Management of Differentiated Thyroid Cancer in Children

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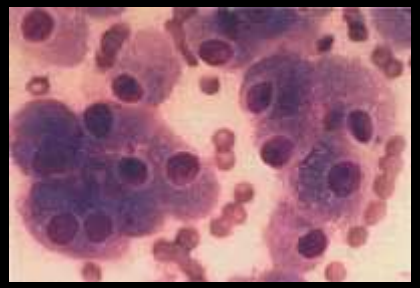
Endocrine Breast Melanoma



What are these?

Thyroid Cancer in paediatrics

- Most common endocrine tumour in children
- ~ 1% of tumours in children
- Most common head and neck tumour

- More common in adults
- But, ~10% occurs before age of 21

Thyroid Cancer in paediatrics

- More commonly advanced at diagnosis
- More frequent recurrence
- Good prognosis if treated appropriately

Thyroid Nodules in paediatrics

- Less common than adults (1.5% vs 7%)
- More commonly malignant (20% vs 10%)
- Solitary nodules more common than MNG

Solitary Thyroid Nodules in 128 Children and Adolescents[1]

MALIGNANT	19%	
Papillary	17	13%
Follicular	4	3.6%
Anaplastic	2	1.6%
Medullary	1	0.8%
BENIGN	81%	
Coll. Nod/Cyst	86	67%
Lymph. Thyroiditis	18	14%

(1) Weisinga WM Management of thyroid nodules in Children *Hormones 2007 6(3):194-9.*

Risk Factors

- Female > Male 5:1
- Post-pubertal > pre-pubertal
- Previous thyroid disease
- Previous neck irradiation
- Environmental radiation exposure
- Family history
- Age > 10yrs

Previous Neck Irradiation

- Ultrasound abnormal in all[2]
- Focal lesions in 37%[2]
- Thyroid cancer in 5.4%[2]

- 27 times the risk of developing nodule[3]

- ? Regular ultrasound screening

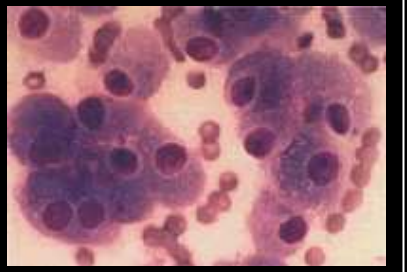
(2) Shafford et al *Br J Cancer 1999; 80:808-14.* (3) Sklar C et al *JCEM 1997;82:4020-27.*

Presentation

- Solitary thyroid nodule 75%[4]
- 20-50%with neck adenopathy[4]
- 9-15% distant metastases[4]

(4) Niedziela M. Pathogenesis, diagnosis and management of thyroid nodules in children. . . *Endocr Relat Cancer. Jun 2006;13(2):427-53.*

Diagnosis



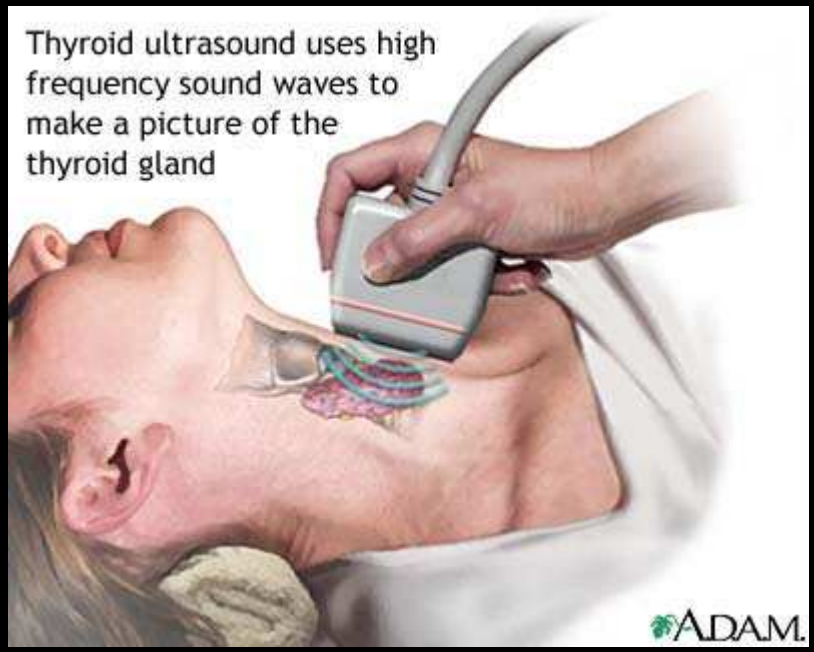
- Diagnostic steps same as for adults
- Application in smaller children is different

Diagnosis

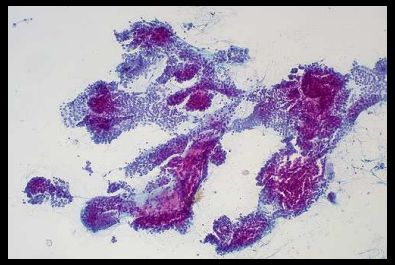
- History (risk factors)
- Examination
  - Thyroid
  - Neck
- Blood tests
  - TSH
  - Calcitonin

Diagnosis - Ultrasound

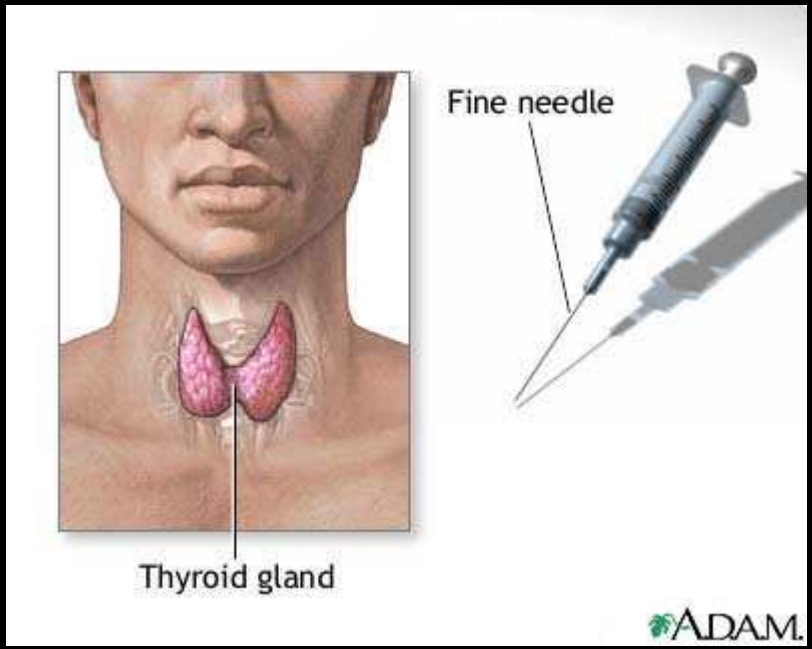
- 60% Sensitive
- 60% Specific
- Solitary vs MNG
- Characteristics
  - Irregular, Tall
  - Microcalcs
  - Intranodular Vasc.
  - Hypoechogenic



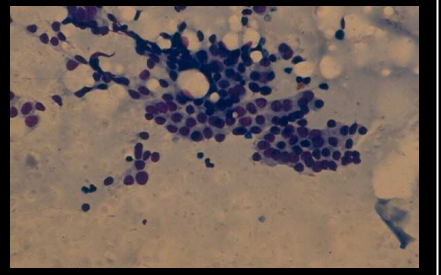
Diagnosis – FNA



- Non-aspiration technique
  - 100% Sensitive
  - 95% Specific
  - 5% false negative
- Sedation
- Ultrasound guidance



Diagnosis – FNA



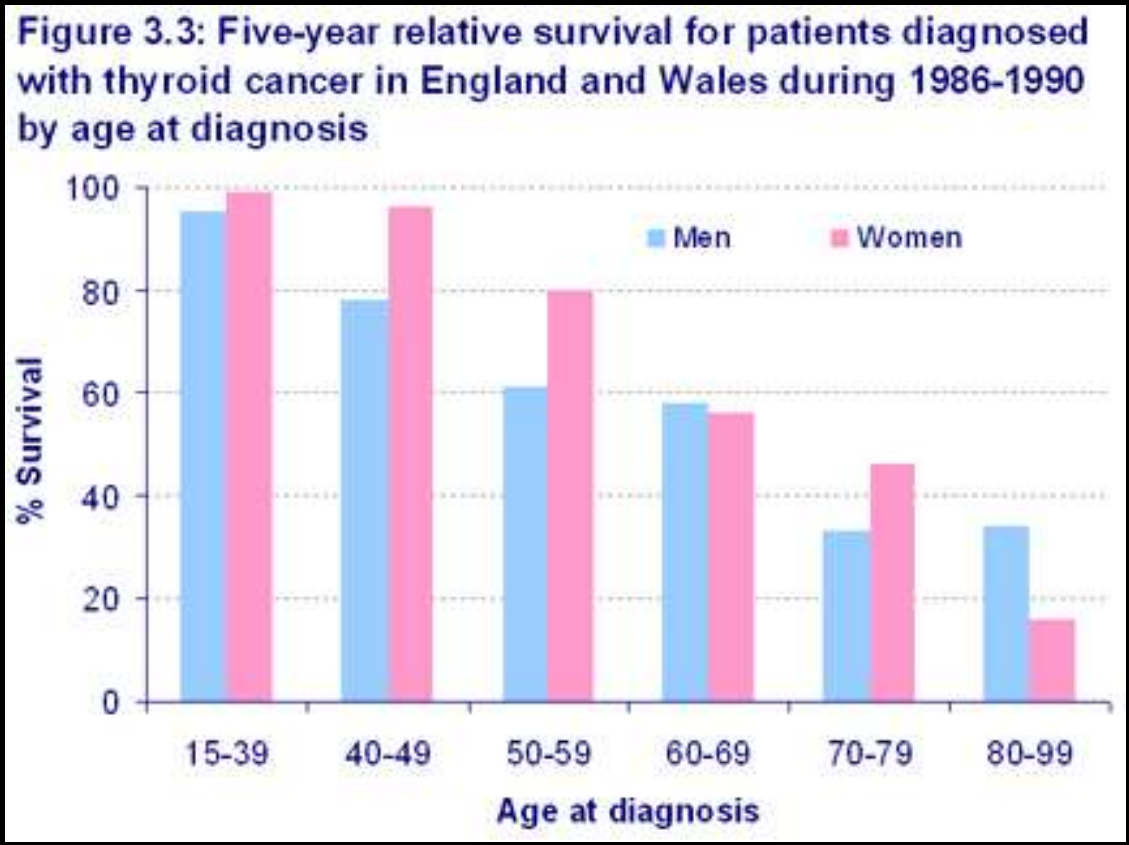
- Results
  - Benign — Repeat once
  - Atypical Follicular — Lobectomy
  - Papillary — Total Thyroidectomy

Pathology

Type	%
Papillary	75%
Follicular	18%
Medullary/Anaplastic etc	7%

Prognosis

Figure 3.3: Five-year relative survival for patients diagnosed with thyroid cancer in England and Wales during 1986-1990 by age at diagnosis



Prognosis

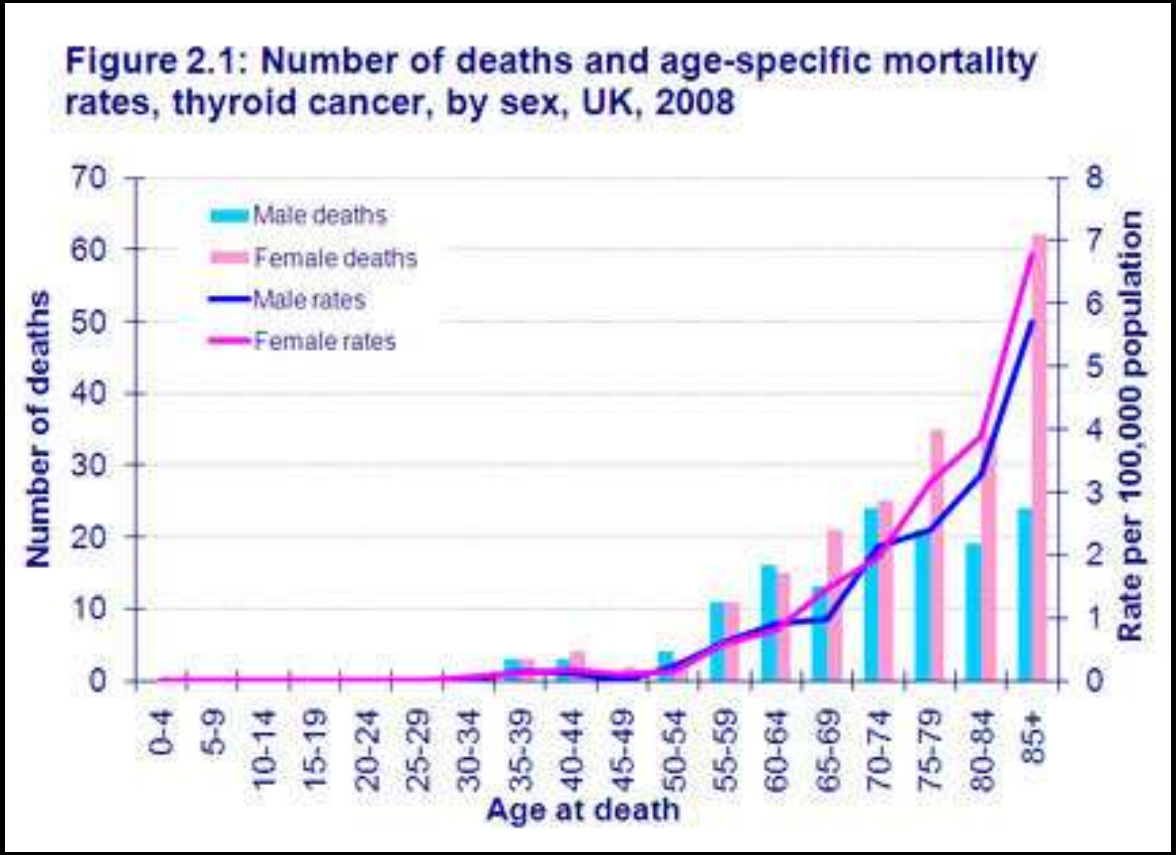
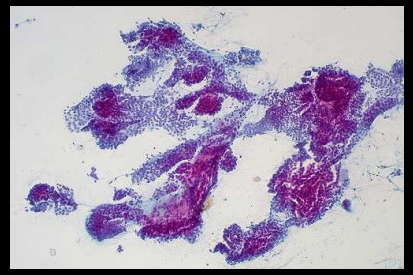


Figure 2.1: Number of deaths and age-specific mortality rates, thyroid cancer, by sex, UK, 2008
Male deaths
Female deaths
Male rates
Female rates
Number of deaths
Rate per 100,000 population
Age at death
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+

Papillary Thyroid Cancer



- MANAGEMENT
- Total Thyroidectomy vs Thyroid lobectomy
- Central Neck Dissection
- Lateral neck dissection
- Radioactive Iodine

- The surgeon confronted with PTC can choose almost any operation and find support for it in the literature

Papillary thyroid cancer risk

- LOW RISK
  - Classic PTC
  - No local or distant mets
  - Complete resection
  - No tumor invasion
  - No vascular invasion
- INT. RISK
  - Microscopic ETExt
  - Cervical LN mets
  - Aggressive Histology
  - Vascular invasion
- HIGH RISK
  - Macroscopic gross ETExt
  - Incomplete tumor resection
  - Distant Mets
  - Inappropriate high Tg

Total Thyroidectomy

- Papillary cancers 50-80% bilateral
- Locoregional recurrence less
- Facilitates adjuvant RAI
- Low complication rates

Total Thyroidectomy

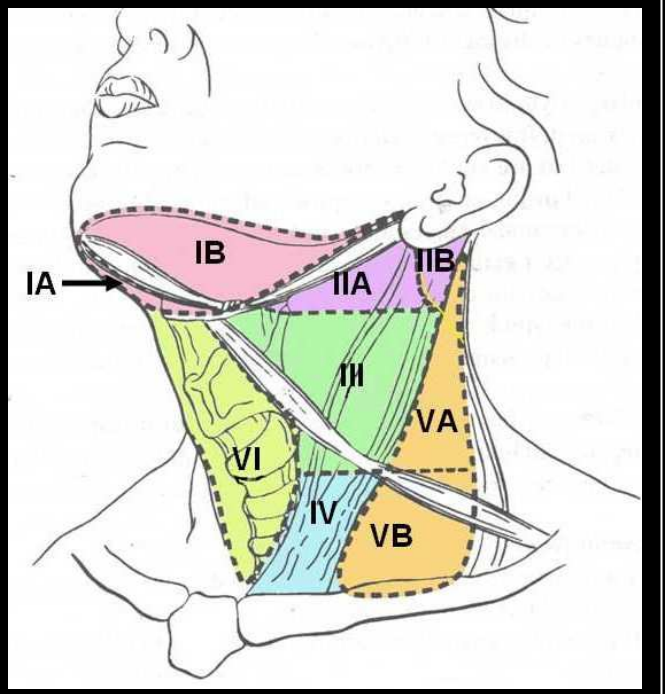
- Grossly palpable or Ultrasound disease in both lobes
- Patient preference
- Patient with high risk tumour
- Young patient with large nodal metastasis to facilitate RAI
- Patient with distant metastasis likely to require RAI

Thyroid lobectomy

- Low risk PTC
  - Classic PTC
  - No local or distant mets
  - Complete resection (small tumour)
  - No tumor invasion
  - No vascular invasion
- Lobectomy has equivalent survival in low risk

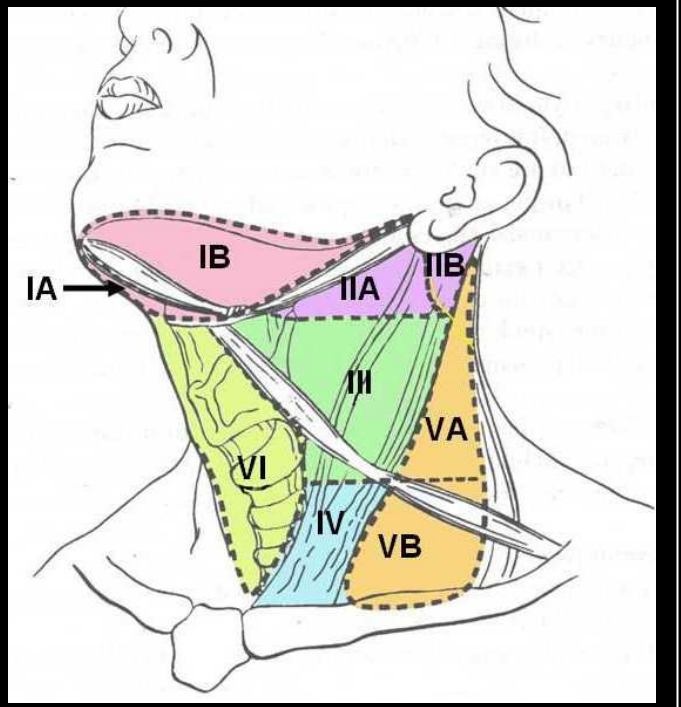
Central Neck Dissection

- Decreases locoregional recurrence
- ?Targets Adjuvant RAI



Lateral neck dissection

- Pre-operative diagnosis
  - Ultrasound
  - FNA
  - CT Scan
- Selective dissection
  - Levels II,III,IV,V
  - Remove all disease



Follicular Thyroid Cancer

- MANAGEMENT
- Lobectomy diagnosis
  - Follicular Adenoma
  - Minimally Invasive Follicular Carcinoma
  - Invasive Follicular Carcinoma
  - Hurthle Cell Tumours

Minimally Invasive FTC

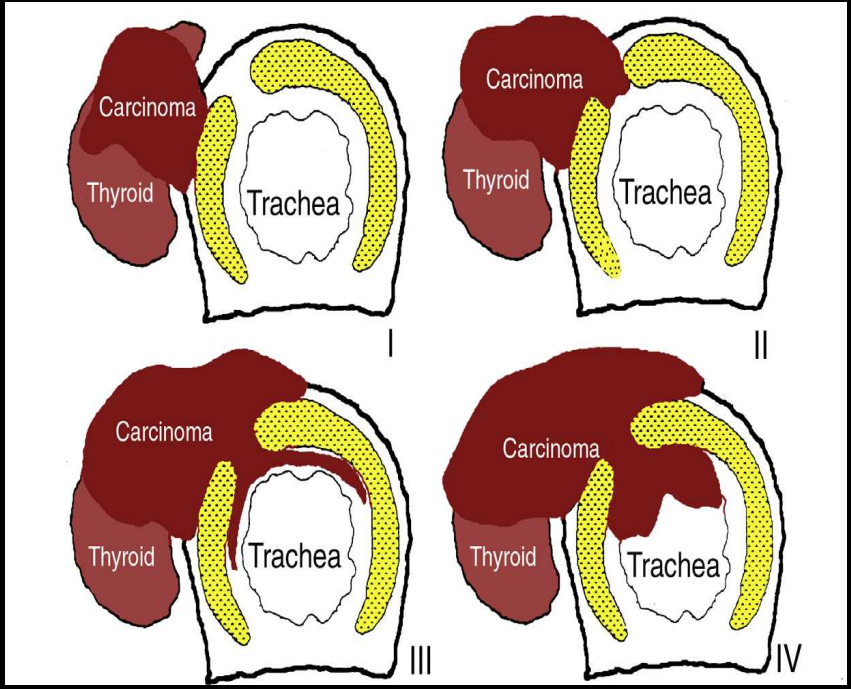
- Lobectomy is standard treatment
  - Minimal capsular invasion
  - No vascular invasion
- Survival equivalent to follicular adenoma

Invasive Follicular Carcinoma

- Completion thyroidectomy
- No node dissection
- Adjuvant RAI

Locally Advanced Thyroid Cancer

- Complete resection of visible disease



- Shave resection
- Adjuvant RAI
- External Beam XRT

Anaplastic Thyroid Cancer

- Very rare in children
- Aggressive maligancy with few survivors
- Surgery only indicated very early in disease

- ?Radiotherapy

Radioactive Iodine

- 636 Node negative patients 1970-2000[5]

	20yr rec	20yr mort
Surgery	3.4%	0.0%
Surgery + RAI	4.3%	0.0%

(5) Hay ID. *J Surg Oncol 94: 692-700, 2006*

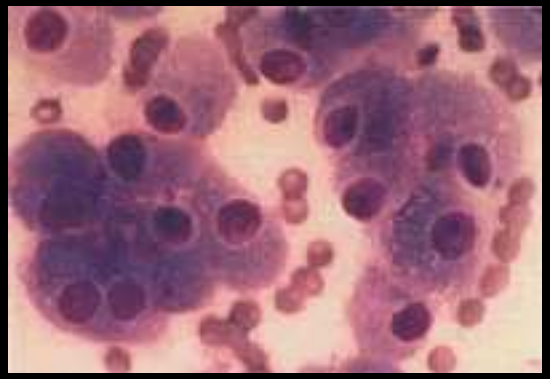
Radioactive Iodine

- RAI adjuvant remant ablation
  - patients with high-risk (MACIS 6+) PTC
  - patients with diagnosis of FTC/HCC
- Study of 6,841 European patients(6)
  - increased risk of both solid tumors and leukemia after I-131 treatment
  - concluded that “it seems necessary to restrict the use of I-131 to thyroid cancer patients in whom it may be beneficial”

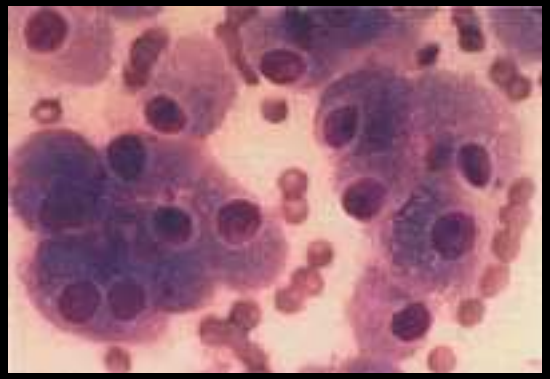
(6)Br J Cancer 89: 1638, 2003

Differentiated Thyroid Cancer in Children and Adolescents

- Ultrasound, FNA
- Papillary Thyroid Cancer
  - Total thyroidectomy and central neck dissection
  - ?Lobectomy in low risk
  - RAI in high risk only
- Follicular Thyroid Cancer
  - Lobectomy for Minimally Invasive FTC
  - Total and RAI for Invasive FTC



Hurthle Cells



Oxyphilic with a pink granular cytoplasm. Mitochondria rich.

Central round nucleus with a central round nucleolus.