TURP or Prostatectomy

<table>
<thead>
<tr>
<th>SSF #</th>
<th>SSF Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSF7</td>
<td>Gleason Pattern – biopsy/TURP</td>
</tr>
<tr>
<td>SSF8</td>
<td>Gleason Score – biopsy/TURP</td>
</tr>
<tr>
<td>SSF9</td>
<td>Gleason Pattern – prostatectomy/autopsy</td>
</tr>
<tr>
<td>SSF10</td>
<td>Gleason Score – prostatectomy/autopsy</td>
</tr>
<tr>
<td>SSF11</td>
<td>Gleason Tertiary – prostatectomy/autopsy</td>
</tr>
</tbody>
</table>
Gleason to Grade Conversion

<table>
<thead>
<tr>
<th>Gleason Score</th>
<th>Differentiation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gleason 2-6</td>
<td>Well Differentiated</td>
<td>1</td>
</tr>
<tr>
<td>Gleason 7</td>
<td>Moderately Differentiated</td>
<td>2</td>
</tr>
<tr>
<td>Gleason 8-10</td>
<td>Poorly Differentiated</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Documentation - Prostate

Source: NCRA Informational Abstracts – Improving Text
Neoplasms of the Testis

Key Statistics

2016 Estimates
8,720 New Cases
380 Deaths

Incidence Increasing for Decades
Most of Increase is Seminoma

90% – Germ Cell Tumors
Child – Stromal Tumors
Young Men – Non-Seminoma
Middle-Aged Men – Seminoma

5-Year Survival Rates

<table>
<thead>
<tr>
<th>Ages affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
</tr>
<tr>
<td>3-5</td>
</tr>
<tr>
<td>6-13</td>
</tr>
<tr>
<td>14-18</td>
</tr>
<tr>
<td>19-40</td>
</tr>
<tr>
<td>41-60</td>
</tr>
<tr>
<td>60+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage</th>
<th>5-Year Relative Survival Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localised</td>
<td>90%</td>
</tr>
<tr>
<td>Regional</td>
<td>90%</td>
</tr>
<tr>
<td>Distant</td>
<td>73%</td>
</tr>
</tbody>
</table>
Risk Factors

- 90% of All Cases – Cryptorchidism – undescended testicle(s)
- Family or Personal History of Germ Cell Tumor
- History of Intratubular Germ Cell Neoplasia
- Androgen Insensitivity Syndrome
- HIV Infection – Seminoma Risk
- Mixed Gonadal Dysgenesis
- Endocrine Disturbances
- Klinefelter Syndrome
- Down Syndrome
- Occupation

Testicular Self-Examination

**Symptoms**
- Solid Mass – No Light Passes
- Painless Swelling or Mass
- Dull Ache in Low Abdomen
- Acute Scrotal Pain
- Gynecomastia
- Metastasis
- Infertility

- Check one testicle at a time.
- Stand in front of a mirror, hold testicle between thumbs and pointer and middle fingers of both hands.
- Gently roll each testicle between your fingers while feeling for lumps, swelling and hardness.
- If you notice any smooth or hard lumps, bumps, or changes in size or shape, see urologist immediately.
Histology

<table>
<thead>
<tr>
<th>GCTs</th>
<th>Tumors With Sex-Cord Stromal Elements</th>
<th>Other Tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonseminoma</td>
<td>Sex cord stromal tumors</td>
<td>Adrenal and paratesticular tumors</td>
</tr>
<tr>
<td>Embryonal carcinoma</td>
<td>Leydig cell tumor</td>
<td>Mecothelioma</td>
</tr>
<tr>
<td>Choriocarcinoma</td>
<td>Sertoli cell tumor</td>
<td>Carcinoma of rete testis</td>
</tr>
<tr>
<td>Yolk sac tumor</td>
<td>Granulosa thecal cell tumor</td>
<td>Miscellaneous tumors</td>
</tr>
<tr>
<td>Teratoma</td>
<td>Mixed germ cell and gonadal stromal tumor</td>
<td>Carcinoid</td>
</tr>
<tr>
<td>Seminoma</td>
<td></td>
<td>Lymphoma</td>
</tr>
<tr>
<td>Classic</td>
<td></td>
<td>Sarcoma</td>
</tr>
<tr>
<td>Spermatocytic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Anatomy of Testis

Primary Tumor – T Category

- T1: The extent of primary tumor is usually classified after radical orchiectomy, and for this reason, a pathologic stage is assigned.
  - pTX: Primary tumor cannot be assessed
  - pT0: No evidence of primary tumor (e.g., histologic scar in testis)
  - pT1: Intratubular germ cell neoplasia (carcinoma in situ)
  - pT1a: Tumor limited to the testes and epididymis without vascular/lymphatic invasion; tumor may invade the tunica albuginea but not the tunica vaginalis
  - pT2: Tumor limited to the testes and epididymis with vascular/lymphatic invasion, or tumor extending through the tunica albuginea with involvement of the tunica vaginalis
  - pT3: Tumor invades the spermatic cord with or without vascular/lymphatic invasion
  - pT4: Tumor invades the scrotum with or without vascular/lymphatic invasion

Regional Lymph Nodes – N Category

Primary Lymph Drainage of Testis to the embryological origin of the testis in the retroperitoneum.

Today’s Dx Imaging allows visualization of Retroperitoneal Nodes which used to require a Retroperitoneal Lymph Node Dissection.

Retroperitoneal Lymph Node Dissection is still required to complete pathologic staging.
### Regional Lymph Nodes – N Category

<table>
<thead>
<tr>
<th>Clinical</th>
<th>NCCN Guidelines – Testicular Cancer version 1.2017 - Staging</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>N0</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis with a lymph node mass 2 cm or less in greatest dimension or multiple lymph nodes, none more than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis with a lymph node mass, more than 2 cm but not more than 5 cm in greatest dimension or multiple lymph nodes, any one mass greater than 2 cm but not more than 5 cm in greatest dimension</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis with a lymph node mass more than 5 cm in greatest dimension</td>
</tr>
</tbody>
</table>

#### Size of Node(s) and # Node(s)

<table>
<thead>
<tr>
<th>Pathologic (pN)</th>
<th>NCCN Guidelines – Testicular Cancer version 1.2017 - Staging</th>
</tr>
</thead>
<tbody>
<tr>
<td>pNX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>pN0</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>pN1</td>
<td>Metastasis with a lymph node mass 2 cm or less in greatest dimension and less than or equal to five nodes positive, none more than 2 cm in greatest dimension</td>
</tr>
<tr>
<td>pN2</td>
<td>Metastasis with a lymph node mass more than 2 cm but not more than 5 cm in greatest dimension; or more than five nodes positive, none more than 5 cm or evidence of extranodal extension of tumor</td>
</tr>
<tr>
<td>pN3</td>
<td>Metastasis with a lymph node mass more than 5 cm in greatest dimension</td>
</tr>
</tbody>
</table>

### AJCC Stage Group

- **Stage 1**
  - Testicles (testes)
  - Lymph nodes

- **Stage 2**
  - Testicles (testes)
  - Lymph nodes
  - Lungs
  - Liver

- **Stage 3**
  - Testicles (testes)
  - Lymph nodes

Testis - Prognostic Factors

**Required for Staging**

- **Serum Tumor Marker(s)** – Note: Serum tumor marker levels should be measured prior to orchiectomy, but levels after orchiectomy are used for assignment of S Category, taking into account the half life of AFP and hCG.
  - SX – marker studies not available or not performed
  - S0 – marker study levels within normal limits
  - S1 – LDH < 1.5 and N* and hCG < 5,000 and AFP < 1,000
  - S2 – LDH 1.5-10 or hCG 5,000-50,000 or AFP 1,000-10,000
  - S3 – LDH > 10 or hCG > 50,000 or AFP > 10,000

**Clinically Significant**

- Size of Largest Lymph Node Metastasis
- Radical Orchiectomy Performed

---

Tumor Markers – Required to Stage (pre-orchiectomy or post-orchiectomy)

Beta-HCG – Human Chorionic Gonadotropin

- Mixed Germ Cell Tumors
- Embryonal Carcinoma
- Choriocarcinoma
- Teratocarcinoma
- Yolk Sac Tumor
- Seminoma

AFP – Alpha-Fetoprotein

- Mixed Germ Cell Tumors
- Pure Embryonal Carcinoma
- Teratocarcinoma
- Yolk Sac Tumor

LDH – Lactate Dehydrogenase
  - Seminoma

---
**Questions**