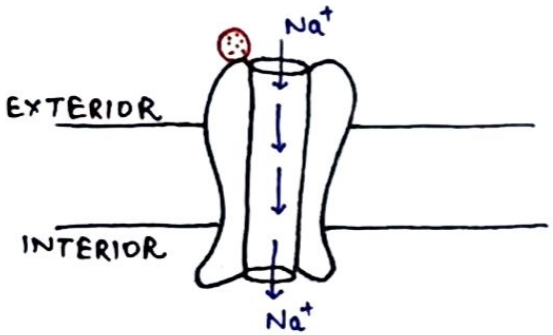
HORMONE - RECEPTOR INTERACTIONS :-

1. ION-CHANNEL-LINKED RECEPTORS
2. G-PROTEIN LINKED HORMONE RECEPTOR
3. ENZYME-LINKED HORMONE RECEPTOR
4. INTRACELLULAR HORMONE RECEPTOR

1. IONCHANNEL - LINKED HORMONE RECEPTOR :-

⇒ LIGANDS FOR THESE RECEPTORS ARE GENERALLY :- Ach, NE (NT)



NT BINDS TO RECEPTOR (Ach, NE)

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CONFIRMATIONAL CHANGE IN RECEPTOR

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OPENING / CLOSING OF CHANNELS (Na^+, K^+, Ca^{++} CHANNELS)

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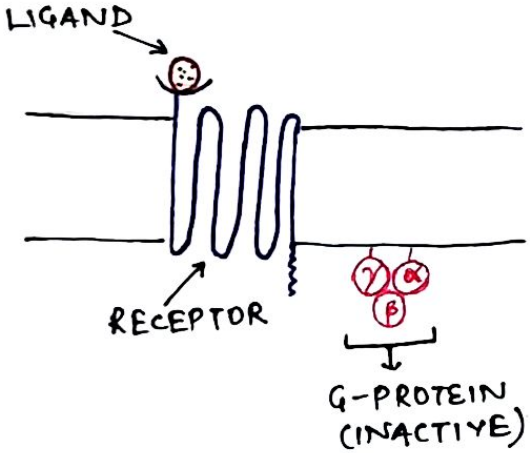
MOVEMENT OF IONS

↓

PHYSIOLOGICAL EFFECT

(2) G-PROTEIN LINKED HORMONE RECEPTOR :-

- G-PROTEIN → HETEROTRIMERIC GTP BINDING PROTEIN (α, β, γ SUBUNITS)
- G-PROTEIN COUPLED RECEPTOR → 7 TRANSMEMBRANE SEGMENTS THAT LOOP IN & OUT OF CELL
  - SOME PART THAT PROTUDE INTO CYTOPLASM → COUPLED TO G PROTEIN (α, β, γ SUBUNITS)
  - EXTRACELLULAR PART → BINDS TO HORMONE
- LIGAND (HORMONE)



⇒ HORMONES ASSOCIATED WITH INHIBITORY G-PROTEINS (G_i) ⇝ (α_i)

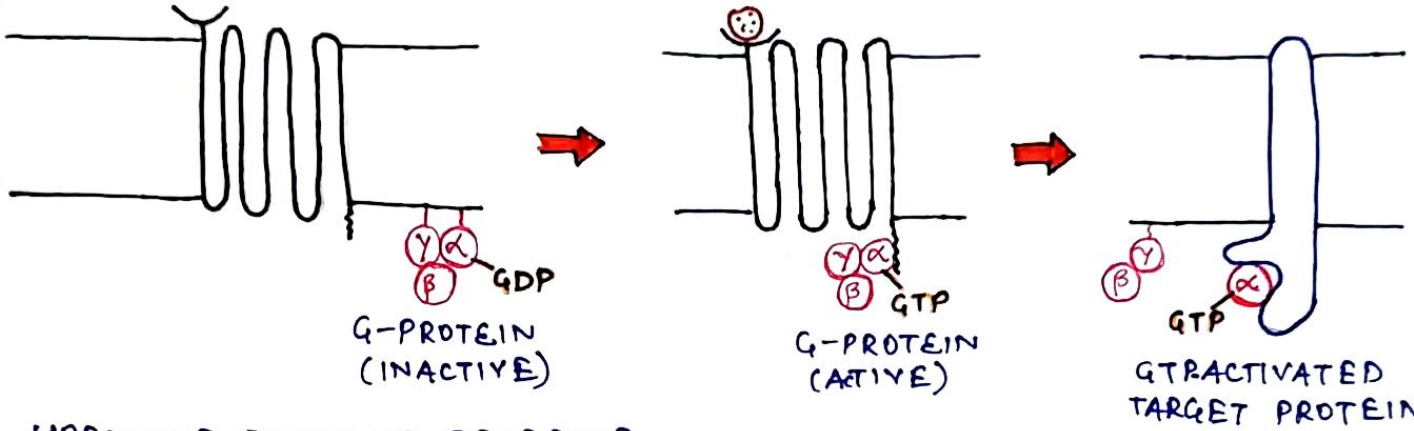
↓

DECREASES ACTIVITY OF INTRACELLULAR ENZYMES

⇒ HORMONES ASSOCIATED WITH STIMULATORY G-PROTEINS (G_s) ⇝ (α_s)

↓

INCREASES ACTIVITY OF INTRACELLULAR ENZYMES.



HORMONE BINDS TO RECEPTOR

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G-PROTEIN LINKS WITH INTRACELLULAR PART OF RECEPTOR

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GDP BOUND TO α-SUBUNIT IS REPLACED BY GTP

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BINDING OF GTP TO α-SUBUNIT, DECREASES AFFINITY OF α WITH γ & β SUBUNIT
∴ CAUSES ITS DISSOCIATION

↓

α-SUBUNIT BINDS TO OTHER INTRACELLULAR SIGNALLING PROTEINS

→ ALTERS ACTIVITY OF ION CHANNELS

→ ALTERS INTRACELLULAR ENZYMES
i.e. - ADENYLYL CYCLASE
- PHOSPHOLIPASE C

↓

ALTERS CELL FUNCTION.

(3) ENZYME-LINKED HORMONE RECEPTOR :-

EITHER FUNCTION DIRECTLY AS ENZYMES

OR CLOSELY ASSOCIATED WITH ENZYMES THAT THEY ACTIVATE.

P JAK2

TYROSINE KINASE SIGNALLING

ACTIVATION OF ENZYMES

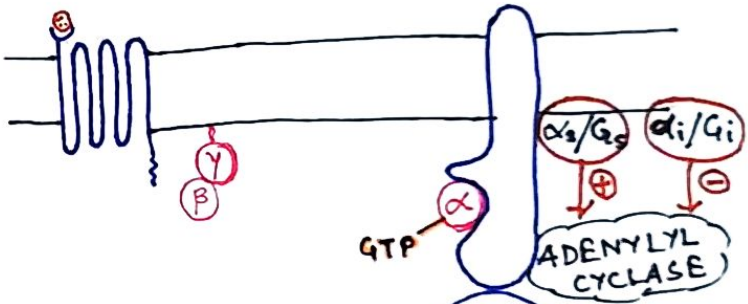
STAT3 P

PHYSIOLOGICAL EFFECT

TARGET GENE

mRNA

TRANSLATION



cAMP MECHANISM

cAMP dependent Protein Kinase

Protein + ATP → Protein P + ADP

HORMONE BINDS TO RECEPTOR ON THEIR HORMONE-BINDING SITE ON OUTSIDE

↓

CONFIRMATIONAL CHANGE IN RECEPTOR

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EITHER :- INTRINSIC ENZYME ACTIVITY OF RECEPTORS ARE ACTIVATED (Eg:- Adenylyl Cyclase)

OR :- ENZYME ASSOCIATED WITH CELL MEMB. IS ACTIVATED (Eg:- JANUS KINASE2 / JAK2) (TYROSINE KINASE SIGNALLING)

- FIBROBLAST GROWTH FACTOR
- GROWTH HORMONE
- LEPTIN
- INSULIN LIKE GF 1
- PROLACTIN

ACTIVATION OF INTRACELLULAR ENZYMES

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PHYSIOLOGICAL EFFECT

SYNTHESIS OF NEW PROTEINS (BY STAT3)

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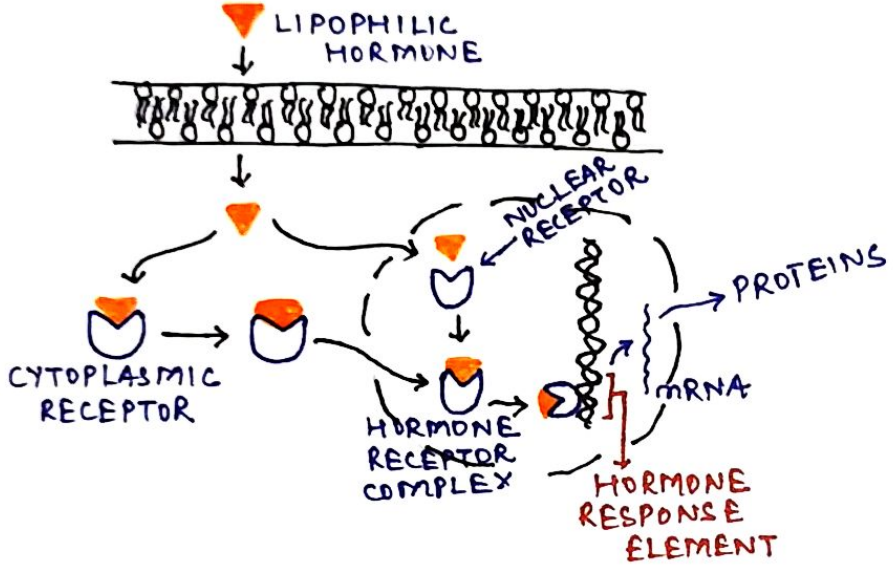
PHYSIOLOGICAL EFFECT

LEPTIN :-

HORMONE SECRETED BY FAT CELL WHICH REGULATE APPETITE & ENERGY BALANCE.

④ INTRACELLULAR HORMONE RECEPTOR :-



LIPOPHILIC HORMONES CROSSES CELL MEMB (LIPID SOLUBLE)

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BINDS WITH CYTOPLASMIC OR NUCLEAR RECEPTOR

↓

FORMS ACTIVATED HORMONE-RECEPTOR COMPLEX

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H-R COMPLEX BINDS WITH SPECIFIC SEQUENCE OF DNA K/a HORMONE RESPONSE ELEMENT

↓

ACTIVATES OR REPRESSES TRANSCRIPTION OF SPECIFIC GENES & FORMATION OF PROTEIN

LIPOPHILIC HORMONES :-

- STEROIDS
  - ALDOSTERONE, CORTISOL
  - TESTOSTERONE
  - ESTROGEN, PROGESTERONE
- THYROID H.
- RETINOID H.
- VIT-D.