HORMONE HALL OF FAME

Grouped more or less by synergistic or antagonistic functions.

Hormone	Source	Effect on target tissue	Stimulus for release
ACTH (Adrenocorticotropic H.)	Ant. Pituitary	• Stimulates adrenal cortex to release aldosterone and cortisol especially during prolonged stress.	• various sources of stress...both physical and psychological
ADH (Antidiuretic H.)	Post. Pituitary	• Directly causes kidneys to reabsorb more water back into the blood and produce a smaller amount of more conc. urine. • Water retention leads to increased BP.	• high osmolality of body fluids or • decreasing BP
Aldosterone	Adrenal cortex	• ↑ Retention (reabsorption) of Na^+ and ↑ excretion of K^+ (& H^+) at kidneys. Water follows sodium so water is conserved indirectly. Water retention leads to increased BP. • Levels are low in Addison's disease. • Levels are high in Cushing's syndrome.	• low blood Na^+ which usually corresponds with ↑ K^+ • low BP. • Stress may also stimulate release of aldosterone via ACTH.
Calcitonin	Thyroid	• Lowers blood Ca^{++} by stimulating osteoblasts to absorb and kidneys to excrete Ca^{++}. "... tones down calcium levels." • Is rarely used by the adult body to control blood calcium levels…Only used when Ca^{++} is excessively high.	• excessively high blood Ca^{++}
PTH - (Parathyroid H.)	Parathyroid	• Increases blood calcium levels by: 1. stimulates osteoclasts to release Ca^{++} from bone 2. stimulates kidneys to retain Ca^{++} in blood 3. stimulates absorption of Ca^{++} at small intestine • Blood calcium levels are normally adjusted ↑ or ↓ by adjusting the amount of PTH.	• low blood calcium
Glucagon	Pancreas	• ↑ blood glucose levels by stimulating glycogenolysis at liver thereby releasing glucose to the blood.	• Low blood glucose levels
Insulin	Pancreas	• Lowers blood glucose by facilitating the transport of glucose (and AA's) from blood into tissue cells, especially into skeletal muscle and fat. • Stimulates protein synthesis. • Type II diabetes mellitus (the most common type) results from target tissue receptors that do not respond to insulin. • Type I diabetes mellitus results from a pancreas that does not produce and/or release correct amounts of insulin.	• high blood glucose levels
Thymosin	Thymus	• Influences development of lymphocytes involved in immunity. Is most active when we are young.	-
Epinephrine (adrenaline) and Norepinephrine (NE)	Adrenal medulla	• Same as general sympathetic stimulation (F/F)....↑ HR, ↑ vasoconstriction, ↑ BP, bronchodilation, etc. • these effects are short lived (minutes)	• sympathetic nerve impulses due to stressful "fight or flight" situations.

Melatonin	Pineal gland	• Has a calming or sedating effect… "makes you mellow" by encouraging the onset and depth of sleep. • Excess melatonin causes some people to become depressed during winter months... a condition known as S.A.D. (Seasonal Affective Disorder)	darkness or lack of bright sunlight
Cortisol (hydrocortisone)	Adrenal cortex	• Helps keep blood glucose up to its normal level between meals by 1) causing cells to make glucose from lipids and proteins and 2) causing cells to burn more FAs and less glucose. • Is anti-inflammatory. Cortisol depresses the normal functioning of your immune system. • Levels are low in Addison's disease. • Levels are high in Cushing's syndrome.	• Stress or hypoglycemia causes the release of ACTH from ant. pituitary. This, in turn, stimulates the adrenal cortex to release cortisol and aldosterone
Estrogen and Progesterone	Ovaries	• Controls changes of the endometrium during the monthly uterine (menstrual) cycle. • also inhibits the ability to: drive a stick shift, parallel park, and to have an argument without taking it personally.	• fluctuating levels of FSH and LH from ant. pituitary.
Prolactin	Ant. Pituitary	• Stimulates production of milk in breasts but not the release or "let down" of milk during a feeding.	• pregnancy and • infant nursing at breast
Oxytocin	Post. Pituitary	• Stimulates uterine contractions associated with childbirth • causes contraction of milk glands and the flow of milk "let down" during breast feeding.	• stretch of uterine cervix or • infant nursing at breast
FSH - Follicle Stim. H.	Ant. Pituitary	• Stimulates growth of ovarian follicles containing eggs.	-
LH - (Luteinizing H.)	Ant. Pituitary	• Stimulates ovulation and formation of a corpus luteum.	-
Testosterone	Testes	• Stimulates anabolic metabolism (protein synthesis), sperm production, growth of chest and facial hair, deep voice, etc. • ↑ aggressiveness and "territorial" tendencies sometimes causing an otherwise polite man to behave like a total ass. • Also causes men to believe they have the God-given responsibility to control the TV remote.	• watching sports on TV, hunting, fishing, being around "babes", and having a beer "with the guys"
GH - Growth H.	Ant. Pituitary	• ↑ anabolic metabolism (protein synthesis) and cartilage growth at epiphyseal plates (bone growth). • Potentiates (enhances) the effects of T3 and T4.	-
TSH - (Thyrotropin or Thyroid stimulating H.)	Ant. Pituitary	• Stimulates thyroid gland to release T3 and T4.	-
TH (includes T_3 & T_4) Thyroid H.	Thyroid gland	• ↑ overall metabolism (especially protein synthesis) thereby ↑ body temperature and energy consumption. • Enhances the effects of GH such as protein synthesis.	• TSH

Step 1: Learn the names of all the various hormones released by these glands.
If given the name of a gland, be able to identify all the hormones it releases.
If given the name of a hormone, be able to identify the gland that releases it.

ENDOCRINE GLANDS (11) And Their Respective HORMONES (23 total)

Use the first column to list the hormones released from each gland. Cover the first column. Recall and write the hormone names *from memory*. Repeat until you go crazy.

GLAND	HORMONE(s) RELEASED
Ant. Pituitary	_____
	_____
	_____
	_____
	_____
	_____
Post. Pituitary	_____
	_____
Pineal	_____
Thyroid	_____
	_____

Parathyroid	_____
Thymus	_____
Pancreas	_____
	_____
Adrenal cortex	_____
	_____
Adrenal medulla	_____
	_____
Ovaries	_____
	_____
Testes	_____

Step 2: SCAVENGER HUNT – Use the Hormone Hall of Fame to find the hormone based on the clue given. Numbers in ( ) indicate the number of hormones that apply.

HORMONE	EFFECT OF HORMONE
_____	Stimulates ejection (release) of breast milk into ducts during feeding... called "let down." This is not the same as milk production.
_____	Stimulates contractions of the smooth muscles of uterus during and following childbirth.
_____	(4) Stimulates protein synthesis of structural proteins.
_____	
_____	
_____	
_____	Released in response to low blood calcium levels. It ↑ blood Ca^{++} concentration.
_____	Indirectly stimulates growth of epiphyseal plates at joints causing bones to grow in length.
_____	Stimulates milk production but not the "let down" of milk in the female breast.
_____	Stimulates maturation of ovarian follicles containing eggs.
_____	Stimulates ovulation and formation of a corpus luteum.
_____	(2) Regulates changes of the endometrial lining of the uterus during the monthly uterine (menstrual) cycle.
_____	
_____	(4) Released in response to a decrease in blood pressure. Two are fast acting for a short-term response and two are slower acting for a long-term response
_____	.
_____	
_____	
_____	Released shortly after a meal to enable muscle and fat cells to absorb glucose from the blood.
_____	This type of diabetes is caused by target tissue receptors that do not respond well to insulin.

Confirm accuracy of above with your instructor.

_____ A powerful anti-inflammatory agent from the adrenal cortex.
You may have a synthetic version of it in your medicine cabinet at home.
High levels of this H, as a result of stress depress the immune system.

_____ *Directly* promotes conservation (retention) of water by kidneys.

_____ Causes the kidney to reabsorb sodium back into the blood. *Indirectly* causes kidneys to save water to the blood because water follows sodium.

_____ Causes glycogenolysis in the liver thereby dumping glucose into the blood.

_____ Stimulates the adrenal cortex to release its hormones (aldosterone and cortisol) during periods of prolonged stress.

_____ (2) Produces widespread short term effects essentially the same as those resulting from stimulation of sympathetic nerves

_____

_____ (2) These H. cause the kidney to conserve water.

_____

_____ (2) These Hs try to prevent hypoglycemia by increasing blood sugar levels between meals or when meals are skipped.

_____

_____ More of this H. could lower circulating calcium and phosphorous levels but would only be used when Ca^{++} is excessively high.

_____ This H. stimulates sperm production is males and makes men occasionally behave with inappropriate aggressiveness.

_____ This H. influences development of lymphocytes that are essential for the healthy functioning of your immune. system.

_____ This H. influences your sleeping/waking cycles and is produced mostly at night. It has a calming, soothing effect.

_____ This H. targets (stimulates) the thyroid gland causing it to release more T_3 and T_4.

MISCELLANEOUS

_____ Neurons "talk" to neurons or effectors by chemicals called NTs. The endocrine system "talks" to target tissues with chemicals called _____.

_____ Is called the "Master Gland" because it releases more Hs than any other and affects many other glands.

_____ Organ found adjacent to first part of the small intestine containing endocrine glands for control of blood sugar levels.

_____ Gland that is the source of Hs associated with Fight or Flight response.

Step 3: PROBLEM SOLVING WITH HORMONES

Many hormones are best understood and appreciated in light of their homeostatic roles. Think of each of the following stimuli as a "problem" and name the hormone(s) that should be released to "fix" the problem.

STIMULUS a situation or condition in the body that needs to be corrected	**HORMONE** released to correct the problem or at least compensate for it.	**EFFECT of the Hormone and <u>HOW</u>** (Explain <u>how</u> this hormone reverses the stimulus.)
excess blood glucose		
decreasing blood glucose	(2)	
increased osmolality (hypertonicity) of body fluids. e.g. When you consume excess sodium.		
decreasing blood calcium		
decreasing blood pressure	(2 for long term) (2 for short term)	
decreasing blood sodium		

SPECIAL SITUATIONS	**H RELEASED**	**EFFECT OF THE HORMONE**
generalized sympathetic stimulation as in "fight or flight" situations	(2)	
infant nursing at breast	(2)	