

# Thyroid Cancer

# Thyroid Carcinoma: Diagnosis

## 1. Follicular Carcinoma

*Follicular cells produce thyroid hormone*

- **Differentiated Thyroid Carcinoma (90%)**
  - Papillary ( >90%, best prognosis)
  - Follicular
  - Hurthle
- **Anaplastic Thyroid Carcinoma (1%)**

## 2. Parafollicular Carcinoma

*Parafollicular cells produce calcitonin*

- **Medullary Thyroid Carcinoma (5-10%)**
  - Sporadic
  - Familial

## Molecular Mutations:

**BRAF**  
**RET**  
**NTRK**  
**ALK**  
**RAS**

## Work Up:

- **Imaging**
  - Iodine-123 or technetium-99 scan
    - \* May not be + in all pts
    - \* CT contrast has iodine, requires wash out period
  - PET scan
- **Labs**
  - TSH, T3/T4, Thyroglobulin, Calcium

# Differentiated Thyroid Carcinoma (DTC): Treatment

## Differentiated Thyroid Cancer

### Trimodal Therapy

1. **Surgery**
2. **RAI (Radioactive Iodine)**
3. **TSH Suppression (Levothyroxine)**

#### Post-Op Monitoring/Management:

- Thyroglobulin/TG antibodies
- TSH
- PRN neck ultrasound

### Surgery

#### Lobectomy or Total Thyroidectomy

Total Thyroidectomy if adverse features:

- Extra-thyroid extension
- Poorly differentiated
- Tumor > 4 cm
- Distant Mets
- Cervical LN involvement

Complications of surgery:

- Hypocalcemia (hypoparathyroidism)
- Hypothyroidism

# Differentiated Thyroid Carcinoma (DTC): Treatment

## Differentiated Thyroid Cancer

### Trimodal Therapy

1. Surgery
2. RAI (Radioactive Iodine)
3. TSH Suppression (Levothyroxine)

#### Post-Op Monitoring/Management:

- Thyroglobulin/TG antibodies
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### RAI

Low dose vs. High Dose

- Low dose: 30-100 mCi
- High dose: 100-200 mCi

Indications:

- Extra-thyroid extension
- Tumor > 4 cm
- Distant mets
- Bulky/>5 LN

Contraindications:

- Small papillary tumors
- Post-op TG <1, no anti-TG AB

# Differentiated Thyroid Carcinoma (DTC): Treatment

## Differentiated Thyroid Cancer

### Trimodal Therapy

1. **Surgery**
2. **RAI (Radioactive Iodine)**
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#### Post-Op Monitoring/Management:

- Thyroglobulin/TG antibodies
- TSH
- PRN neck ultrasound

### TSH Suppression

Levothyroxine suppression of TSH

Low Risk goal TSH: 0.1-0.5 mU/L

High Risk goal TSH: < 0.1 mU/L

# Differentiated Thyroid Carcinoma (DTC): Treatment

## Differentiated Thyroid Cancer

### **RAI refractory or metastatic:**

- Consider repeat RAI (can re-sensitize)
- Targeted therapy
  - BRAF → Dabrafenib, vemurafenib
  - NTRK → Larotrectinib, entrectinib
  - RET → Selpercatinib, pralsetinib
  - ALK → Crizotinib, ceritinib, entrectinib
- TKIs: Sorafenib, Lenvatinib
- NO role for chemotherapy

# Thyroid Carcinoma (non-DTC): Treatment

## Anaplastic Thyroid Cancer

### Pathogenesis

- Follicular cell tumor (1%)
- **BRAF mutations common**

### Prognosis

- Worse prognosis

## Treatment

### Local Treatment

Usually unresectable

### Systemic Treatment (+/- RT)

Non-BRAF mutated → Chemo + RT  
(carbo/taxol, taxol, taxotere, taxotere/doxorubicin)

**BRAF mutated → dabrafenib (BRAF) + trametinib (MEK)**

# Thyroid Carcinoma (non-DTC): Treatment

## Medullary Thyroid Cancer

### Pathogenesis

- Parafollicular cell tumor
- Sporadic (75%) or familial (25%)
- **RET mutations common in familial**  
Prophylactic total thyroidectomy indicated
- **Associated with MEN 2A/2B**  
Screen for pheochromocytomas

### Monitoring

- Calcitonin (produced by parafollicular cells)
- CEA

### Treatment

#### Local Treatment:

Resection + TSH suppression

#### Systemic Treatment:

Non-RET mutated → TKIs: vandetanib, cabozantinib

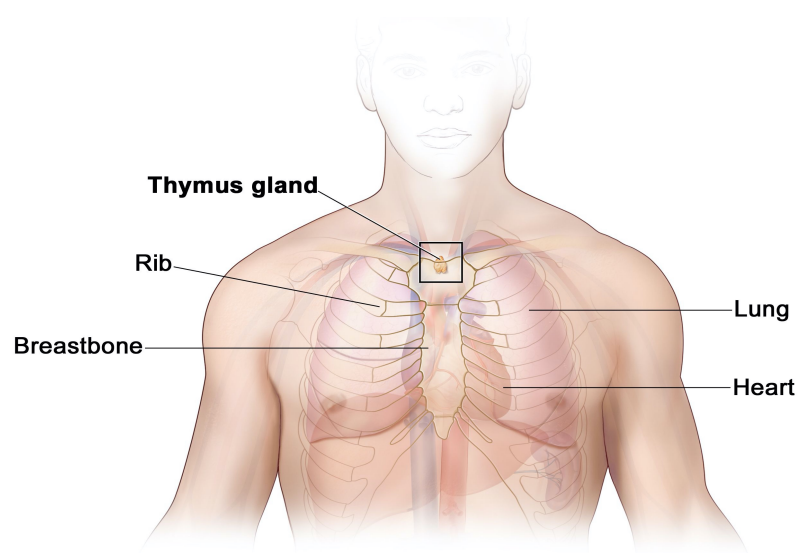
**RET mutated → selpercatinib, pralsetinib**



# Thymoma & Thymic Carcinoma

## General:

- Tumor of the thymus gland
- Most common anterior mediastinal cancer in adults
- **Associated with myasthenia gravis**
- **Associated with RBC aplasia**



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## Localized Treatment: Resectable

- Surgical Resection
- R1+ Margins

Thymoma → RT

Thymic Carcinoma → ChemoRT

## Advanced Treatment: Unresectable

- ChemoRT

### Thymoma

cisplatin/doxorubicin/cyclophosphamide +/- RT

\* Or neoadjuvant chemo → surgery → chemo +/- RT

### Thymic Carcinoma

carboplatin/taxol +/- RT

# Thyroid Cancer Reference Handout

## Thyroid Carcinoma: Dx

### 1. Follicular Carcinoma

*Follicular cells produce thyroid hormone*

#### Differentiated Thyroid Carcinoma (90%)

Papillary  
Follicular  
Hurthle

#### Anaplastic Thyroid Carcinoma (1%)

### 2. Parafollicular Carcinoma

*Parafollicular cells produce calcitonin*

#### Medullary Thyroid Carcinoma (5-10%)

Sporadic  
Familial

### Work Up:

#### Imaging

Iodine-123 or technetium-99 scan  
PET scan

#### Labs

TSH, T3/T4, Thyroglobulin, Calcium

## Thyroid Carcinoma: Tx

### Differentiated Thyroid Cancer

#### Trimodal Therapy

1. Surgery
2. RAI (Radioactive Iodine)
3. TSH Suppression (Levothyroxine)

#### Post-Op Monitoring:

Thyroglobulin/TG antibodies  
TSH  
PRN neck ultrasound

#### RAI refractory or metastatic:

- Targeted therapy
  - BRAF → Dabrafenib, vemurafenib
  - NTRK → Larotrectinib, entrectinib
  - RET → Selpercatinib
  - ALK → Crizotinib, ceritinib, entrectinib
- Consider repeat RAI (can re-sensitize)
- TKIs: Sorafenib, Lenvatinib
- NO role for chemotherapy

### Medullary Thyroid Cancer

#### Pathogenesis

RET mutations common in familial  
Associated with MEN 2A/2B

#### Monitoring

Calcitonin (produced by parafollicular cells)

Local treatment = Resection

Systemic Treatment =

Non-RET mutated → vandetanib, cabozantinib  
RET mutated → selpercatinib, pralsetinib

### Anaplastic Thyroid Cancer

#### Pathogenesis

BRAF mutations common

#### Prognosis

Worse prognosis

Local Treatment = Often Unresectable

Systemic Treatment =

Non-BRAF mutated → Chemo + RT  
BRAF mutated → dabrafenib (BRAF) + trametinib (MEK)

# Thymoma & Thymic Carcinoma

## Thymus Gland Tumors

Most common anterior mediastinal cancer in adults

Associated with myasthenia gravis

Associated with RBC aplasia

### Localized Treatment: Resectable

#### Surgical Resection

##### R1+ Margins

Thymoma → RT

Thymic Carcinoma → ChemoRT

### Advanced Treatment: Unresectable

#### ChemoRT

##### Thymoma

cisplatin/doxorubicin/cyclophosphamide +/- RT

\* Or neoadjuvant chemo → surgery → chemo +/- RT

##### Thymic Carcinoma

carboplatin/taxol +/- RT