

**CANCER DIAGNOSIS:**

**SCREENING AND EARLY DETECTION:**

- **Purpose:** to apply a rapid, relatively simple, & inexpensive test to a large sample to identify those with risk factors for, or who are in early stages of, cancer
- **Screening initiatives in BC:** colorectal, breast, cervical cancer – no test is perfect

**MAKING THE DIAGNOSIS:**

<b>Initial clinical presentation</b>	<ul style="list-style-type: none"> <li>• Signs and symptoms may be variable, non-specific, or reflective of site of cancer</li> <li>• Non-specific symptoms: anorexia, weight loss, fatigue, pain</li> </ul>
<b>Blood tests</b>	<ul style="list-style-type: none"> <li>• Do not provide an absolute diagnosis of cancer, with exception of blood cancers</li> <li>• Help to identify organ function and/or involvement</li> <li>• Common tests: CBC &amp; differential, electrolytes, SCr/eGFR, liver function</li> </ul>
<b>Tumor markers</b>	<ul style="list-style-type: none"> <li>• Substances found in tumor tissue, or released from tumor into the <b>blood/urine</b></li> <li>• Not sensitive or specific for cancer diagnosis</li> </ul>
<b>Diagnostic imaging</b>	<ul style="list-style-type: none"> <li>• Generates detailed views inside the body → shows abnormalities, sites of tumors &amp; presence of metastases</li> <li>• Types: CT scan, MRI, PET scan, nuclear scan, ultrasound, x-ray</li> <li>• Common areas: head, neck, chest, abdomen, pelvis, limbs</li> </ul>
<b>Biopsy</b>	<ul style="list-style-type: none"> <li>• Required for definitive diagnosis of cancer</li> <li>• Procedure which involves obtaining a tissue sample for pathological review                             <ul style="list-style-type: none"> <li>◦ Gross and microscopic description, margin, <b>grade</b></li> </ul> </li> <li>• Results contribute to overall prognosis and/or guide treatment</li> <li>• Types: fine needle biopsy, via endoscope, surgical</li> </ul>

**STAGING:** standardized process used to objectively classify the extent and spread of disease

**PURPOSE:**

- Helps to establish prognosis, goals of therapy, and overall treatment plan
- Common language amongst healthcare professionals
- Completed at the time of diagnosis and **does not** change over time

**SYSTEMS:**

Solid organ cancers	Hematologic cancers
TNM Staging System	Lymphoma: Ann Arbor
Prognostic Stage Groups	CLL/SLL: Raid Staging
Organ specific: FIGO, Dukes Staging	

**SOLID ORGAN CANCERS: TNM SYSTEM**

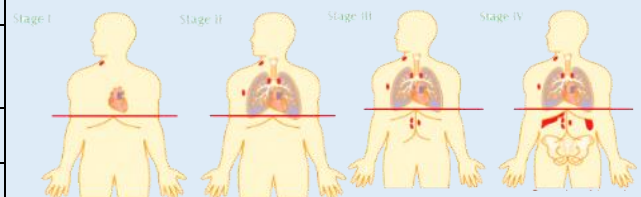
<b>T: information about the primary tumor (size and invasion)</b>	
Tx	No information, unknown, or cannot be assessed
T0	No evidence of a primary tumor
Tis	Carcinoma <i>in situ</i>
T1,T2,T3 or T4	Invasive carcinoma, where higher category indicates: <i>increasing size, depth of tissue invasion, or both</i>
<b>N: information about regional lymph node involvement</b>	
Nx	No information, unknown, or cannot be assessed
N0	No regional lymph node involvement
N1, N2, or N3	Regional lymph nodes containing cancer, higher category indicates: <i>number, location, or increasing size</i>
<b>M: information of additional organ involvement (metastases)</b>	
M0	No distant metastasis found
M1	Evidence of cancer in distant metastasis

**SOLID ORGAN CANCERS: STAGING GROUPS**

Stage 0	Carcinoma <i>in situ</i>	Treatment intent: curative
Stage I	Localized (ex// T1-2, N0, M0) <ul style="list-style-type: none"> <li>• Small tumor size</li> <li>• No regional lymph node involvement or metastases</li> </ul>	
Stage II	Locally advanced (ex// T1-2, N0-1, M0) <ul style="list-style-type: none"> <li>• Larger tumor size</li> <li>• Potential regional lymph node involvement</li> <li>• No metastases (M0)</li> </ul>	
Stage III	Invasive, locally advanced (ex// T3-4, N1-2, M0) <ul style="list-style-type: none"> <li>• Larger tumor size, presence tissue invasion</li> <li>• Regional lymph node involvement but no metastases</li> </ul>	
Stage IV	Metastasis present (M1)	Treatment intent: palliative

**HEMATOLOGICAL CANCERS: ANN ARBOR**

Stage I	<ul style="list-style-type: none"> <li>• Only one group of lymph nodes</li> </ul>
Stage II	<ul style="list-style-type: none"> <li>• ≥ 2 groups of lymph nodes affected</li> <li>• One side of the diaphragm</li> <li>• Either in the chest or abdomen</li> </ul>
Stage III	<ul style="list-style-type: none"> <li>• ≥ 2 groups of lymph nodes affected</li> <li>• Present in both the chest and abdomen</li> </ul>
Stage IV	<ul style="list-style-type: none"> <li>• ≥ 1 organ outside lymph system: bone marrow, liver, lungs</li> <li>• Present in lymph nodes</li> </ul>



B symptoms: weight loss (>10%), fever, night sweats

**TUMOR GRADE:**

**DEFINITION:**

- Degree of abnormality of tumor cells under microscopy
  - Well differentiated vs. poorly/undifferentiated
- Deviations from normal cellular proliferation and arrangement

**GRADING CLASSIFICATION:**

- Depends on the cancer type
  - Ex// breast cancer → Nottingham grading scale
- Generally, graded from 1 to 4

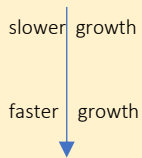
**PURPOSE:**

- Indicator of rate of growth and spread
- Helps determine the prognosis

**HOW DOES THE GRADE AFFECT PROGNOSIS?**

- Low grade = better prognosis
- Higher grade = faster growth and spread, requiring more intensive, immediate treatment

**TUMOR GRADE:**



Grade	Category	Differentiation
G1	Low grade	Well differentiated
G2	Intermediate grade	Moderately differentiated
G3	High grade	Poorly differentiated
G4	High grade	Undifferentiated/anaplastic

**PROGNOSTIC INDEX:**

- Clinical tool that *estimates* the overall survival based on cancer-type specific prognostic factors identified from observational evidence
  - Factors identified during diagnosis, staging and grading contribute to the overall evaluation of the prognosis
- Examples of prognostic factors:
  - Clinical age: symptoms, stage, laboratory results
  - Pathological: histology, grade
  - Molecular: gene mutation
- Implications of overall prognosis are dependent on early vs. advanced cancer

**SUMMARY:**

Cancer diagnosis	Integration of blood tests, tumor markers, diagnostic imaging, and biopsy results contribute to the primary cancer diagnosis
Cancer staging	Staging systems act as common language for HCP – helps with communication, interpretation of evidence, and considerations for clinical trials
Cancer grading	<ul style="list-style-type: none"> <li>• Grade/stage not synonymous – correlated with each other</li> <li>• Histologic classification influences its natural history, pattern of progression, and responsiveness to treatment</li> </ul>