



THE ENDOCRINE SYSTEM

INTRODUCTION

- The Endocrine System is made up of glands that release hormones into the bloodstream
 - Hormones are chemical messengers that target specific cells
 - The specific cells that are effected by the specific hormones are called target cells
 - If a cell does not have receptors, or the receptors do not respond to a particular hormone, the hormone has no effect on it
 - The body's response to hormones are slower and longer-lasting
 - It may take several minutes, hours or days for a hormone to have its full effect on its target cells

CONTROL OF THE ENDOCRINE SYSTEM

- Hormones are closely monitored in order to keep the functions of different organs in balance
- The endocrine system is regulated by feedback mechanisms that function to maintain homeostasis
 - When parts of the body sense that something is out of balance, an endocrine gland responds by either releasing a hormone or stopping production of a hormone

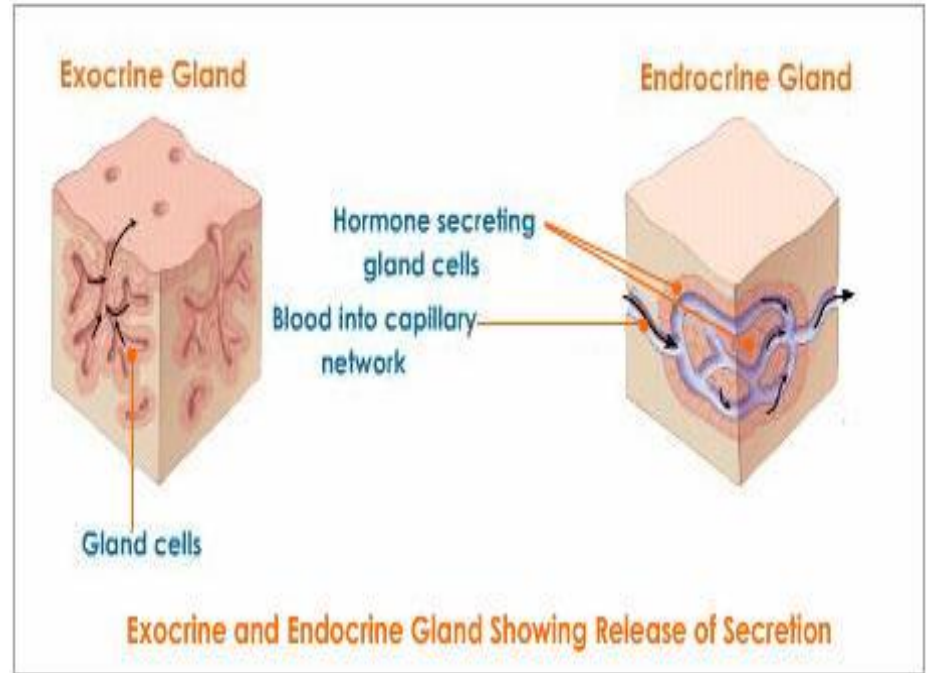
CONTROL OF THE ENDOCRINE SYSTEM

Example:

- The hypothalamus senses that the thyroxin level in the blood is low
- It secretes thyroid releasing hormone (TRH)
- TRH stimulates the pituitary gland to secrete thyroid stimulating hormone (TSH)
- TSH stimulates the thyroid gland to secrete thyroxin
 - Results in an increase in cellular activity, or metabolism
- As the hypothalamus senses more and more thyroxin in the blood, the hypothalamus releases less and less TRH

EXOCRINE AND ENDOCRINE GLANDS

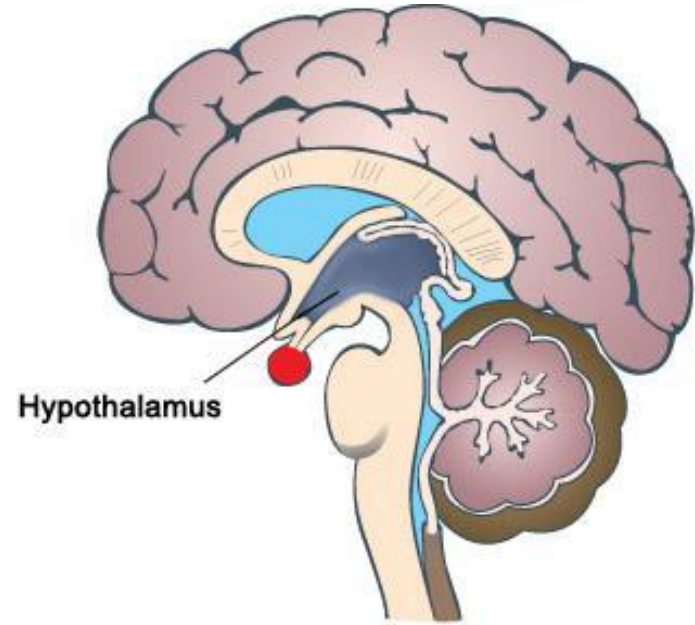
- **Exocrine** glands release their secretions through tube-like structures called ducts
 - Salivary glands, sweat glands, digestive glands
- **Endocrine** glands release hormones directly into the bloodstream



THE ENDOCRINE GLANDS

Hypothalamus

- Controls the secretions of the pituitary gland
- Influenced by the levels of hormones in the blood and by sensory information from other parts of the central nervous system



PITUITARY GLAND

- The pituitary gland secretes 9 hormones that directly regulate many body functions
- Controls the actions of several other endocrine glands

Antidiuretic Hormone (ADH)

Oxytocin

Follicle Stimulating Hormone (FSH)

Luteinizing Hormone

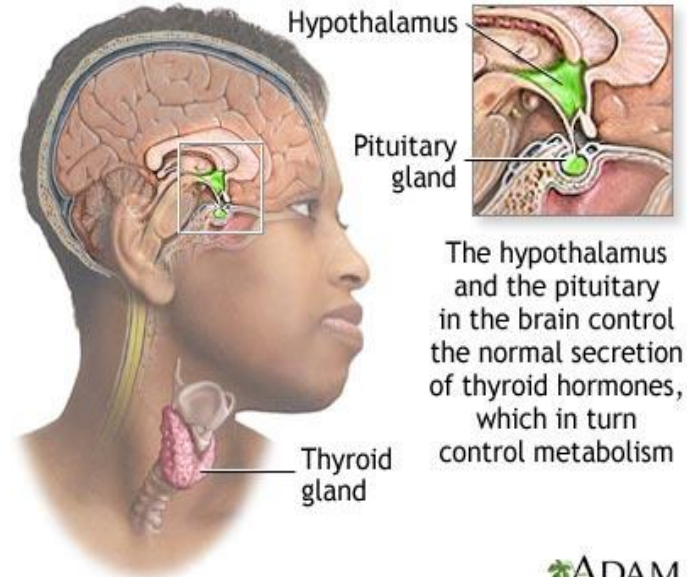
Thyroid-Stimulating Hormone (TSH)

Adreno-Corticotropic Hormone (ACTH)

Growth Hormone (GH)

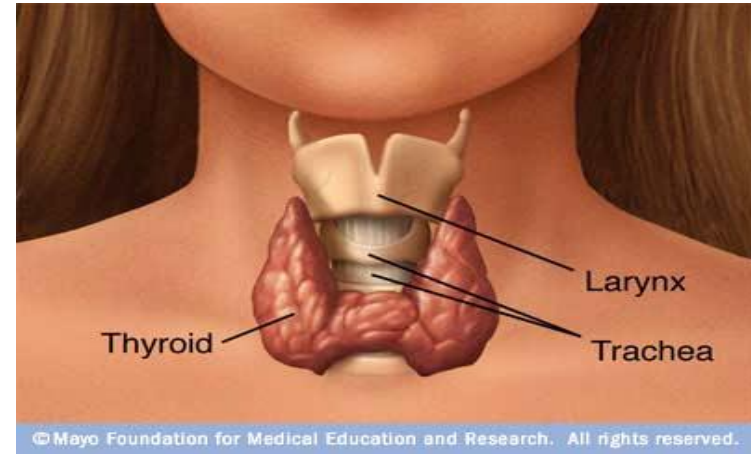
Prolactin

Melanocyte-Stimulating Hormone (MSH)



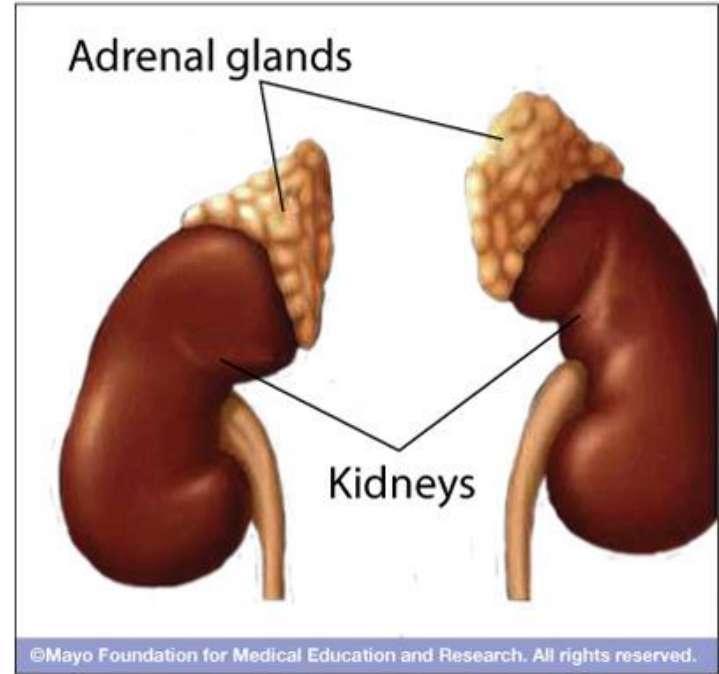
THYROID GLAND

- The thyroid gland has a major role in regulating metabolism
- Hyperthyroidism: Overactive thyroid gland, resulting in nervousness, elevated body temperature, weight loss, etc.
- Hypothyroidism: Underactive thyroid gland, resulting in lower metabolic rates and body temperature, lack of energy and weight gain



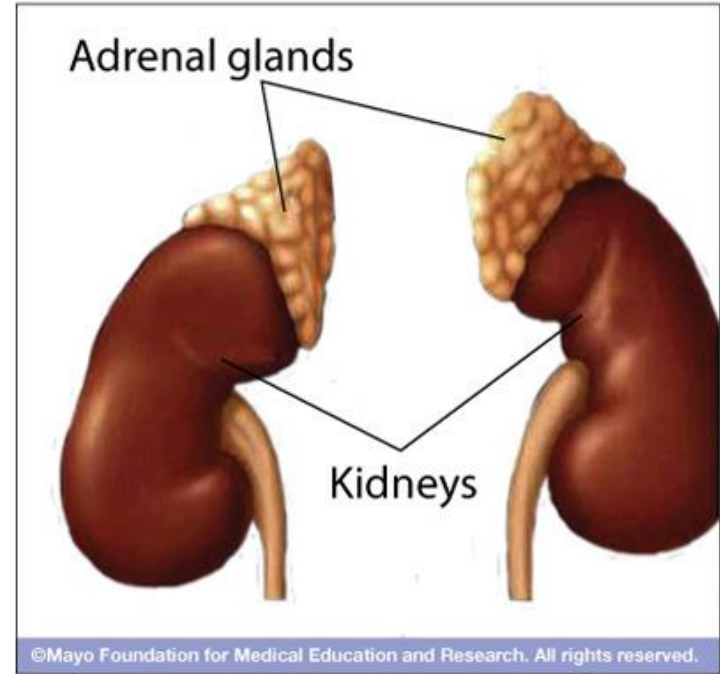
ADRENAL GLANDS

- Help the body prepare for and deal with stress
- Adrenal Cortex:
 - Produces more than two dozen corticosteroids
 - Aldosterone: Regulates the reabsorption of sodium and excretion of potassium by the kidneys
 - Cortisol: Controls the rate of metabolism of carbs, proteins and fats



ADRENAL GLANDS

- Adrenal Medulla:
 - Epinephrine and norepinephrine
 - AKA Adrenaline
 - “Fight or Flight Response”
 - Increase heart rate, blood pressure, and cause blood vessels and the airway to open up



Pancreas

- The pancreas is an exocrine and endocrine gland
 - *Exocrine*: Produces enzymes that break down carbohydrates, proteins, fats and nucleic acids; produces sodium bicarbonate, which neutralizes stomach acid
 - *Endocrine*: Produces insulin and glucagon
- Insulin and glucagon help regulate blood-glucose levels
 - *Insulin*: Stimulates cells in the liver and muscles to remove sugar from the blood and store it as glycogen
 - *Glucagon*: Stimulates the liver to release glucose back into the blood

DIABETES MELLITUS

- Diabetes Mellitus is a condition where the pancreas does not produce enough insulin
 - Blood-glucose levels may rise so high that the kidneys excrete glucose into the urine
 - Diabetic coma can result from blood-glucose levels being either too high or too low
 - Can be fatal if not treated soon enough
 - In the long term, diabetes can lead to many problems such as vision problems and blindness, nerve damage, circulatory problems, heart disease, and kidney disease

DIABETES MELLITUS



- Type I Diabetes

- Juvenile onset, usually develops before 15 years of age
- Little or no secretion of insulin
- Daily regular injections of insulin
- Must follow a strict diet

- Type II Diabetes

- Adult onset, usually after 40 years of age
- Produce low to normal levels of insulin
 - Insulin receptors do not work properly