

# Chapter 18 – Study Guide

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in general you should know: appearance of each gland & where in the body it is found  
(that includes being able to identify in a picture those structures listed as ***bold, italicized and underlined***)  
vocabulary words and concepts listed below that apply to hormones and glands generally  
which glands secrete or release which hormones (know the gland of origin individually for each hormone)  
which hormones have which functions  
(know all of the functions of each hormone as a “package” –  
that means I won't ask about individual functions in isolation from the other functions)

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hormone  
exocrine gland  
endocrine gland  
down regulation  
up regulation  
circulating hormones  
local hormones  
paracrine cell  
autocrine cell  
transport protein  
lipid soluble hormones  
    bind to receptors in the cytosol or nucleus  
    alter gene expression  
    alter protein synthesis  
water soluble hormones  
    bind to receptors on the plasma membrane  
    activate one or several enzymes to catalyze reactions that produce physiologic responses  
permissive effect  
synergistic effect  
antagonistic effect

## **ANTERIOR PITUITARY GLAND**

hGH – human growth hormone  
    stimulates several tissues to secrete insulin like growth factors  
        that stimulate general body growth  
        and regulate aspects of metabolism  
TSH – thyroid stimulating hormone  
    controls secretions and activities of the thyroid gland  
FSH – follicle stimulating hormone  
& LH – luteinizing hormone  
    stimulate secretion of estrogens & progesterone  
    stimulate maturation of oocytes  
    stimulate secretion of testosterone  
    stimulate sperm production  
PRL – prolactin  
    initiates milk production in mammary glands  
ACTH – adrenocorticotropic hormone  
    stimulates secretion of glucocorticoids

## **POSTERIOR PITUITARY GLAND**

OT – oxytocin  
    enhances contraction of smooth muscle cells in wall of uterus  
    stimulates milk ejection in response to suckling infant  
    enhances affection and trust between mother & child, and between partners  
ADH – antidiuretic hormone  
    causes kidneys to return more water to the blood rather than going to urine output

decreases water loss through perspiration  
raises blood pressure by constricting arterioles

### **THYROID**

T<sub>4</sub> = thyroxine & T<sub>3</sub> = triiodothyronine (T<sub>4</sub> and T<sub>3</sub>)  
stimulate use of cellular oxygen to produce ATP  
stimulate synthesis of Na<sup>+</sup> / K<sup>+</sup> pumps  
increase heat generated  
increase protein synthesis, lipolysis, cholesterol excretion  
increase use of glucose & fatty acids for ATP production  
enhance some actions of norepinephrine & epinephrine  
accelerate body growth – particularly of nervous tissue

calcitonin  
inhibits osteoclasts

### **PARATHYROID GLANDS**

PTH – parathyroid hormone  
regulates blood levels of Ca<sup>2+</sup>, Mg<sup>2+</sup>, HPO<sub>4</sub><sup>2-</sup>  
increases number and activity of osteoclasts  
decreases Ca<sup>2+</sup> and Mg<sup>2+</sup> loss in urine  
increases HPO<sub>4</sub><sup>2-</sup> loss in urine  
promotes formation of calcitriol by kidneys  
which increases GI absorption of Ca<sup>2+</sup>, Mg<sup>2+</sup>, HPO<sub>4</sub><sup>2-</sup>

### **ADRENAL CORTEX**

#### MINERALOCORTICIDS

aldosterone  
regulates blood levels of Na<sup>+</sup>, K<sup>+</sup>  
helps adjust blood pressure & volume

#### GLUCOCORTICIDS

cortisol (hydrocortisone), corticosterone, cortisone  
results in increased protein breakdown, glucose formation, lipolysis  
resistance to stress  
anti-inflammatory effects  
depression of immune response

#### ANDROGENS

DHEA dehydroepiandrosterone, testosterone  
promote libido  
stimulates development & maintenance of male secondary sex characteristics  
get converted to estrogens by other body tissues

### **ADRENAL MEDULLA**

epinephrine (adrenalin) and norepinephrine (noradrenalin)  
produce effects that enhance those of the sympathetic division of the ANS during stress

### **PANCREAS**

glucagon  
stimulates liver cells to accelerate the breakdown of glycogen into glucose  
stimulates the formation of glucose from other nutrients (lactic acid, amino acids)  
raises blood glucose

insulin  
accelerates transport of glucose into cells  
stimulates conversion of glucose into glycogen  
decreases formation of glucose from other molecules (decreases glycogenolysis & gluconeogenesis)  
increases protein & lipid synthesis  
lowers blood glucose

somatostatin  
inhibits secretion of insulin & glucagon

pancreatic polypeptide  
inhibits somatostatin secretion

**TESTES (or TESTICLES)**

testosterone

- promotes libido
- stimulates development & maintenance of male secondary sex characteristics  
(beard growth, deepening of voice, etc.)
- gets converted to estrogens by other body tissues

**OVARIES**

estrogen (estradiol & estrone)

progesterone

- regulate menstrual cycle
- maintain pregnancy
- prepare mammary gland for lactation
- help stimulate development & maintenance of female secondary sex characteristics  
(big breasts, wide hips, etc.)

**PINEAL GLAND**

melatonin

- thought to contribute to setting the body's biological clock

**THYMUS**

thymosin, THF thymic humoral factor, TF thymic factor, thymopoietin

- promote maturation of T cells of immune system

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In case some students still have doubts about my opening instructions

about knowing hormone origins individually,

and hormone functions as a "package",

the following are examples of questions that could appear on the exam:

Q. Which gland produces/releases hGH – human growth hormone?

A. anterior pituitary gland

Q. Which hormone(s) stimulates several tissues to secrete insulin like growth factors that stimulate general body growth and regulate aspects of metabolism?

A. hGH – human growth hormone

Q. Which gland produces/releases TSH – thyroid stimulating hormone?

A. anterior pituitary gland

Q. Which hormone(s) controls secretions and activities of the thyroid gland?

A. TSH – thyroid stimulating hormone

Q. Which gland produces/releases FSH – follicle stimulating hormone & LH – luteinizing hormone?

A. anterior pituitary gland

Q. Which hormone(s) stimulate secretion of estrogens & progesterone, stimulate maturation of oocytes, stimulate secretion of testosterone, and stimulate sperm production?

A. FSH – follicle stimulating hormone & LH – luteinizing hormone

Q. Which gland produces/releases PRL – prolactin?

A. anterior pituitary gland

Q. Which hormone(s) initiates milk production in mammary glands?

A. PRL – prolactin

Q. Which gland produces/releases ACTH – adrenocorticotropic hormone?

A. anterior pituitary gland

Q. Which hormone(s) stimulates secretion of glucocorticoids?

A. ACTH – adrenocorticotropic hormone

- Q. Which gland produces/releases OT – oxytocin?  
A. posterior pituitary gland
- Q. Which hormone(s) enhances contraction of smooth muscle cells in wall of uterus, stimulates milk ejection in response to suckling infant, and enhances affection and trust between mother & child, and between partners?  
A. OT – oxytocin
- Q. Which gland produces/releases ADH – antidiuretic hormone?  
A. posterior pituitary gland
- Q. Which hormone(s) causes kidneys to return more water to the blood rather than going to urine output, decreases water loss through perspiration, and raises blood pressure by constricting arterioles?  
A. ADH – antidiuretic hormone
- Q. Which gland produces/releases  $T_4$  = thyroxine and  $T_3$  = triiodothyronine ( $T_4$  and  $T_3$ )?  
A. thyroid gland
- Q. Which hormone(s) stimulate use of cellular oxygen to produce ATP, stimulate synthesis of  $Na^+$  /  $K^+$  pumps, increase heat generated, increase protein synthesis, lipolysis, cholesterol excretion, increase use of glucose & fatty acids for ATP production, enhance some actions of norepinephrine & epinephrine, and accelerate body growth – particularly of nervous tissue?  
A.  $T_4$  = thyroxine and  $T_3$  = triiodothyronine ( $T_4$  and  $T_3$ )
- Q. Which gland produces/releases calcitonin?  
A. thyroid gland
- Q. Which hormone(s) inhibits osteoclasts?  
A. calcitonin
- Q. Which gland produces/releases PTH – parathyroid hormone?  
A. parathyroid glands
- Q. Which hormone(s) regulates blood levels of  $Ca^{2+}$ ,  $Mg^{2+}$ ,  $HPO_4^{2-}$ , increases number and activity of osteoclasts, decreases  $Ca^{2+}$  and  $Mg^{2+}$  loss in urine, increases  $HPO_4^{2-}$  loss in urine, and promotes formation of calcitriol by kidneys which increases GI absorption of  $Ca^{2+}$ ,  $Mg^{2+}$ ,  $HPO_4^{2-}$ ?  
A. PTH – parathyroid hormone
- Q. Which gland produces/releases aldosterone?  
A. adrenal cortex
- Q. Which hormone(s) regulates blood levels of  $Na^+$ ,  $K^+$ , and helps adjust blood pressure & volume?  
A. aldosterone
- Q. Which gland produces/releases cortisol (hydrocortisone), corticosterone, and cortisone?  
A. adrenal cortex
- Q. Which hormone(s) results in increased protein breakdown, glucose formation, lipolysis, and resistance to stress, anti-inflammatory effects, and depression of immune response?  
A. cortisol (hydrocortisone), corticosterone, and cortisone
- Q. Which gland produces/releases DHEA dehydroepiandrosterone, and testosterone?  
A. adrenal cortex
- Q. Which hormone(s) promote libido, stimulates development & maintenance of male secondary sex characteristics, and get converted to estrogens by other body tissues?  
A. DHEA dehydroepiandrosterone, and testosterone
- Q. Which gland produces/releases epinephrine (adrenalin) and norepinephrine (noradrenalin)?

A. adrenal medulla

Q. Which hormone(s) produce effects that enhance those of the sympathetic division of the ANS during stress?

A. epinephrine (adrenalin) and norepinephrine (noradrenalin)

Q. Which gland produces/releases glucagon?

A. pancreas

Q. Which hormone(s) stimulates liver cells to accelerate the breakdown of glycogen into glucose, stimulates the formation of glucose from other nutrients (lactic acid, amino acids), and raises blood glucose?

A. glucagon

Q. Which gland produces/releases insulin?

A. pancreas

Q. Which hormone(s) accelerates transport of glucose into cells, stimulates conversion of glucose into glycogen, decreases formation of glucose from other molecules (decreases glycogenolysis & gluconeogenesis), increases protein & lipid synthesis, and lowers blood glucose?

A. insulin

Q. Which gland produces/releases somatostatin?

A. pancreas

Q. Which hormone(s) inhibits secretion of insulin & glucagon?

A. somatostatin

Q. Which gland produces/releases pancreatic polypeptide?

A. pancreas

Q. Which hormone(s) inhibits somatostatin secretion?

A. pancreatic polypeptide

Q. Which gland produces/releases testosterone?

A. testes (testicles)

Q. Which hormone(s) promotes libido, and stimulates development & maintenance of male secondary sex characteristics (beard growth, deepening of voice, etc.), and gets converted to estrogens by other body tissues?

A. testosterone

Q. Which gland produces/releases estrogen (estradiol & estrone) and progesterone?

A. ovaries

Q. Which hormone(s) regulate the menstrual cycle, maintain pregnancy, prepare mammary gland for lactation, and help stimulate development & maintenance of female secondary sex characteristics (big breasts, wide hips, etc.)

A. estrogen (estradiol & estrone) and progesterone

Q. Which gland produces/releases melatonin?

A. pineal gland

Q. Which hormone(s) is thought to contribute to setting the body's biological clock?

A. melatonin

Q. Which gland produces/releases thymosin, THF thymic humoral factor, TF thymic factor, and thymopoietin?

A. thymus

Q. Which hormone(s) promote maturation of T cells of immune system?

A. thymosin, THF thymic humoral factor, TF thymic factor, and thymopoietin