Pituitary Hormones

1- Adenohypophysis: vascular connection to hypothalamus (hypothalamo-hypophysial portal system)

Hormone	Stimuli for hypothalamus		Hypophysiotropic hormones	Effect on Hormone	Systemic effect (response)		Outcome and regulation
GH [1]By somatotropes of Ant. Pituitary	Low blood levels of GH as well as by a number of 2ndry triggers for example :	Hypoglycemia (e.g. fasting)	release of GHRH and Inhibit inhibitory	GH ↑	GH and somatomedins speed up glycogen break down by the liver , glucose enter blood more rapidly		Blood glucose level normalize –ve feed back HOWEVER if continue to increase inhibit release of GHRH
		Hyperglycemia	release of GHIH (somatostatin) and inhibit stimulatory	GH ↓	GH and somatomedins slow down glycogen break down by the liver , glucose enter blood more slowly		Blood glucose level normalize –ve feedback HOWEVER if continue to decrease inhibit release of GHIH
TSH by By thyrotropes of Ant. Pituitary	Low blood levels of T_3 and T_4 + Low metabolic rate		release of TRH	TSH ↑	TSH stimulate thyroid follicular cells , T_3 and T_4 release + maintain follicular cell size		Elevated T_3 inhibit release of <u>both</u> TRH and TSH
ACTH by corticotropes of Ant. Pituitary	Internal and external factors such as fever , hypoglycemia and Stressors		release of CRH in a daily rhythm	ACTH ↑	Stimulate secretion of glucocorticoids (e.g. cortisol) and androgens by adrenal cortex + maintain size of zona fasciciculata and zona reticularis of cortex		Elevated cortisol inhibit release of <u>both</u> ACTH and CRH
LH , FSH By gonadotropes of Ant. Pituitary	Low levels Of LH \ FSH		GnRH	LH \ FSH ↑	ovaries	<u>LH-></u> stimulate ovulation, formation of corpus luteum in addition to estrogen and progesterone synthesis in the ovaries <u>FSH -></u> growth of ovarian follicles	- Estrogen (+ve feed back within 12-14 days) - Estrogen and progesterone (-ve feedback over most of the cycle)
					Testis	<u>**L**H -></u> **L**eydig cells -> testosterone (+ve on spermatogenesis) <u>F**S**H -></u> **S**ertoli cells -> spermatogenesis + release inhibin	- Testosterone (–ve feedback on <u>Both</u> LH\FSH responsiveness and GnRH secretion) - Inhibin (–ve feedback on LH\FSH)
PRL By mamotropes (lactotropes) of Ant. Pituitary	Higher brain centers (sound of child's cry or baby suckling ->mechanoreceptors in nipple\ ascending sensory info) in addition to exercise , stress sleep , pregnancy and TRH		PIH (dopamine)	Inhibit inhibition of prolactin cells -> PRL ↑	Act mainly on mammary gland for Milk production (casein + lactalbumin) , Inhibit effect of gonadotropins and other actions on different organs		Itself Stimulate secretion of dopamine in the median eminence , But the stimulus such as baby suckling create a +ve feedback loop
Beta-Endorphins					Act on opioid receptor to inhibit pain perception		

[1] General physiologic roles of GH is stimulating postnatal body growth, secretion of IGF-1 and other Direct metabolic effects.

2- Neurohypophesis: nervous connection to hypothalamus (hypothalamo-hyposphysial tract)

Hormone	Stimuli for hypothalamus	Hypophysiotropic hormones	Effect on Hormone	Systemic effect (response)	Outcome and regulation
ADH By supraoptic nucleus in hypothalamus	↑ Osmotic pressure (input from **osmoreceptors**[2] located in the anterolateral hypothalamus) *more sensitive 1-2% change in pressure ↓ blood volume (reduce input from baroreceptors in carotid artery and aortic arch + stretch receptors in left atrium and pulmonary veins collectively called **pressure receptors**) *less sensitive 5-10% change in volume stress , nausea and pain	_____	If osmoreceptors are stimulated a **small** amount of ADH is produced If pressure receptors are suppressed **large** amount of ADH is produced for systemic vasoconstriction ; hence it override	Has 3 receptors: - V_{1A} -> 1- blood vessels -> mediate vasoconstriction -> increase BP 2- liver -> glycogenolysis - V_{1B} -> Ant. Pituitary (corticotropes cells) -> increase ACTH secretion - V_2 -> principle cells of distal convolutes tubules and collecting ducts in the kidneys -> enhance water permeability at the luminal membrane -> conserve body water by antidiuresis In addition to its effect on sudoriferous gland -> decrease water loss by perspiration from skin	Hypothalamus receives feedback from osmoreceptors, baroreceptors and stretch receptors. any increase in osmolality or decrease in blood volume will stimulate ADH secretion from post. Pituitary and once normalizes the secretion is inhibited Alcohol decrease secretion
Oxytocin By periventricular nucleus in hypothalamus	Neural stimuli (higher brain centers stimuli + parturition) other stimuli such as hugging , stress .	_____	Oxytocin ↑	Parturition: Strong stimulant of myometrium contractions during and after child birth Breast-feeding: it triggers milk ejection by contracting myoepithelial cells of the alveoli (letdown reflux)	Regulated by +ve feedback mechanism which lead to increase in the intensity of the contractions due to increased sensitivity of myometrium to hormone ending in birth Alcohol decrease secretion

[2] also stimulate thirst