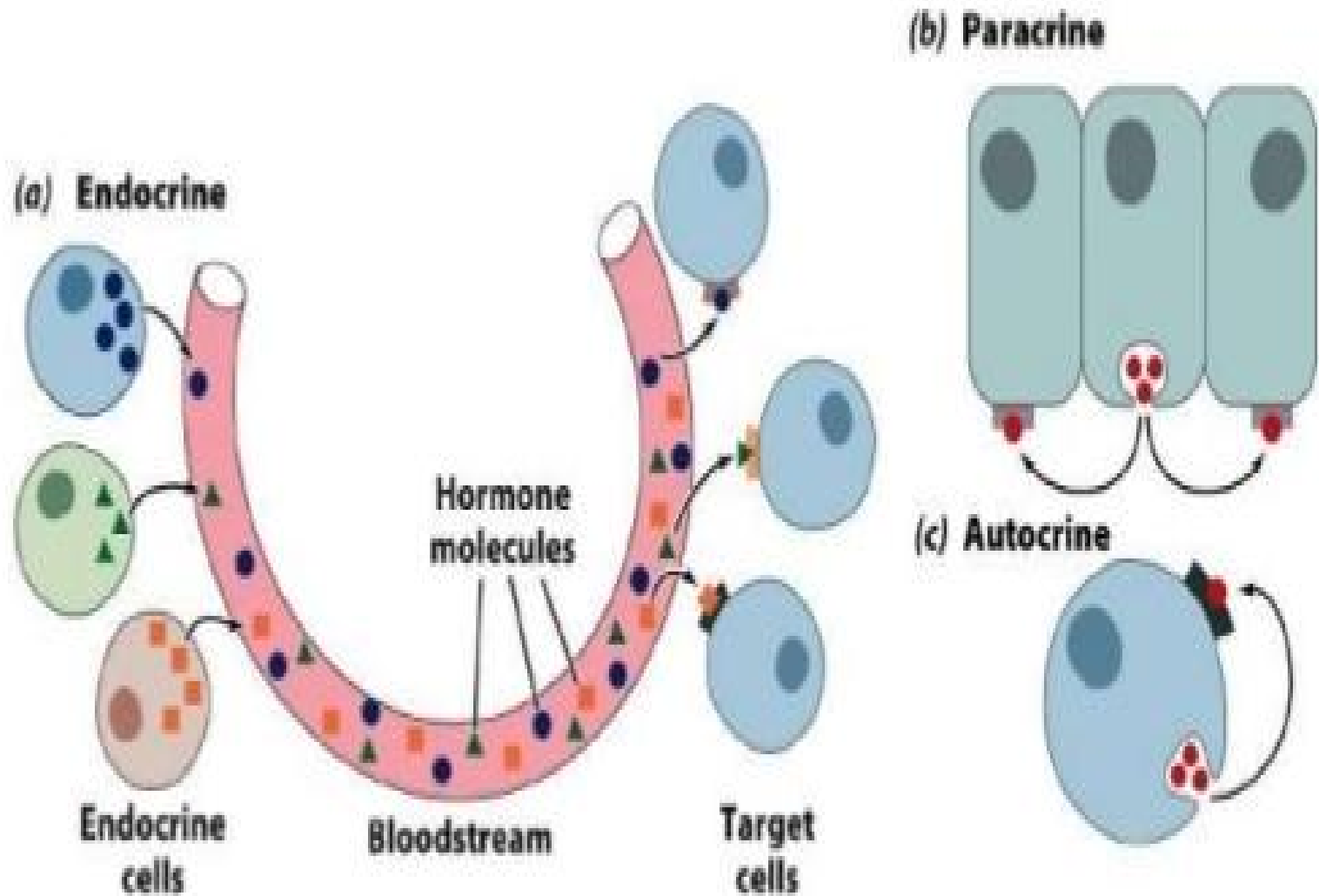


HORMONES

- Term hormone was introduced by **Starling** and **Bayliss** in 1905.
- Hormones are the **chemical messengers** produced by endocrine gland and transported by blood to other tissue or organ where these stimulate a change in some metabolic activity.
- They are produced from by **one type of cell** and have regulatory effect on the activities of **other type of cell or on itself**.
- The tissue or organ stimulated by a specific hormone are called **Target Tissue/ Target organ**



Polypeptides

Insulin
glucagon
somatotropin

FSH
LH
vasopressin

Oxytocin
thyrotropin
ACTH

Steroids

Estrogen
testosterone
cortisol

Aldosterone
corticosterone
Progesterone

Amino acid derivatives

Epinephrine
norepinephrine
dopamine

Thyroxine, T3 and T4
Melatonin
Serotonin

Rule: All peptide hormones are synthesized as inactive “pre-pro” precursors

Rule: A signal peptide must be cleaved off to activate the mature form of the hormone

- Hormones act on specific cells and organs called target cell or target organ.
- **Target cell** or organ is that cell which has specific receptors for the hormone which bind to them with or without any demonstratable biochemical or physiological response
- Concentration of hormone is **very low** in blood but..
- Presence of **receptors** on target tissue
Specific binding between hormone and receptor
Very high local concentration
- Makes the target tissue highly specific to hormones

CLASSIFICATION OF HORMONES BY MECHANISM OF ACTION

I. Hormones that bind to intracellular receptors

1. Androgens
2. Calcitriol (1,25[OH]₂-D₃)
3. Estrogens
4. Glucocorticoids
5. Mineralocorticoids
6. Progestins
7. Retinoic acid
8. Thyroid hormones (T₃ and T₄)

II. HORMONES THAT BIND TO CELL SURFACE RECEPTOR

A. The second messenger is cAMP

- α 2-Adrenergic catecholamines
- β -Adrenergic catecholamines
- Adrenocorticotrophic hormone (ACTH)
- Antidiuretic hormone (vasopressin)
- Calcitonin
- Human Chorionic gonadotropin, (HCG)
- Corticotropin-releasing hormone
- Follicle-stimulating hormone (FSH)
- Glucagon
- Luteinizing hormone (LH)
- Melanocyte-stimulating hormone (MSH)
- Parathyroid hormone (PTH)
- Somatostatin
- Thyroid-stimulating hormone (TSH)

B. The second messenger is cGMP

- Atrial natriuretic factor
- Nitric oxide

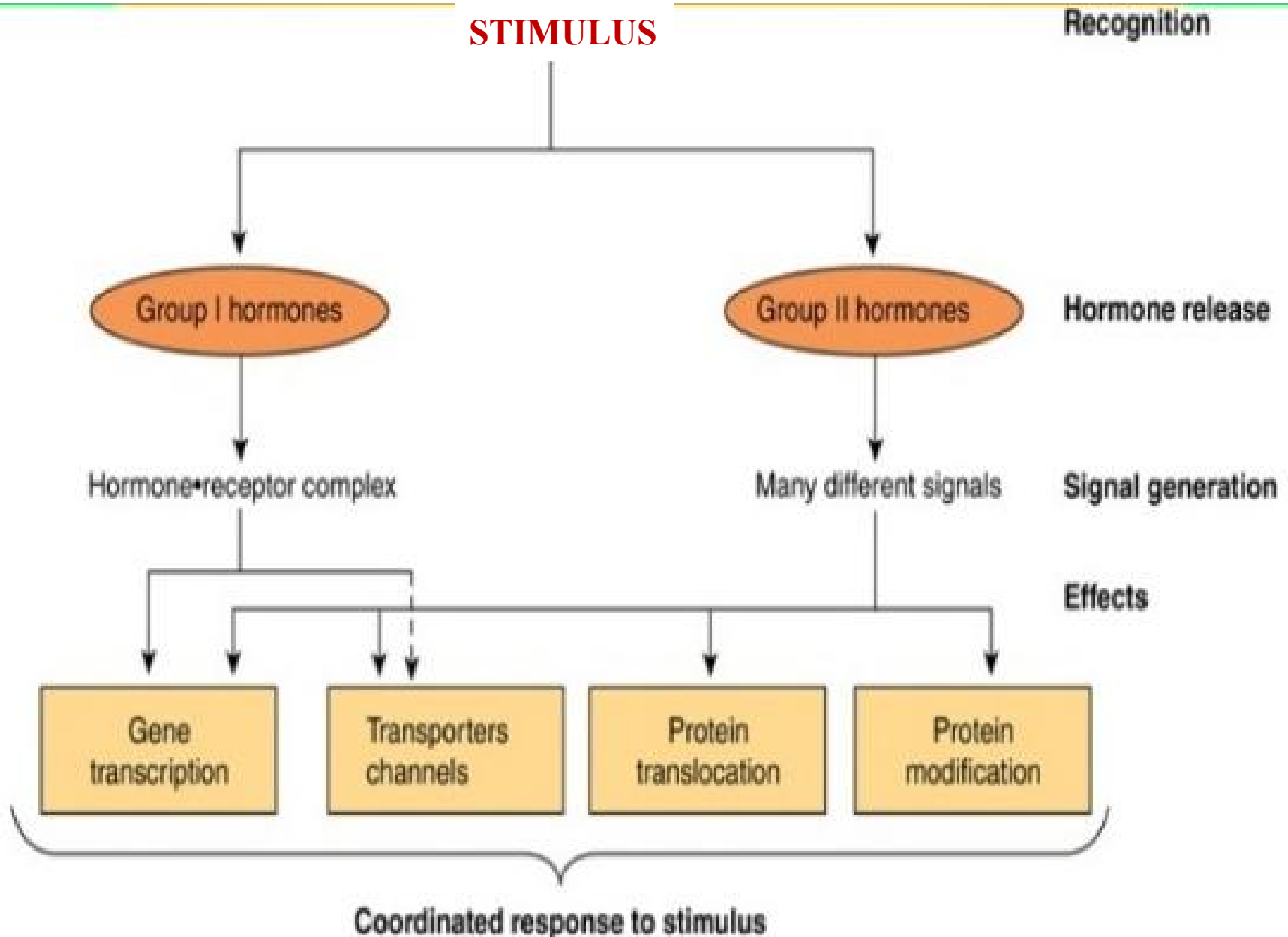
C. The second messenger is calcium or phosphatidylinositols (or both)

- Acetylcholine (muscarinic)
- α 1-Adrenergic catecholamines
- Angiotensin II
- Antidiuretic hormone (vasopressin)
- Cholecystokinin
- Gastrin
- Gonadotropin-releasing hormone
- Oxytocin
- Thyrotropin-releasing hormone (TRH)

D. The second messenger is a kinase or phosphatase cascade

- Adiponectin
 - Chorionic somatomammotropin
 - Epidermal growth factor (EGF)
 - Erythropoietin (EPO)
 - Fibroblast growth factor (FGF)
 - Growth hormone (GH)
 - Insulin
 - Insulin-like growth factors I and II
 - Leptin
 - Nerve growth factor (NGF)
 - Platelet-derived growth factor
 - Prolactin
-

HORMONES



PROPERTY	GROUP I	GROUP II
1.HORMONES	Adrenal steroids, thyroid hormones, sex hormones, calcitriol ,retinoids	Hypothalamic hormones, pituitary hormones, pancreatic hormones, Adrenal hormones
2.Chemical nature	Steroids, iodothyronines, retinoids	Peptides & polypeptides, proteins, glycoproteins, Catecholamines
3.Solubility	Hydrophobic, Water insoluble	Hydrophilic Water soluble
4.Transport Protein	Required	Not required
5.Receptors location	Cytoplasm and nucleus	Cell membrane
6.Mediators of action	Hormone -Receptors Complex	• cAMP • cGMP • Ca^{++} • Phosphoinositides, kinase Cascade etc.

SUBCLASSIFICATION OF GROUP II.A HORMONES

Hormones That Stimulate Adenylyl Cyclase (HS)	Hormones That Inhibit Adenylyl Cyclase (HI)
ACTH	Acetylcholine
ADH	α 2-Adrenergics
β -Adrenergics	Angiotensin II
Calcitonin	Somatostatin
CRH	
Glucagon	
TSH	