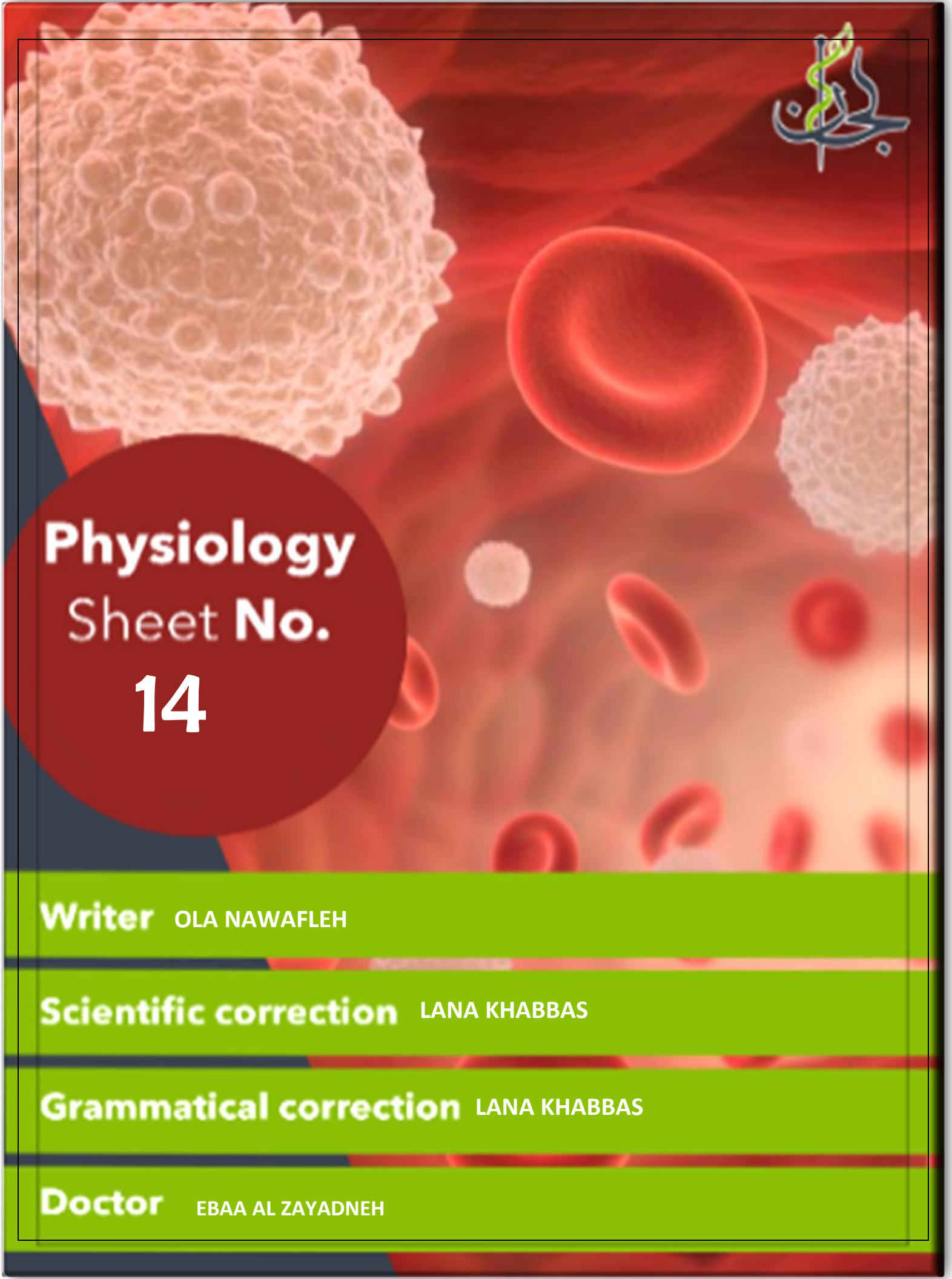

Physiology
Sheet No. 14

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Grammatical correction LANA KHABBAS

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Prohormones and Prehormones:

-The hormones are synthesized in the Nucleus then packaged in the

ER, then into the Golgi apparatus for post-translational modification,

packaged then released by exocytosis.

-Before the modification (precursor) = Prohormones

*__prohormone:__ precursor is a longer chained polypeptide that is cut and spliced together to make the hormone

Proinsulin_ gives insulin

-Preprohormones: Larger precursor molecule that prohormones are

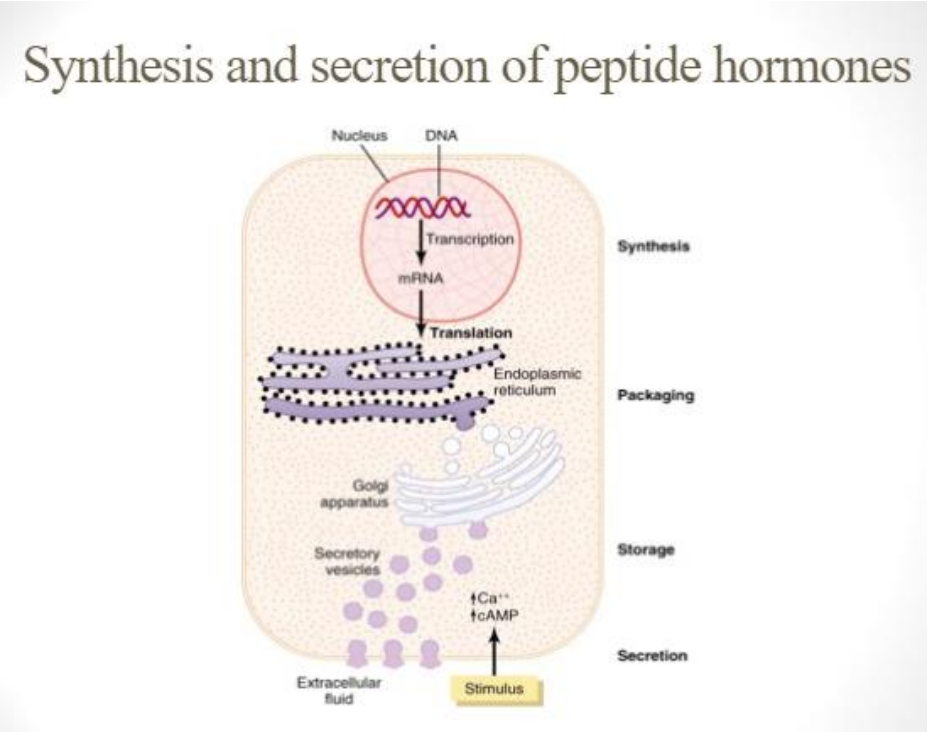
derived from

***for example :preproinsulin**

***prehormone:**

molecules secreted by endocrine glands that are inactive until changed into Hormones by target cells

T4 converted to T3 (tri-iodothyronin)



Chemical classification of hormones

Table 10-4 Chemical Classification and Function of Hormones

Chemical Classification	Examples	Regulated Function
Endocrine Hormones		
Amino acid derivatives	Epinephrine (adrenaline) and norepinephrine (both derived from tyrosine)	Stress responses: regulation of heart rate and blood pressure; release of glucose and fatty acids from storage sites
	Thyroxine (derived from tyrosine)	Regulation of metabolic rate
Peptides	Antidiuretic hormone (vasopressin)	Regulation of body water and blood pressure
	Hypothalamic hormones (releasing factors)	Regulation of tropic hormone release from pituitary gland
Proteins	Anterior pituitary hormones	Regulation of other endocrine systems
Steroids	Sex hormones (androgens and estrogens)	Development and control of reproductive capacity
	Corticosteroids	Stress responses; control of blood electrolytes
Paracrine Hormones		
Amino acid derivative	Histamine	Local responses to stress and injury
Arachidonic acid derivatives	Prostaglandins	Local responses to stress and injury

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***you do not have to memorize the REGULATED FUNCTION**

Peptide and Protein Hormones

Gland/Tissue	Hormones
Hypothalamus	TRH, GnRH, CRH GHRH, Somatostatin,
Anterior pituitary	ACTH, TSH, FSH, LH, PRL, GH
Posterior pituitary	Oxytocin, ADH
Thyroid	Calcitonin
Pancreas	Insulin,Glucagon, Somatostatin
Liver	Somatomedin C (IGF-1)
Parathyroid	PTH

Gland/Tissue	Hormones
Placenta	HCG, HCS or HPI
Kidney	Renin
Heart	ANP
G.I. tract	Gastrin, CCK, Secretin, GIP, Somatostatin
Adipocyte	Leptin

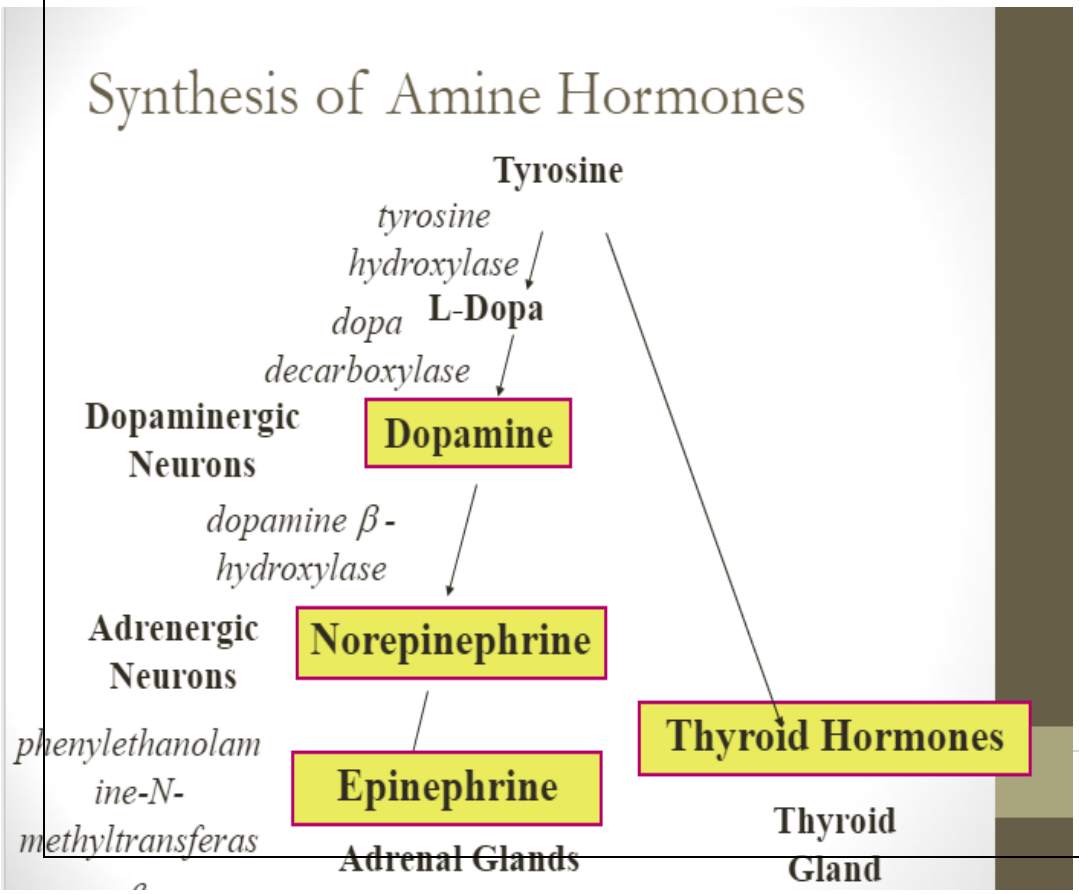
- **the thing in common between protein and polypeptide hormones is the location of receptor.**

Amine Hormones

Gland/Tissue	Hormones
Hypothalamus	Dopamine
Thyroid	T_3, T_4
Adrenal medulla	Epinephrine and Norepinephrine (NE, EPI)

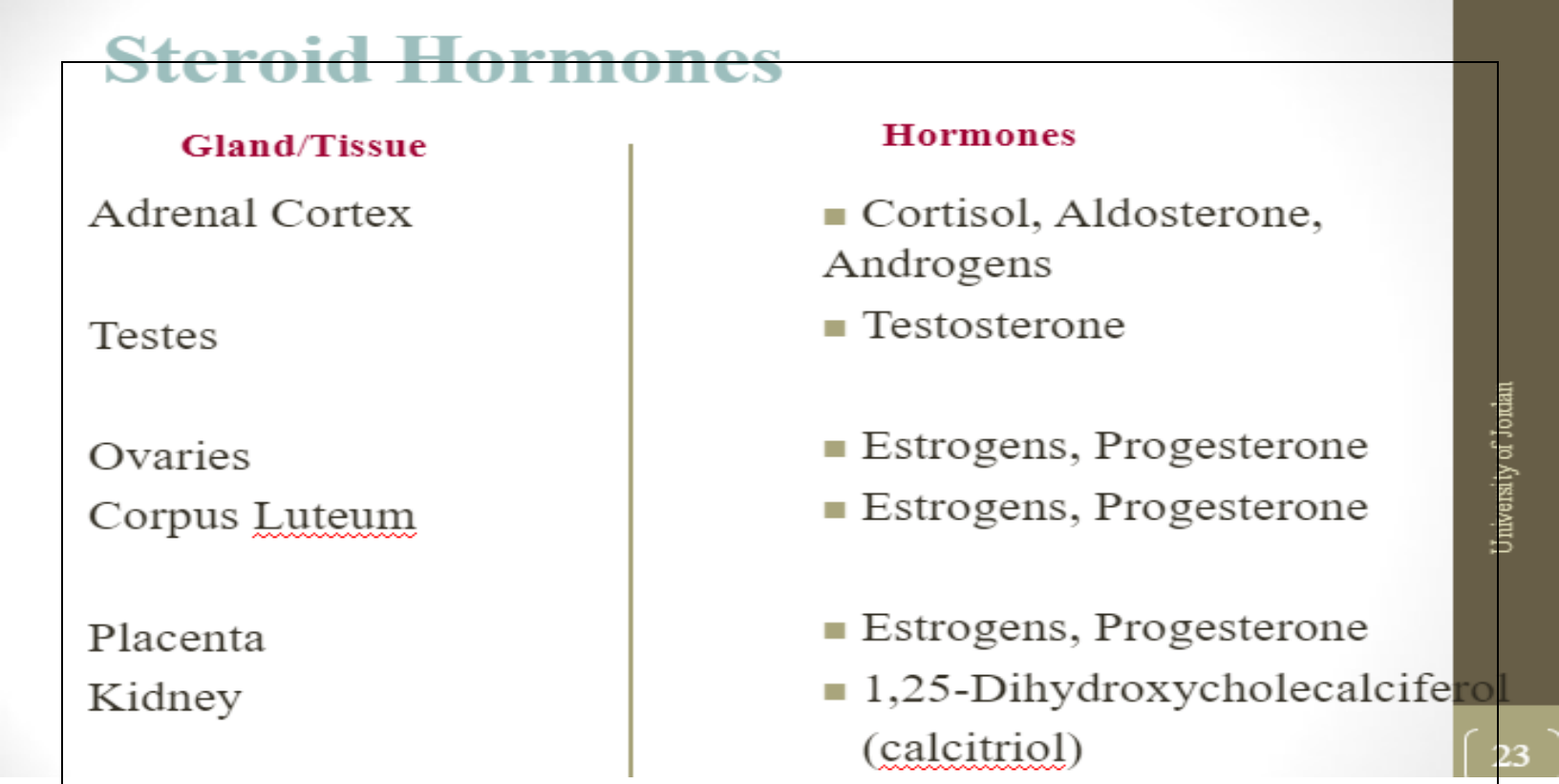
- All amine hormones are hydrophilic
- EPI and NE can be neurotransmitters

Synthesis of Amine Hormones



*each hormone synthesized where the enzyme needed is found .

You're not required to memorize enzymes names here, this is just an example that we can get different hormones from the same precursor.



Hormone Activity:

-Hormones only affect specific target tissues with specific receptors.

-Receptors are dynamic and can be either broken down or synthesized in the membrane.

- **If there's no receptor for the hormone, it will not make any action**
- **Different density for hormones gives different response.**

-Downregulation: decrease in the number of receptors or response.

➢ Downregulation decreases the activity of the hormone and causes desensitization caused from prolonged exposure to hormones, especially the polypeptide hormones. For example, insensitivity of

insulin does not mean that the insulin is not there, it just means that it exists in high levels, so the cells are not sensitive to it anymore.

- Upregulation: increase in the number of receptors or activity

  Upregulation Increases the sensitivity and activity of the hormone which leads to a greater response, this is called the priming effect.

- **Effects of Hormones in tissue response**

*priming effect (upregulation):

- Increase the number of receptors formed on target cells in response to particular Hormone.
- greater response by the target cell

*desensitization (downregulation):

- prolonged exposure to high polypeptide hormone
- Subsequent exposure to the same hormone
- decrease in number of receptors on target cell

example : *insulin in adipose tissue * (Diabetes type 2)

***pulsatile secretion may prevent downregulation**

- **Pulsatile :not continuous**

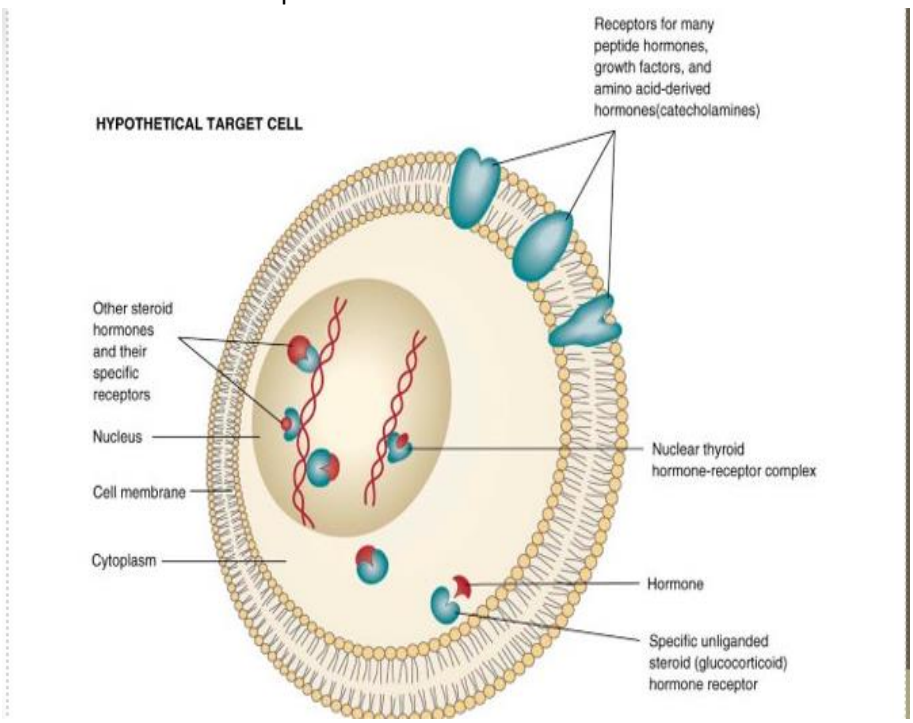
Effects of hormone concentration on tissue response

- **hormone in blood reflect the rate of secretion**

(the rate affected by the life of hormones)

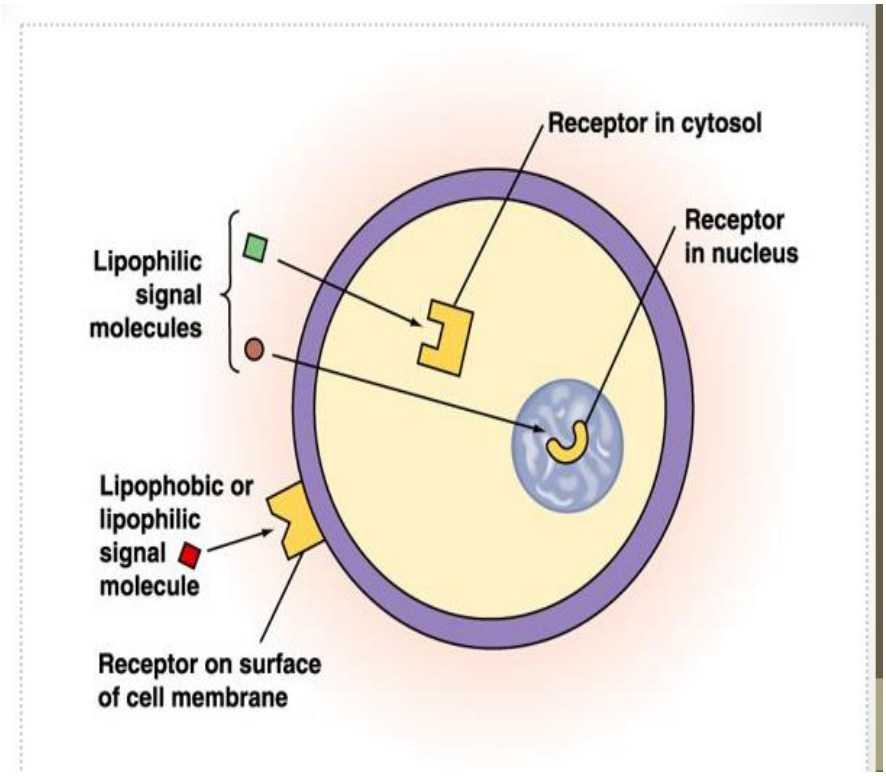
*** Half-life:**

- time required for the blood hormone concentration to be reduced to half the reference level



- it may be minutes to days
- affinity of receptors to ligand (Kd) affects the half life
- Normal tissue response is produced only when Hormone is present within physiological range .

Mechanism of hormones



*intracellular receptor may be a cytosolic or to a nuclear receptor.

*LIPOPHILIC MOLECULES HAVE THE CHANCE TO BIND EITHER TO A CELL-SURFACE RECEPTOR OR INTRACELLULAR RECEPTOR

Mechanism of hormone action:

Hormones of same chemical class have similar mechanisms of action

***similarities includes** :

1)location of cellular receptor protein (depends on the chemical nature of the hormone).

2) events that occur in the target cells

*To respond to hormone :

- target cell must have specific receptor for that hormone (specificity)
- Hormone exhibit :

*affinity (to bind to receptors with high bond strength)

(affinity depend on the nature of chemical bonds)

*saturation (low capacity of receptors little binding and vice versa)

GOOD LUCK