

Quiz

Question 1

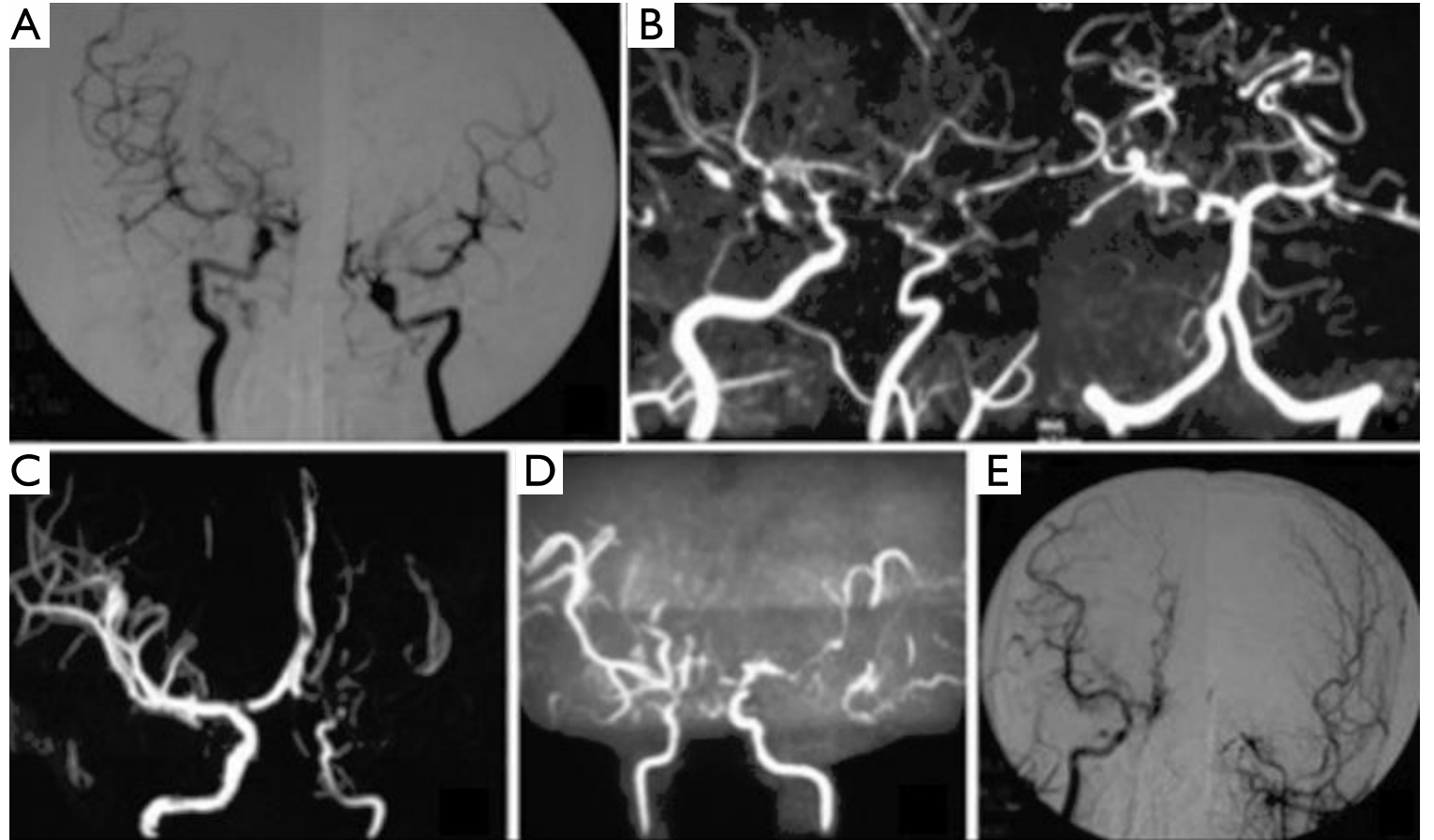
All are true about resistance to thyroid hormone (RTH) beta **except**

- a. Serum thyroid binding globulin (TBG) is elevated
- b. Most patients are clinically thyrotoxic
- c. Goiter is present in 65-95%
- d. Associated with an increased risk for autoimmune thyroid disease

Question 2

What is the diagnosis?

- A. Takatsubo's disease
- B. Hirata's disease
- C. Moyamoya syndrome
- D. Pendred syndrome



Question 3

Immune checkpoint inhibitors can cause

- a. Central hypothyroidism
- b. Hypothyroidism
- c. Painless thyroiditis
- d. All of the above

Question 4

All are true about biotin related interference in thyroid assay except

- A. TSH is falsely high
- B. Free T4 is falsely high
- C. Free T3 is falsely high
- D. TSH receptor-binding inhibitor immunoglobulin is falsely high

Question 5

All of the following can be associated with an increased radioiodine uptake in the thyroid gland **except**

- A. Hydatidiform mole
- B. Struma ovarii
- C. Thyrotropinoma
- D. Thyroid hormone resistance

Question 6

All are ultrasound characters of a medullary thyroid carcinoma except

- A. Microcalcification
- B. Macrocalcification
- C. More wide than tall
- D. Hyperechogenicity

Question 7

Serum thyroid binding globulin is elevated with all the drugs except

- A. Glucocorticoids
- B. Tamoxifen
- C. Methadone
- D. 5-fluorouracil

Question 8

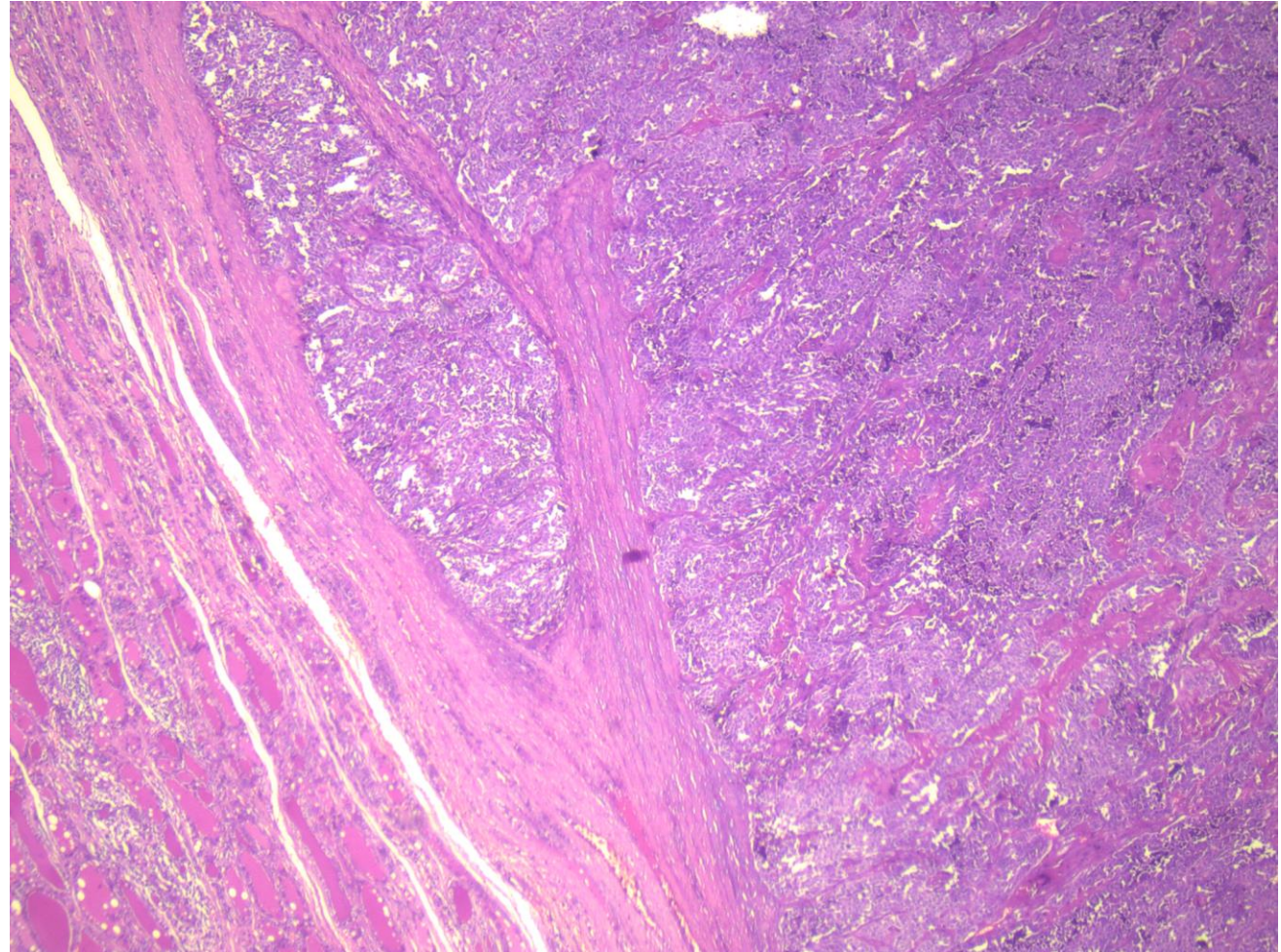
On 21st January 2020, the FDA approved Tepezza (teprotumumab) for the treatment of active Graves' orbitopathy (GO). All are true about the drug except

- A. Monoclonal antibody against insulin-like growth factor 1 receptor
- B. Is effective in patients with milder forms of GO
- C. Hypoglycemia is an adverse effect
- D. Has teratogenic potential

Question 9

What is the diagnosis?

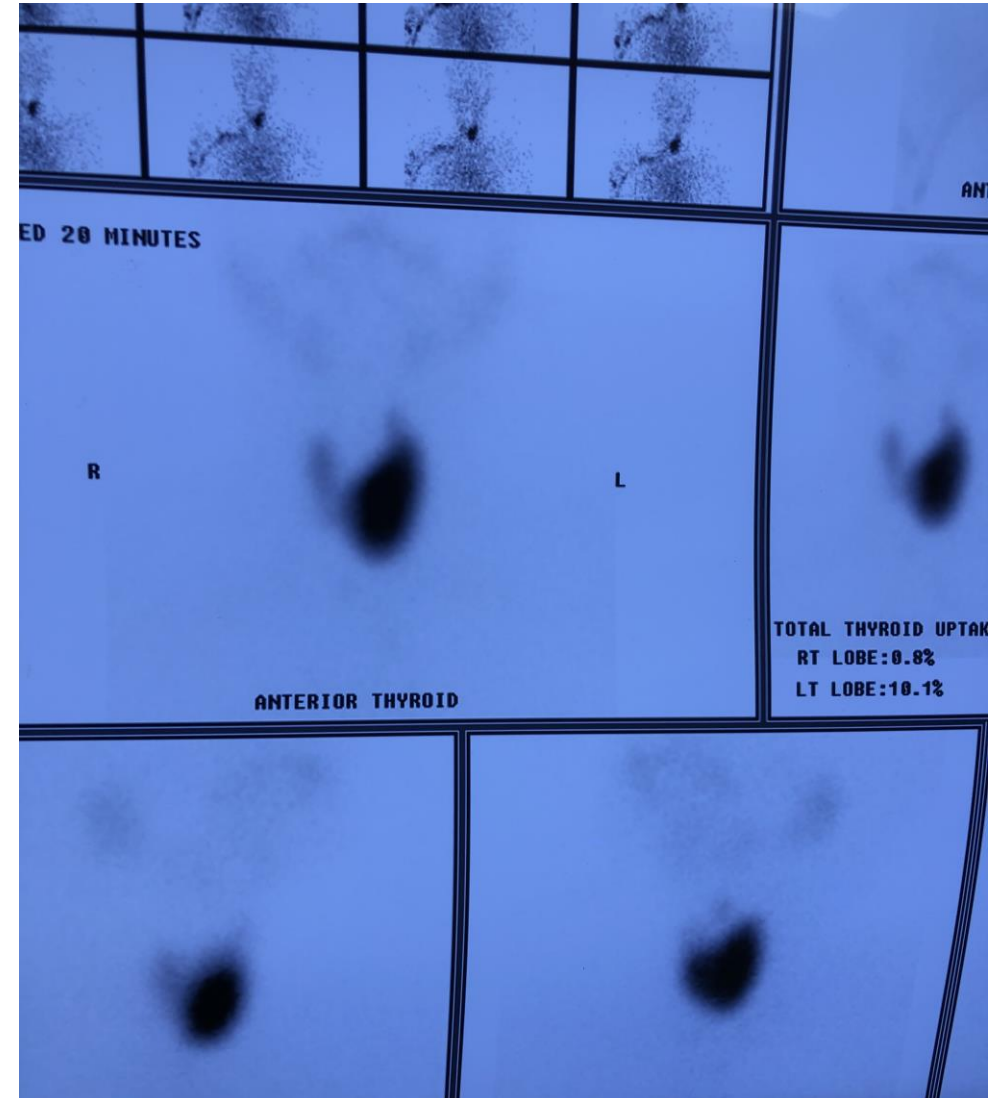
- A. Papillary carcinoma thyroid
- B. Follicular carcinoma thyroid
- C. Medullary Carcinoma thyroid
- D. Lymphoma of thyroid



Question 10

What is the treatment of choice?

- A. Antithyroid drugs
- B. Surgery
- C. Therapeutic strategy will depend on FNAC
- D. Radioiodine therapy**



Question 11

The maximum permissible daily iodine intake in pregnancy is

- A. 150 mcg
- B. 300 mcg
- C. 500 mcg
- D. 1000 mcg

Question 12

What is the diagnosis?

- A. Neonatal thyrotoxicosis
- B. Congenital hypothyroidism
- C. MEN 2B syndrome
- D. Autoimmune polyglandular syndrome type 1



Answers

Question 1

All are true about resistance to thyroid hormone (RTH) beta **except**

- a. Serum thyroid binding globulin (TBG) is elevated
- b. Most patients are clinically thyrotoxic**
- c. Goiter is present in 65-95%
- d. Associated with an increased risk for autoimmune thyroid disease

Hints

- The concentration of thyroglobulin tends to be high, reflecting the level of TSH-induced thyroid gland hyperactivity.
- Most patients are clinically euthyroid.
- Goiter is the most common (65 to 95 %), followed by hyperactivity (33 to 68 %) and tachycardia (33 to 75 %)
- An association has been described between RTH β and AITD. Proposed pathophysiologic mechanisms include TSH or TH induced stimulation of pro-inflammatory and cytotoxic responses

Refetoff, S, Weiss, RE, Usala, SJ. The syndromes of resistance to thyroid hormone. Endocr Rev 1993; 14:348.

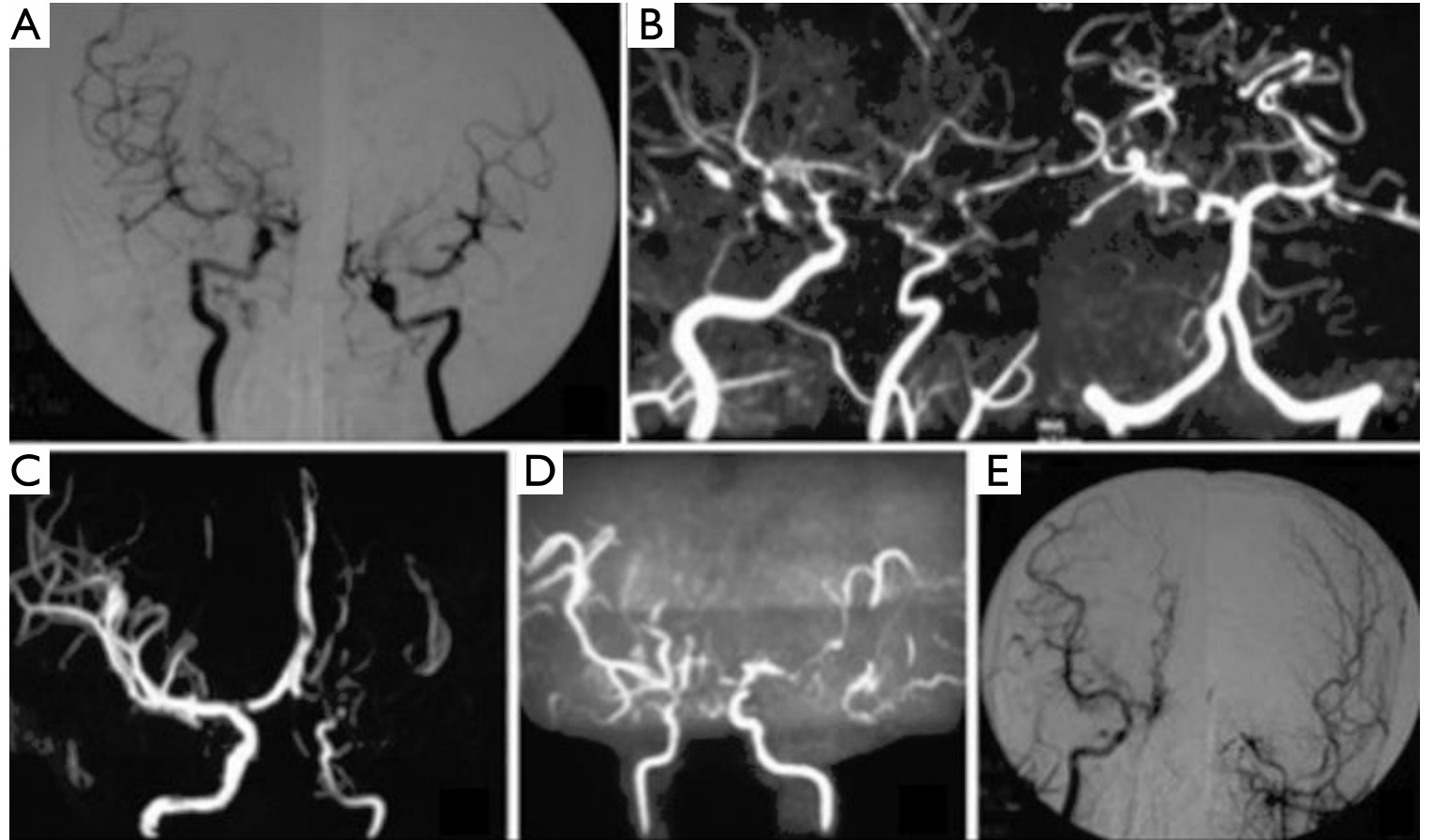
Beck-Peccoz, P, Chatterjee, VK. The variable clinical phenotype in thyroid hormone resistance syndrome. Thyroid 1994; 4:225.

Brucker-Davis, F, Skarulis, MC, Grace, MB, et al. Genetic and clinical features of 42 kindreds with resistance to thyroid hormone. The National Institutes of Health Prospective Study. Ann Intern Med 1995; 123:57

Question 2

What is the diagnosis?

- A. Takatsubo's disease
- B. Hirata's disease
- C. Moyamoya syndrome**
- D. Pendred syndrome



Moyamoya syndrome associated with Graves' disease: a case series study

Jun Ni¹, Li-Xin Zhou¹, Yan-Ping Wei¹, Ming-Li Li², Wei-Hai Xu¹, Shan Gao¹, Li-Ying Cui¹

- Described initially in Asian young (mean age 31) females, but also observed in Caucasian populations is the syndrome of **Moyamoya** disease
- Involves both coronary and cerebral vascular spasm or occlusion
- The latter can manifest as an acute cerebral vascular accident or vascular migraine (often mimics embolic CVA)
- Proposed pathophysiologic mechanisms - autoimmune process affecting the cerebral arteries or a vasculopathy produced by chronic thyrotoxic activation of the sympathetic nervous system

Question 3

Immune checkpoint inhibitors can cause

- a. Central hypothyroidism
- b. Hypothyroidism
- c. Painless thyroiditis
- d. All of the above

Anticancer-drug Induced Thyroid Dysfunction

Saptarshi Bhattacharya,¹ Alpesh Goyal,² Parjeet Kaur,³ Randeep Singh,⁴ Sanjay Kalra⁵

Table 1: Anticancer drugs causing thyroid dysfunction

Immune checkpoint inhibitors	Hypophysitis (ipilimumab, nivolumab)
	Primary thyroid dysfunction (ipilimumab, nivolumab, pembrolizumab)
Tyrosine kinase inhibitors	Hypothyroidism (sunitinib, sorafenib, axitinib, pazopanib, vandetanib, motesanib)
	Increased levothyroxine requirement in thyroidectomised patients (imatinib, sorafenib, motesanib)
Interferon- α	Hypothyroidism, destructive thyroiditis
Interleukin-2	Hypothyroidism
Alemtuzumab	Graves' disease
Thalidomide analogues	Hypothyroidism, ischaemic thyroiditis (thalidomide, lenalidomide)
Radioiodine-based cancer therapy	Hypothyroidism, radiation thyroiditis
Bexarotene	Central hypothyroidism

Question 4

All are true about biotin related interference in thyroid assay except

- A. TSH is falsely high
- B. T4 is falsely high
- C. T3 is falsely high
- D. TSH receptor-binding inhibitor immunoglobulin is falsely high

Hints

- Biotin is a water-soluble vitamin belonging to vitamin B family. It is also an essential component of streptavidin-biotin immobilising systems (SBIS) used for most immunoassays.
- Falsely low readings occur with sandwich immunoassays (glycoprotein hormones like TSH)
- Falsely high values in competitive immunoassays (e.g. triiodothyronine (T3) & thyroxine (T4)).
- Though the effect of biotin on FT3, FT4 and TSH estimation wanes in hours, anti-TSH receptor antibodies (TRAbs), which can also be falsely elevated due to this assay interference, may take up to 7 days to normalise

Question 5

All of the following can be associated with an increased radioiodine uptake in the thyroid gland **except**

- A. Hydatidiform mole
- B. Struma ovarii**
- C. Thyrotropinoma
- D. Thyroid hormone resistance

Question 6

All are ultrasound characters of a medullary thyroid carcinoma except

- A. Microcalcification
- B. Macrocalcification
- C. More wide than tall
- D. Hyperechogenicity

Hints

- A meta-analysis reported hypoechogenicity in 83.4% (32.7% being markedly hypoechogenic).
- Hyperechogenicity was not seen in any of the 157 MTCs that were analyzed.
- Irregular margins were present in 38.0%. microcalcifications in 35.5%, and macrocalcifications in 27.0%.²³
- MTC in comparison to papillary thyroid cancers are larger, more frequently round or oval (more wide than tall), less commonly show suspicious findings, demonstrate more intra-nodular vascularity and have higher tumor-node-metastasis (TNM) stage.

23. Woliński K, Rewaj-Łosyk M, Ruchała M. Sonographic features of medullary thyroid carcinomas--a systematic review and meta-analysis. *Endokrynol Pol.* 2014;65(4):314-318. doi:10.5603/EP.2014.0043

24. Liu M, Liu Z, Hou Y, et al. Ultrasonographic characteristics of medullary thyroid carcinoma: a comparison with papillary thyroid carcinoma. *Oncotarget.* 2017;8(16):27520-27528. doi:10.18632/oncotarget.15897

25. Thomas CM, Asa SL, Ezzat S, Sawka AM, Goldstein D. Diagnosis and pathologic characteristics of medullary thyroid carcinoma—review of current guidelines. *Curr Oncol.* 2019;26(5):338-344. doi:10.3747/co.26.5539

Question 7

Serum thyroid binding globulin is elevated by all the drugs except

- A. Glucocorticoid
- B. Tamoxifen
- C. Methadone
- D. 5-fluorouracil

Hints

<i>Increased TBG</i>	<i>Decreased TBG</i>	<i>Binding inhibitors</i>
Inherited Pregnancy Neonatal state Estrogens Hepatitis Porphyria Heroin Methadone Mitotane 5-Fluorouracil SERMS (e.g., tamoxifen, raloxifene) Perphanazine	Inherited Androgens Anabolic steroids Glucocorticoids Severe illness Hepatic failure Nephrosis Nicotinic acid L-Asparaginase	Salicylates Furosemide Free fatty acids Phenytoin Carbamazepine NSAIDs (variable, transient) Heparin
TBG, T ₄ -binding globulin; SERMS, selective estrogen receptor modulators; NSAIDs, nonsteroidal anti-inflammatory drugs.		

Question 8

On 21st January 2020, the FDA approved Tepezza (teprotumumab) for the treatment of active Graves' orbitopathy (GO). All are true about the drug except

- A. Monoclonal antibody against insulin-like growth factor 1 receptor
- B. Is effective in patients with milder forms of GO
- C. Hypoglycemia is an adverse effect
- D. Can be an alternative to surgery for proptosis and diplopia

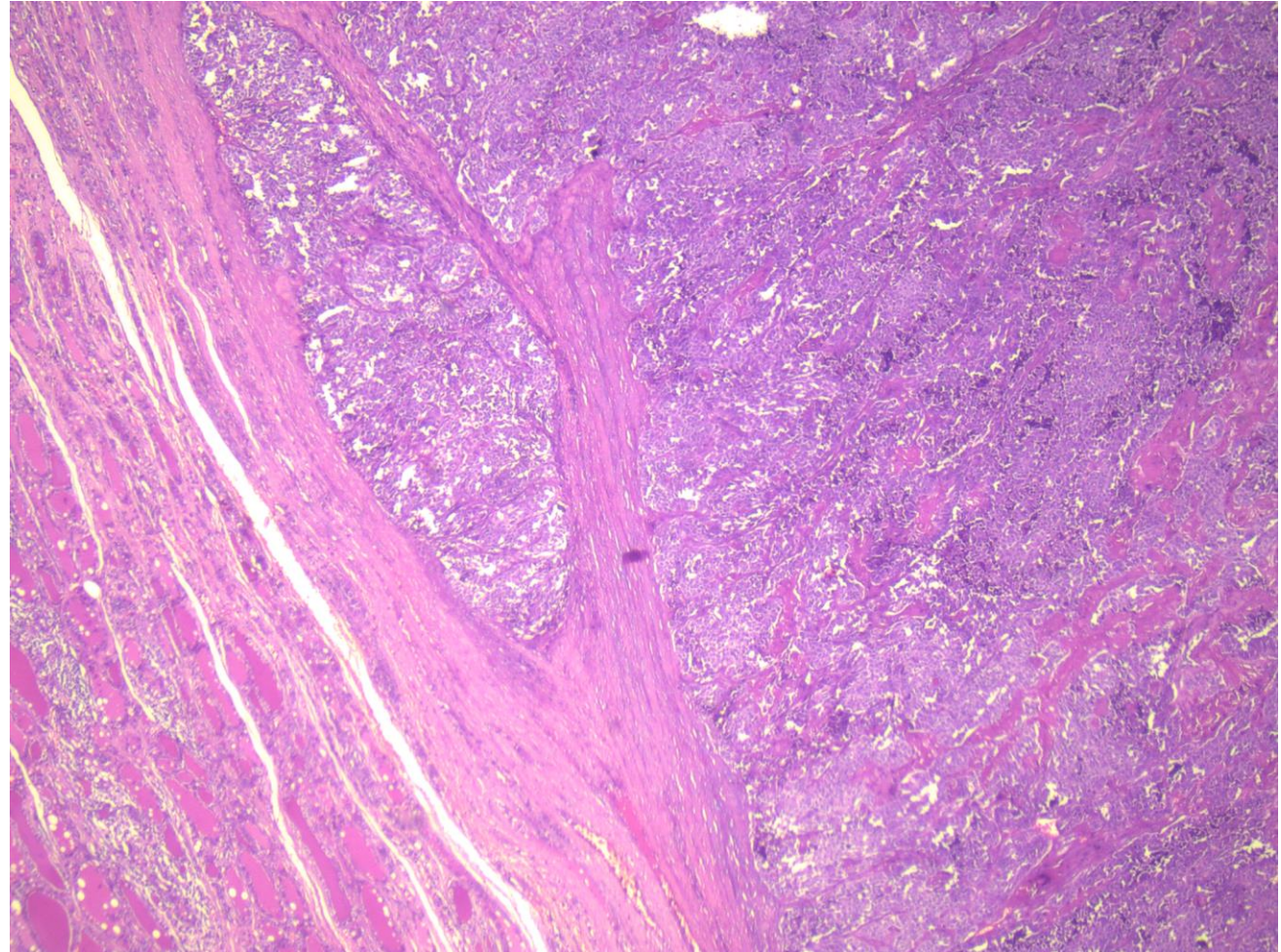
Hints

- The results from two large trials have shown that teprotumumab could have remarkable effects on multiple clinical outcomes in GO.
- It may herald a new era in the treatment of thyroid eye disease and we are cautiously optimistic that teprotumumab may offer an alternative to surgery and its associated complications
- Hyperglycemia was the only adverse event clearly identified by the investigators as being related to teprotumumab. In most cases it was mild, and induced hyperglycaemia in patients with diabetes, was readily controlled by adjustments in diabetic medications.

Question 9

What is the diagnosis?

- A. Papillary carcinoma thyroid
- B. Follicular carcinoma thyroid
- C. Medullary Carcinoma thyroid
- D. Lymphoma of thyroid



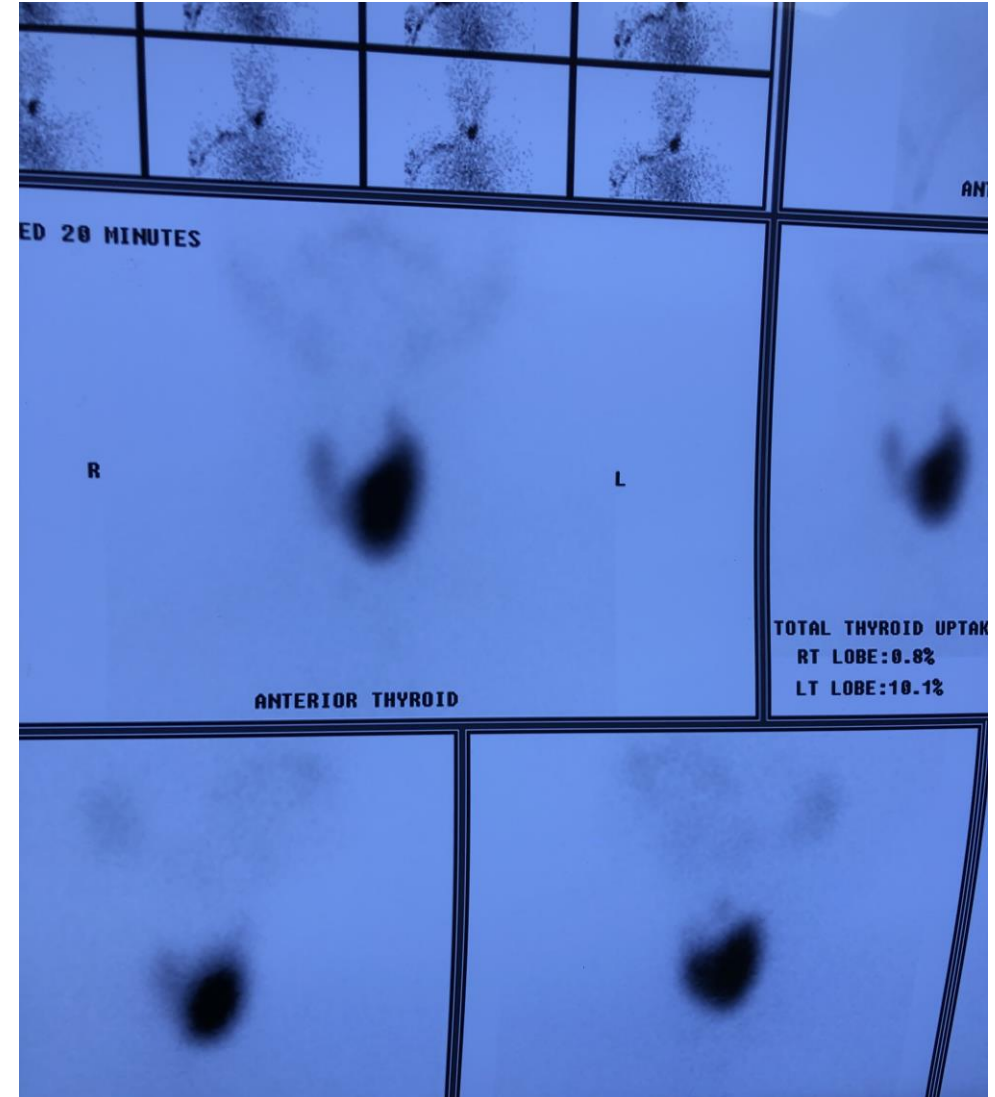
Hints

- Hematoxylin and eosin stained section (40x) shows a well circumscribed tumor separated from the adjacent normal thyroid by a fibrous capsule. The tumor cells are arranged in solid nests and focal follicular pattern. Strands of fluffy, acellular, eosinophilic deposits of amyloid identified.

Question 10

What is the treatment of choice?

- A. Antithyroid drugs
- B. Surgery
- C. Therapeutic strategy will depend on FNAC
- D. Radioiodine therapy**



Question 11

The maximum permissible daily iodine intake in pregnancy is

- A. 150 mcg
- B. 300 mcg
- C. 500 mcg
- D. 1000 mcg

Question 12

What is the diagnosis?

- A. Neonatal thyrotoxicosis
- B. Congenital hypothyroidism
- C. MEN 2B syndrome
- D. Autoimmune polyglandular syndrome type 1



