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Endocrine System: Pituitary, Thyroid & Adrenal

Printable Flashcards — Pre-Med Biology

Hormone classes, hypothalamic-pituitary axes, thyroid and parathyroid hormones, adrenal cortex and medulla, pancreatic hormones, feedback loops, and clinical patterns.

230 cards — Print double-sided, flip on long edge, then cut along dashed lines.

230 cards — Printable Flashcards

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1

Endocrine vs exocrine: what's the difference?

2

Hormone = basically...

3

Trap: if a hormone is in the blood, every cell responds. True or false?

4

Endocrine system is best for... compared to nervous system

5

Nervous vs endocrine: which one is usually faster?

6

Nervous vs endocrine: which one is usually longer-lasting?

7

Classic endocrine control strategy is...

8

Positive feedback exists, but it's rare. Classic examples:

2

A chemical messenger sent in blood to change what target cells do.

1

Endocrine releases hormones into blood. Exocrine releases into ducts to a surface/lumen.

4

Slow-ish, longer-lasting control (growth, metabolism, reproduction).

3

False.

6

Endocrine system.

5

Nervous system.

8

LH surge (ovulation) and oxytocin during labor.

7

Negative feedback.

9

Why do we like negative feedback in the body?

10

Endocrine glands are usually highly vascular (lots of blood vessels) because...

11

If a gland is called 'pituitary', the nickname you should think is:

12

Endocrine = releases into {{c1::blood}}.
Exocrine = releases into {{c2::ducts}}.

13

Most common feedback type in endocrine loops:

14

Three big hormone 'chemical families':

15

Peptide/protein hormones are... soluble or fat-soluble?

16

Steroid hormones are... soluble or fat-soluble?

10

Hormones need quick access to blood to travel.

9

Because it stabilizes things around a set point.

12

Endocrine = releases into blood.
Exocrine = releases into ducts.

11

The master gland (but it still takes orders from hypothalamus).

14

Peptide/protein, steroid, and amine (tyrosine-derived).

13

Negative feedback

16

Fat-soluble (lipid-soluble).

15

Water-soluble.

17

Amine hormones are tricky:
which ones act like steroids?

18

Catecholamines (epinephrine/norepinephrine) are...

19

Where are steroid hormone
receptors usually located?

20

Where are peptide hormone
receptors usually located?

21

Steroid hormones usually travel in blood...

22

Peptide hormones usually travel in blood...

23

Which type usually has faster
effects: peptides or steroids?

24

Which type usually has longer-
lasting effects: peptides or steroids?

18

Water-soluble and act on cell-surface receptors.

17

Thyroid hormones (T3/T4) act steroid-like (intracellular receptors).

20

On the cell membrane.

19

Inside the cell (cytoplasm/nucleus).

22

Mostly free (not bound).

21

Bound to carrier proteins.

24

Steroids (usually longer).

23

Peptides (usually faster).

25

Second messenger systems are typical for...

26

Nuclear receptor signaling is typical for...

27

Trap: thyroid hormones act like peptide hormones because they come from an amino acid. True or false?

28

Why do steroid hormones have longer half-lives?

29

If a hormone is stored in vesicles and released by exocytosis, it's usually...

30

If a hormone is synthesized on demand and diffuses out, it's usually...

31

Receptor upregulation means...

32

Receptor downregulation means...

26

Steroids and thyroid hormones.

25

Peptide hormones and catecholamines.

28

They bind carrier proteins and are broken down more slowly.

27

False.

30

A steroid hormone.

29

A peptide/protein hormone.

32

Fewer receptors -> cell becomes less sensitive (desensitized).

31

More receptors -> cell becomes more sensitive.

33

Trap: hormone levels are the only thing that matters. True or false?

34

Peptide hormones bind {{c1::cell-surface}} receptors. Steroid hormones bind {{c2::intracellular}} receptors.

35

Steroids usually travel bound to {{c1::carrier proteins}}; peptides usually travel {{c2::free}} in plasma.

36

Amine hormone family that acts steroid-like (intracellular receptor):

37

Hypothalamus is basically the...

38

Pituitary has two parts with very different jobs:

39

Posterior pituitary releases which two hormones?

40

Trap: posterior pituitary makes ADH. True or false?

34

Peptide hormones bind cell-surface receptors.
Steroid hormones bind intracellular receptors.

33

False.

36

Thyroid hormones (T3/T4)

35

Steroids usually travel bound to carrier proteins; peptides usually travel free in plasma.

38

Anterior pituitary (makes hormones) and posterior pituitary (stores/releases).

37

Control center that links nervous system to endocrine system.

40

False.

39

ADH and oxytocin.

41

Anterior pituitary secretes (big list):

42

How does hypothalamus control anterior pituitary?

43

Why is the portal system useful?

44

Hypothalamus releases TRH, CRH, GnRH, GHRH. What do these letters basically mean?

45

Hypothalamus also makes dopamine and somatostatin. Their job is mostly to...

46

Prolactin is weird because its main control signal from hypothalamus is...

47

Trap: dopamine increases prolactin. True or false?

48

Somatostatin does what to growth hormone (GH)?

42

Via releasing/inhibiting hormones through the hypophyseal portal system.

41

TSH, ACTH, LH, FSH, GH, prolactin.

44

They are releasing hormones that tell pituitary what to secrete.

43

It delivers hypothalamic hormones directly to anterior pituitary without dilution in whole-body blood.

46

Inhibition (dopamine).

45

Inhibit pituitary hormone release.

48

Decreases it.

47

False.

49

ADH's simple job is...

50

Oxytocin's simple jobs are...

51

Trap: prolactin causes milk ejection. True or false?

52

Pituitary axes are mostly organized as...

53

Posterior pituitary releases {{c1::ADH}} and {{c2::oxytocin}}, but the hypothalamus {{c3::makes}} them.

54

Dopamine {{c1::inhibits}} prolactin. Removing dopamine -> prolactin goes {{c2::up}}.

55

Two hormones released by posterior pituitary:

56

HPT axis (thyroid axis) in order:

50

Uterine contractions and milk ejection.

49

Save water by increasing water reabsorption in the kidney.

52

Hypothalamus -> pituitary -> target gland -> hormone -> negative feedback.

51

False.

54

Dopamine inhibits prolactin. Removing dopamine -> prolactin goes up.

53

Posterior pituitary releases ADH and oxytocin, but the hypothalamus makes them.

56

TRH (hypothalamus) -> TSH (pituitary) -> T3/T4 (thyroid).

55

ADH and oxytocin

57

HPA axis (stress/adrenal cortex) in order:

58

HPG axis (reproduction) in order:

59

GH axis in one line:

60

If a target gland hormone is high, what happens to pituitary hormone in negative feedback?

61

If a target gland hormone is low, what happens to pituitary hormone (if pituitary is working)?

62

Primary vs secondary endocrine problem: primary means the problem is in the...

63

In primary gland failure, the classic lab pattern is: target hormone... and pituitary hormone...

64

In secondary (pituitary) failure, the classic lab pattern is: target hormone... and pituitary hormone...

58

GnRH -> LH/FSH -> sex hormones (estrogen/progesterone/testosterone).

57

CRH -> ACTH -> cortisol.

60

It goes down.

59

GHRH (+) and somatostatin (-) control GH -> GH stimulates IGF-1 (mainly from liver).

62

Target gland (thyroid/adrenal/gonad).

61

It goes up.

64

Low target hormone, low (or inappropriately normal) pituitary hormone.

63

Low target hormone, high pituitary hormone.

65

Trap: high TSH always means hyperthyroidism. True or false?

66

Trap: high cortisol means ACTH is always high. True or false?

67

If cortisol is high because of a pituitary ACTH tumor (secondary), ACTH would be...

68

If cortisol is high because of an adrenal tumor (primary), ACTH would be...

69

Most endocrine axes are negative feedback. The classic 'positive feedback' endocrine event is:

70

Primary hypothyroidism pattern: {{c1::low}} T3/T4 with {{c2::high}} TSH.

71

HPA axis: CRH -> {{c1::ACTH}} -> {{c2::cortisol}}.

72

Pituitary hormone that stimulates thyroid gland:

66

False.

65

False.

68

Low.

67

High.

70

Primary hypothyroidism pattern:
low T3/T4 with high TSH.

69

Estrogen -> LH surge (ovulation).

72

TSH

71

HPA axis: CRH -> ACTH -> cortisol.

73

Thyroid gland main hormones are...

74

Which is more active: T3 or T4?

75

TSH does what to the thyroid?

76

TRH comes from... and stimulates release of...

77

Negative feedback in thyroid axis: high T3/T4 makes TSH...

78

Trap: TSH is a thyroid hormone. True or false?

79

Thyroid hormones are made using...

80

Goiter basically means...

74

T3 is more active.

73

T4 (thyroxine) and T3 (triiodothyronine).

76

Hypothalamus; TSH (and also prolactin).

75

Stimulates thyroid hormone synthesis and release (and thyroid growth).

78

False.

77

Go down.

80

Enlarged thyroid gland.

79

Iodine.

81

Trap: goiter always means hyperthyroidism. True or false?

82

Hyperthyroidism (too much T3/T4) tends to cause...

83

Hypothyroidism (too little T3/T4) tends to cause...

84

Lab trap: in most hyperthyroidism cases, TSH is...

85

Lab trap: in primary hypothyroidism, TSH is...

86

Thyroid hormones mostly travel in blood...

87

Calcitonin is made by the thyroid (C cells) and mainly... (basic)

88

Trap: calcitonin increases blood calcium. True or false?

82

High metabolism: weight loss, heat intolerance, fast heart rate (concept).

81

False.

84

Low.

83

Low metabolism: weight gain, cold intolerance, fatigue (concept).

86

Bound to carrier proteins.

85

High.

88

False.

87

Lowers blood calcium a bit (opposes PTH).

89

Thyroid axis: TRH -> {{c1::TSH}} -> {{c2::T3/T4}} -> negative feedback.

90

More active thyroid hormone:

91

Parathyroid hormone (PTH) main job is to...

92

PTH increases blood calcium by:

93

PTH effect on phosphate (high-level):

94

Vitamin D (active form) helps raise blood calcium mainly by...

95

Trap: PTH lowers blood calcium. True or false?

96

Trap: thyroid and parathyroid are the same gland. True or false?

90

T3

89

Thyroid axis: TRH -> TSH -> T3/T4 -> negative feedback.

92

Releasing Ca^{2+} from bone, increasing Ca^{2+} reabsorption in kidney, and activating vitamin D.

91

Increase blood calcium (Ca^{2+}).

94

Increasing calcium absorption from the gut.

93

It increases phosphate excretion in kidney.

96

False.

95

False.

97

If blood calcium is low, PTH should go...

98

If blood calcium is high, PTH should go...

99

In kidney, PTH makes you...

100

Why does PTH dump phosphate? (concept)

101

Calcitonin vs PTH: which one is the main controller day-to-day?

102

PTH raises blood {{c1::calcium}} and lowers blood {{c2::phosphate}} (high-level).

103

Hormone that raises blood calcium:

104

Adrenal gland has two parts with different hormones:

98

Down.

97

Up.

100

So calcium can stay free in blood instead of binding phosphate.

99

Reabsorb more calcium and excrete more phosphate.

102

PTH raises blood calcium and lowers blood phosphate (high-level).

101

PTH (much bigger role).

104

Cortex (steroids) and medulla (catecholamines).

103

PTH

105

Adrenal cortex makes 3 categories of steroid hormones:

106

Adrenal cortex layers from outside to inside are (classic):

107

Zona glomerulosa makes mainly...

108

Zona fasciculata makes mainly...

109

Zona reticularis makes mainly...

110

Adrenal medulla releases...

111

Which adrenal part is controlled by ACTH the most?

112

Big trap: aldosterone is controlled mainly by...

106

Zona glomerulosa, zona fasciculata, zona reticularis.

105

Mineralocorticoids, glucocorticoids, and androgens.

108

Cortisol (glucocorticoid).

107

Aldosterone (mineralocorticoid).

110

Epinephrine and norepinephrine.

109

Androgens (like DHEA).

112

Angiotensin II (RAAS) and potassium levels (not ACTH).

111

Adrenal cortex (especially cortisol production).

113

Aldosterone's main kidney effect (one line):

114

Cortisol's big effects (pre-med level):

115

Why is cortisol called a 'glucocorticoid'?

116

Catecholamines (epi/norepi) are fast because they...

117

Steroid hormones from adrenal cortex are slower because they...

118

If cortisol is low (primary adrenal failure), ACTH is usually...

119

If cortisol is high because of an adrenal tumor (primary), ACTH is usually...

120

If cortisol is high because of too much ACTH from pituitary, ACTH is...

114

Stress support, higher blood glucose availability, and anti-inflammatory effects.

113

Keep Na^+ (water follows) and dump K^+.

116

Use membrane receptors and second messengers.

115

Because it affects glucose metabolism.

118

High.

117

Bind intracellular receptors and change gene expression.

120

High.

119

Low.

121

Adrenal insufficiency (Addison concept) tends to cause...

122

Cushing syndrome (too much cortisol) concept tends to cause...

123

Stress response cheat: adrenal medulla vs cortex

124

Adrenal cortex zones: zona {{c1::glomerulosa}} -> aldosterone; zona {{c2::fasciculata}} -> cortisol; zona {{c3::reticularis}} -> androgens.

125

Main hormone of zona glomerulosa:

126

TSH from anterior pituitary targets the...

127

ACTH from anterior pituitary targets the...

128

LH and FSH from anterior pituitary target the...

122

High blood glucose and immune suppression (and other whole-body effects).

121

Low BP, fatigue, and dehydration (because low cortisol +/- low aldosterone).

124

Adrenal cortex zones: zona glomerulosa -> aldosterone; zona fasciculata -> cortisol; zona reticularis -> androgens.

123

Medulla = fast (adrenaline).
Cortex = slower (cortisol).

126

Thyroid gland.

125

Aldosterone

128

Gonads (ovaries/testes).

127

Adrenal cortex.

129

GH (growth hormone) targets...

130

Prolactin targets the...

131

TRH stimulates release of...

132

CRH stimulates release of...

133

GnRH stimulates release of...

134

GHRH stimulates release of...

135

Dopamine mainly does what to prolactin?

136

Prolactin is high. A common axis effect is that GnRH goes... and fertility goes...

130

Breast (milk production).

129

Many tissues directly and stimulates IGF-1 production (mainly liver).

132

ACTH.

131

TSH (and also can increase prolactin).

134

Growth hormone (GH).

133

LH and FSH.

136

Down; down.

135

Inhibits it.

137

Why do some breastfeeding people have reduced fertility (basic)?

138

Trap: GH is controlled only by GHRH. True or false?

139

IGF-1 is produced mainly by...

140

If IGF-1 is high, what happens to GH (via feedback)?

141

Anterior pituitary: TSH -> {{c1::thyroid}}; ACTH -> {{c2::adrenal cortex}}; LH/FSH -> {{c3::gonads}}.

142

Hypothalamus hormone that inhibits prolactin:

143

Endocrine pancreas lives in the...

144

Beta cells make...

138

False.

137

High prolactin can suppress GnRH -> lower LH/FSH.

140

GH tends to go down.

139

The liver (in response to GH).

142

Dopamine

141

Anterior pituitary: TSH -> thyroid; ACTH -> adrenal cortex; LH/FSH -> gonads.

144

Insulin.

143

Islets of Langerhans.

145

Alpha cells make...

146

Insulin's big job is to...

147

Glucagon's big job is to...

148

Insulin is high after...

149

Glucagon is high during...

150

Trap: insulin breaks down glycogen to release glucose. True or false?

151

Main organ targeted by glucagon for raising blood glucose:

152

Why doesn't glucagon strongly increase glucose uptake into muscle?

146

Lower blood glucose.

145

Glucagon.

148

A meal (fed state).

147

Raise blood glucose.

150

False.

149

Fasting/exercise (need glucose).

152

Its main job is liver glucose output,
not pushing glucose into cells.

151

Liver.

153

Somatostatin from pancreatic delta cells basically...

154

Diabetes mellitus basic idea:

155

Type 1 diabetes is mainly...

156

Type 2 diabetes is mainly...

157

Why does uncontrolled diabetes cause glucose in urine?

158

Glucose in urine pulls water with it. That causes...

159

Trap: glucagon is released after a big meal. True or false?

160

Beta cells -> {{c1::insulin}} (lowers glucose).
Alpha cells -> {{c2::glucagon}} (raises glucose).

154

Not enough effective insulin -> high blood glucose.

153

Inhibits insulin and glucagon release (local brake).

156

Insulin resistance (and later beta cell exhaustion).

155

Autoimmune destruction of
beta cells -> low/zero insulin.

158

More urination (polyuria) and thirst (polydipsia).

157

Blood glucose is so high that kidney
transporters can't reabsorb it all.

160

Beta cells -> insulin (lowers glucose).
Alpha cells -> glucagon (raises glucose).

159

False (generally).

161

Hormone that raises blood glucose:

162

Main male sex hormone is...

163

Main female sex hormones are...

164

LH in males mainly stimulates...

165

FSH in males mainly stimulates...

166

In females, LH surge triggers...

167

Inhibin is made in gonads and mainly...

168

Trap: LH and FSH come from hypothalamus. True or false?

162

Testosterone (androgens).

161

Glucagon

164

Leydig cells -> testosterone production.

163

Estrogen and progesterone.

166

Ovulation.

165

Sertoli cells -> support spermatogenesis (and inhibin).

168

False.

167

Inhibits FSH.

169

Sex hormones (estrogen, progesterone, testosterone) are... (hormone class)

170

HPG axis: GnRH -> {{c1::LH/FSH}} -> {{c2::sex hormones}} -> negative feedback (usually).

171

Hypothalamic hormone that stimulates LH/FSH release:

172

Kidneys act endocrine too. They release...

173

Renin is released when blood pressure/volume is...

174

Heart releases ANP when...

175

Pineal gland releases...

176

Melatonin tends to be higher at...

170

HPG axis: GnRH -> LH/FSH -> sex hormones -> negative feedback (usually).

169

Steroid hormones.

172

Renin and EPO, and they activate vitamin D.

171

GnRH

174

Blood volume/pressure is high (atria stretched).

173

Low.

176

Night (darkness).

175

Melatonin.

177

Adipose tissue isn't just storage - it can release... (basic example)

178

GI tract also has hormones. A basic one: gastrin mainly...

179

Thymus (immune organ) is linked to hormones for...

180

Kidney endocrine: renin (BP), {{c1::EPO}} (RBCs), and activation of {{c2::vitamin D}} (calcium).

181

Hormone from pineal gland:

182

Diabetes insipidus (DI) is basically...

183

SIADH is basically... (high-level)

184

Trap: diabetes insipidus causes glucose in urine. True or false?

178

Stimulates acid secretion in the stomach.

177

Leptin (signals energy stores).

180

Kidney endocrine: renin (BP), EPO (RBCs), and activation of vitamin D (calcium).

179

T cell maturation (thymic hormones, high-level).

182

Too little ADH effect -> you can't concentrate urine -> lots of dilute urine.

181

Melatonin

184

False.

183

Too much ADH -> too much water retained -> very concentrated urine (and dilution of blood).

185

If ADH is low, urine volume is... and urine is...

186

If ADH is high, urine volume is... and urine is...

187

ADH low -> urine volume {{c1::up}},
urine concentration {{c2::down}}.

188

Posterior pituitary hormone that saves water:

189

Endocrine lab questions: step 1 is usually...

190

Endocrine lab questions: step 2 is...

191

Pattern: low T3/T4 + high TSH =

192

Pattern: high T3/T4 + low TSH =

186

Low; concentrated.

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185

High; dilute.

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188

ADH

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187

ADH low -> urine volume up, urine concentration down.

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190

Check the pituitary hormone and apply negative feedback logic.

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189

Ask: is the target hormone high or low?

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192

Primary hyperthyroidism (thyroid making too much).

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191

Primary hypothyroidism (thyroid problem).

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193

Pattern: low T3/T4 + low TSH =

194

Trap pattern: high T3/T4 + high TSH means...

195

Pattern: low cortisol + high ACTH =

196

Pattern: high cortisol + low ACTH =

197

Pattern: high cortisol + high ACTH =

198

Pattern: low sex hormones + high LH/FSH =

199

Pattern: low sex hormones + low LH/FSH =

200

Steroid use trap: external steroids usually make your own ACTH...

194

Not the usual primary hyperthyroidism. Think pituitary issue or rare resistance (hard).

193

Secondary hypothyroidism (pituitary/hypothalamus problem).

196

Primary adrenal overproduction (adrenal problem).

195

Primary adrenal insufficiency (adrenal problem).

198

Primary gonadal failure (gonads not responding).

197

ACTH-driven cortisol (pituitary or ectopic source).

200

Go down.

199

Secondary gonadal failure (pituitary/hypothalamus issue).

201

Primary gland failure pattern: target hormone {{c1::low}}, pituitary hormone {{c2::high}}.

202

Lab pattern: high T3/T4 with low TSH suggests:

203

Insulin is a... type of hormone (class)?

204

Cortisol is a... type of hormone (class)?

205

Aldosterone is a... type of hormone (class)?

206

Epinephrine is a... type of hormone (class)?

207

Thyroid hormones (T3/T4) are... type (class)?

208

ADH is a... type of hormone (class)?

202

Primary hyperthyroidism

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201

Primary gland failure pattern: target hormone low, pituitary hormone high.

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204

Steroid hormone.

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203

Peptide/protein hormone.

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206

Amine (catecholamine).

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205

Steroid hormone.

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208

Peptide hormone.

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207

Amine-derived but act steroid-like (lipid-soluble).

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209

TSH is a... type of hormone (class)?

210

LH/FSH are... type of hormones (class)?

211

Testosterone is a... type of hormone (class)?

212

Quick 'class trap': steroid hormones mostly...

213

A 'tropic' hormone means...

214

Which anterior pituitary hormones are clearly tropic?

215

Prolactin is not tropic because it targets...

216

GH is tricky: it's not purely tropic because it...

210

Glycoprotein hormones (peptide-type).

209

Peptide/glycoprotein hormone.

212

Travel bound, act intracellular, and have slower onset but longer effects.

211

Steroid hormone.

214

TSH, ACTH, LH, FSH.

213

A hormone that stimulates another endocrine gland to release hormones.

216

Acts on many tissues directly and also stimulates IGF-1 (tropic-like).

215

Breast tissue directly (not another endocrine gland).

217

Trap wording: 'anterior pituitary produces ADH'. True or false?

218

If you see the phrase 'releasing hormone', it's almost always from the...

219

Tropic = stimulates another {{c1::endocrine gland}} (TSH, ACTH, LH/FSH).

220

GH excess in CHILDREN (before growth plates close) causes...

221

GH excess in ADULTS causes...

222

Trap: acromegaly = very tall person. True or false?

223

GH deficiency in childhood mainly causes...

224

IGF-1 is often used as a marker for GH status because...

218

Hypothalamus.

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217

False.

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220

Gigantism (very tall growth).

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219

Tropic = stimulates another endocrine gland (TSH, ACTH, LH/FSH).

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222

False.

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221

Acromegaly (growth of hands/feet/jaw, not height).

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224

It reflects average GH activity better than a single GH measurement (concept).

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223

Short stature (growth failure).

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225

Prolactin excess can cause... (basic)

226

Graves disease (high level) causes...

227

Hashimoto thyroiditis (high level) causes...

228

Trap: both Graves and Hashimoto cause the same direction of thyroid hormone. True or false?

229

If iodine is deficient, the thyroid can enlarge (goiter) because...

230

In iodine deficiency, the lab direction you expect is: T3/T4..., TSH...

226

Hyperthyroidism (too much thyroid hormone).

225

Milk production when not expected and fertility issues (via GnRH suppression).

228

False.

227

Hypothyroidism (too little thyroid hormone).

230

Low; high.

229

TSH rises to push the thyroid harder, causing growth.