Clinical staging

- Inspection and palpation of the thyroid gland and lymph nodes
- Indirect laryngoscopy to evaluate vocal cord motion
- Radioisotope thyroid scan, CT, MRI, and US for imaging studies
- Needle or open biopsy of the tumor for definite diagnosis
Pathologic staging

- All available clinical data are combined with pathologic study of the surgically resected specimen for pathologic staging.
- The surgeon’s evaluation of gross unresected residual tumor must be included.
Definition of TNM

- Primary tumor (T)
- Regional lymph nodes (N)
- Distant metastasis (M)
Primary tumor (T)

- **Tx** Primary tumor cannot be assessed
- **T0** No evidence of primary tumor
- **T1** Tumor $\leq 1$cm, limited to the thyroid
- **T2** $1$cm $<$ tumor $\leq 4$cm, limited to the thyroid
- **T3** Tumor $\geq 4$cm, limited to the thyroid
- **T4** Any size, extending beyond the thyroid
Regional lymph nodes (N)

- **Nx** Regional lymph nodes cannot be assessed
- **N0** No regional lymph nodes metastasis
- **N1** Regional lymph node metastasis
  - **N1a** ipsilateral cervical lymph nodes
  - **N1b** bilateral, midline, or contralateral cervical or mediastinal lymph nodes
Distant metastasis (M)

- Mx  Distant metastasis cannot be assessed
- M0  No distant metastasis
- M1  Distant metastasis
Histopathologic type

- For major types:
  - papillary carcinoma
  - follicular carcinoma
  - medullary carcinoma
  - anaplastic carcinoma
Papillary or Follicular CA

<table>
<thead>
<tr>
<th>Stage</th>
<th>&lt; 45y/o</th>
<th>≥ 45y/o</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>TxNxM0</td>
<td>T1N0M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>TxNxM1</td>
<td>T2N0M0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T3N0M0</td>
</tr>
<tr>
<td>Stage III</td>
<td></td>
<td>T4N0M0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TxN1M0</td>
</tr>
<tr>
<td>Stage IV</td>
<td></td>
<td>TxNxM1</td>
</tr>
</tbody>
</table>
# Medullary CA

<table>
<thead>
<tr>
<th>Stage</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1N0M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>T2N0M0</td>
</tr>
<tr>
<td></td>
<td>T3N0M0</td>
</tr>
<tr>
<td></td>
<td>T4N0M0</td>
</tr>
<tr>
<td>Stage III</td>
<td>TxN1M0</td>
</tr>
<tr>
<td>Stage IV</td>
<td>TxNxM1</td>
</tr>
</tbody>
</table>
Anaplastic CA

- All cases are stage IV
Cancer staging

Hepatobiliary system
presented by Intern 廖伯豪
Liver
(including intrahepatic bile ducts)
Rules for classification

- T staging is based on tumor number, tumor size, and vascular invasion
- TNM systems does not consider etiologic mechanisms
- Vascular invasion includes either gross or histologic involvement of vessels
- Imaging of the liver is important for staging
Clinical staging

- Imaging study for tumor size and vascular invasion
- Surgical exploration is usually not carried out due to low possibility of complete resection of the tumor
TNM staging system
Primary tumor (T)

- Tx  primary tumor cannot be assessed
- T0  no evidence of primary tumor
- T1  solitary tumor \( \leq 2 \text{cm} \) without vascular invasion
- T2
  - solitary tumor \( \leq 2 \text{cm} \) with vascular invasion, or
  - multiple tumors \( \leq 2 \text{cm} \) limited to one lobe without vascular invasion, or
  - solitary tumor \( > 2 \text{cm} \) without vascular invasion
Primary tumor (T)

- **T3**
  - solitary tumor $>2\text{cm}$ with vascular invasion, or
  - multiple tumors $\leq 2\text{cm}$ limited to one lobe with vascular invasion, or
  - multiple tumor $>2\text{cm}$ limited to one lobe with or without vascular invasion

- **T4**
  - multiple tumors in more than one lobe or
  - tumors involve portal or hepatic veins or invasion of adjacent organs other than gallbladder or perforation of visceral peritoneum
Regional lymph nodes (N)

- Nx  regional lymph nodes cannot be assessed
- N0  no regional lymph node metastasis
- N1  regional lymph node metastasis
Distant metastasis (M)

- Mx  distant metastasis cannot be assessed
- M0  no distant metastasis
- M1  distant metastasis
## Stage group

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1N0M0</td>
<td></td>
</tr>
<tr>
<td>Stage II</td>
<td>T2N0M0</td>
<td></td>
</tr>
<tr>
<td>Stage III A</td>
<td>T3N0M0</td>
<td></td>
</tr>
<tr>
<td>Stage III B</td>
<td>T1-3N1M0</td>
<td></td>
</tr>
<tr>
<td>Stage IV A</td>
<td>T4NxM0</td>
<td></td>
</tr>
<tr>
<td>Stage IV B</td>
<td>TxNxM1</td>
<td></td>
</tr>
</tbody>
</table>
Histopathologic type

- Hepatocellular carcinoma
- Cholangiocarcinoma
- Bile duct cystadenocarcinoma
- Mixed type
Histologic grade (G)

- Gx  grade cannot be assessed
- G1  well differentiated
- G2  moderately differentiated
- G3  poorly differentiated
- G4  undifferentiated
Prognostic factors

- Preceding liver disease, such as cirrhosis and invasion of portal vein
- Positive surgical margins
- Portal involvement
- Tumor number in the liver
- Serum $\alpha$-fetoprotein level
Extrahepatic bile ducts
TNM staging system
Primary tumor (T)

- **Tx** primary tumor cannot be assessed
- **T0** no evidence of primary tumor
- **Tis** carcinoma in situ
- **T1**
  - **T1a** subepithelial connective tissue (+)
  - **T1b** fibromuscular layer (+)
- **T2** perifibromuscular connective tissue (+)
- **T3** adjacent structures (+): liver, pancreas, duodenum, GB, colon, stomach
Regional lymph nodes (N)

- Nx  regional lymph node cannot be assessed
- N0  no regional lymph node metastasis
- N1
  - cystic duct, pericholedochal or hilar lymph nodes (+)
- N2
  - peripancreatic (head only), periduodenal, periportal, celiac, or sup. Mesenteric or post. Pancreaticoduodenal lymph nodes (+)
Distant metastasis (M)

- **Mx** distant metastasis cannot be assessed
- **M0** no distant metastasis
- **M1** distant metastasis
<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Tumor Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>TisN0M0</td>
<td>TisN0M0</td>
</tr>
<tr>
<td>I</td>
<td>T1N0M0</td>
<td>T1N0M0</td>
</tr>
<tr>
<td>II</td>
<td>T2N0M0</td>
<td>T2N0M0</td>
</tr>
<tr>
<td>III</td>
<td>T1-2N1-2M0</td>
<td>T1-2N1-2M0</td>
</tr>
<tr>
<td>IV A</td>
<td>T3NxM0</td>
<td>T3NxM0</td>
</tr>
<tr>
<td>IV B</td>
<td>TxNxM1</td>
<td>TxNxM1</td>
</tr>
</tbody>
</table>
Prognostic factors

- Histologic type, histologic grade, blood vessel or lymphatic vessel invasion, and perineural invasion as prognostic factors
- Papillary carcinoma have a more favorable prognosis
- Involvement of surgical margins should be considered an important prognostic factor
Gallbladder
Rules for classification

- T staging depends on the depth of tumor penetration into GB wall, hepatic invasion, and the involvement of adjacent organs.
- The liver is not considered a metastatic site.
- Tumor confined to the GB is classified as T1 or T2.
- Lymph nodes must be specifically identified to separate N1 from N2.
TNM staging system
Primary tumor (T)

- **Tx** primary tumor cannot be assessed
- **T0** no evidence of primary tumor
- **Tis** carcinoma in situ
- **T1** tumor invades lamina propria or muscle layer
  - **T1a** lamina propria
  - **T1b** muscle layer
- **T2**
  - tumor invades perimuscular connective tissue; no extension beyond serosa or into liver
Primary tumor (T)

- **T3**
  - tumor perforates serosa (visceral peritoneum) or
  - directly invades one adjacent organ, or both (extension into liver $\leq 2$ cm)

- **T4**
  - tumor $> 2$ cm extends into liver or
  - $\geq 2$ involvement of adjacent organs (stomach, duodenum, colon, pancreas, omentum, extrahepatic bile ducts, any involvement of liver)
Regional lymph nodes (N)

- Nx  regional lymph node cannot be assessed
- N0  no regional lymph node metastasis
- N1
  - metastasis in cystic duct, pericholedochal, or hilar lymph nodes
- N2
  - metastasis in peripancreatic (head only), periduodenal, periportal, celiac, or superior mesenteric lymph nodes
Distant metastasis (M)

- Mx  distant metastasis cannot be assessed
- M0  no distant metastasis
- M1  distant metastasis
## Stage grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>TisN0M0</td>
</tr>
<tr>
<td>Stage I</td>
<td>T1N0M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>T2N0M0</td>
</tr>
<tr>
<td>Stage III</td>
<td>T1-2N1M0, T3N0-1M0</td>
</tr>
<tr>
<td>Stage IV A</td>
<td>T4N0-1M0</td>
</tr>
<tr>
<td>Stage IV B</td>
<td>TxN2M0, TxNxM1</td>
</tr>
</tbody>
</table>
Histopathologic type

- Adenocarcinoma (98%)
- carcinoma in situ
- papillary carcinoma
- adenocarcinoma, intestinal type
- clear cell adenocarcinoma
- mucinous carcinoma
- signet ring cell carcinoma

- Squamous cell carcinoma
- adenosquamous carcinoma
- small cell carcinoma
- undifferentiated carcinoma
- carcinosarcoma
- other (specify)
Histologic grade (G)

- Gx  grade cannot be assessed
- G1  well differentiated
- G2  moderately differentiated
- G3  poorly differentiated
- G4  undifferentiated
Prognostic factors

- Histologic type, histologic grade, and vascular invasion
- Papillary carcinoma: most favorable prognosis
- Unfavorable prognosis: small cell carcinoma and undifferentiated carcinoma
- Lymphatic or vascular invasion
Ampulla of Vater
Rules for classification

- T staging depends on extension of primary tumor through the ampulla or sphincter of Oddi into duodenal wall or beyond pancreatic head or contiguous soft tissue.
- The extent of invasion in “cm” to separate T3 from T4.
Rules for classification

- For T4, adjacent organs include extrahepatic bile ducts and soft tissue
- EUS and CT are effective in pre-operative staging and in evaluating resectability of ampullary carcinoma
TNM staging system
Primary tumor (T)

- **Tx** primary tumor cannot be assessed
- **T0** no evidence of primary tumor
- **Tis** carcinoma in situ
- **T1**
  - tumor limited to ampulla of Vater or sphincter of Oddi
- **T2** duodenal invasion
- **T3** pancreatic invasion ≤ 2cm
- **T4**
  - pancreatic invasion > 2cm or invasion of other adjacent organs
Regional lymph nodes (N)

- Nx  regional lymph nodes cannot be assessed
- N0  no regional lymph node metastasis
- N1  regional lymph node metastasis
Distant metastasis (M)

- Mx  distant metastasis cannot be assessed
- M0  no distant metastasis
- M1  distant metastasis
### Stage grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>TisN0M0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1N0M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>T2-3N0M0</td>
</tr>
<tr>
<td>Stage III</td>
<td>T1-3N1M0</td>
</tr>
<tr>
<td>Stage IV</td>
<td>T4NxM0</td>
</tr>
<tr>
<td></td>
<td>TxNxM1</td>
</tr>
</tbody>
</table>
Prognostic factors

- Though tumor size is not part of TNM system, it has prognostic significance
- perineural invasion, ulceration, local extension, and histologic grade
- papillary tumors have a better outcome
Exocrine pancreas
Rules for classification

- Imaging studies such as US and CT with cytology and ERCP
- Laparotomy and surgical exploration with biopsy for tumor staging
- Pathologic staging is often based on Whipple procedure
- Extension to liver or peritoneum is defined as M1
Rules for classification

- Peripancreatic tissues include surrounding retroperitoneal fat, mesentery, mesocolon, greater/lesser omentum, and peritoneum.
- Direct invasion of ampulla of Vater should be classified as T3.
- For T4, adjacent large vessels include celiac a., SMA, common hepatic a., portal v., SMV, and hepatic v., but not splenic vessels.
TNM staging system
Primary tumor (T)

- Tx  primary tumor cannot be assessed
- T0  no evidence of primary tumor
- Tis  in situ carcinoma
- T1  tumor limited to pancreas ≤ 2cm
- T2  tumor limited to pancreas > 2cm
- T3  tumor extends into duodenum, bile duct, peripancreatic tissues
- T4  tumor extends into stomach, spleen, colon, adjacent large vessels
**Regional lymph nodes (N)**

- **Nx**  regional lymph nodes cannot be assessed
- **N0**  no regional lymph node metastasis
- **N1**  regional lymph node metastasis
  - **pN1a**  metastasis in a single regional lymph node
  - **pN1b**  metastasis in a multiple regional lymph node
Distant metastasis (M)

- Mx  distant metastasis cannot be assessed
- M0  no distant metastasis
- M1  distant metastasis
# Stage grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tumor Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>TisN0M0</td>
</tr>
<tr>
<td>Stage I</td>
<td>T1-2N0M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>T3N0M0</td>
</tr>
<tr>
<td>Stage III</td>
<td>T1-3N1M0</td>
</tr>
<tr>
<td>Stage IV A</td>
<td>T4NxM0</td>
</tr>
<tr>
<td>Stage IV B</td>
<td>TxNxM1</td>
</tr>
</tbody>
</table>
Histopathologic type

- Carcinoma in situ
- ductal adenocarcinoma
- mucinous noncystic carcinoma
- signet ring cell carcinoma
- adenosquamous carcinoma
- anaplastic carcinoma
- mixed ductal-endocrine carcinoma
- Osteoclast-like giant cell tumor
- serous cystadenocarcinoma
- mucinous cystadenocarcinoma
- acinar cell carcinoma
- pancreaticoblastoma
- other
- borderline tumors
Prognostic factors

- Histologic grade, lymphatic vessel invasion, perineural invasion, and capsular infiltration as adverse prognostic factors
Thanks for your attention!