

Endocrine glands

•The principal endocrine glands in the human body are the hypothalamus, pituitary, thyroid, parathyroids, adrenals, pancreatic islets, gonads, and pineal.

•Some organs have an endocrine function in addition to their main function, e.g. the heart, lungs, kidneys, liver, gastrointestinal tract, and placenta.

Chemical Identity of Hormones

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- 1) hormones synthesized from cholesterol eg adrenal cortex hormones like aldosterone and cortisol
- 2) **Polypeptide / Protein hormones** eg anterior and posterior pituitary gland hormones, pancreas, parathyroid
- 3) **Derivatives of amino acid tyrosine** eg thyroid hormone (thyroxine and triiodothyroxine) and adrenal medullae (epinephrine and norepinephrine)

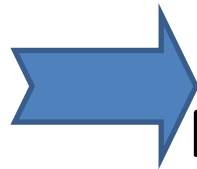
MECHANISM OF ACTION OF HORMONES

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- Hormones of the same class have similar mechanism of actions. They can be divided into class of hormones

- Lipid soluble hormones (Lipophilic)

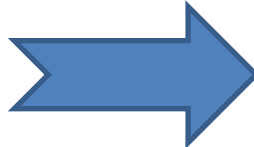
Steroid + thyroid hormones



**Hydrophobic
Membrane permeable**

- Polar/ non lipid soluble Hormones

All other hormones

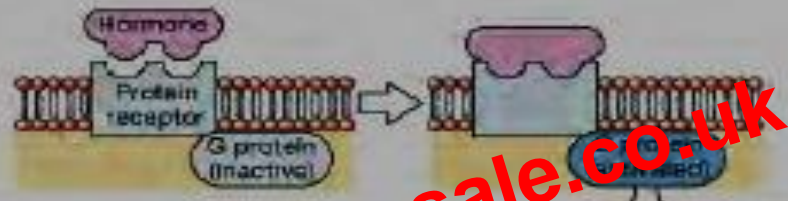


**Hydrophilic
Membrane-impermeable**

Second messengers

- Some actions of hydrophilic hormones are carried out and completed on binding of the hormone to its receptor without the need to another chemical mediator, activation or inhibition of ion channels.
- Most of hydrophilic hormones, however, exert their actions on target cells by inducing the production of another, chemical mediator inside the cell.

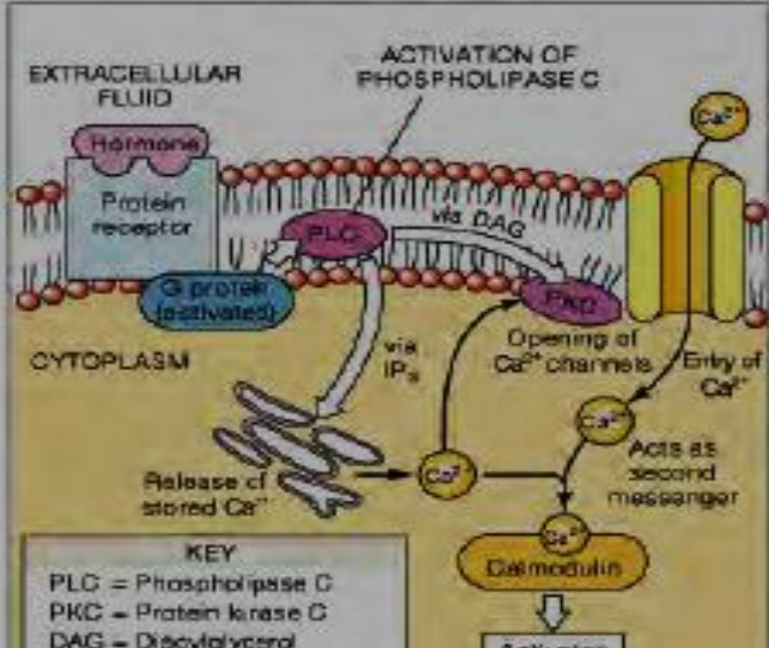
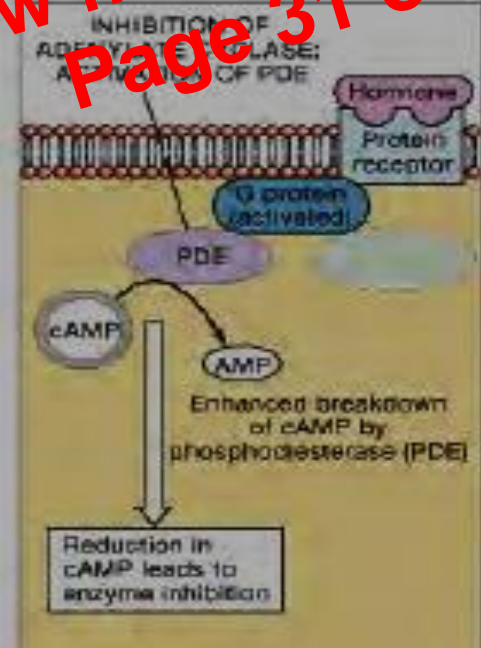
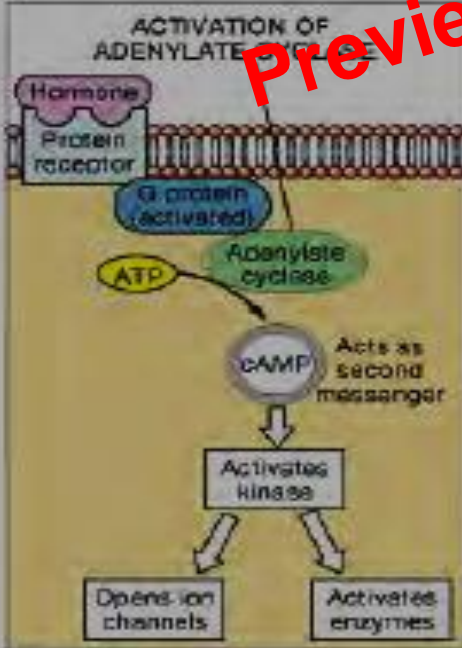
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EFFECTS ON cAMP LEVELS

EFFECTS ON Ca²⁺ LEVELS



KEY
 PLC = Phospholipase C
 PKC = Protein kinase C
 DAG = Diacylglycerol
 IP₃ = Inositol triphosphate

- Examples:**
- Epinephrine and norepinephrine (β receptors)
 - Calcitonin
 - Parathyroid hormone
 - ADH, ACTH, FSH, LH, TSH
 - Glucagon

- Examples:**
- Epinephrine and norepinephrine (α_2 receptors)

- Examples:**
- Epinephrine and norepinephrine (α_1 receptors)
 - Oxytocin
 - Regulatory hormones of hypothalamus
 - Several eicosanoids