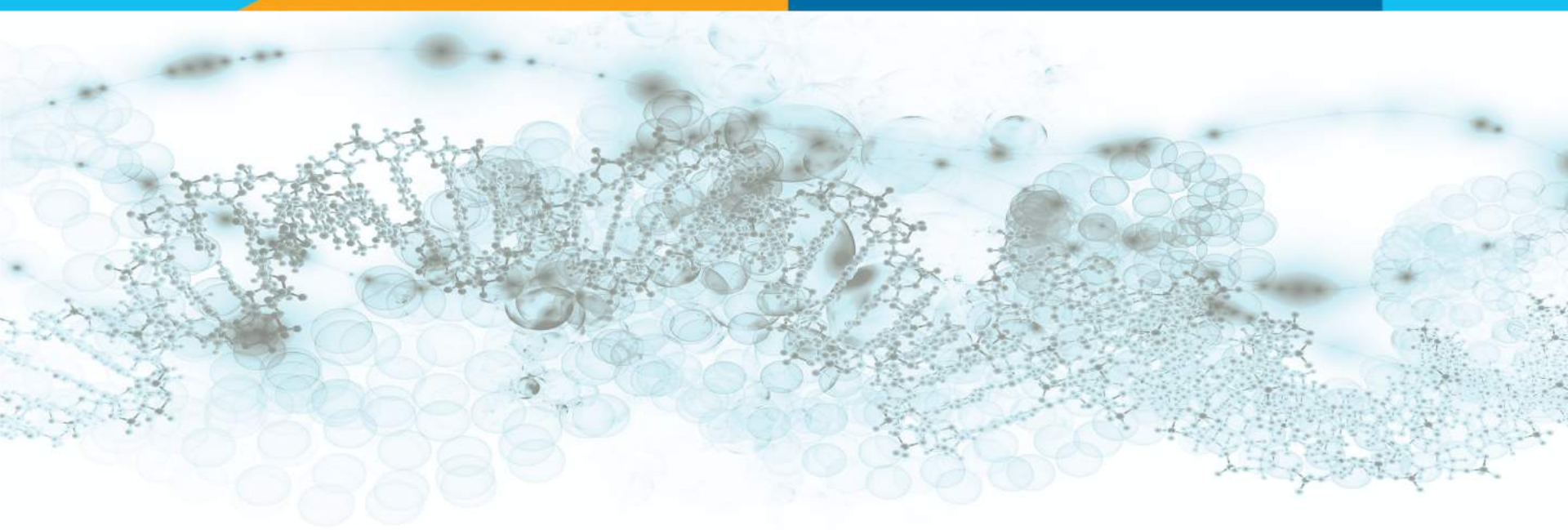




**Dana-Farber**  
Cancer Institute



# Staging of Stomach Cancer

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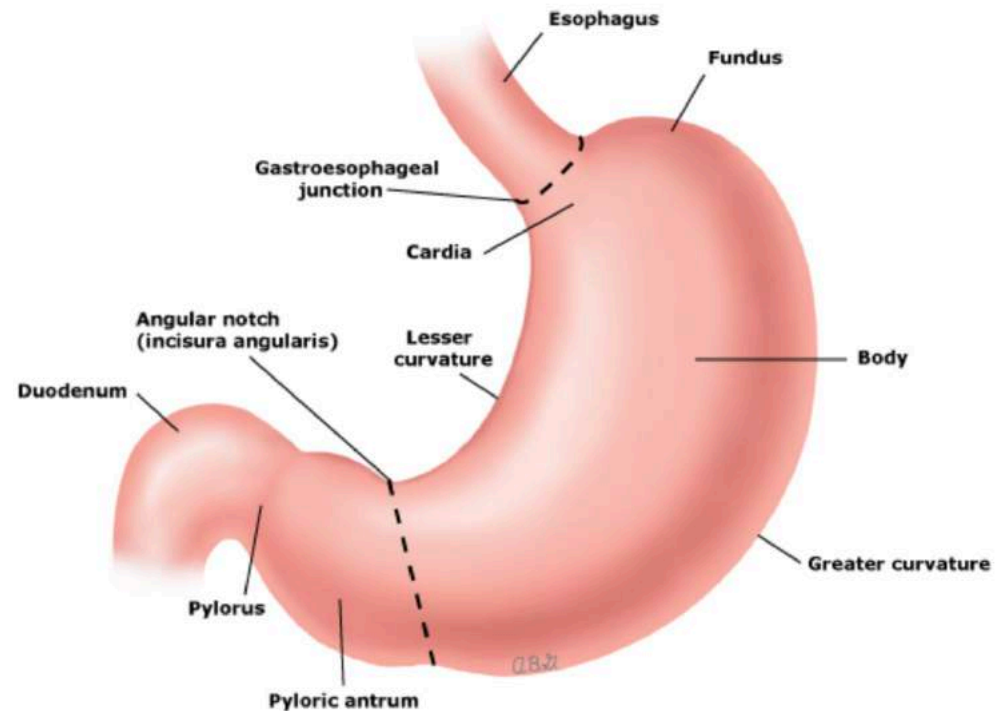
Medical Oncologist

Gastrointestinal Cancer Center

Dana-Farber Cancer Institute

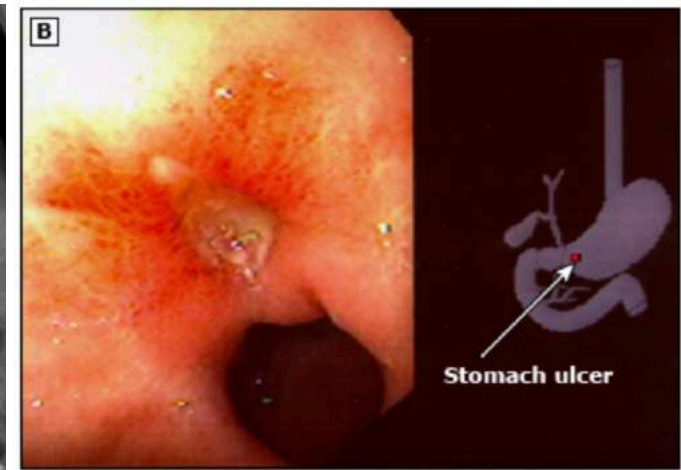
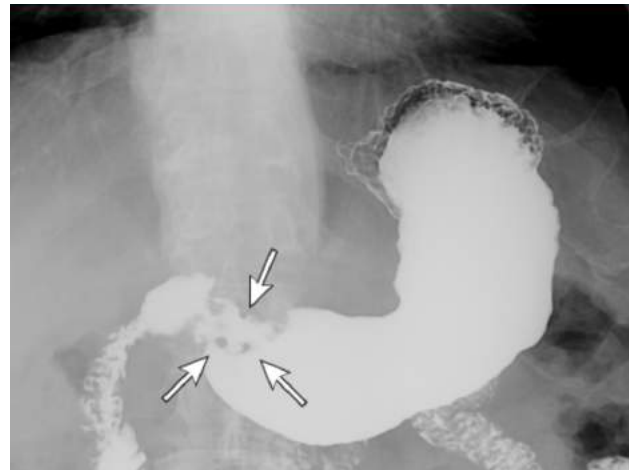
# Stomach Cancer – presenting symptoms

- Weight loss
- Abdominal pain
- Nausea
- Difficulty swallowing
- Dark stool
- Fullness/bloating



# Diagnosis of gastric cancer

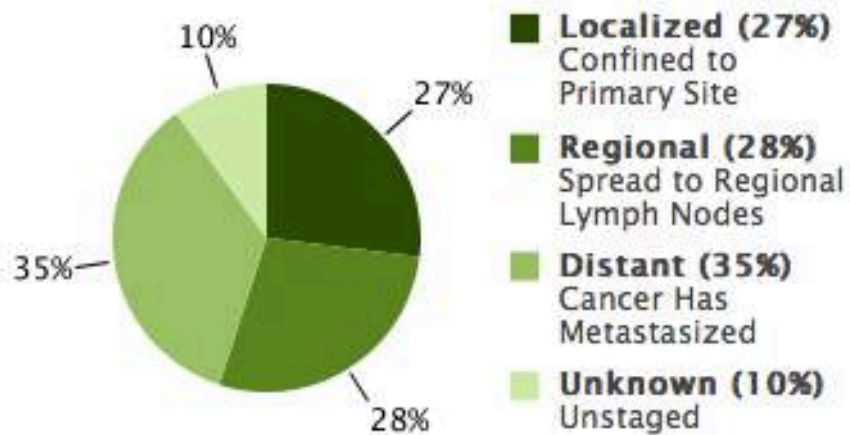
- Upper endoscopy
  - Ulcerated mass
  - Benign appearing ulcer, but proven malignant on biopsy
  - In diffuse cancers, endoscopy may not show any obvious abnormalities (linitis plastica)
- Biopsy
  - Adenocarcinoma
- Barium study (rare)



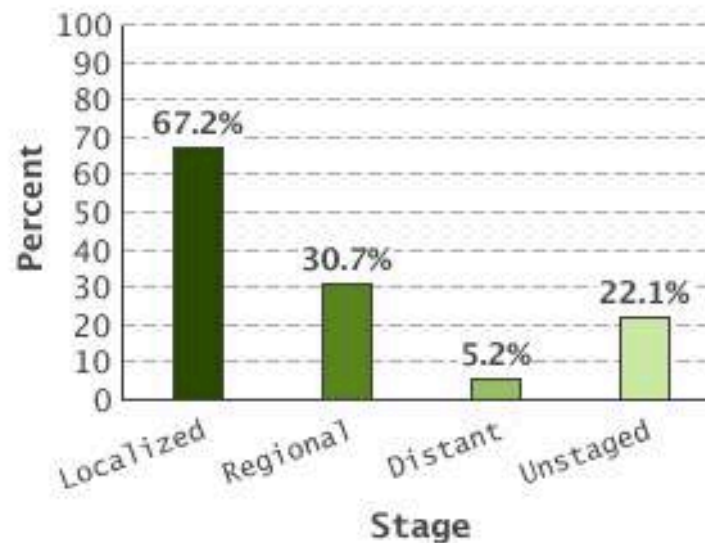
# Why is staging important?

Staging correlates with prognosis

Percent of Cases by Stage



5-Year Relative Survival



SEER Database 2007-2013

# Why is staging important?

## Staging guides treatment decisions

- Treatment modalities (surgery, chemotherapy, radiation)
- Sequence of therapies
- Patients without metastases who are eligible for surgery have potentially curable disease
- Patients with metastatic disease are referred for palliative therapy

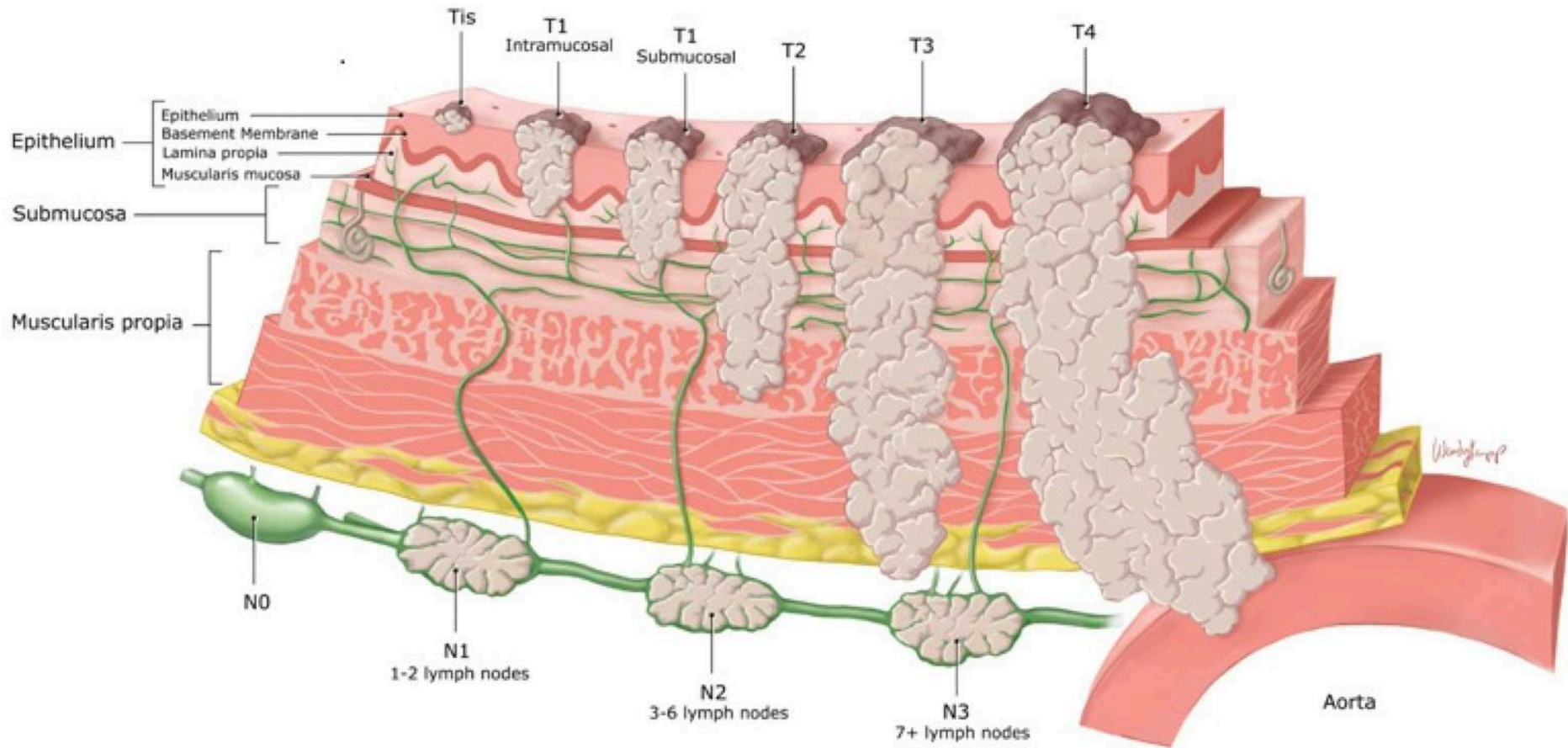
## Staging of gastric cancer – TNM criteria

- **Tumor**
  - Depth of tumor invasion in the wall of the stomach
- **Node**
  - Number of regional lymph nodes involved
- **Metastasis**
  - Presence or absence of distant metastases

### Stage I-IV

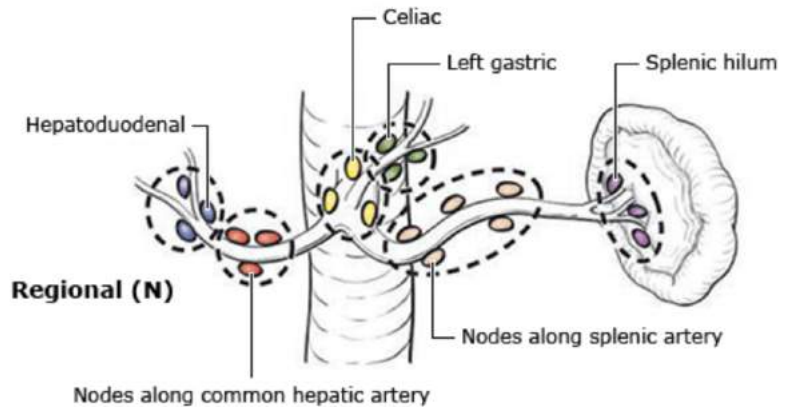
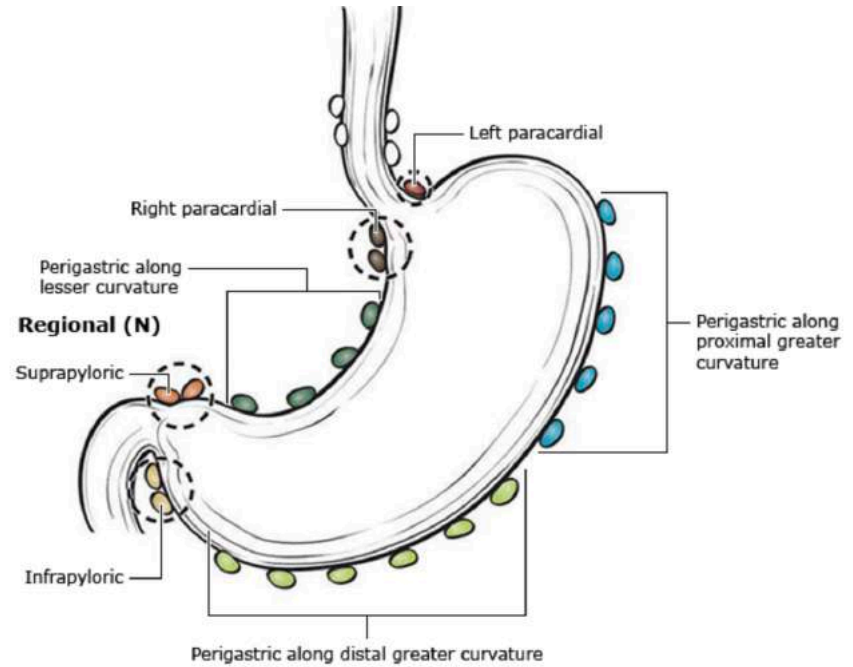


# Tumor (Tis-T4)



## Node (N0-N3)

- N0: no lymph nodes
- N1: 1-2 lymph nodes
- N2: 3-6 lymph nodes
- N3: 7+ lymph nodes





## Metastasis (M0-M1)

- M0: no distant metastasis
- M1: distant metastasis (other organs, non-regional lymph nodes or peritoneal disease, including malignant ascites)

# Stage I-IV

- **Stage I**
  - T1 or T2 N0
- **Stage II**
  - T1 or T2 N+
  - T3 or T4a N0
- **Stage III**
  - T3 or T4a N+
- **Stage IV**
  - T4b
  - M1

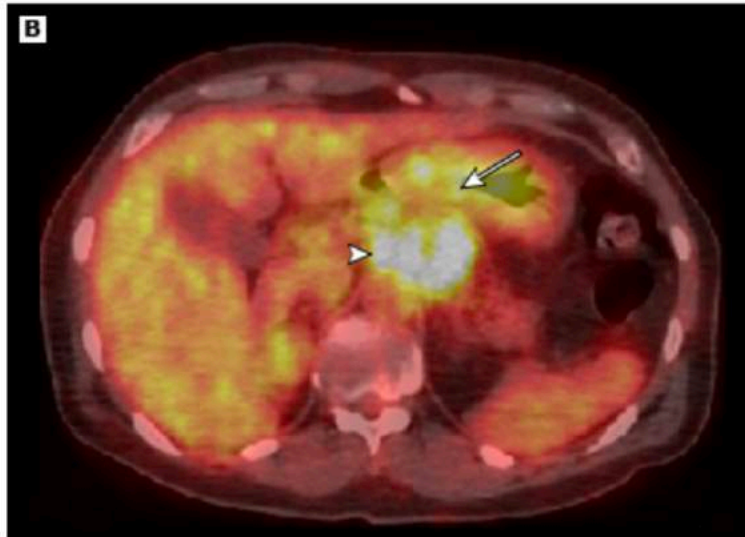
## Staging evaluation

- Initial goal is to determine if patients have potentially resectable disease (stage I to III) or unresectable/metastatic disease (stage IV)
- **TNM**
- First, we look for **M**
- Then we evaluate **T** and **N**

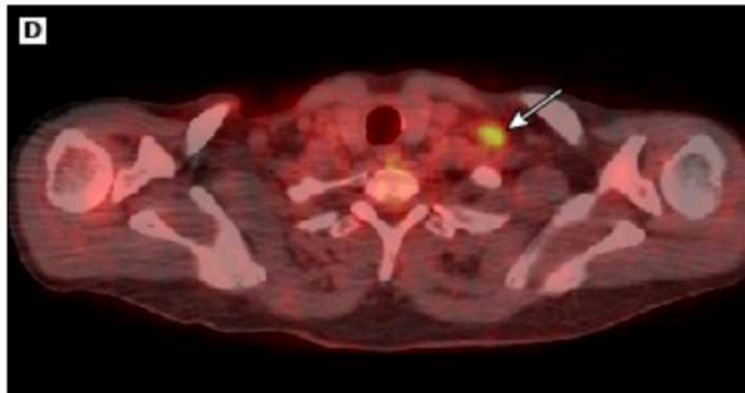
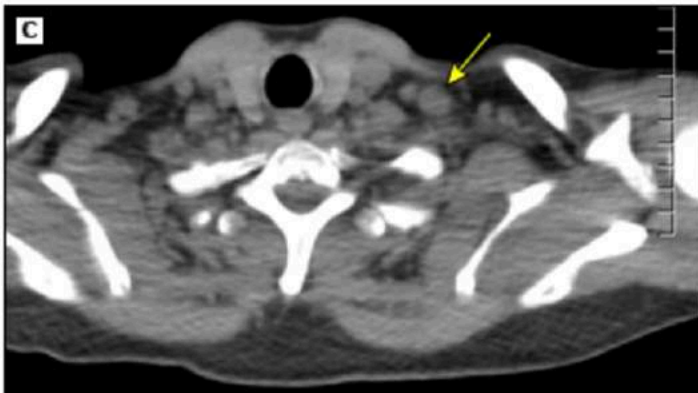
## CT of the chest, abdomen and pelvis

- Goal to evaluate for the presence or absence of distant metastases
- If there are suspicious findings, we biopsy the lesions to confirm distant metastases
- If there is ascites, we recommend sampling of the ascites to evaluate for the presence of cancer cells
- If there is no evidence of metastasis, PET/CT is performed to screen for distant metastases, as PET/CT is a more sensitive test in most cases

# CT and PET/CT in a patient with metastatic gastric cancer



Stomach cancer



Lymph node in the upper chest

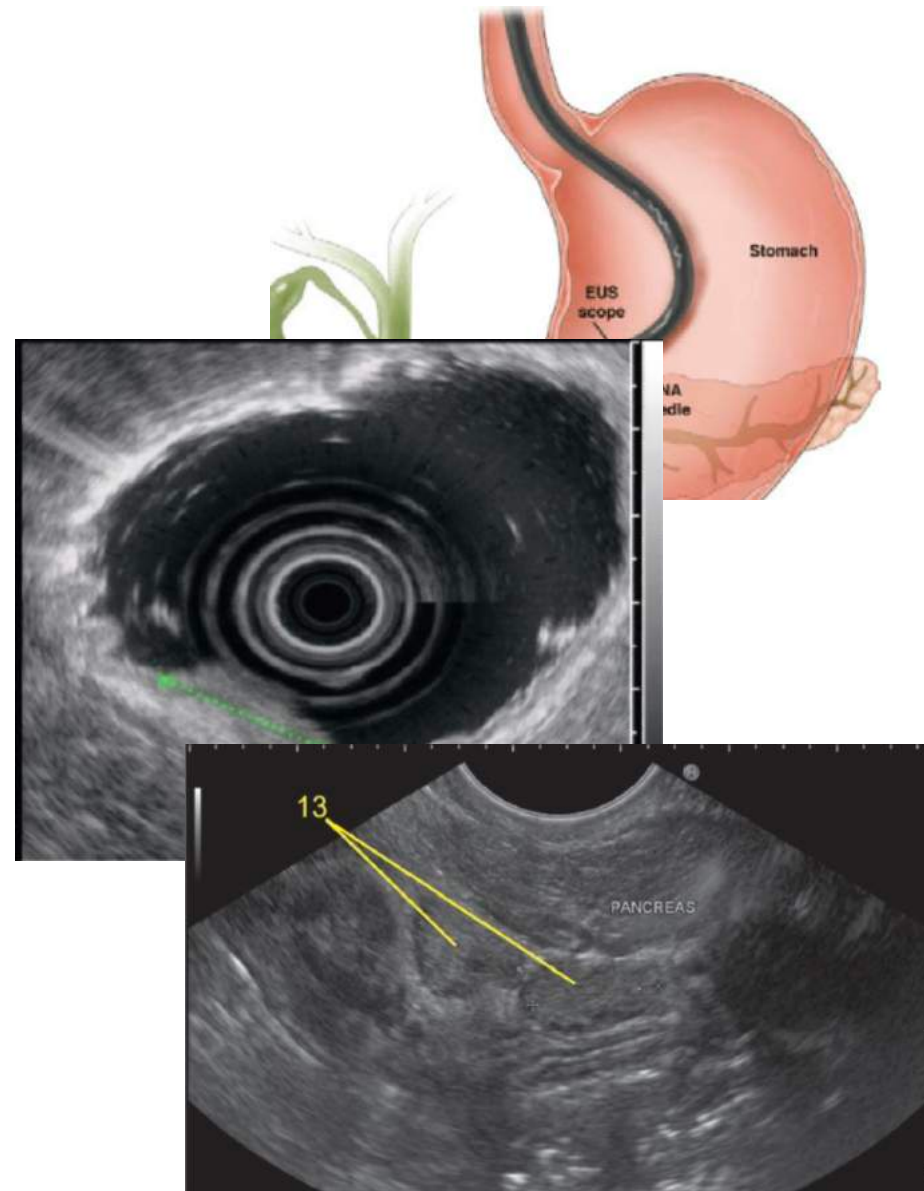
## After negative CT and PET/CT

- we evaluate **T** and **N**
- Endoscopic ultrasound



# Endoscopic Ultrasound (EUS)

- Goal to evaluate depth of invasion (T stage) and lymph node involvement (N stage)
- Biopsy of suspicious lymph nodes
- Repeat biopsy of primary tumor if additional tissue is needed
- If T2 or higher or N+, preoperative chemotherapy is the best treatment option

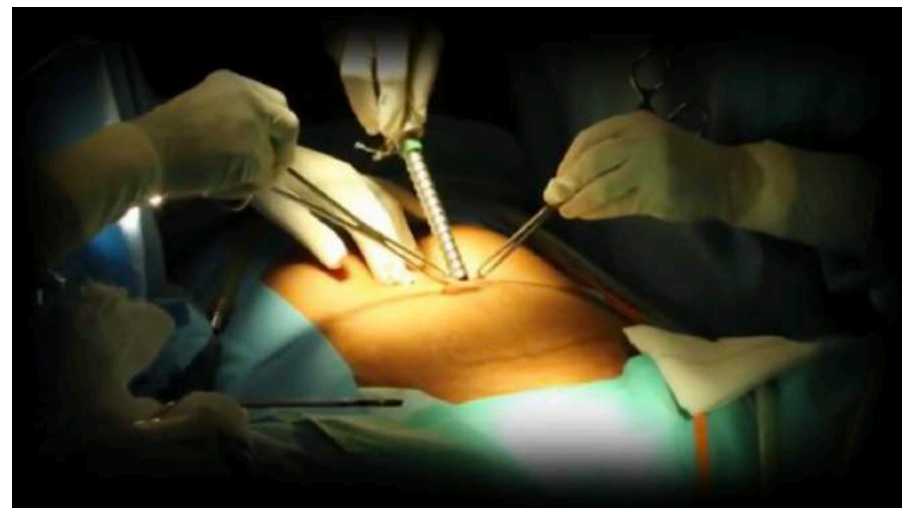


## After endoscopic ultrasound

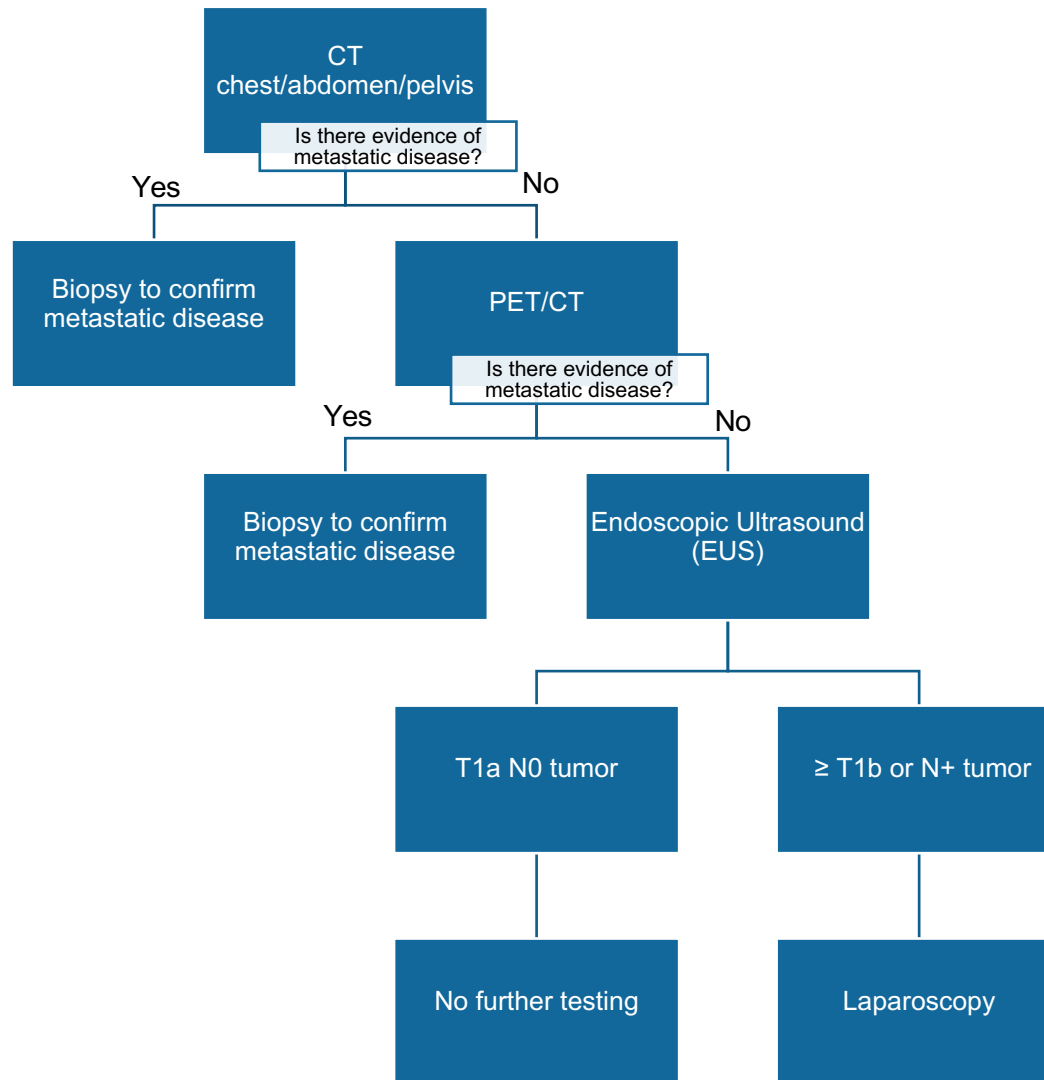
- we rule out metastatic disease that may not be visible on imaging studies (CT or PET/CT)
- Staging laparoscopy

## Staging Laparoscopy

- Goal to directly visualize the liver surface, peritoneum, and local lymph nodes
- Biopsy of any suspicious lesions and peritoneal washings
- 20-30% of patients with no evidence of metastases on imaging have peritoneal metastases
- All patients with  $\geq$  T1b disease are recommended to have staging laparoscopy
- Positive peritoneal cytology (even in the absence of visible peritoneal implants) is associated with poor prognosis and is considered metastatic disease



# Staging Algorithm



# Molecular testing

- Microsatellite Instability (MSI) or Mismatch Repair (MMR) testing
  - Tumors with microsatellite instability (MSI) or mismatch repair deficiency (dMMR)
  - Tumors without microsatellite instability (MSS) or mismatch repair proficiency (pMMR)
- HER2 testing
  - 0 or 1+ → Negative
  - 2+
    - FISH- → Negative
    - FISH+ → Positive
  - 3+ → Positive
- PD-L1 testing
  - CPS (combined positive score) 0 → Negative
  - CPS  $\geq 1$  → Positive

## Novel molecular tests

- Genomic profiling of the tumor (next-generation sequencing)
- Liquid biopsy (genomic profiling of circulating tumor DNA)
- EBV testing of the tumor



## Conclusions

- Staging is the most important next step after diagnosis of gastric cancer
- Staging provides information about prognosis and guides treatment decisions
- Distinguishing between early stage disease (local or regional disease) and metastatic disease is the goal of the staging evaluation
- Once metastatic disease is ruled out, endoscopic ultrasound can help us decide if surgery should be the first step in therapy or if preoperative chemotherapy should be pursued first
  - In Western countries, the majority of gastric cancers are diagnosed at more advanced stages (stage II or above)
- Molecular testing (HER2, MSI, PD-L1) should be performed for all metastatic tumors but can also be considered in earlier stages