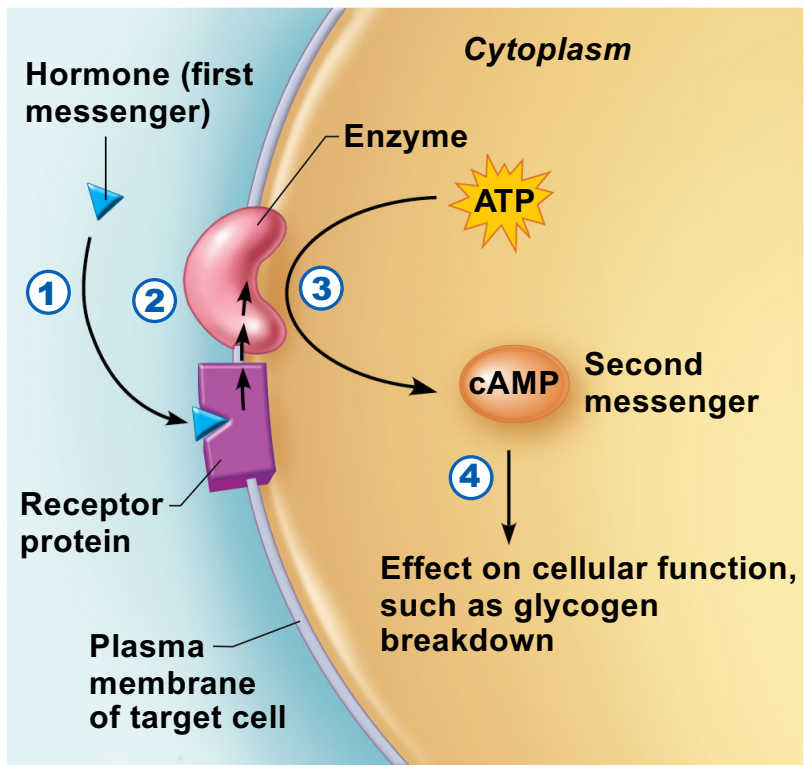


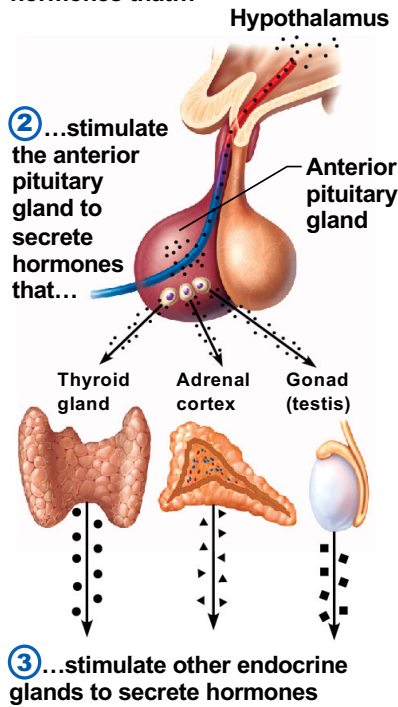
(a) Direct gene activation



(b) Second-messenger system

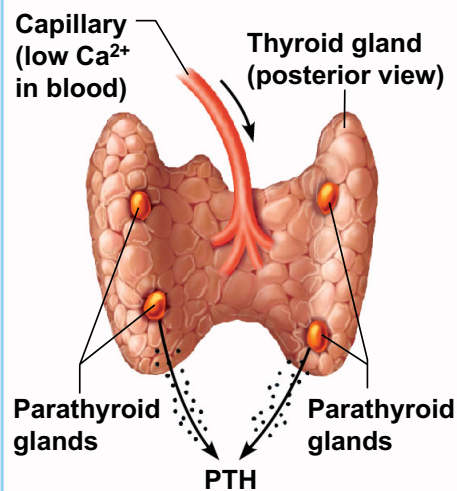
(a) Hormonal stimulus

① The hypothalamus secretes hormones that...



(b) Humoral stimulus

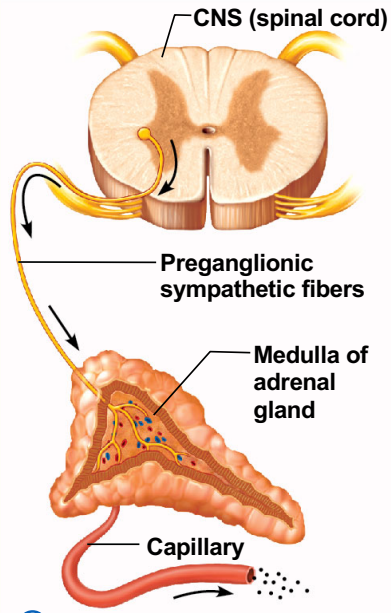
① Capillary blood contains low concentration of Ca^{2+} , which stimulates...



② ...secretion of parathyroid hormone (PTH) by parathyroid glands

(c) Neural stimulus

① Preganglionic sympathetic fiber stimulates adrenal medulla cells...



② ...to secrete catecholamines (epinephrine and norepinephrine)

Pineal gland
Hypothalamus
Pituitary gland

Thyroid gland
Parathyroid glands

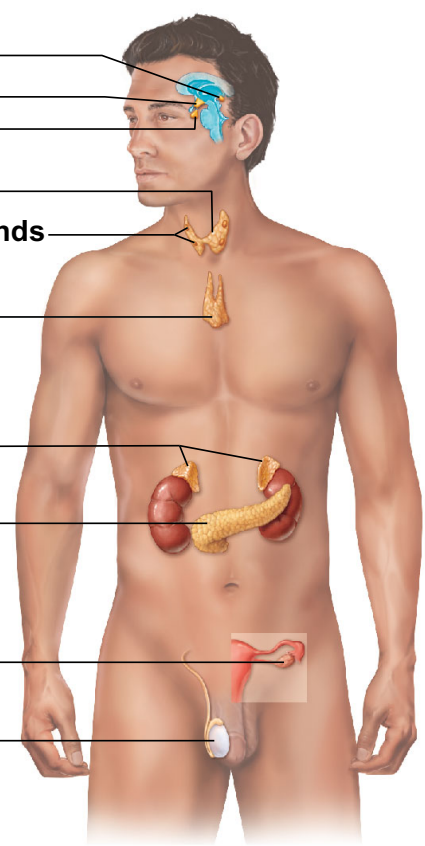
Thymus

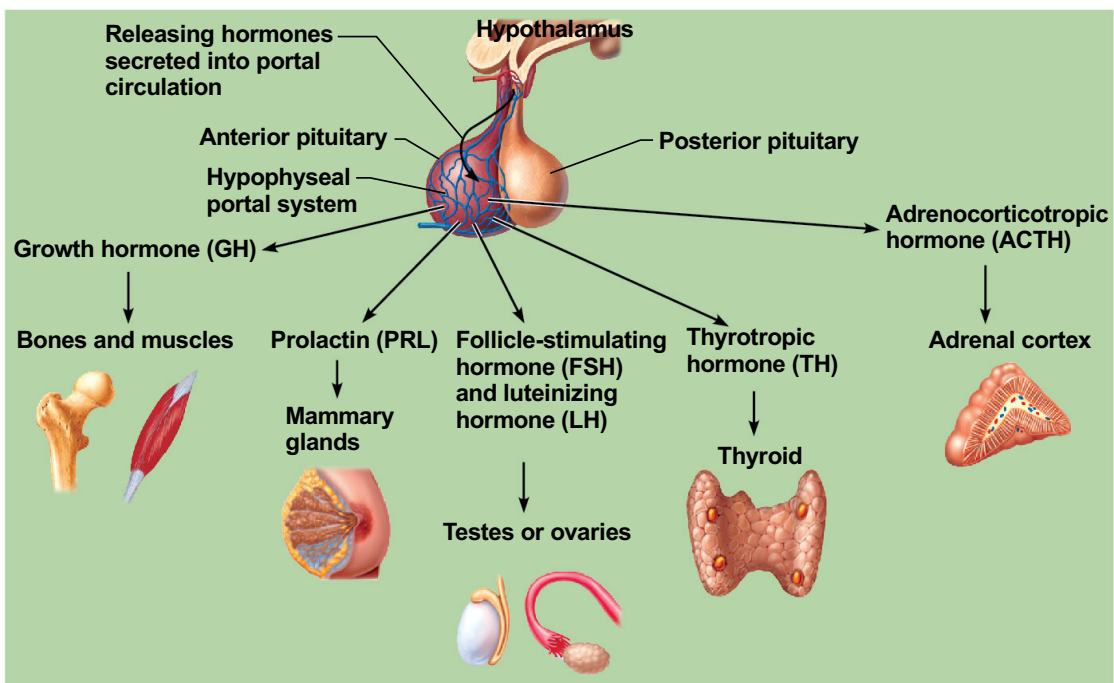
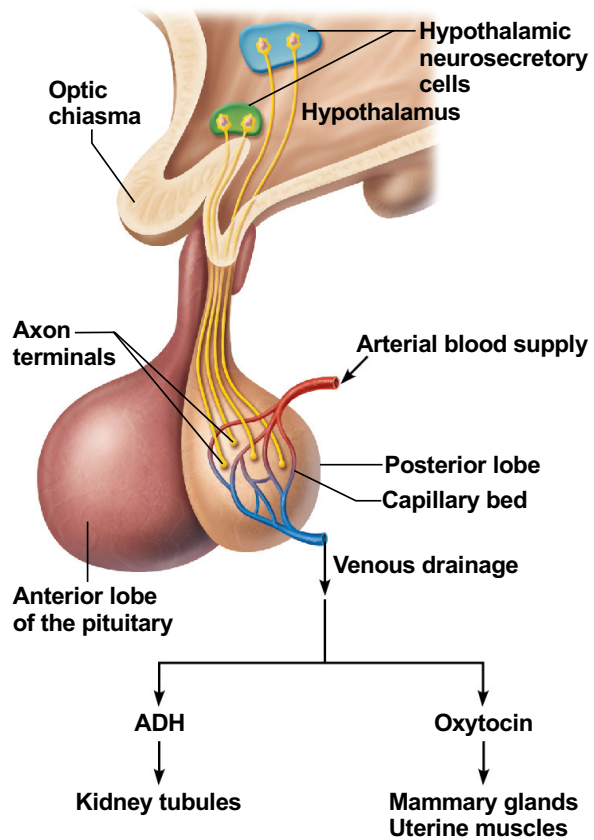
Adrenal glands

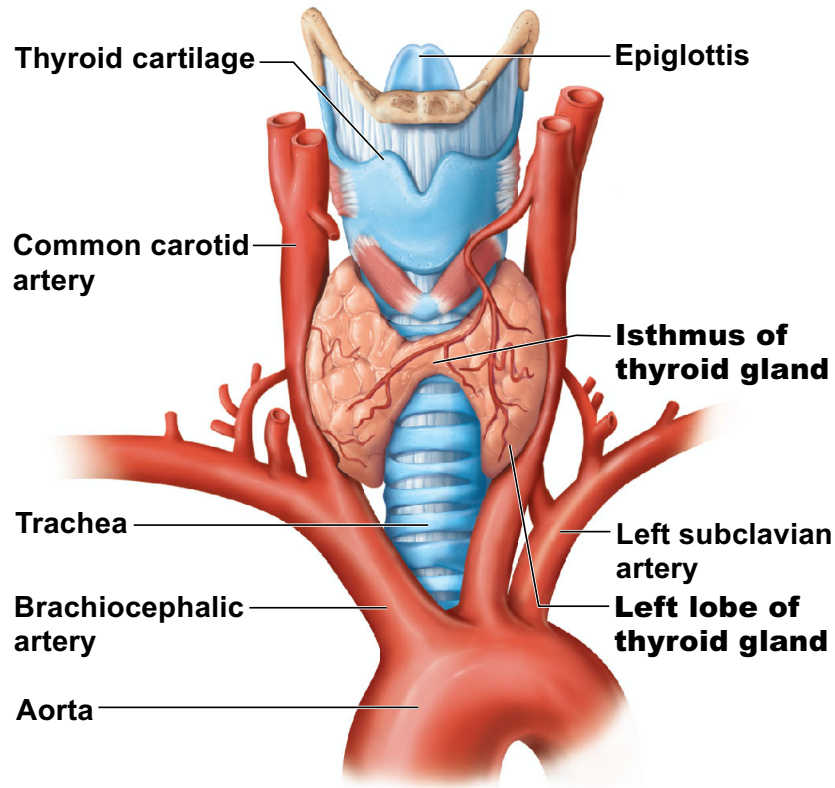
Pancreas

Ovary (female)

Testis (male)

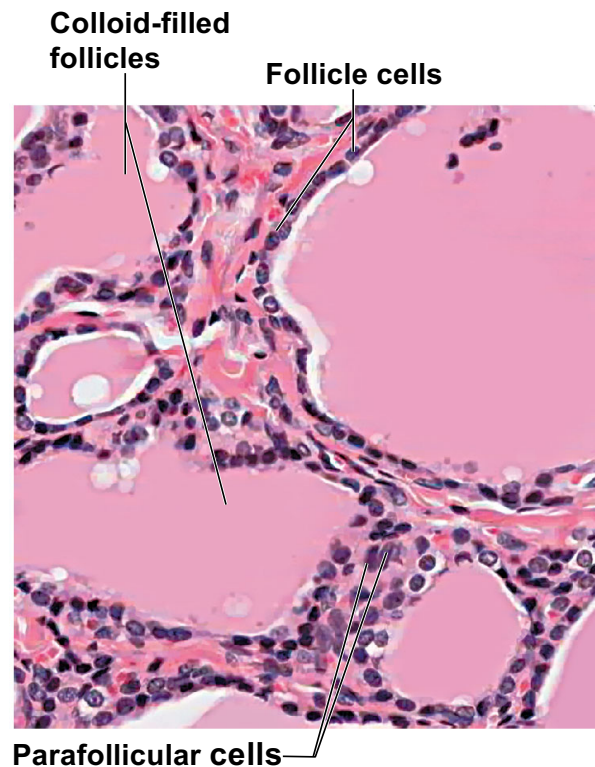






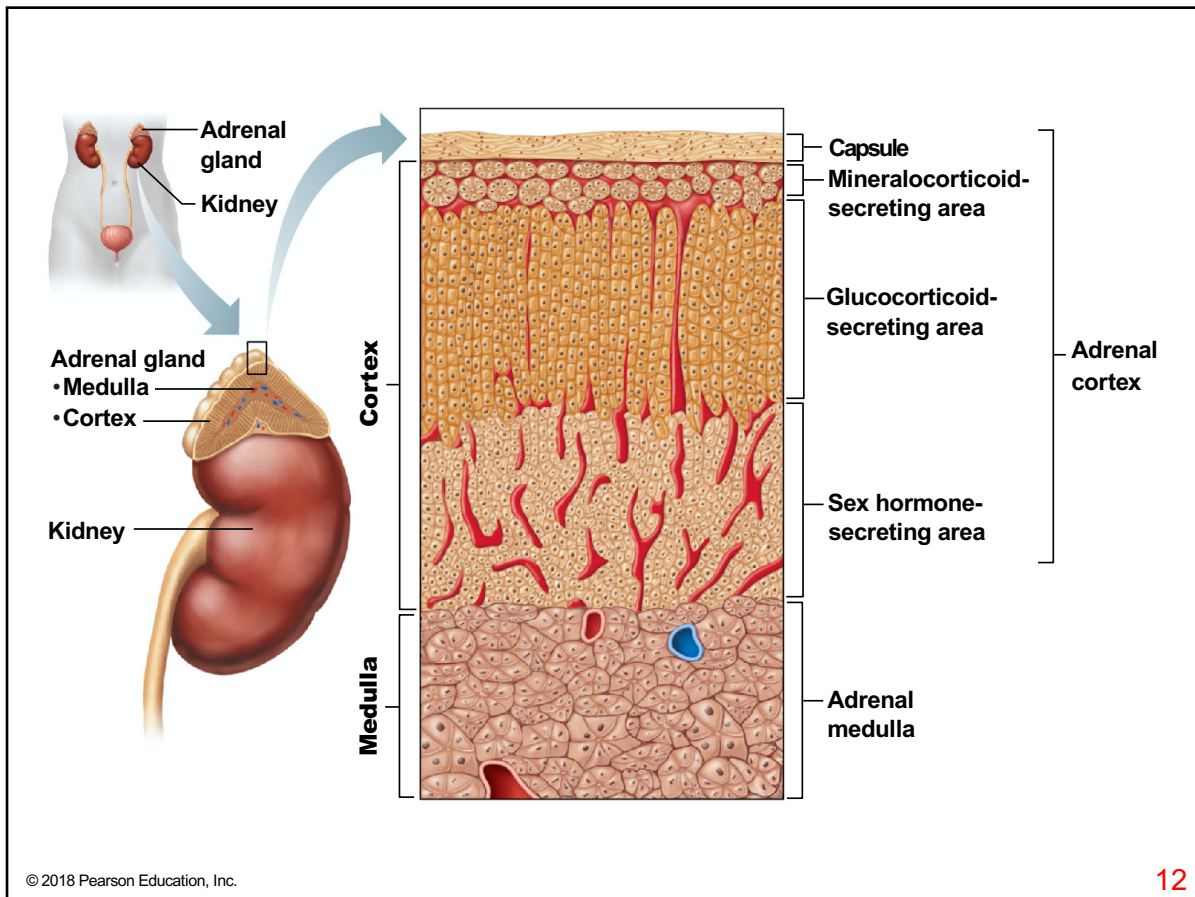
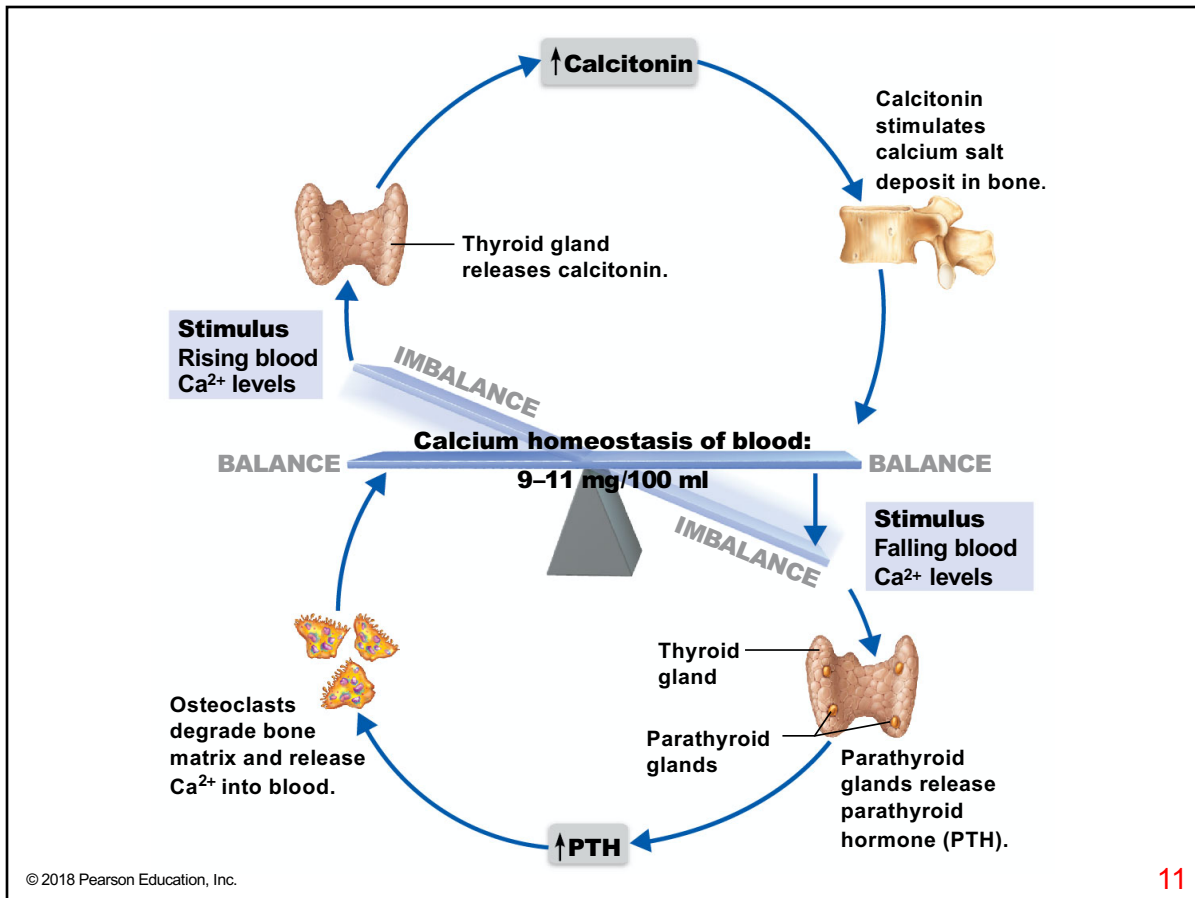
(a) Gross anatomy of the thyroid gland, anterior view

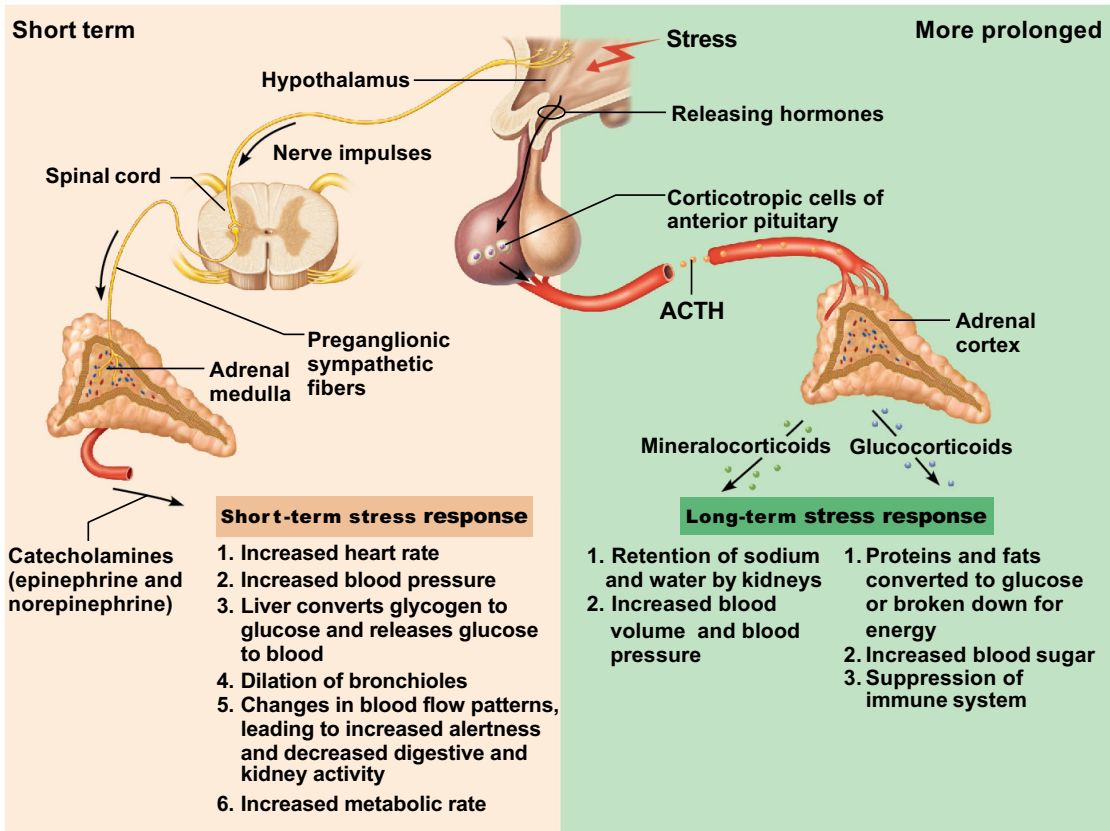
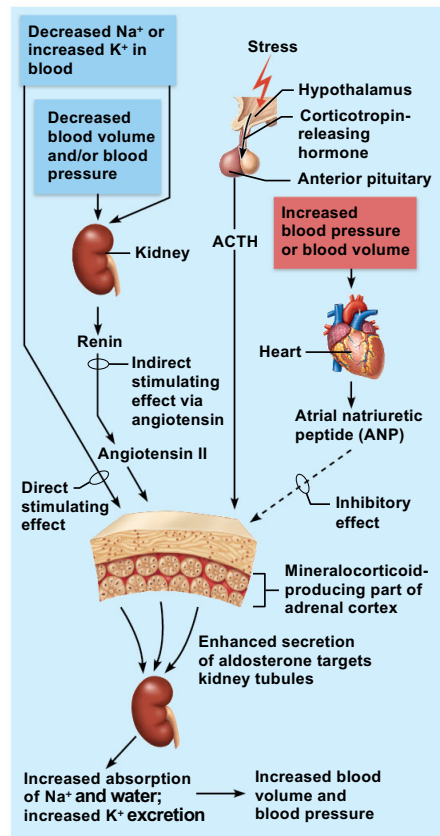
© 2018 Pearson Education, Inc.

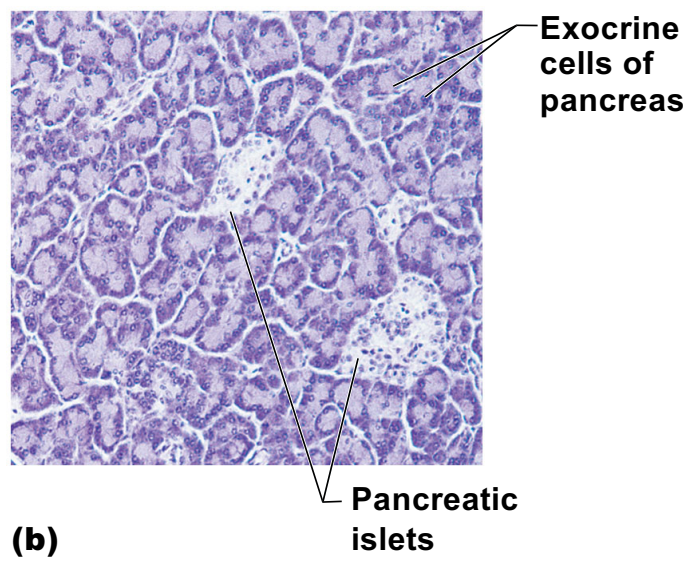
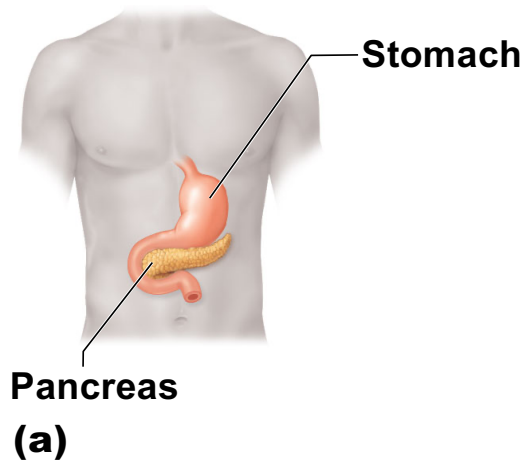


(b) Photomicrograph of thyroid gland follicles (380x)

© 2018 Pearson Education, Inc.







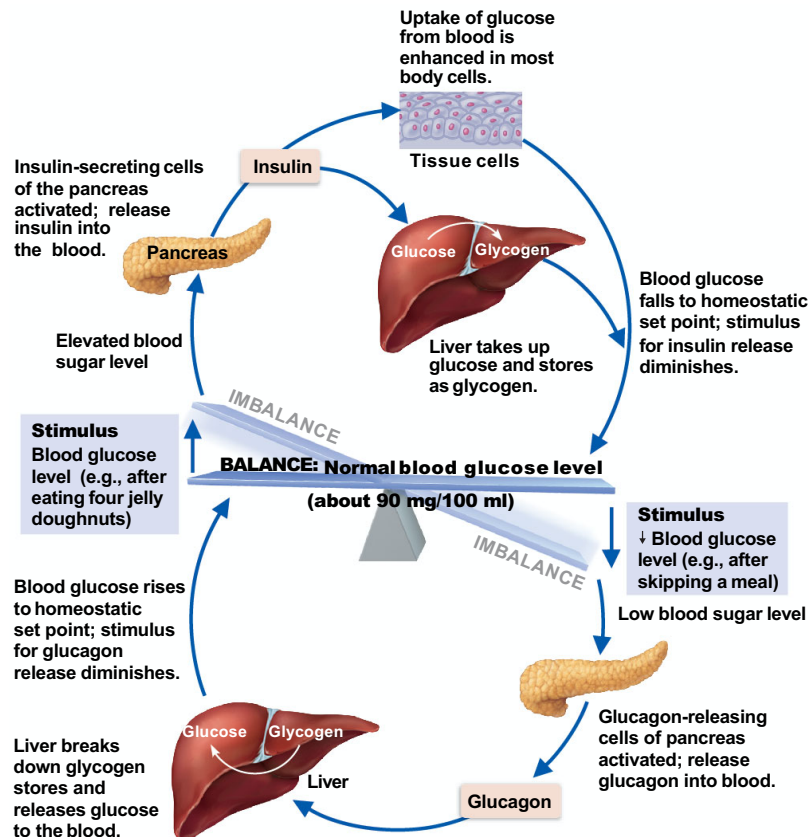
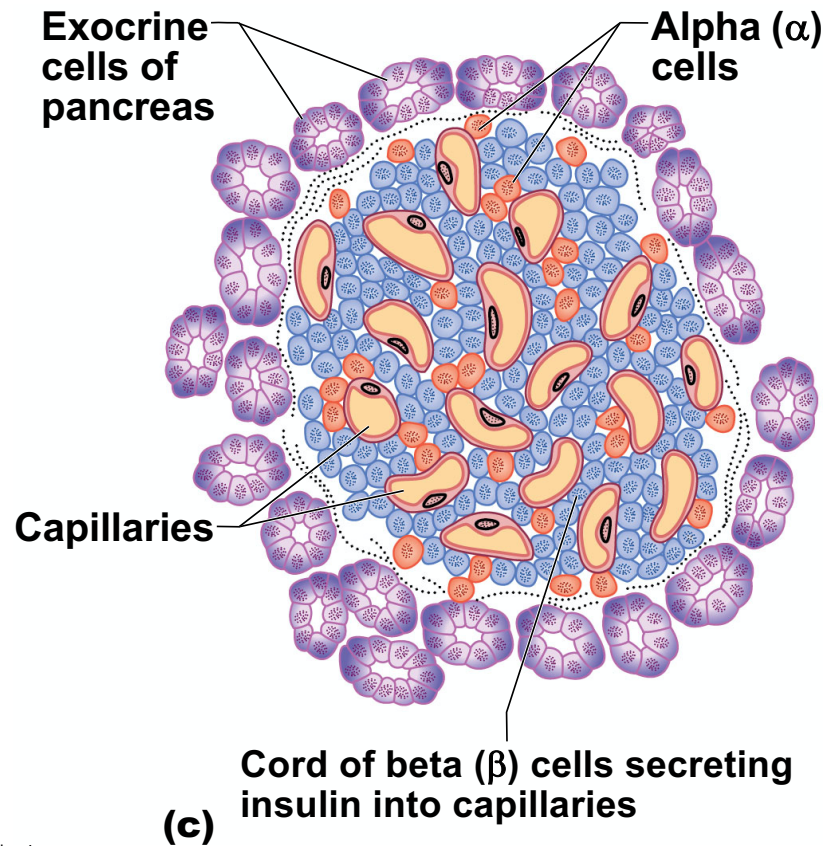








Table 9.1 Major Endocrine Glands and Some of Their Hormones

Gland	Hormone	Chemical class*	Major actions	Regulated by	
Hypothalamus		Hormones released by the posterior pituitary; releasing and inhibiting hormones that regulate the anterior pituitary (see below)			
Pituitary gland					
• Posterior lobe (releases hormones made by the hypothalamus)		Oxytocin	Peptide	Stimulates contraction of uterus and the milk "let-down" reflex	Nervous system (hypothalamus), in response to uterine stretching and/or suckling of a baby
		Antidiuretic hormone (ADH)	Peptide	Promotes retention of water by kidneys	Hypothalamus, in response to water/salt imbalance
• Anterior lobe		Growth hormone (GH)	Protein	Stimulates growth (especially of bones and muscles) and metabolism	Hypothalamic releasing and inhibiting hormones
		Prolactin (PRL)	Protein	Stimulates milk production	Hypothalamic hormones
		Follicle-stimulating hormone (FSH)	Protein	Stimulates production of ova and sperm	Hypothalamic hormones
		Luteinizing hormone (LH)	Protein	Stimulates ovaries and testes	Hypothalamic hormones
		Thyroid-stimulating hormone (TSH)	Protein	Stimulates thyroid gland	Thyroxine in blood; hypothalamic hormones
		Adrenocorticotropic hormone (ACTH)	Protein	Stimulates adrenal cortex to secrete glucocorticoids	Glucocorticoids; hypothalamic hormones




* Any class not indicated as steroid is amino acid based.

Table 9.1 Major Endocrine Glands and Some of Their Hormones (continued)

Gland	Hormone	Chemical class*	Major actions	Regulated by	
Pineal gland		Melatonin	Amine	Involved in biological rhythms (daily and seasonal)	Light/dark cycles
Thyroid gland		Thyroxine (T ₄) and triiodothyronine (T ₃)	Amine	Stimulates metabolism	TSH
		Calcitonin	Peptide	Reduces blood calcium ion level	Calcium ion level in blood
Parathyroid glands		Parathyroid hormone (PTH)	Peptide	Raises blood calcium ion level	Calcium ion level in blood




* Any class not indicated as steroid is amino acid based.

Table 9.1 Major Endocrine Glands and Some of Their Hormones (continued)

Gland	Hormone	Chemical class*	Major actions	Regulated by
Thymus	 Thymosin	Peptide	"Programs" T lymphocytes	Not known
Adrenal glands				
• Adrenal medulla	 Epinephrine and norepinephrine	Amines	Raise blood glucose level; increase rate of metabolism; constrict certain blood vessels	Nervous system (sympathetic division)
• Adrenal cortex		Glucocorticoids	Increase blood glucose level	ACTH
		Mineralocorticoids	Promote reabsorption of Na ⁺ and excretion of K ⁺ (potassium) in kidneys	Changes in blood volume or blood pressure; K ⁺ or Na ⁺ level in blood
		Androgens and estrogens (see entry under gonads)		

* Any class not indicated as steroid is amino acid based.

Table 9.1 Major Endocrine Glands and Some of Their Hormones (continued)

Gland	Hormone	Chemical class*	Major actions	Regulated by
Pancreas	 Insulin	Protein	Reduces blood glucose level	Glucose level in blood
	Glucagon	Protein	Raises blood glucose level	Glucose level in blood
Gonads				
• Testes	 Androgens	Steroids	Support sperm formation; development and maintenance of male secondary sex characteristics	FSH and LH
• Ovaries	 Estrogens	Steroids	Stimulate uterine lining growth; development and maintenance of female secondary sex characteristics	FSH and LH
		Progesterone	Promotes growth of uterine lining	FSH and LH

* Any class not indicated as steroid is amino acid based.