

L'organismo pluricellulare necessita di comunicazione intercellulare

Omeostasi

“Mantenimento di condizioni stabili mediante meccanismi fisiologici coordinati”

- 1) Interazione con l'esterno
- 2) Comunicazione tra cellule

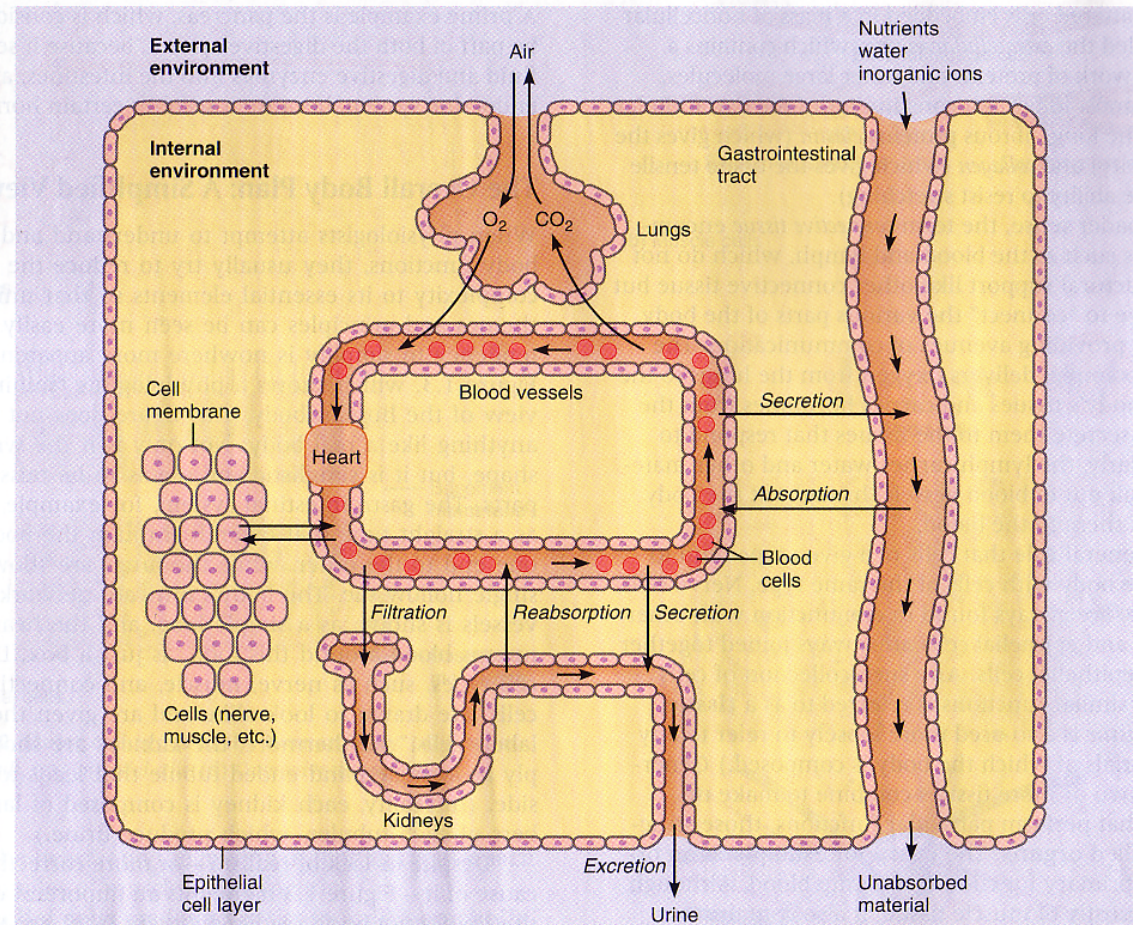
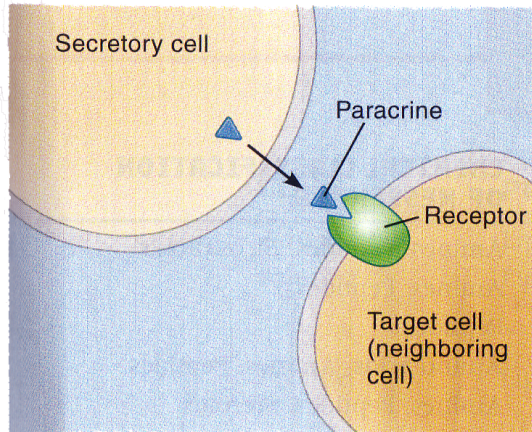


FIGURE 1.3 A highly simplified view of the overall plan of the human body.

Flows of material are indicated by arrows.

Comunicazione chimica tra le cellule



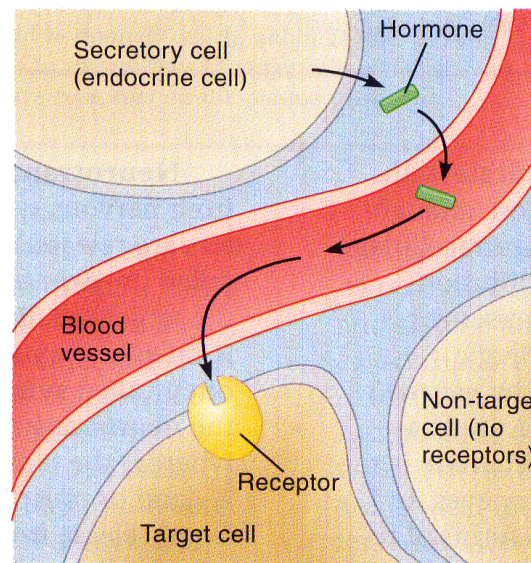
(a) Paracrines

Quando le cellule sono vicine
(comunicazione a breve distanza)

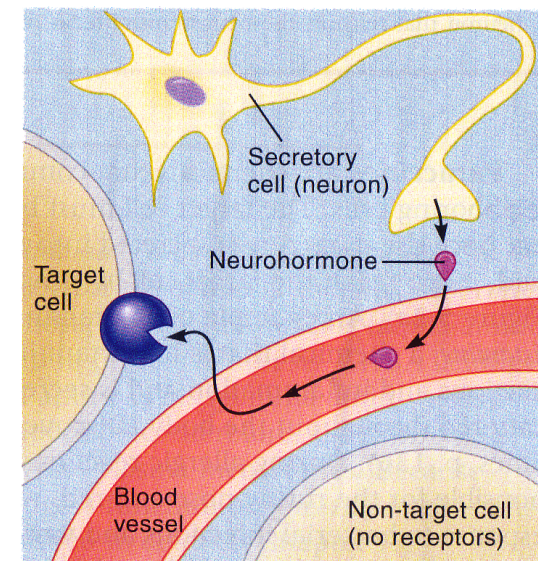
diffusione semplice

Quando le cellule sono lontane
(comunicazione a lunga distanza)

trasporto mediato
dal torrente circolatorio

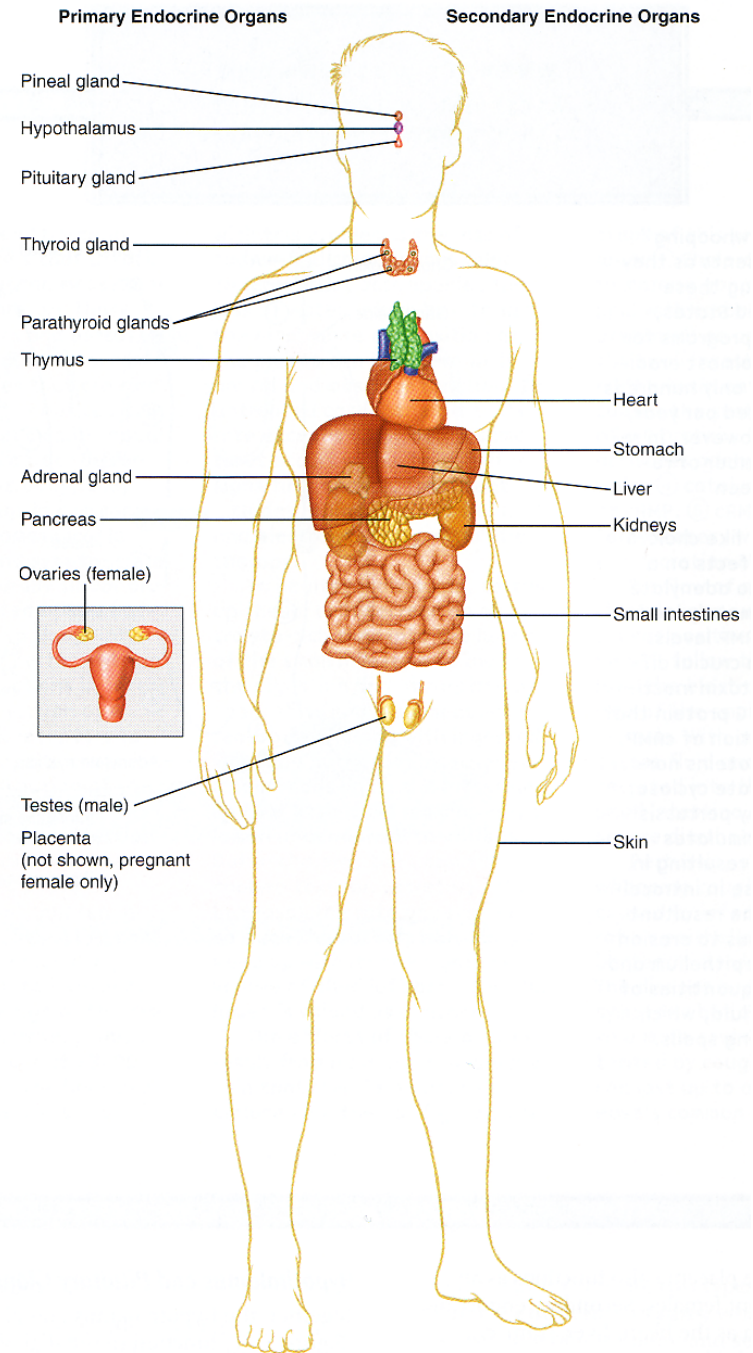


(e) Hormones



(f) Neurohormones

Le ghiandole endocrine



Il recettore e la specificità di risposta

- Il recettore è in genere una glicoproteina
- La sua attivazione si basa su un meccanismo “chiave-serratura” (sito di legame specifico)

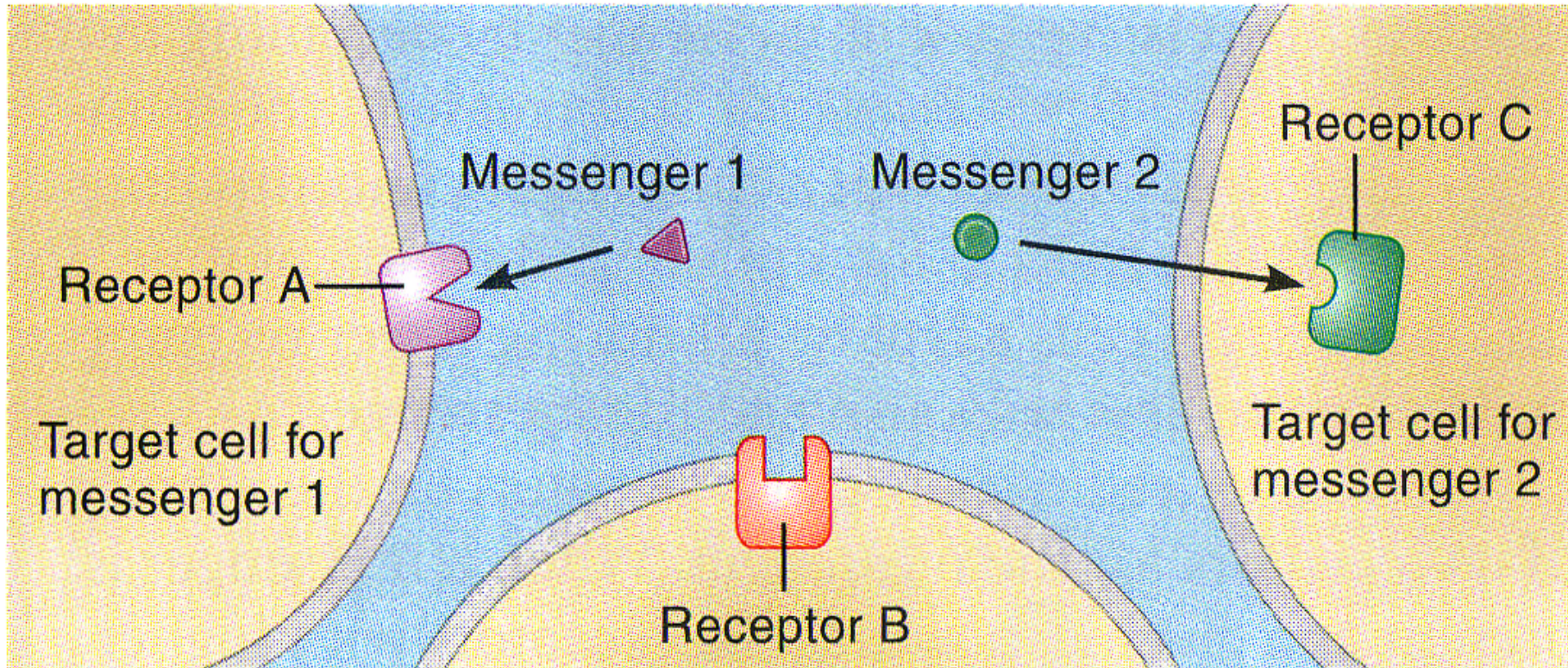


FIGURE 5.8 Receptor specificity. Receptor A is specific for messenger 1, receptor C is specific for messenger 2, and neither messenger can bind to receptor B. Note that receptors can be located either on the plasma membrane (receptors A and B) or inside the cell (receptor C).

La localizzazione del recettore è funzione delle proprietà chimico fisiche del segnale extracellulare

TABLE 5.2 CHEMICAL CLASSIFICATION OF MESSENGERS

CLASS	CHEMICAL PROPERTY	LOCATION OF RECEPTORS ON TARGET CELL	FUNCTIONAL CLASSIFICATION
Amino acids	<u>Lipophobic</u>	<u>Plasma membrane</u>	Neurotransmitters
Amines*	<u>Lipophobic</u>	<u>Plasma membrane</u>	Paracrines, autocrines, neurotransmitters, hormones
Peptides	<u>Lipophobic</u>	<u>Plasma membrane</u>	Paracrines, autocrines, cytokines, neurotransmitters, hormones
Steroids	<u>Lipophilic</u>	<u>Cytosol</u> [†]	Hormones
Eicosanoids	<u>Lipophilic</u>	<u>Cytosol</u>	Paracrines

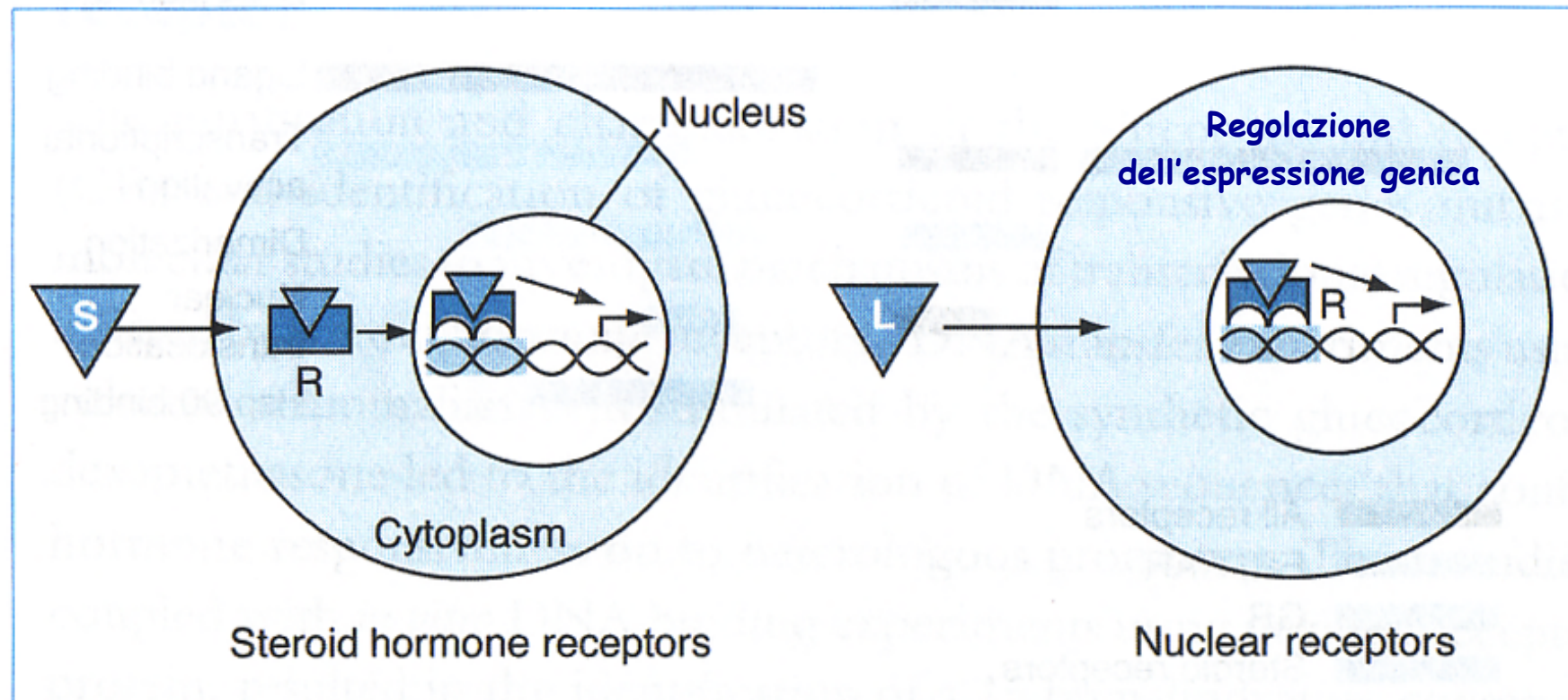
*One exception is the thyroid hormones, which, although amines, are lipophilic and have receptors in the nucleus of target cells.

[†]A few steroid hormones have receptors on the plasma membrane.

Se il segnale extracellulare (o ligando) è lipofilo i recettori sono intracellulari

I recettori intracellulari possono essere:

- citoplasmatici
- nucleari



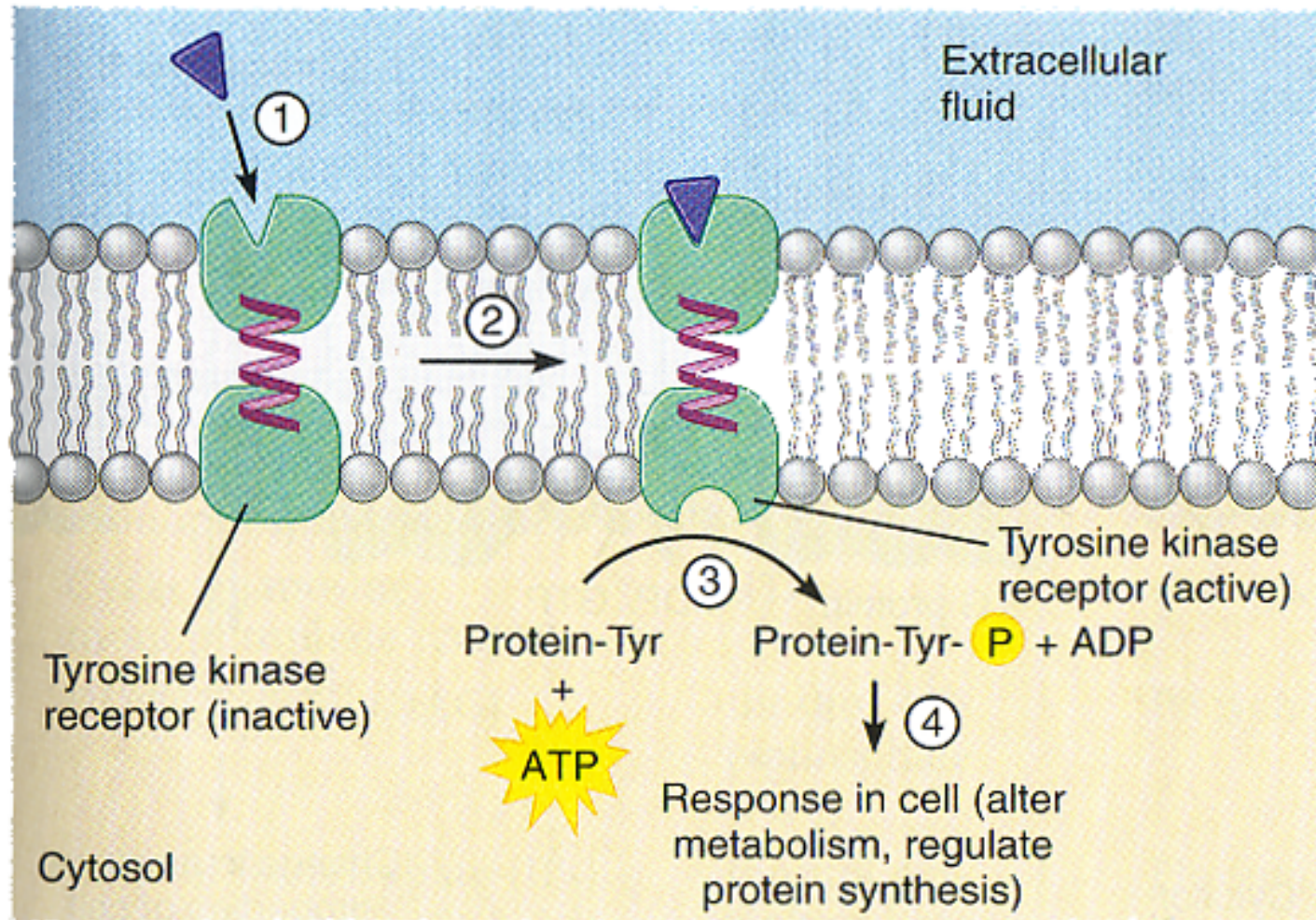
Se il segnale extracellulare (o ligando) è idrofilo
i recettori sono inseriti nella membrana plasmatica

I recettori di membrana possono essere:

recettori dotati di attività enzimatica

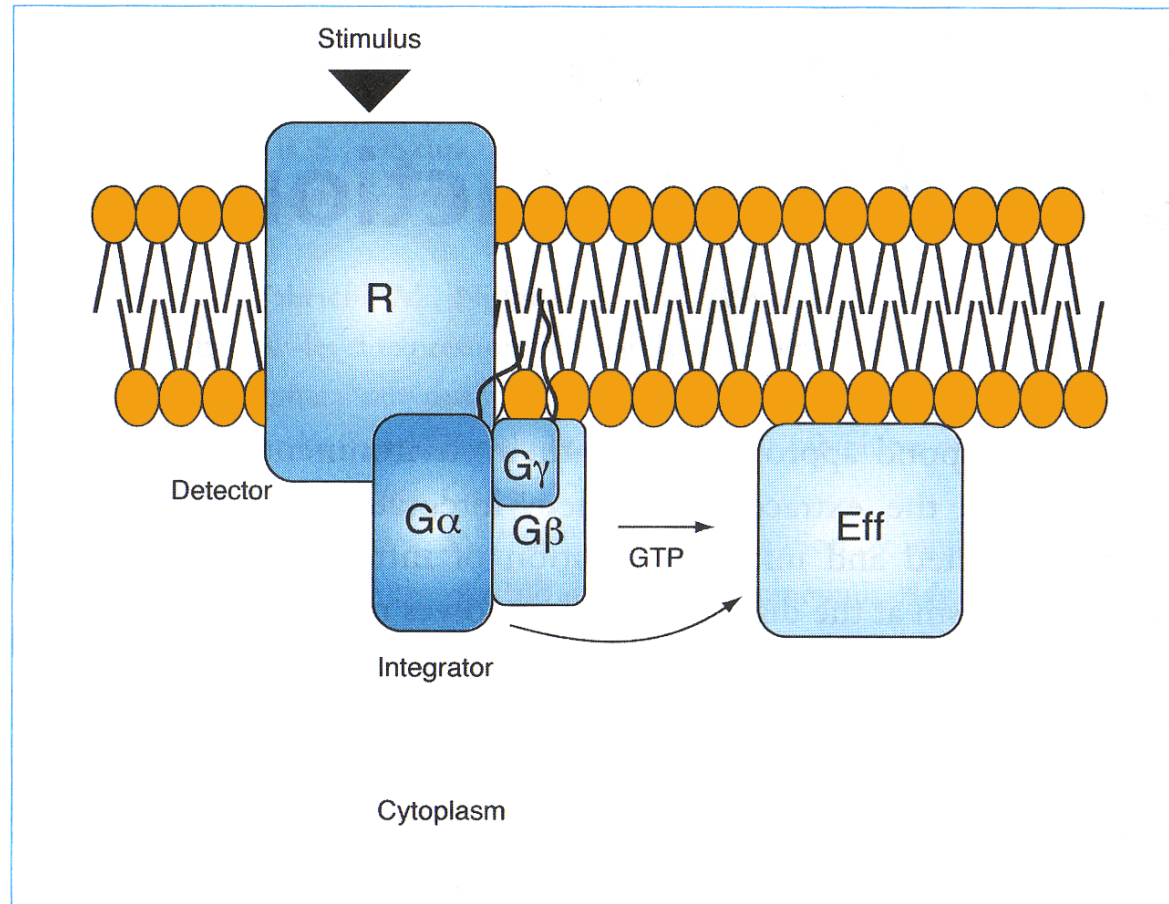
recettori accoppiati a proteine G

I recettori con attività enzimatica: i recettori tirosina chinasi



Gli elementi caratterizzanti la trasduzione via recettori accoppiati a proteine G

Figure 19.1 Basic pathway for G-protein-dependent signal transduction. Stimulation of receptors initiates a vectorial signaling cascade that results in the production of an amplified intracellular signal. See text for details. Abbreviations: R, receptor; G, G protein; Eff, effector.



L'effettore è un enzima

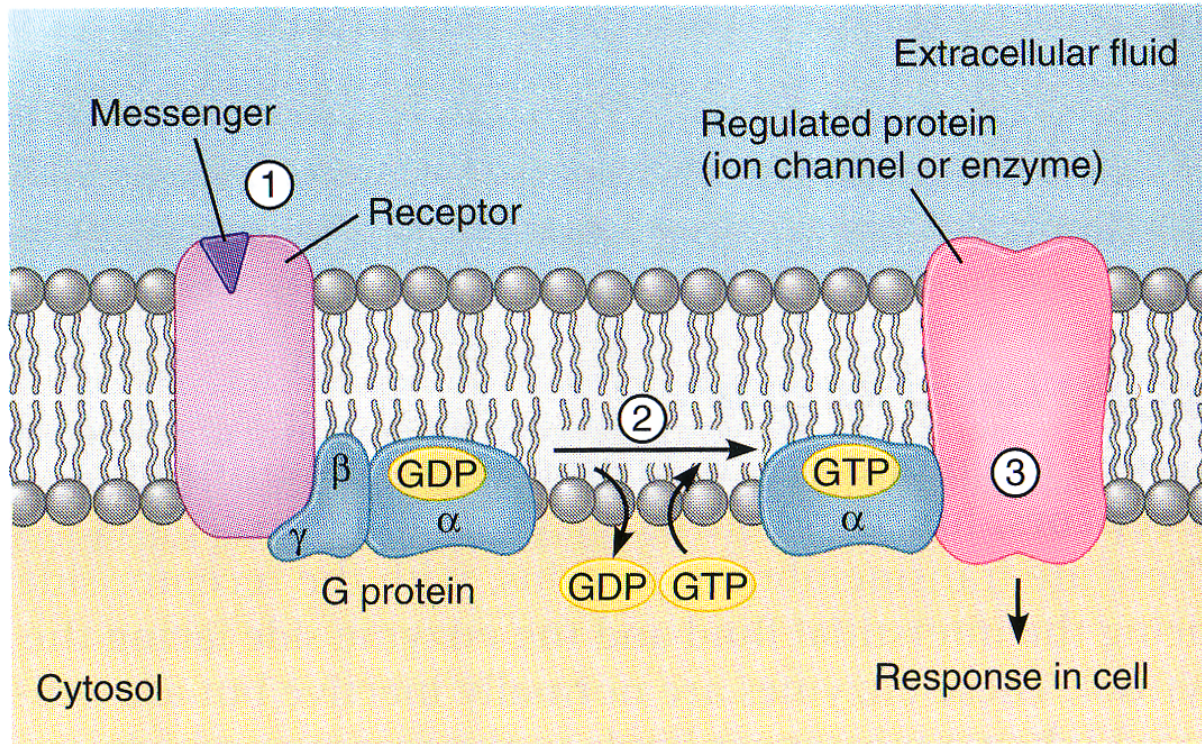
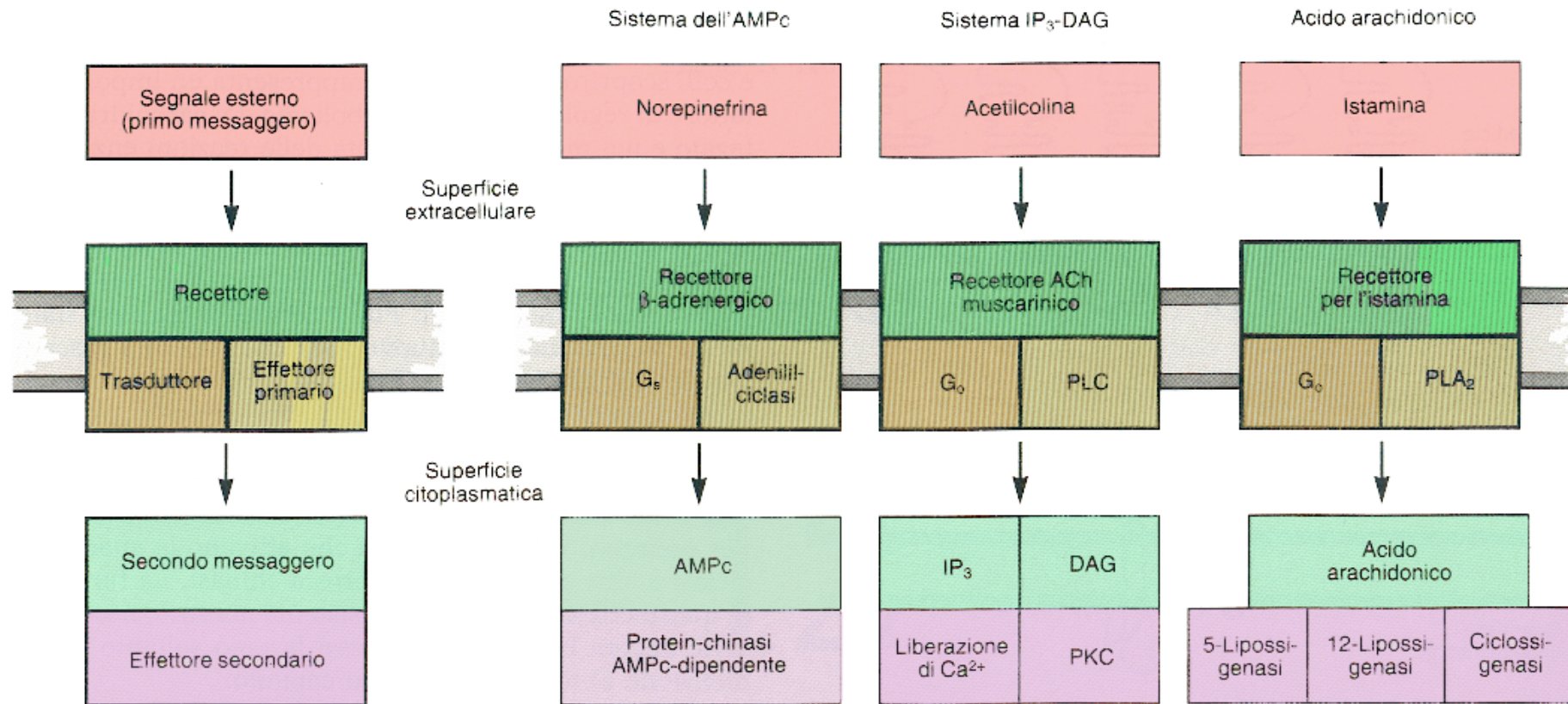
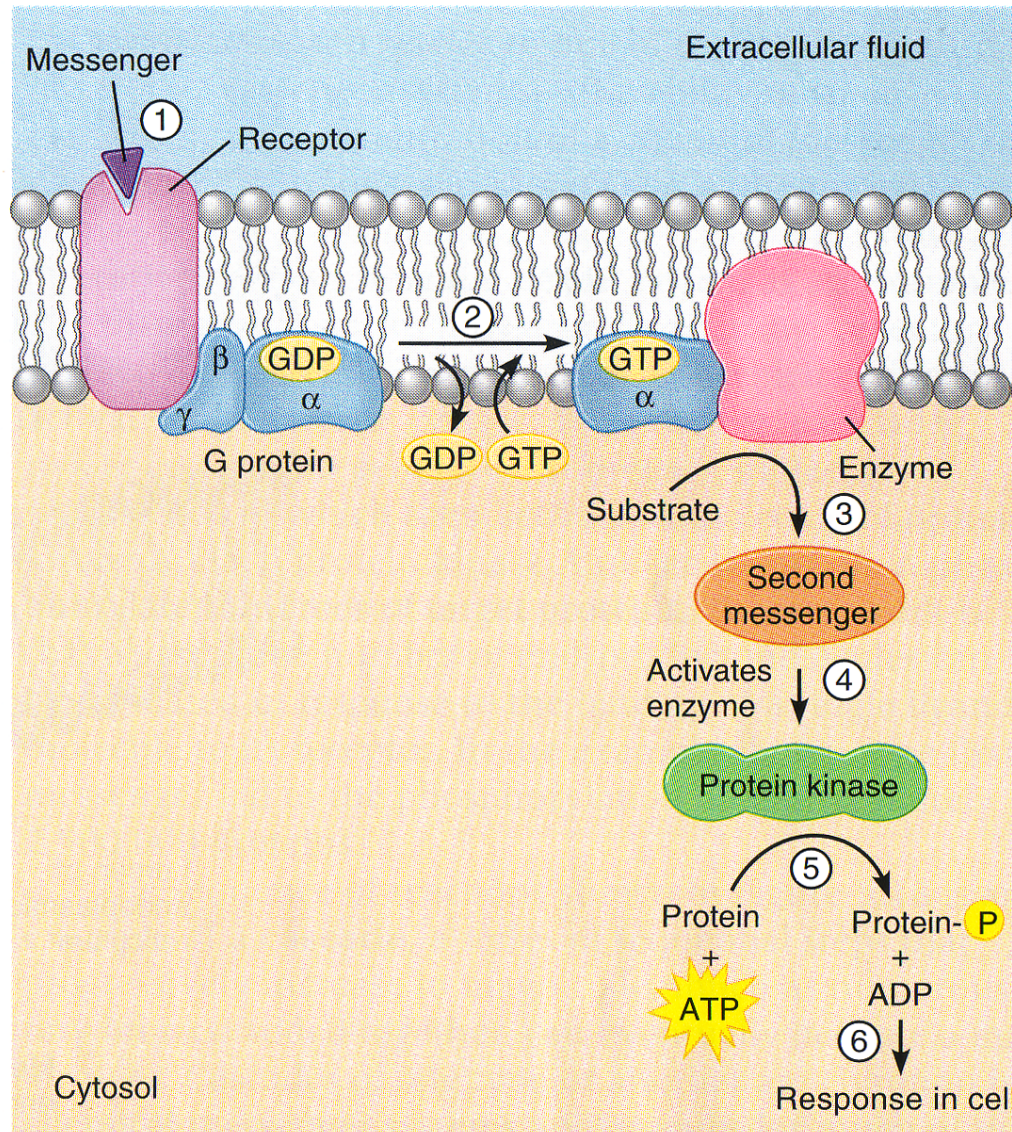


FIGURE 5.14 Actions of G proteins. *G proteins have three subunits: alpha, beta, and gamma. The alpha subunit has binding sites for guanosine nucleotides. In the inactive state, GDP is bound to the alpha subunit. ① Binding of a messenger to a G-protein-linked receptor activates the G protein. ② The GDP is released as the alpha subunit moves laterally within the membrane and binds a GTP. ③ The alpha unit then activates another membrane protein, producing a response in the cell.*

I secondi messaggeri



Il secondo messaggero attiva le protein chinasi



Fosforilazione

strategia “universale”
di attivazione cellulare

FIGURE 5.16 G-protein-regulated enzymes and second messengers. In this example the G protein is coupled to an enzyme in the plasma membrane. ① Binding of the messenger to its receptor activates the G protein. ② The alpha subunit moves to and activates an enzyme in the membrane. ③ The activated enzyme catalyzes formation of a second messenger in the cytosol. ④ The second messenger activates a protein kinase, which ⑤ catalyzes phosphorylation of a protein, which ⑥ initiates a response in the cell.