

ENDOCRINOLOGY

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INTRODUCTION

- ◉ Endocrine vs exocrine gland
- ◉ Endocrine glands
- ◉ Definition of a hormone
- ◉ Chemical structure
- ◉ Mechanism of action
- ◉ Target cells
- ◉ Receptors, down-regulation and up-regulation

INTRODUCTION

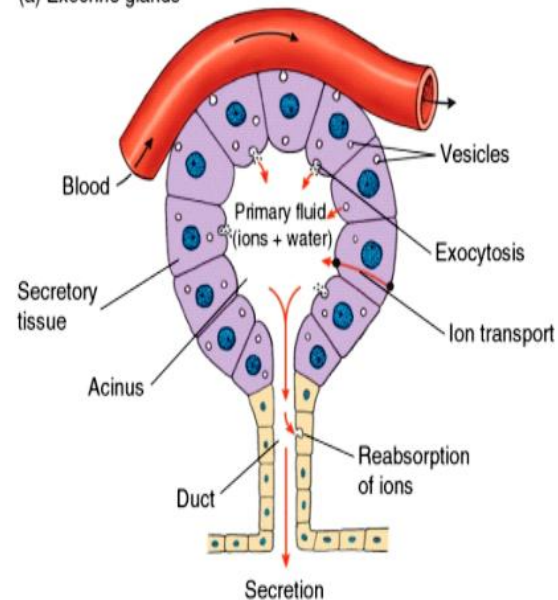
A. Exocrine gland

- Lumen and surfaces
- Ducts

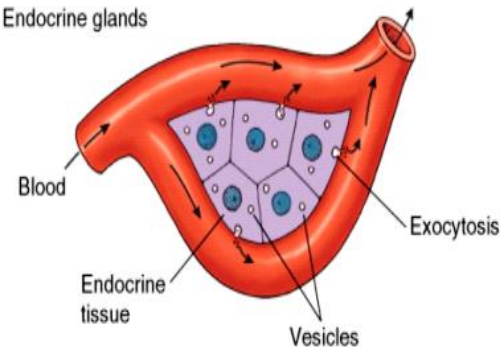
B. Endocrine gland

- Chemical messengers
- Blood stream

(a) Exocrine glands



(b) Endocrine glands

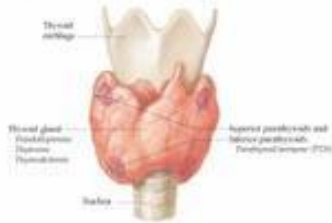


INTRODUCTION

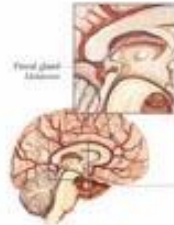
- Endocrine glands:
 - Pituitary
 - Thyroid, parathyroid
 - Adrenal
 - Pancreas
 - Ovaries
 - Testes

THE ENDOCRINE SYSTEM

Thyroid and Parathyroid Glands



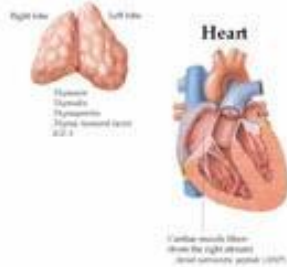
Pineal Gland



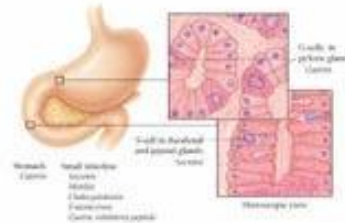
Pituitary Gland and Hypothalamus



Thymus Gland



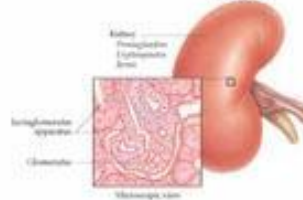
Stomach, Duodenum, and Jejunum



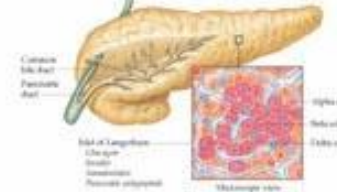
Adrenal Glands



Kidney



Pancreas



Ovary

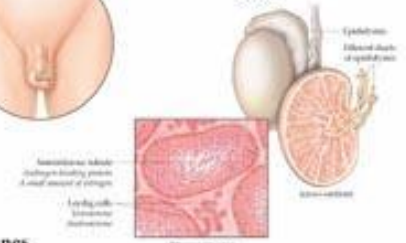


Placental Hormones

(from mother during pregnancy)

- Human chorionic gonadotropin (HCG)
- Human placental lactogen (HPL)
- Human chorionic somatomammotropin (HCS)
- Human chorionic gonadotropin (HCG)

Testes



INTRODUCTION

- The multiple hormone systems play a key role in regulating almost all body functions:
 - Metabolism
 - Growth and development
 - Water and electrolyte balance
 - Reproduction
 - Behavior

INTRODUCTION

○ Definition :

- Hormone is a chemical substance released by group of cells to control the function of other type of cells.

○ Types of hormones

- Affect many different types of cells (eg. GH and Thyroxin)
- Affect only specific target cells (eg. ACTH, prolactin and estrogen)

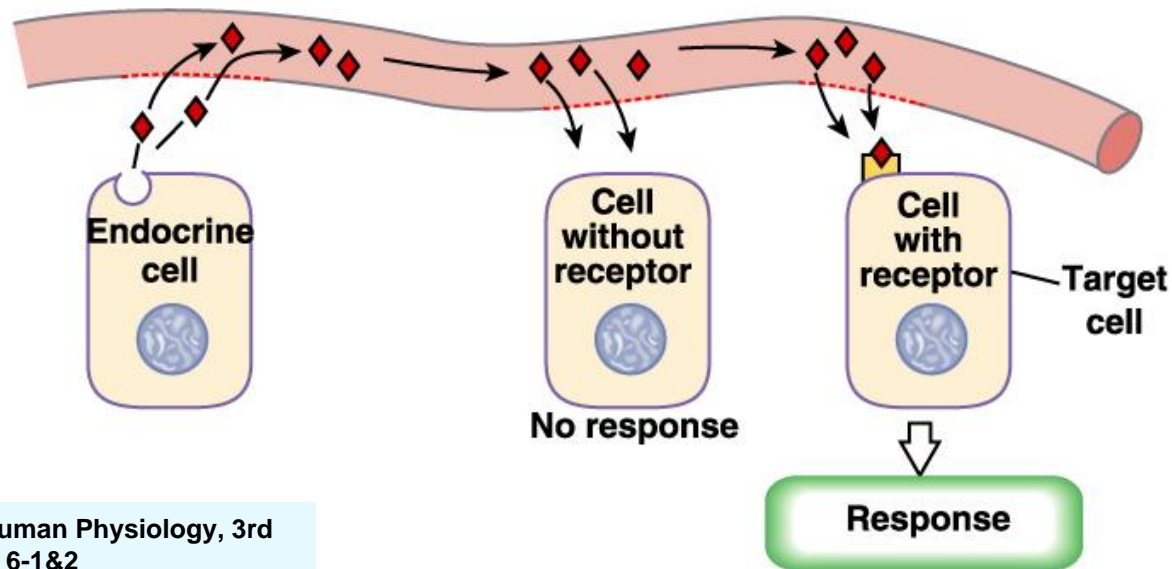
INTRODUCTION

- What are **target cells**?

Target cells refer to cells that contain specific receptors (binding sites) for a particular hormone

- Once a hormone binds to receptors on a target cell, a series of cellular events unfold that eventually impact gene expression and protein synthesis.

Hormone



INTRODUCTION

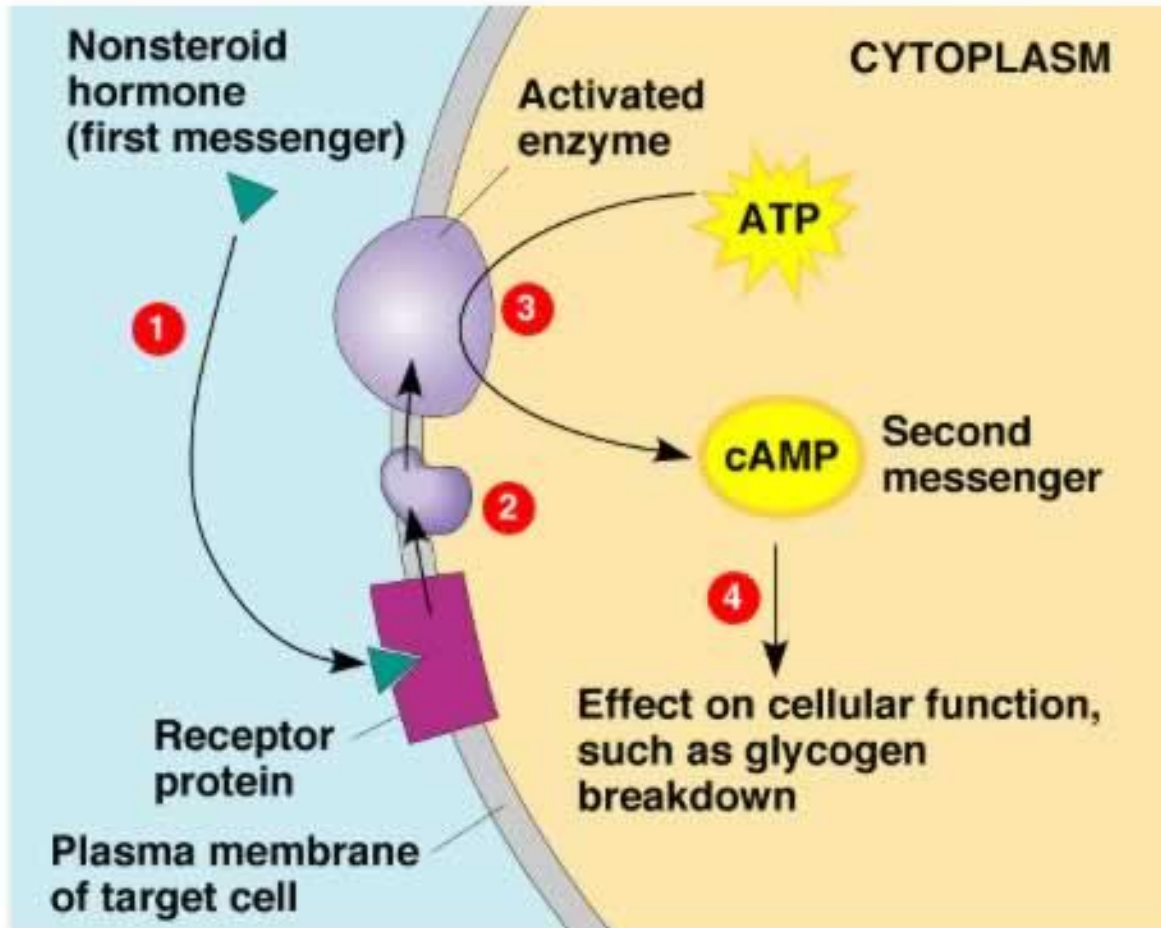
- Chemical structure of hormones
 - Three general classes of hormones:
 - Proteins and polypeptides (anterior and posterior pituitary, pancreas and parathyroid hormones)
 - Steroids (adrenal cortex, ovarian and testicular hormones)
 - Derivatives of amino acid tyrosine (thyroid and adrenal medullary hormones)

INTRODUCTION

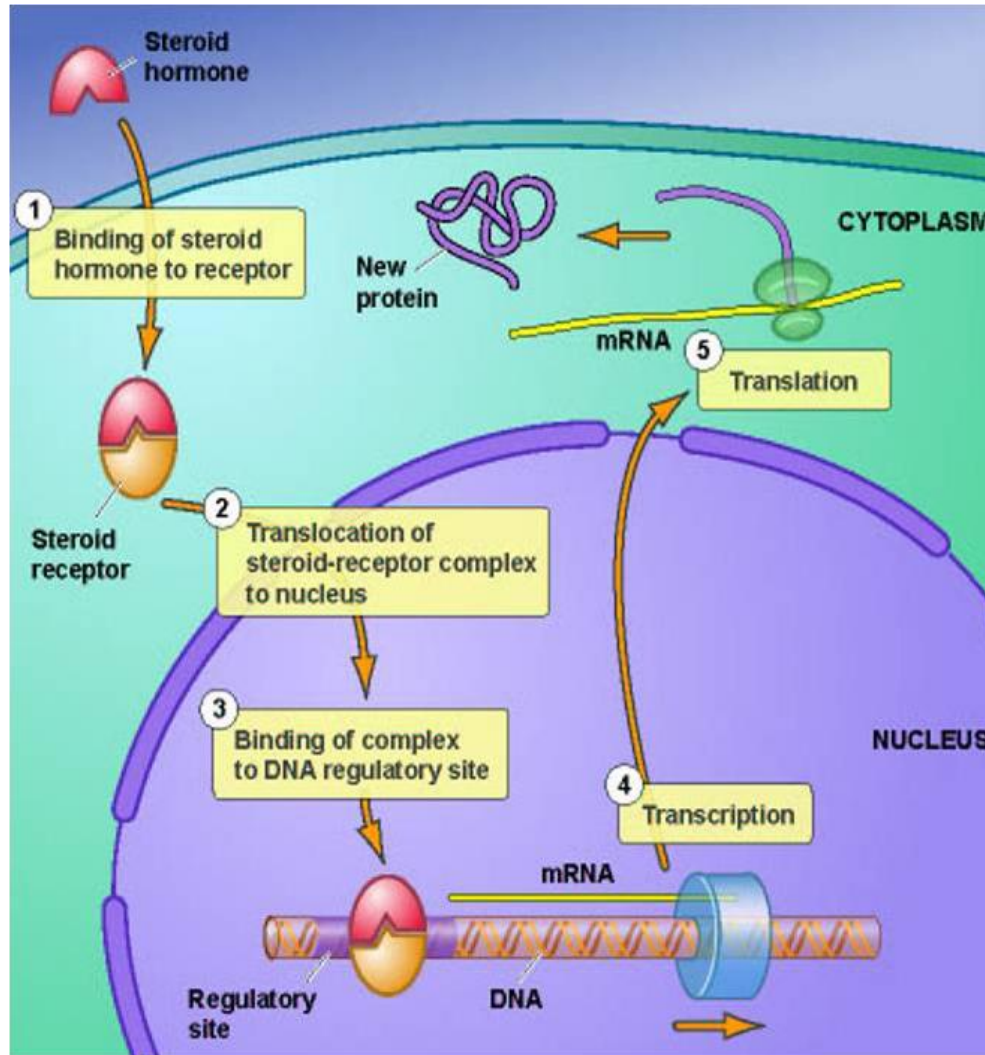
⦿ Mechanism of action of hormones:

1. Hormone-receptor interaction (1st messenger)
2. Enzyme activation
3. Release of the second messenger
4. Effects on cellular function

MECHANISM OF ACTION (NONSTEROID HORMONES)



MECHANISM OF ACTION (STEROID HORMONES)



INTRODUCTION

⦿ Receptors:

- Hormonal receptors are large proteins
- 2000-100,000 receptors/cell
- Receptors are highly specific for a single hormone

⦿ Receptor's Location:

- On the surface of cell membrane (proteins, peptides and catecholamines)
- In the cell cytoplasm (Steroids)
- In the cell nucleus (thyroid hormones)

INTRODUCTION

- Regulation of hormonal receptors
 - Receptors does not remain constant
 - Inactivated or destroyed
 - Reactivated or manufactured
 - Downregulation
 - Increase hormone concentration leads to decrease in the number of active receptors
 - Upregulation
 - The hormone induces greater than normal formation of a receptor or intracellular signaling proteins