Cut up techniques in Endocrine pathology

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• Thyroid
• Parathyroid
• Adrenal
Thyroid

Thyroid Gland
Left Lobe
Right Lobe
Isthmus

Hyroid Bone
Cricothyroid Ligament
Thyroid Cartilage
Cricoid Cartilage
Trachea
Indications

- **Cysts** (rapidly expanding or refilling)
- **Hyperplastic nodule**
- **Multinodular goitre**
- **Graves disease**
- **Hashimoto’s thyroiditis**

- **THY3 nodule** (diagnostic lobectomy)
- **Adenoma**
- **Carcinoma**
- **Other tumours**
- **‘Lymphoma’**
Thyroid – types of specimen

- Lobectomy
- Lobectomy with isthmus / pyramidal lobe (hemithyroidectomy)
- Sub-total thyroidectomy
- Total thyroidectomy
Thyroid – types of specimen

- Lobectomy
- Lobectomy with isthmus / pyramidal lobe (hemithyroidectomy)
- Sub-total thyroidectomy
- Total thyroidectomy
Thyroid – Neck dissections

- Central compartment
  - Level 6 (prelaryngeal [Delphian], paralaryngeal & paratracheal)
- Level 7 (sup mediastinal)
- Selective / Functional neck dissection
- Modified neck dissection (internal jugular vein and/or SCM muscle spared)
- Radical neck dissection
Unifocal vs Multifocal
Thyroid staging – UICC/TNM8

- **pTX**: Cannot be assessed
- **pT0**: No evidence of primary tumor
- **pT1**: Tumor size 2 cm or less, limited to thyroid
  - **pT1a**: Tumor 1 cm or less in greatest dimension
  - **pT1b**: Tumor > 1 cm but not more than 2 cm in greatest dimension
- **pT2**: Tumor > 2 cm, but not more than 4 cm, limited to thyroid
- **pT3**: Tumor > 4 cm
  - **pT3a**: Tumor >4 cm limited to thyroid
  - **pT3b**: Gross extrathyroidal extension invading strap muscles (sternohyoid, sternothyroid, thyrohyoid or omohyoid muscles) from a tumor of any size.
- **pT4a**: Gross extrathyroidal extension invading subcutaneous soft tissues, larynx, trachea, esophagus or recurrent laryngeal nerve from a tumor of any size.
- **pT4b**: Gross extrathyroidal extension invading prevertebral fascia or encasing carotid artery or mediastinal vessels from a tumor of any size.

**Regional Lymph Nodes**

- **pNX**: Cannot be assessed
- **pN0**: No regional lymph node metastasis
- **pN1a**: Nodal metastases to Level VI or VII lymph nodes (pretracheal, paratracheal and prelaryngeal/Delphian or upper mediastinal). This can be unilateral or bilateral disease.
- **pN1b**: Metastases to unilateral, bilateral or contralateral cervical (Levels I, II, III, IV, V) or retropharyngeal lymph nodes.

**Distant Metastasis**

- **pM0**: No distant metastasis
- **pM1**: Distant metastasis

TNM8 applicable to papillary, follicular, poorly differentiated, Hurthle cell and Anaplastic carcinoma.
How to cut up

- Measure
- Ink
- Slicing for fixation
How to cut up
Blocks

Multinodular Goitre

- 4 from each lobe
- 1 isthmus
- 1 pyramidal lobe
- Sample any cream nodules
- Look for lymph nodes – if present then sample them.
Blocks

Diagnostic lobectomy for a solitary nodule

- <2 cms – sample entire nodule
- > 2 cms representative sections of lesion – sample entire capsular region if neoplasm
Capsular & vascular invasion

Follicular neoplasm

Fibrous capsule

Not yet (B) Yes (C)
No (A)

No (J)
Not yet (I) Yes (D)

No (G)
Not yet (F)
Yes (H)

Yes (E)

Yes (C) Yes (D) Yes (E) Yes (F)
No (A)

Follicular neoplasm

Capsule

College of American Pathologists Thyroid cancer protocol 2012
Larger nodules – capsule sampling techniques
Blocks – malignant lesions

- Tumour
- Margins
- Soft tissue extension
- Adjacent thyroid + other lesions
- Lymph nodes
Parathyroid
Indications & type of specimen

- Hyperplasia
- Adenoma
  - Parathyroidectomy
    - Single gland
    - Multiple glands
    - Part of a gland
- Carcinoma
  - En block resection
Benign lesions

- Measure
- Weigh
- Bisect / bread loaf
- Submit entirely
Parathyroid carcinoma staging

- No officially accepted system
- MSKCC proposed system

Stage I: T1N0M0
Stage II: T2N0M0
Stage IIIA: T3N0M0
Stage IIIB: T4N0M0
Stage IIIC: Any T, N1, M0;
Stage IV: Any T, Any N, M1

- T1 = Primary tumor < 3 cm.
- T2 = Primary tumor > 3 cm.
- T3 = Primary tumor of any size with invasion of the surrounding soft tissues, such as the thyroid gland, strap muscles, etc.
- T4 = Massive central compartment disease invading the trachea and esophagus or recurrent parathyroid carcinoma.

- N0 = No regional lymph node metastases.
- N1 = Regional lymph node metastases.

- M0 = No evidence of distant metastases.
- M1 = Evidence of distant metastasis.
Malignant lesions – en bloc resections

- Orient if possible
- Measure
- Ink
- Serially slice
- Blocks
  - Tumour
  - Margins
  - Soft tissue extension
  - Lymph nodes
  - Thymus
Adrenal
Indications

- Unilateral hyperplasia
- Adenoma
  - Conn’s
  - Cushing’s
  - Virilizing syndromes
- Adrenocortical carcinoma
- Phaeochromcytoma
- Neuroblastic tumours
- Metastasis
Type of specimen

- Adrenalectomy
- Adrenalectomy with nephrectomy
- Adrenalectomy with kidney + other organs
Type of specimen

- Adrenalectomy
- Adrenalectomy with nephrectomy
- Adrenalectomy with kidney + other organs
Primary Tumor

- pTX: Primary tumor cannot be assessed
- pT0: No evidence of primary tumor
- pT1: Tumor 5 cm or less in greatest dimension, no extra-adrenal invasion
- pT2: Tumor > 5 cm, no extra-adrenal invasion
- pT3: Tumor of any size with local invasion, but not invading adjacent organs
- pT4: Tumor of any size with invasion of adjacent organs

Adjacent organs include kidney, diaphragm, great vessels, pancreas, and liver.

Regional Lymph Nodes

- pN0: Negative regional nodes
- pN1: Positive regional nodes

Regional lymph nodes include aortic (para-aortic and peri-aortic) and retroperitoneal (peri-nephric and peri-adrenal).

Distant Metastasis

- pM0: No distant metastasis
- pM1: Distant metastasis
# ENSAT system of staging

<table>
<thead>
<tr>
<th>Stage</th>
<th>UICC / TNM8 Criteria</th>
<th>5 year survival rate</th>
<th>ENSAT system Criteria</th>
<th>5 year survival rate</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Ref 3</td>
<td>Ref 4</td>
<td>Same as TNM7</td>
<td>Ref 3</td>
</tr>
<tr>
<td>Stage 1</td>
<td>pT1 N0 M0</td>
<td>82%</td>
<td>74%</td>
<td>Same as TNM7</td>
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<tr>
<td>Stage 2</td>
<td>pT2 N0 M0</td>
<td>58%</td>
<td>64%</td>
<td>Same as TNM7</td>
</tr>
<tr>
<td>Stage 3</td>
<td>pT1-2 N1 M0</td>
<td>55%</td>
<td>57%</td>
<td>Tumour with any one of the following:</td>
</tr>
<tr>
<td></td>
<td>pT3 N0 M0</td>
<td></td>
<td></td>
<td>• Involved lymph nodes</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Extradrenal tissue infiltration</td>
</tr>
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<td></td>
<td></td>
<td>• Venous tumour thrombus in renal vein or IVC</td>
</tr>
<tr>
<td>Stage 4</td>
<td>pT3 N1 M0</td>
<td>18%</td>
<td>12%</td>
<td>Any tumour with distant metastasis</td>
</tr>
<tr>
<td></td>
<td>pT4 N0 M0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pT1-4 N0-1 M1</td>
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</tr>
</tbody>
</table>
Cut up

- Adrenal + periadrenal fat
- Adrenal medullary vein
- Remove vascular clamp / staple
- Measure (entire + tumour dimensions [if possible])
- **Do not separate fat from adrenal**
- If tumour capsule visible – document for breaches.
- Ink
- Serially slice
- Measure tumour
Blocks - benign

- Hyperplasia – multiple representative
  - adjacent adrenal (cortex + medulla)
  - lymph nodes
  - peri-adrenal fat (if needed)
Solitary mass lesion < 3 cms:
Submit entirely

Solitary mass lesion > 3 cms:
Representative of lesion (atleast 1/cm)
+ adjacent adrenal (cortex + medulla), + lymph nodes, + peri-adrenal fat (if needed)
Phaeochromocytoma
Blocks - malignant

- Tumour (at least 1 / cm)
- Sample areas with differing appearances including some of necrotic zones.
- Capsule
- Extra-adrenal extension
- Margins
- Vessels
- Venous tumour thrombi
- Lymph nodes
- Soft tissue deposits
Malignant masses
Resources

- RCPath datasets
  - Thyroid
  - Parathyroid
  - Adrenal

- College of American Pathologists Cancer checklists
  - Thyroid
  - Adrenal

- http://www.cap.org