

1-3. A 50 year old man has a malignant thyroid mass removed. The surgeon noted that cervical nodes were positive for metastasis. Microscopically, the tumor has an amyloid stroma.

1. What is the most likely embryological origin of the malignant cells?

- A. Endoderm of floor of pharynx
- B. Neural crest
- C. Ectoderm of the fourth branchial arch
- D. Endoderm of the third branchial cleft

2. What familial syndrome is LEAST associated with the type of malignancy seen in this patient?

- A. MEN I
- B. MEN IIa
- C. MEN IIb
- D. von Hippel Lindau
- E. neurofibromatosis

3. You perform a genetic analysis of the *RET* protooncogene on chromosome 10 in this patient. What do you expect to find?

- A. Germline mutation
 - B. Germline rearrangement
 - C. Nondisjunction
 - D. Polyglutamine repeats
 - E. Deletion
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4-5. A 37 year old woman presents with chief complaints of cold-intolerance and hair loss. She has a diffusely enlarged thyroid gland. She has a previous medical history of pernicious anemia three years ago.

You give her the “workup” and find:

- Anti-TPO antibodies: ↑
- Anti-thyroglobulin antibodies: ↑
- Free T4: ↓
- TSH: ↑

4. If you biopsied her thyroid, what you expect to find?

- A. Ground-glass (orphan annie) nuclei, nuclear pseudoinclusions, nuclear grooves
- B. Fibrosis and Psammoma bodies
- C. Lymphocytic infiltrate, tall columnar follicular epithelium, reduced colloid with scalloping
- D. Lymphocytic infiltrate, Hurthle cells, and atrophic follicles

5. What is involved in the pathogenesis of her disorder?

- A. Upregulation of BCL-2, predisposing to other malignancies
 - B. Downregulation of Fas and FasL, predisposing to other malignancies
 - C. Downregulation of BCL-2 with a predisposition to other malignancies by a different mechanism
 - D. Primary B-cell deficit
 - E. Inflammatory fibrosclerosis
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6. A 21 year old woman presents with a severe sore throat and a thyroid that is tender to palpation. Her labs show:

- Free T4: ↑
- RAIU: ↓

What’s the diagnosis?

- A. Graves
 - B. TSH secreting adenoma
 - C. Follicular adenoma
 - D. Granulomatous thyroiditis
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7. An inhibition of Type I 5'-deiodinase could be associated with:

- A. quickened relaxation phase of deep tendon reflex
 - B. sick euthyroid condition
 - C. ↓serum rT3
 - D. ↓ serum T4
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8-13. Mix and match: Factors that affect TSH secretion, TBG binding, and deiodinase activity.

- A. This decreases Type I 5' deiodinase activity
 - B. This increases TSH secretion
 - C. This decreases TSH secretion
 - D. This increases binding of T4 to TBG, causing an ↑ in *total* T4
 - E. This decreases binding of T4 to TBG, causing a ↓ in *total* T4
8. Estrogens
9. Anti-seizure meds (dilantin, phenytoin, tegretol)
10. β blockers
11. Lithium
12. Dopamine, surgical stress, chronic illness, glucocorticoids
13. PTU, chronic illness, glucocorticoids
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14. What is the natural progression of hormone levels in sick euthyroid syndrome?

- A. Low T3 → Low T4 → High T4 → Recovery
- B. Low T4 → Low T3 → High T4 → Recovery
- C. High T4 → Low T4 → Low T3 → Recovery
- D. High T4 → Low T3 → Low T4 → Recovery

15. In which of these stages of sick euthyroid syndrome is risk of mortality the greatest?

- A. Low T4
- B. Low T3
- C. High T4
- D. High T3

16. What is the most common finding in all stages of sick euthyroid?

- A. Low T4
 - B. Low T3
 - C. High T4
 - D. High T3
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17. Order these enzymes that synthesize cortisol in the proper sequence:

- a. 21 hydroxylase
 - b. 3βOH dehydrogenase
 - c. 11 hydroxylase
 - d. side chain cleavage
- A. D, B, A, C
 - B. A, B, C, D
 - C. D, A, B, C
 - D. D, C, B, A

18. What is common to all forms of CAH?

- A. Salt wasting
- B. Ambiguous genitalia
- C. Low cortisol
- D. Hypotension
- E. Excess virilization of both males and females

19-21. Mix and match: CAH enzyme deficiencies and phenotype

- A. ↓ 3βOH dehydrogenase
 - B. ↓ 21 hydroxylase
 - C. ↓ 11 hydroxylase
19. ↑ Androstenedione and ↑ serum [K+]
20. ↑ DHEA and ↑ serum [K+]
21. ↑ Androstenedione and ↓ serum [K+]
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22. Order the enzymes of gluconeogenesis in the proper sequence, from pyruvate to glucose:

- a. phosphoenolpyruvatecarboxykinase
 - b. glucose-6-phosphatase
 - c. fructose 1-6 biphosphatase
 - d. pyruvate carboxylase
- A. A, D, B, C
B. A, D, C, B
C. D, A, C, B
D. D, A, B, C

23. Where is preproinsulin cleaved to produce proinsulin?

- A. Golgi
- B. Cytoplasm
- C. Rough ER
- D. Smooth ER
- E. Secretory granules

24. What enzyme is responsible for the osmotic effects of lens damage in diabetics with poor control?

- A. Aldose reductase
- B. Fructose-6-phosphatase
- C. Glukokinase
- D. No enzyme is responsible: damage is due to nonenzymatic glycosylation

25. Which mechanism of diabetic complication pathogenesis is not correctly matched?

- A. AGE → cytokines/macrophage chemotaxis
- B. PKC activation → ↑ VEGF and other growth factors
- C. Hexosamine flux → F6P diverted to signaling pathway that results in transcription factor activation
- D. Polyol pathway → Fructose exerts osmotic effects
- E. Brownlee hypothesis → Oxidative stress damages cells

26. A 62 Type 2 diabetic patient complains of joint stiffness. You notice he cannot press his palms together completely. What is the mechanisms of the joint stiffness?

- A. nonenzymatic glycosylation → collagen carboxymethyllysine accumulation
 - B. PKC activation → ↑ growth factors → fibrosis
 - C. Oxidative stress → damage to collagen
 - D. Non-enzymatic glycosylation of joint tendons → T cell activation
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27. Where would you expect to see Crooke's change (cytokeratin)?

- A. Prolactinoma
 - B. Corticotroph adenoma
 - C. Somatotroph adenoma
 - D. Thyrotroph adenoma
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28-33. Pharmacology of diabetes: Mix and match

- A. Pramlintine
 - B. Exenatide
 - C. Sulfonylurea
 - D. Metformin
 - E. Thiazolidinedione
 - F. α -Glucoside inhibitors
28. Blocks hepatic production of glucose
29. Activates PPAR- γ , which causes adipocytes to differentiate
30. Inhibits carbohydrate absorption
31. Blocks a potassium channel on the surface of the β cell, directly increasing insulin secretion
32. Must be injected subcutaneously, analog of human hormone secreted by β cells
33. Must be injected subcutaneously, analog of a human hormone secreted by intestinal cells

34-44. Lipoprotein disorders: Mix and match

- A. Type I
 - B. Type IIa
 - C. Type IIb
 - D. Type III
 - E. Type IV
 - F. Type V
34. Apo C-II deficiency
35. Apo E deficiency
36. $\uparrow\uparrow$ chylomicrons
37. $\uparrow\uparrow$ LDL due to LDL receptor defect
38. $\uparrow\uparrow$ chylomicrons & $\uparrow\uparrow$ VLDL
39. $\uparrow\uparrow$ LDL & $\uparrow\uparrow$ VLDL
40. $\uparrow\uparrow$ IDL
41. $\uparrow\uparrow$ VLDL
42. Eruptive xanthomas, but normal VLDL and IDL
43. Tendinous xanthomas
44. Tuberos xanthomas

Here's a mnemonic: **CLIV**

- Type I **C**hylomicrons
- Type IIa **L**DL
- Type III **I**DL
- Type IV **V**LDL
- Type V 4 + 1 = 5 (Chylomicrons + VLDL)
- (then just add that IIb is IIa + VLDL)

ANSWERS:

1. B
2. A
3. A
4. D
5. C
6. D
7. B
8. D
9. E
10. A
11. B
12. C
13. A
14. D
15. A
16. B
17. A
18. C
19. B
20. A
21. C
22. C
23. C
24. A
25. D
26. A
27. B
28. D
29. E
30. F
31. C
32. A
33. B
34. A
35. D
36. A
37. B
38. F
39. C
40. D
41. E
42. A
43. B
44. D