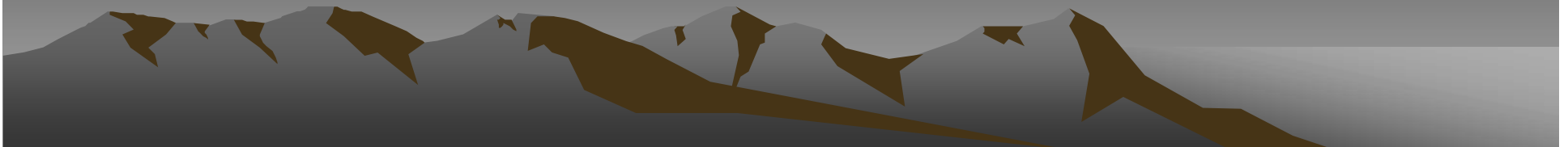
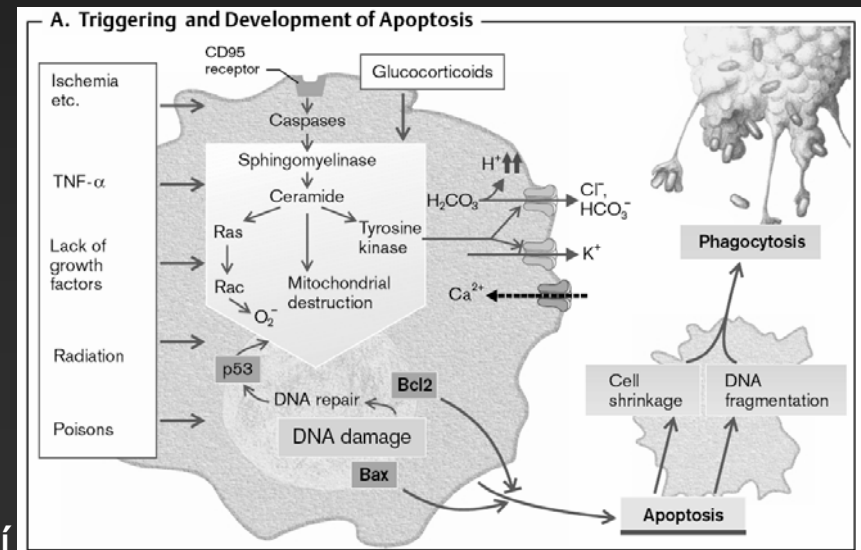


Látkové regulace Hormonální řízení

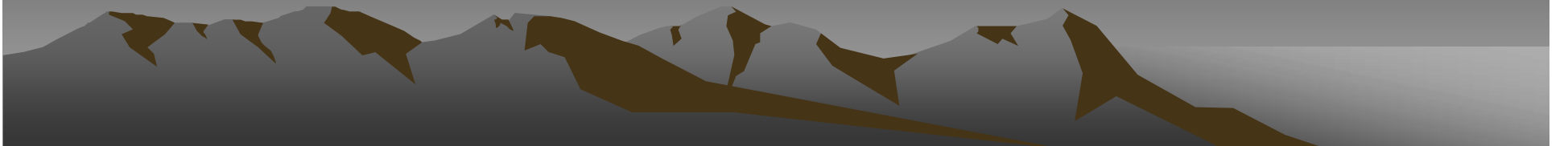
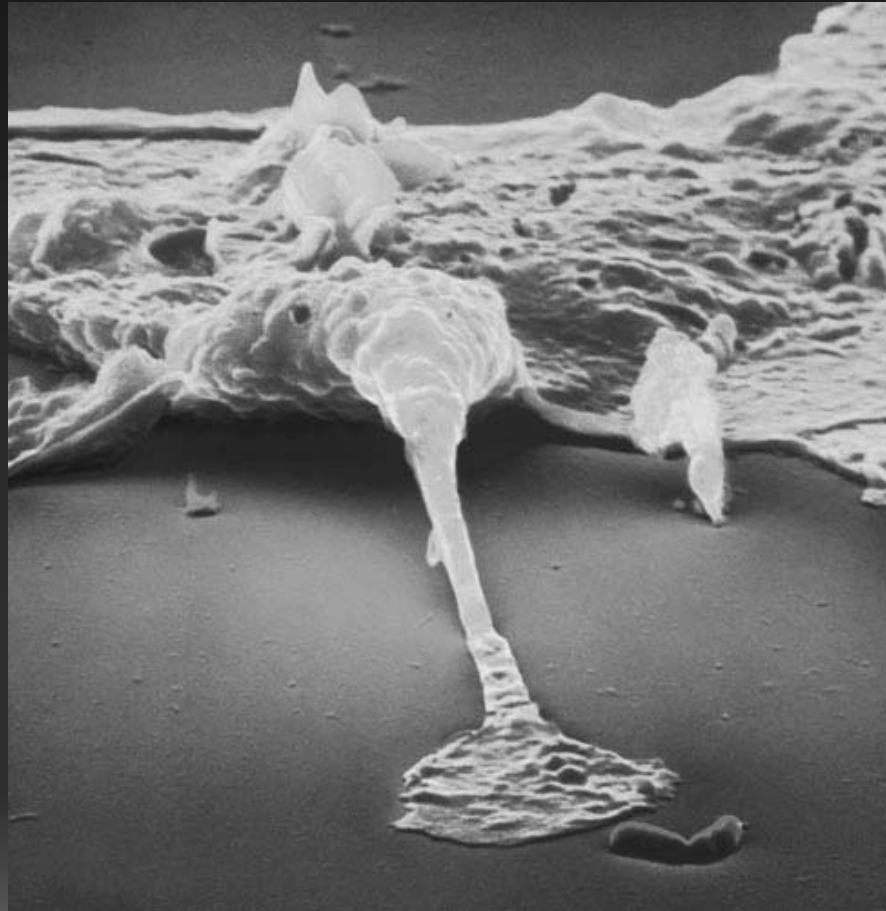


Mezibuněčná komunikace a signálová transdukce

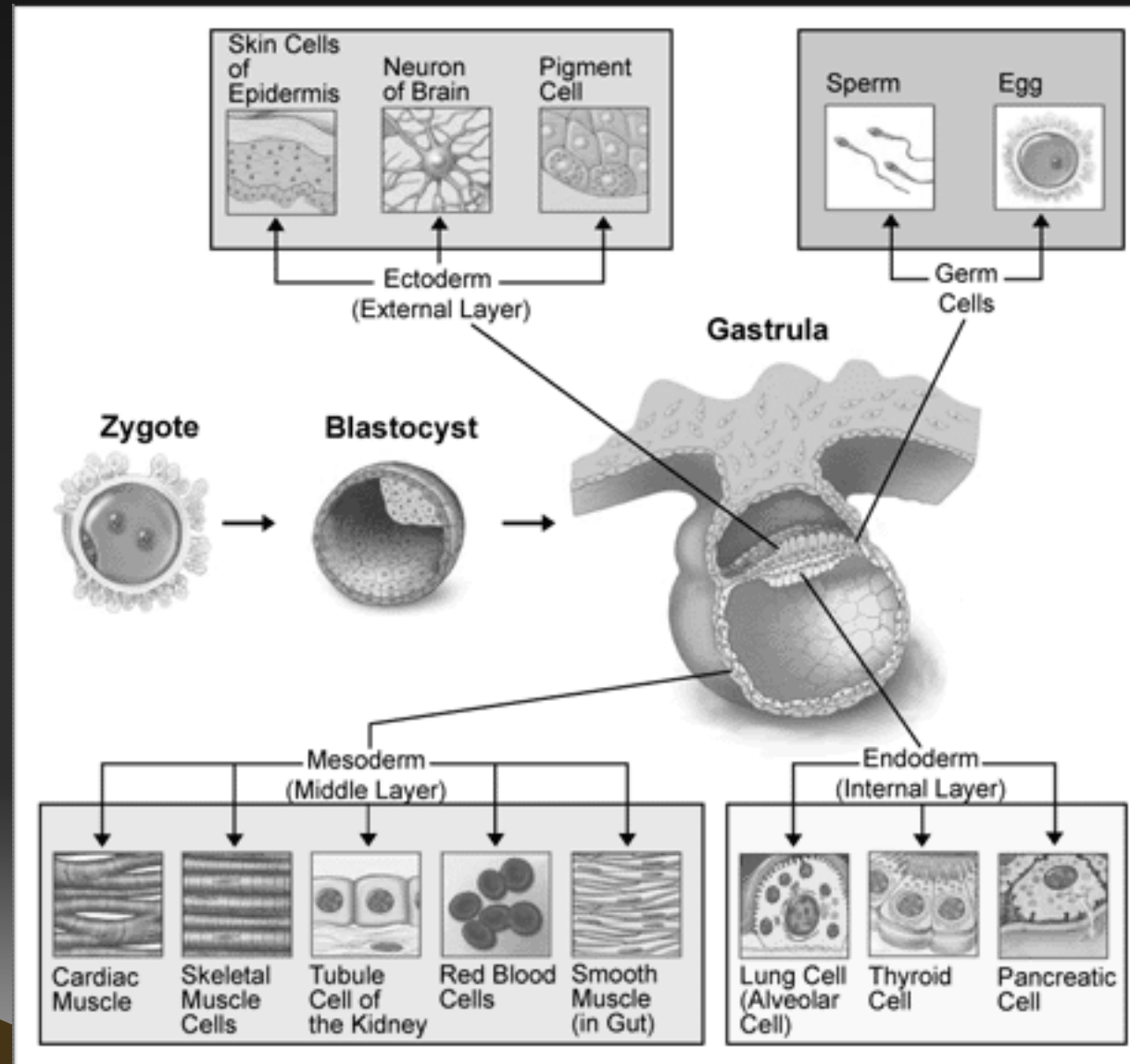
Obecná chemorecepční schopnost buněk
Komunikace ve společenství buněk, rozeznání
poškozené nebo cizí buňky
Signály: diferencuj, proliferuj, syntetizuj, zemři...
Porozumění = klíč k podstatě



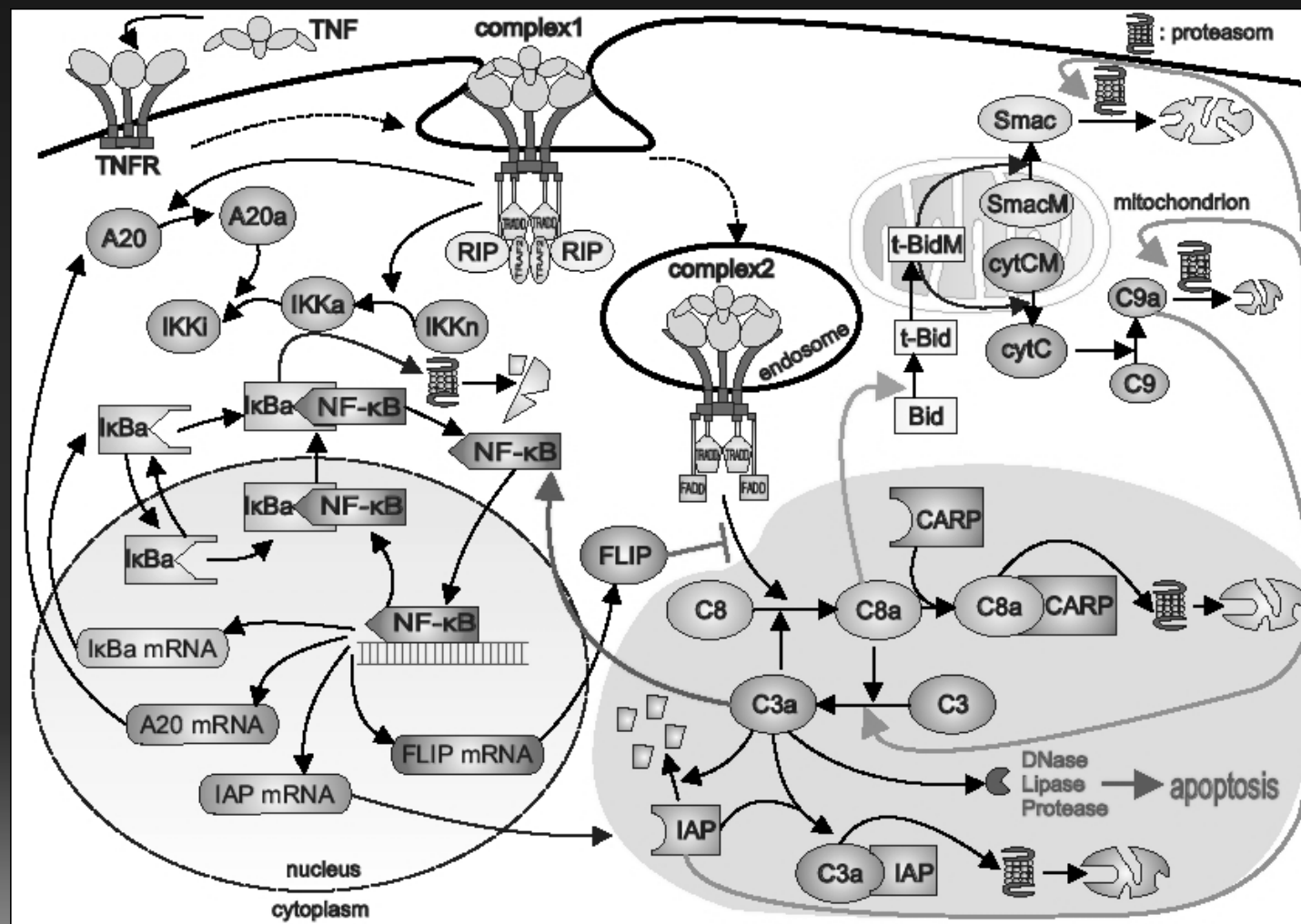
Chemotaxe



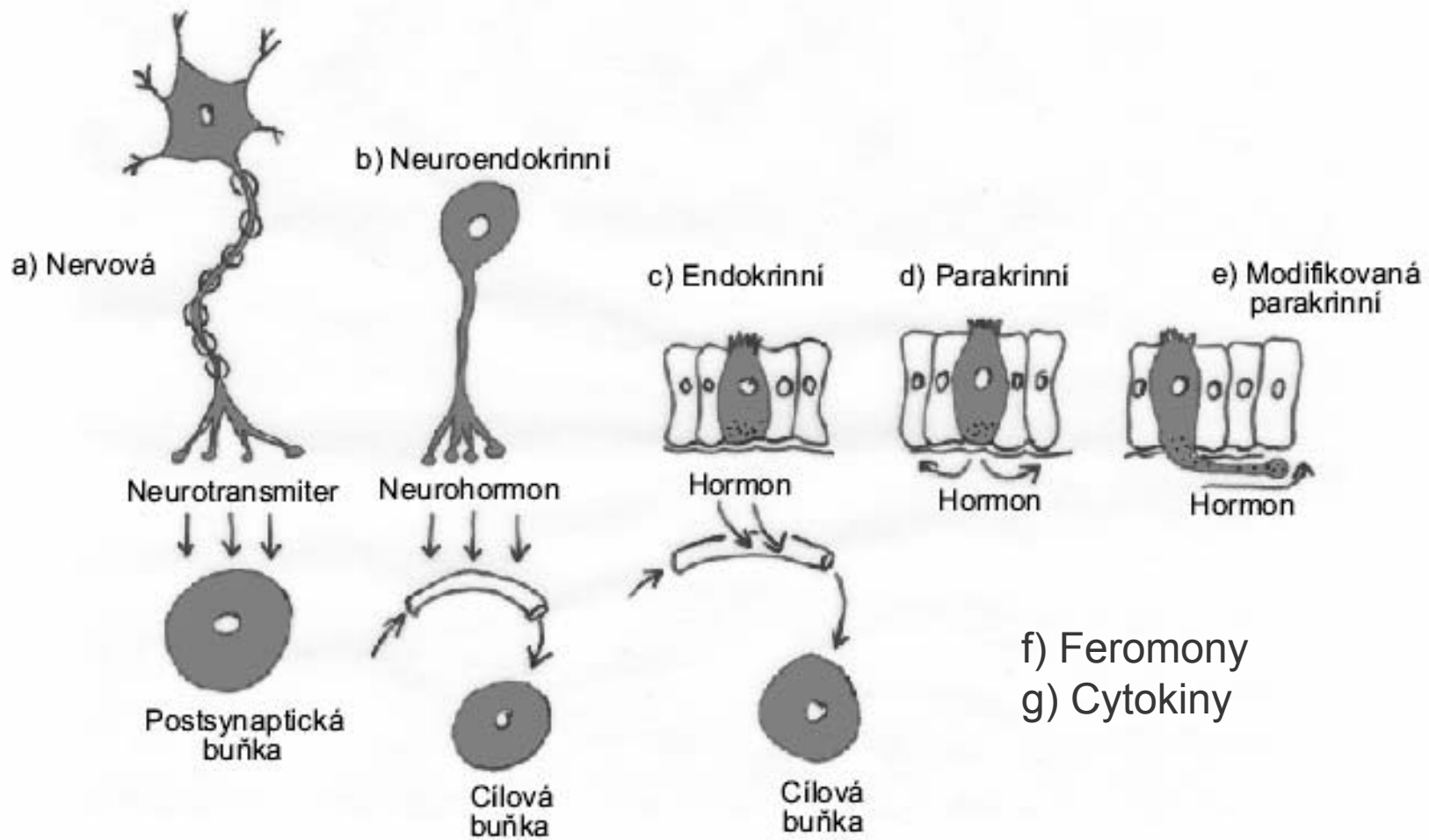
Embryonální diferenciaci



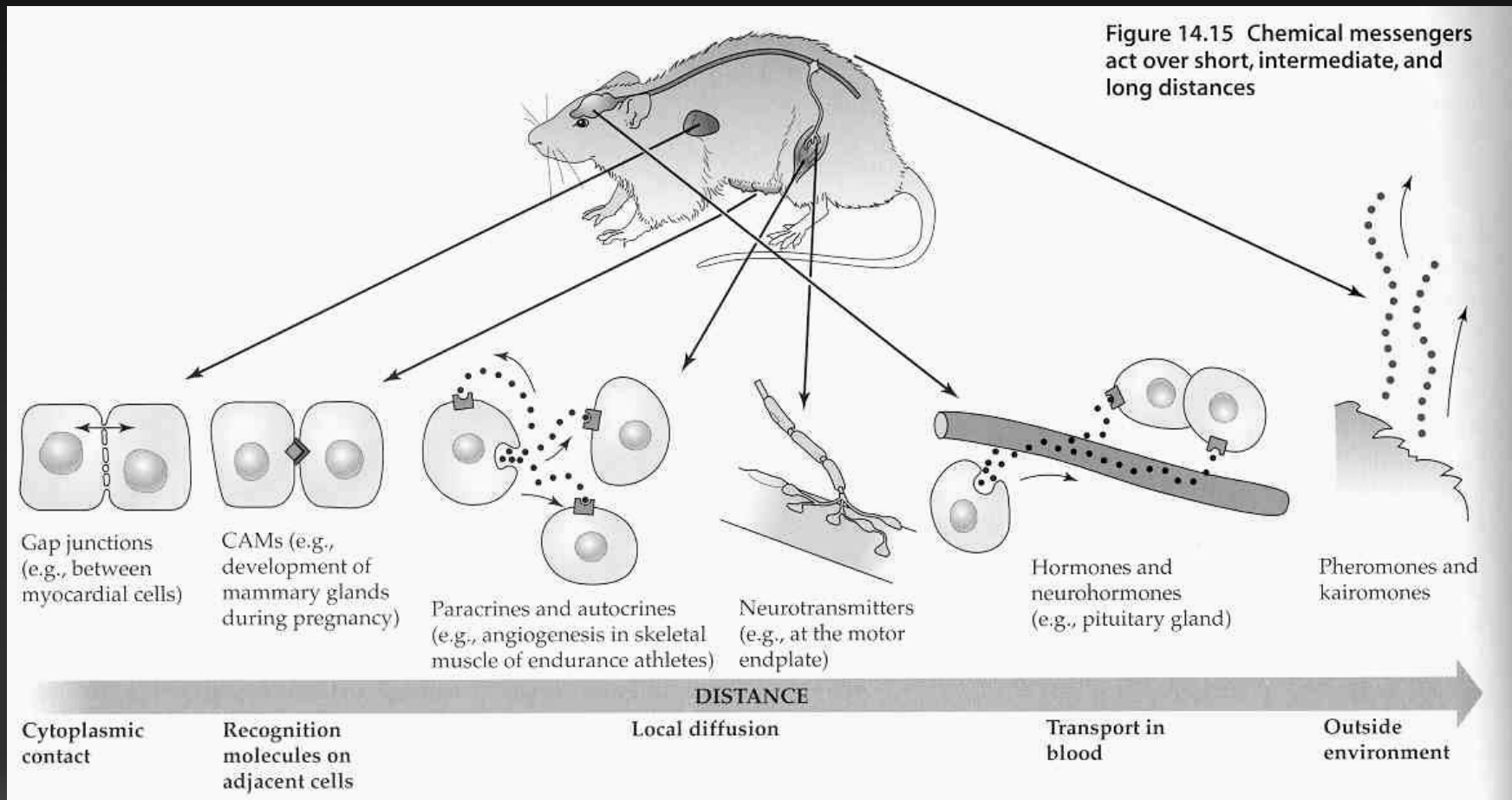
Signály: diferencuj!, zemři!, proliferuj!



Způsob předání signálu – mezi buňkami

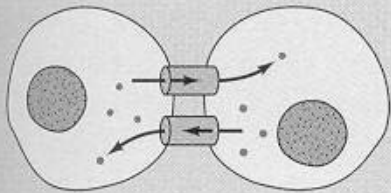


Způsob předání signálu – mezi buňkami

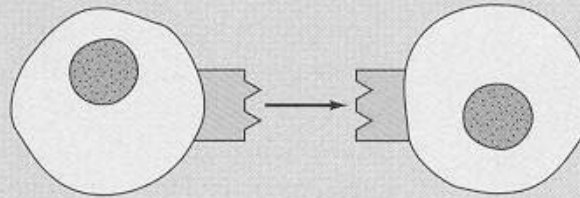


Způsob předání signálu – mezi buňkami

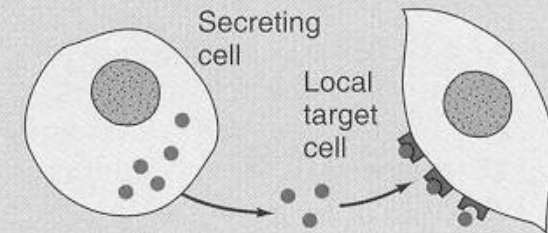
Gap junctions



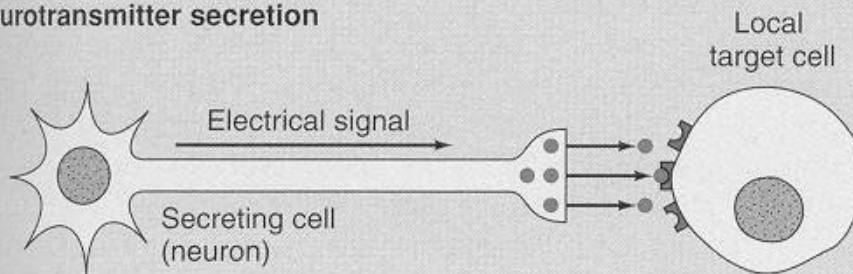
Transient direct linkup of cells



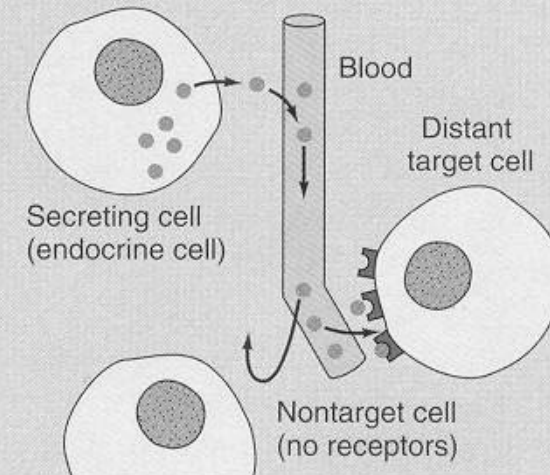
Paracrine secretion



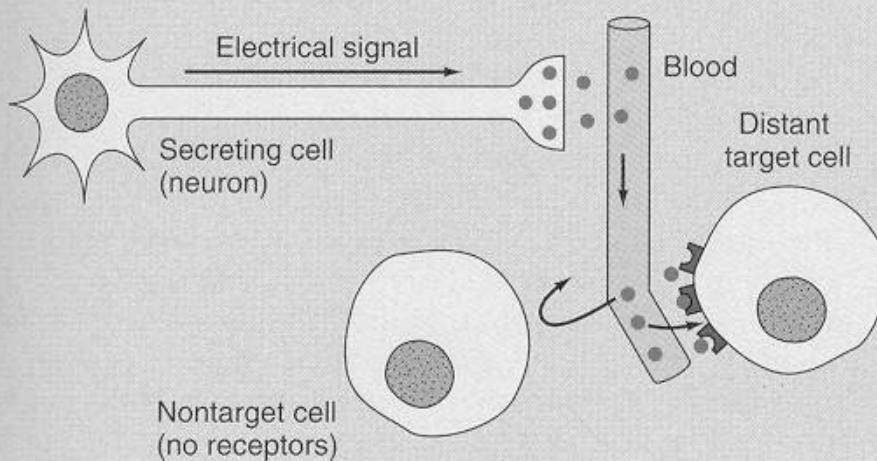
Neurotransmitter secretion



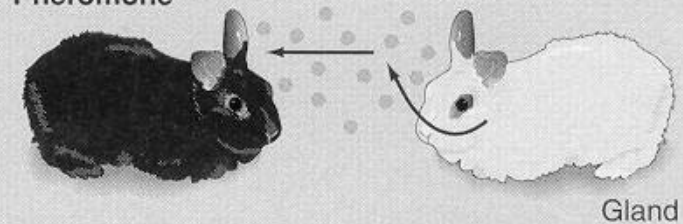
Hormonal secretion



Neurohormone secretion



Pheromone



• Small molecules and ions • Paracrine • Neurotransmitter • Hormone • Neurohormone • Pheromone

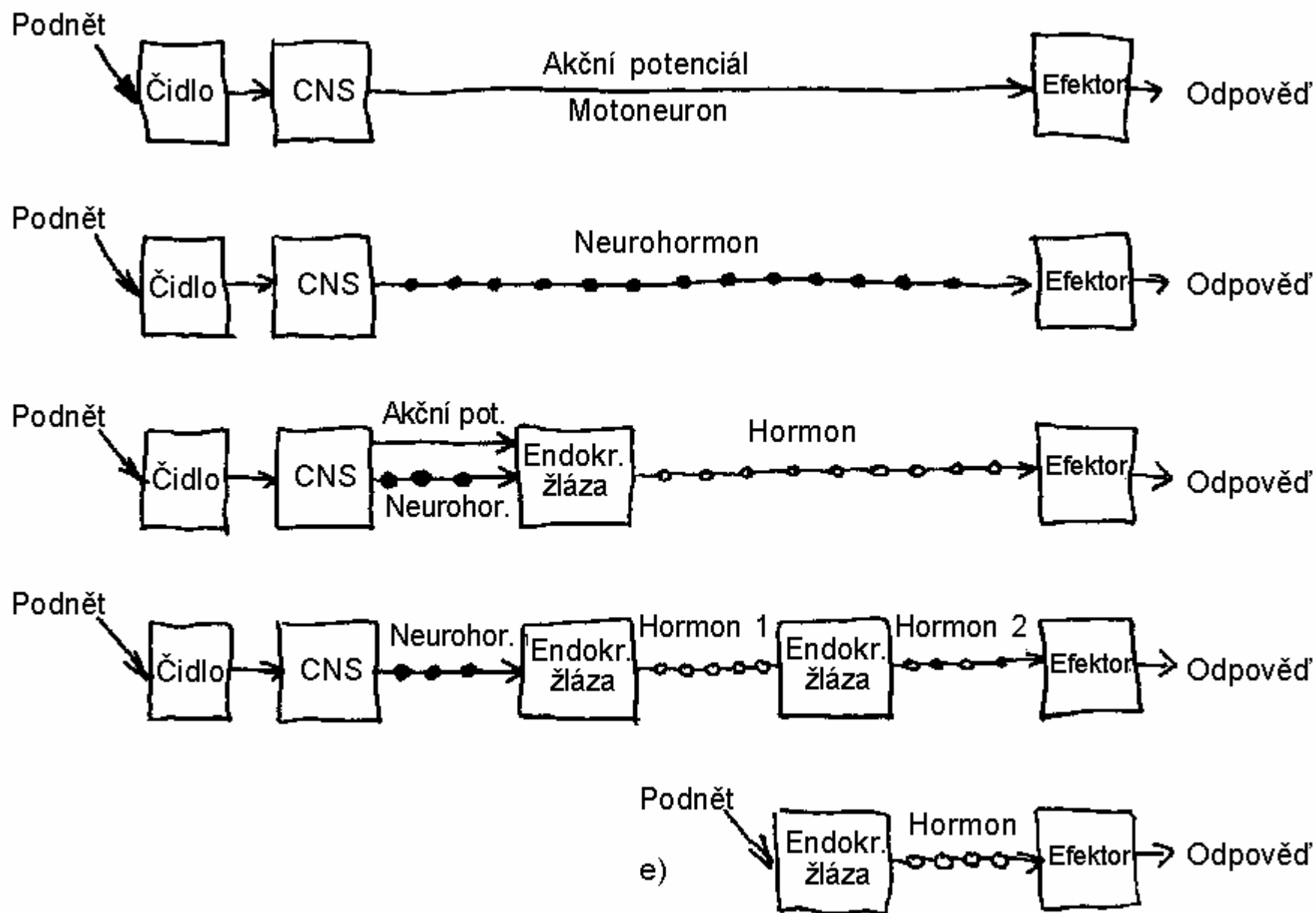
Chemická struktura

- Eikosanoidy – (prostaglandiny)
- Plyny – (NO, CO)
- Puriny – ATP, cAMP
- Aminy – od tyrozinu (adrenalin, par. histamin)
- Peptidy a proteiny – mnoho hormonů neurohormonů
- Steroidy – hormony a feromony
- Retinoidy – od vit A

Způsob předání signálu – jeden klíč a různé dveře

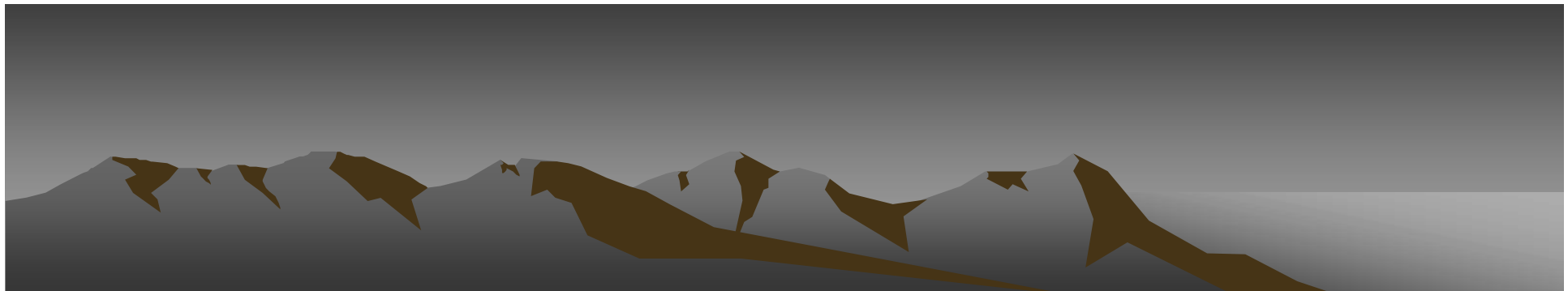
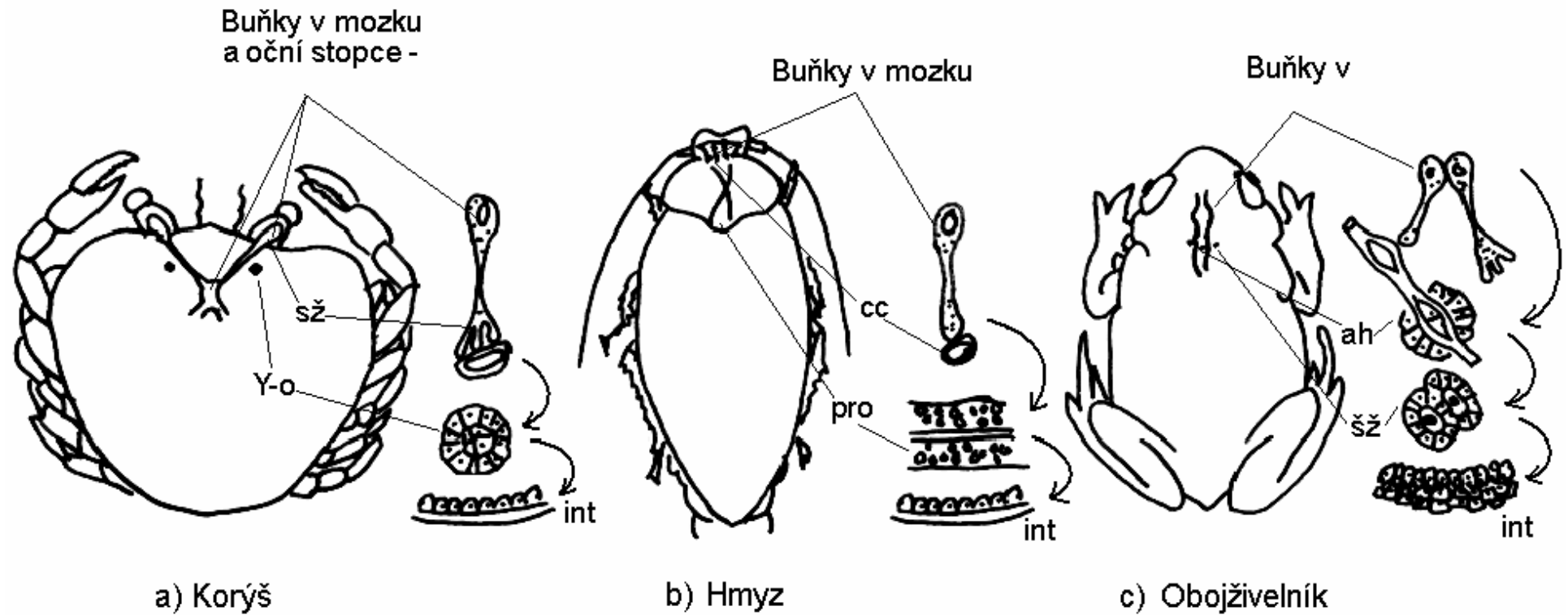
Kaskáda od neurosekrece po cílový orgán

Extracelulární kaskáda

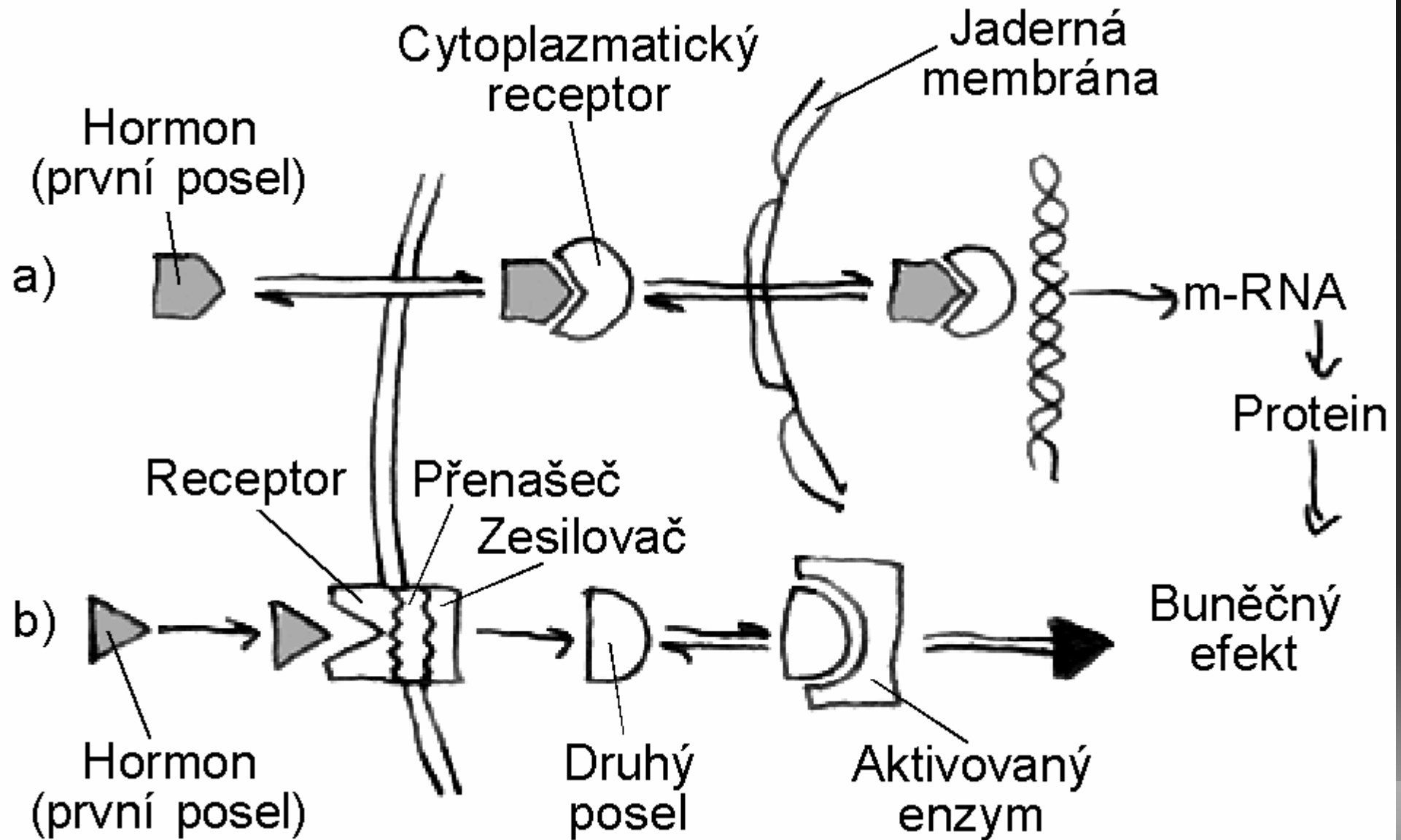


Kaskáda od neurosekrece po cílový orgán

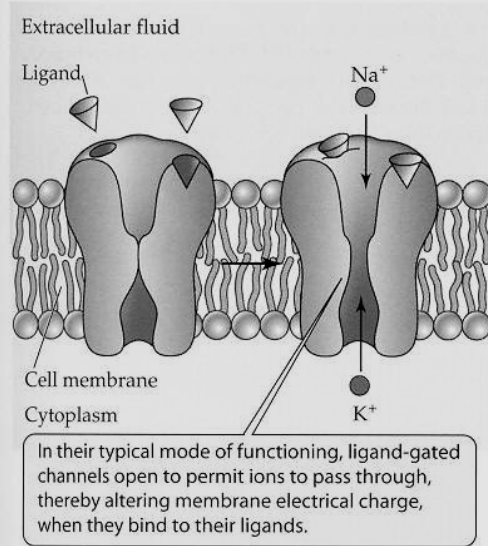
Extracelulární kaskáda



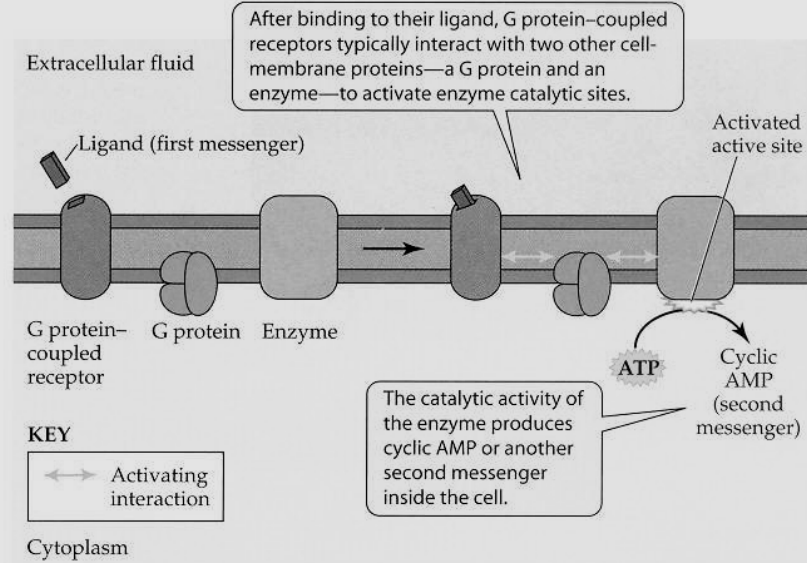
Intracelulární kaskáda



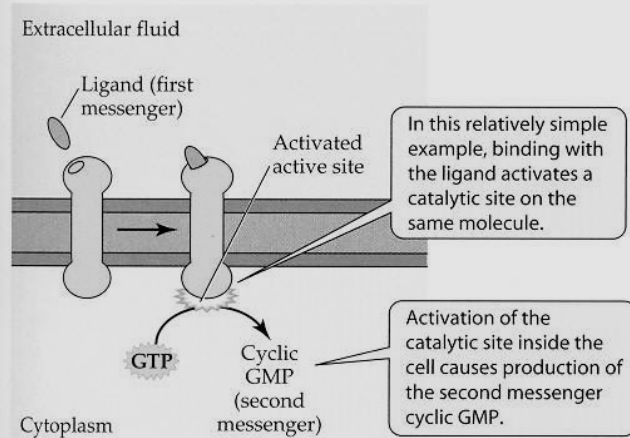
(a) Ligand-gated channel



(b) G protein-coupled receptor and associated G protein system



(c) Enzyme/enzyme-linked receptor



(d) Intracellular receptor

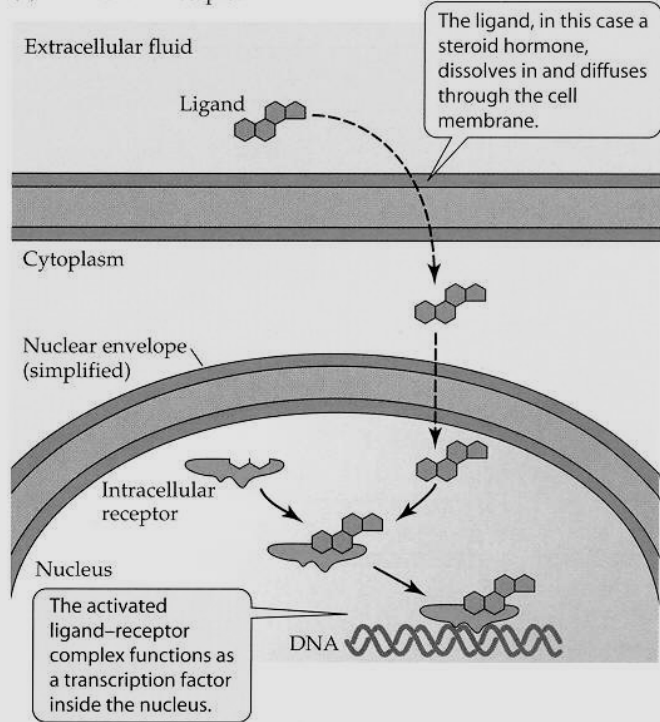
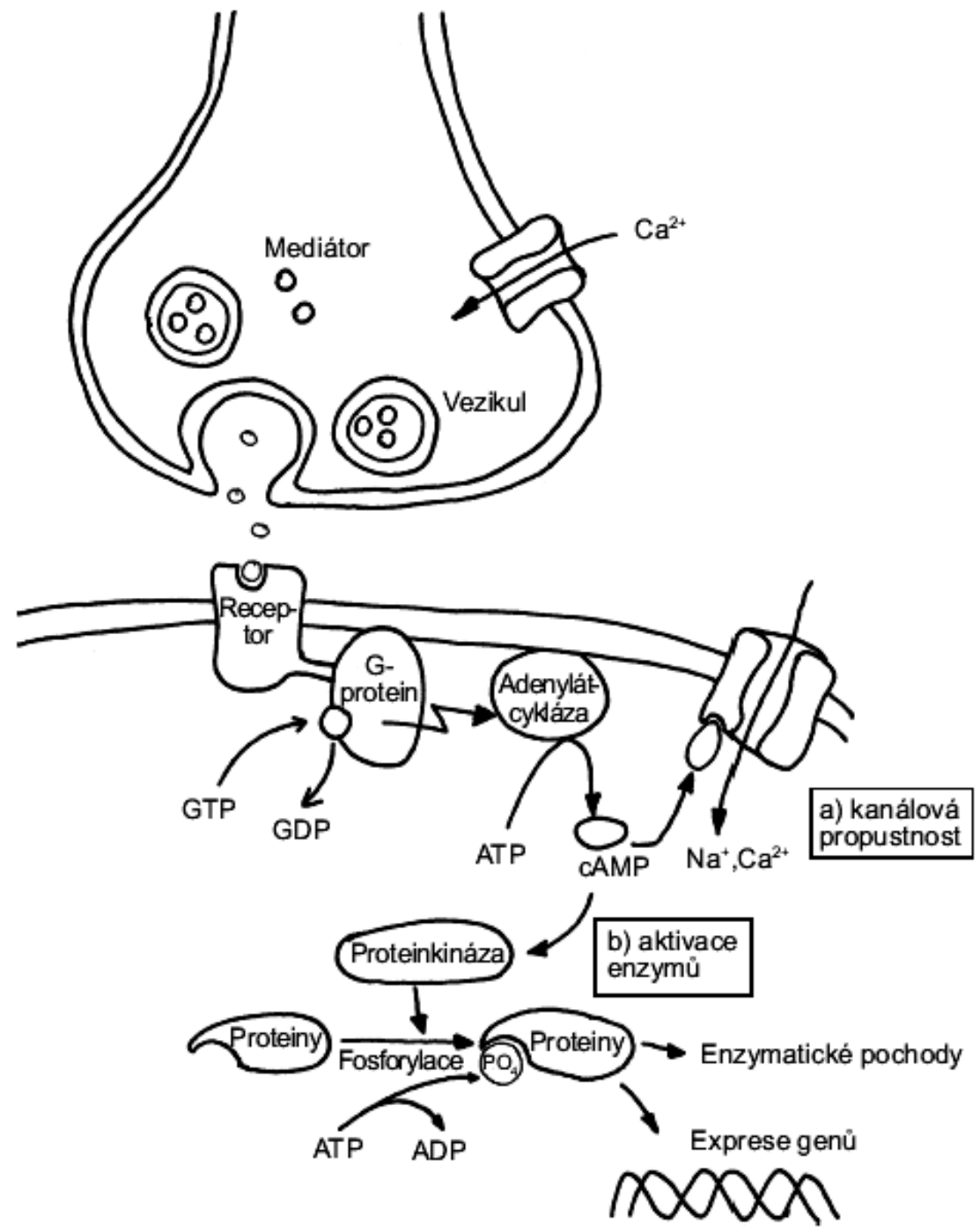
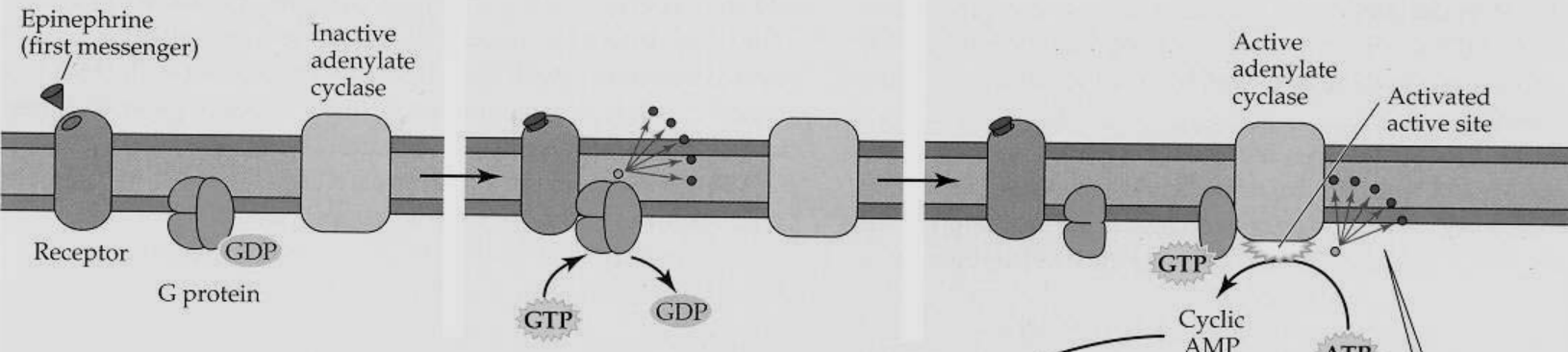


Figure 2.23 The four types of receptor proteins involved in cell signaling (a) A ligand-gated channel. The particular example shown, a muscle cell acetylcholine receptor, must bind a ligand molecule at two sites for the channel to open. (b) A G protein-coupled receptor. Details of the molecular interactions symbolized by double-headed arrows are discussed later in this chapter. (c) Enzyme/enzyme-linked receptors are themselves enzymes or, when activated, interact directly with other membrane proteins that are enzymes. One way or the other, binding with the ligand activates an enzyme catalytic site inside the cell. The example shown is the atrial natriuretic peptide receptor which is particu-

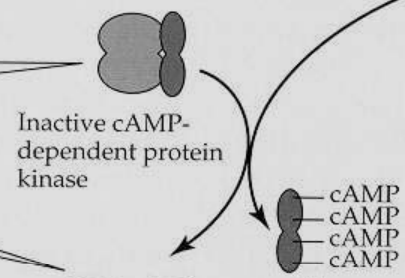


Extracellular fluid



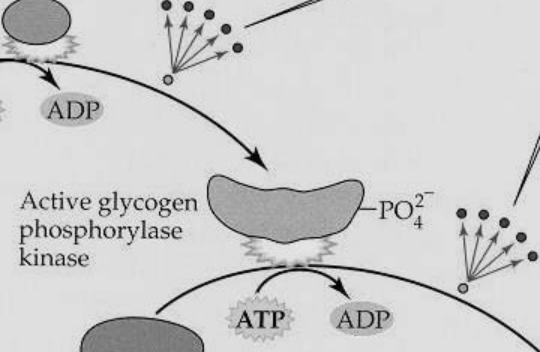
Inactive cAMP-dependent protein kinase dissociates when molecules of cAMP bind to one of its molecular subunits ...

... and two of the subunits released are catalytically active enzyme units.

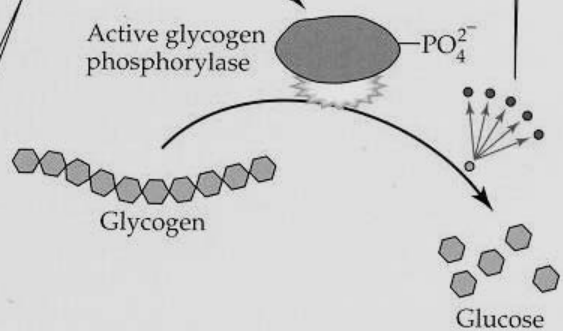


Amplification occurs in each of these steps because the active forms of the enzymes catalyze formation of many product molecules.

Active cAMP-dependent kinase units are protein kinases and activate their target protein by phosphorylating it using phosphate groups ($-PO_4^{2-}$) drawn from ATP. Moreover...

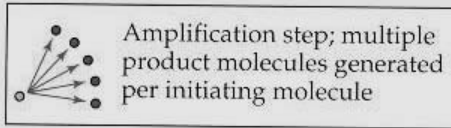


... active glycogen phosphorylase kinase molecules are also protein kinases and activate their target protein in the same way.



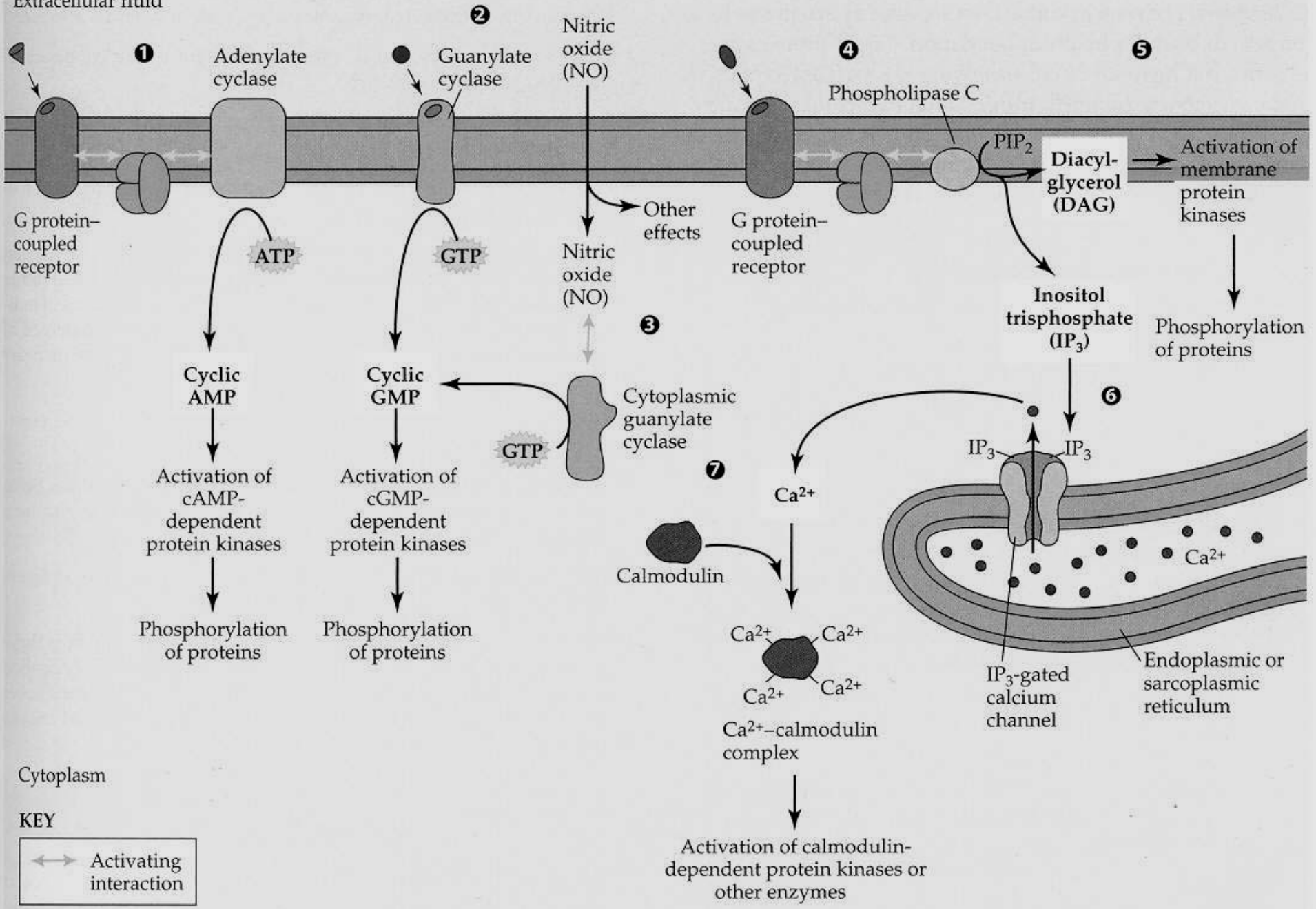
Cytoplasm

KEY



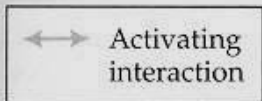
Amplification step; multiple product molecules generated per initiating molecule

Extracellular fluid

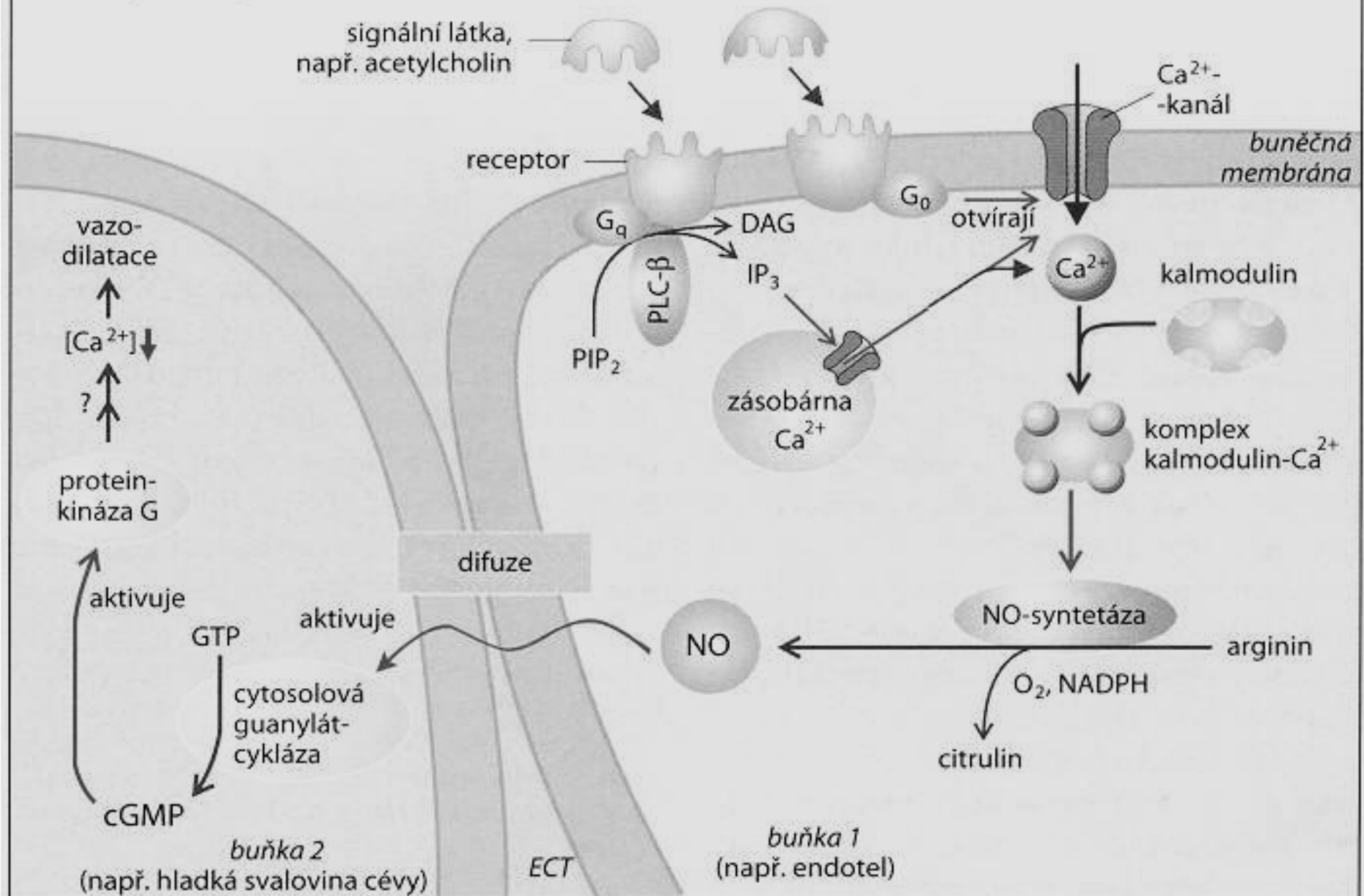


Cytoplasm

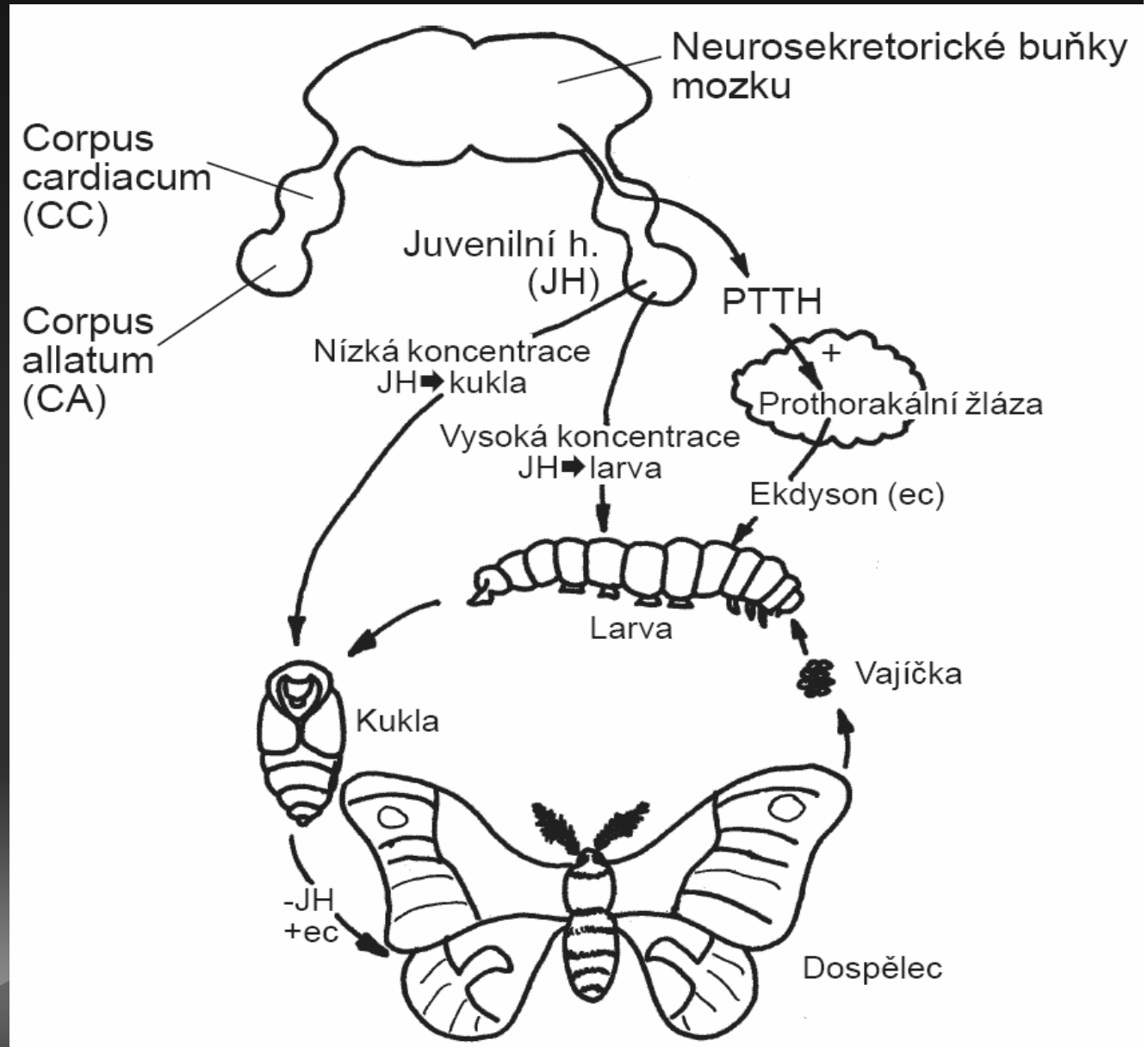
KEY



E. NO jako signální látka



Působení hormonů a hmyz



Caterpillar ligated during last larval instar

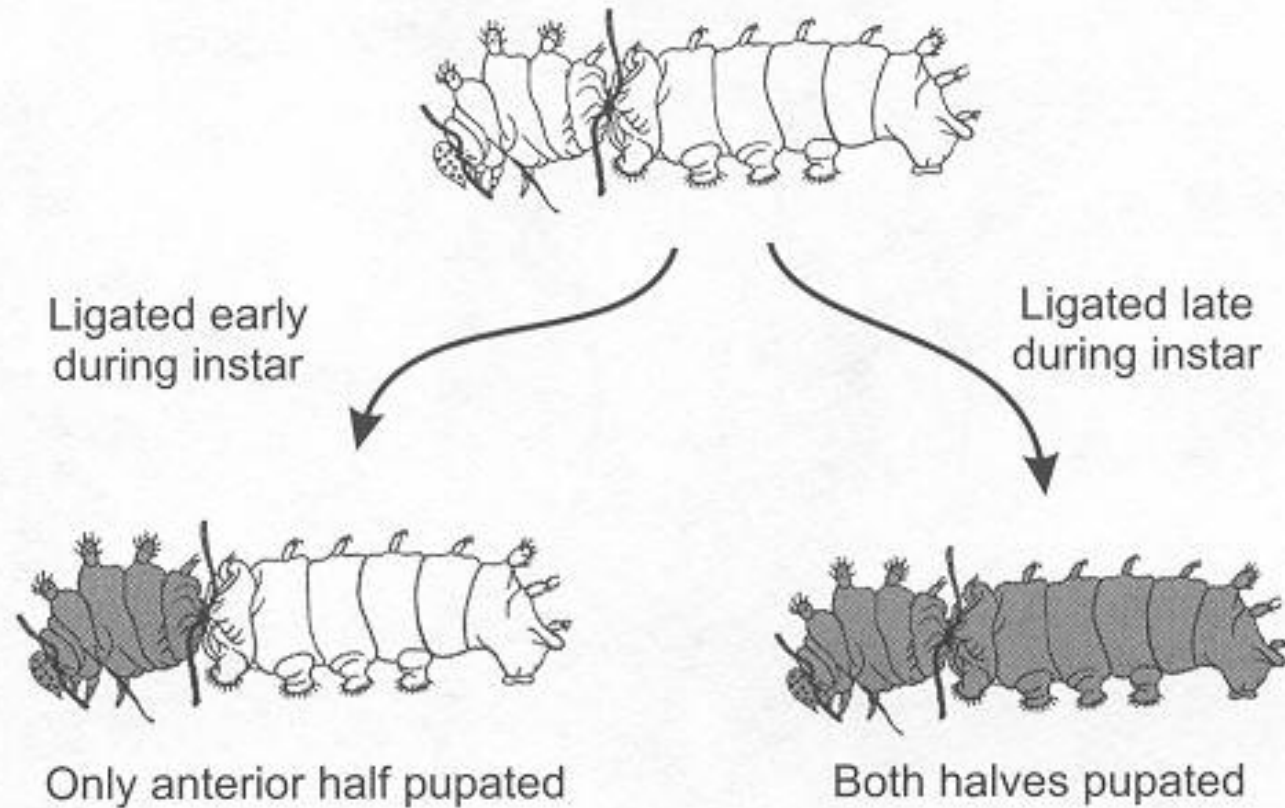
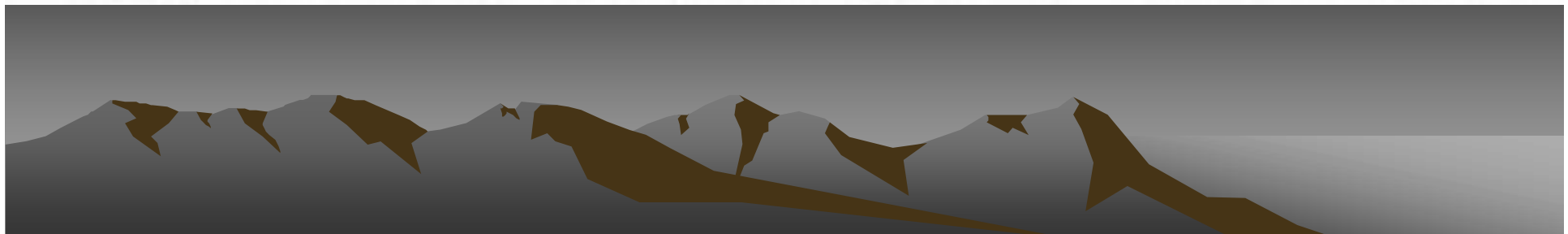
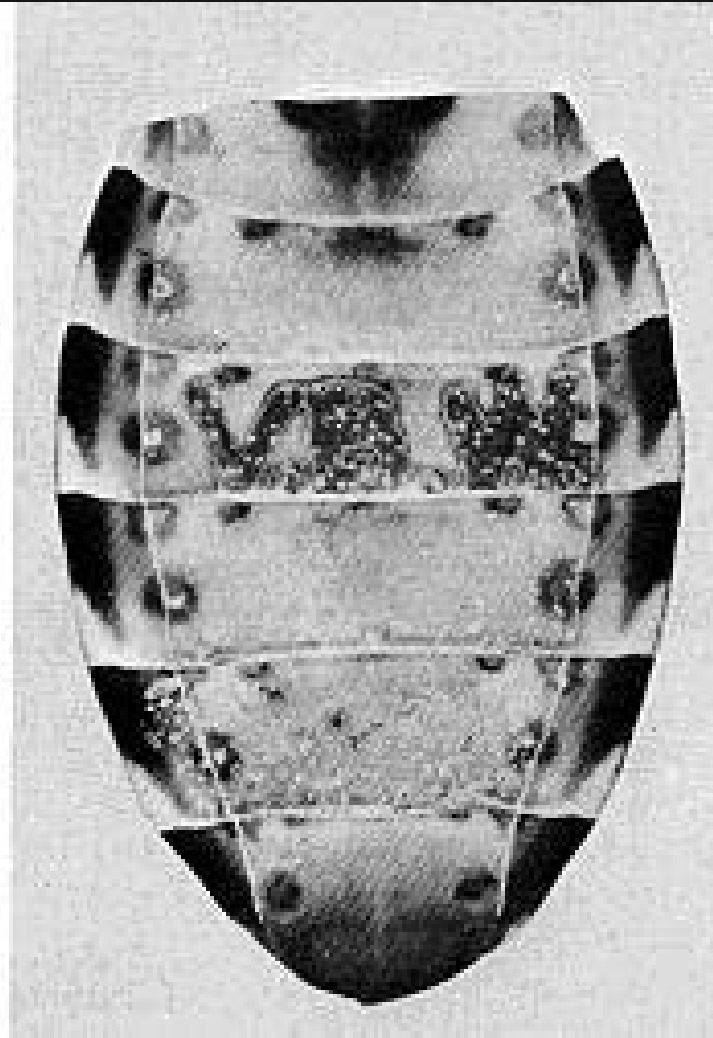
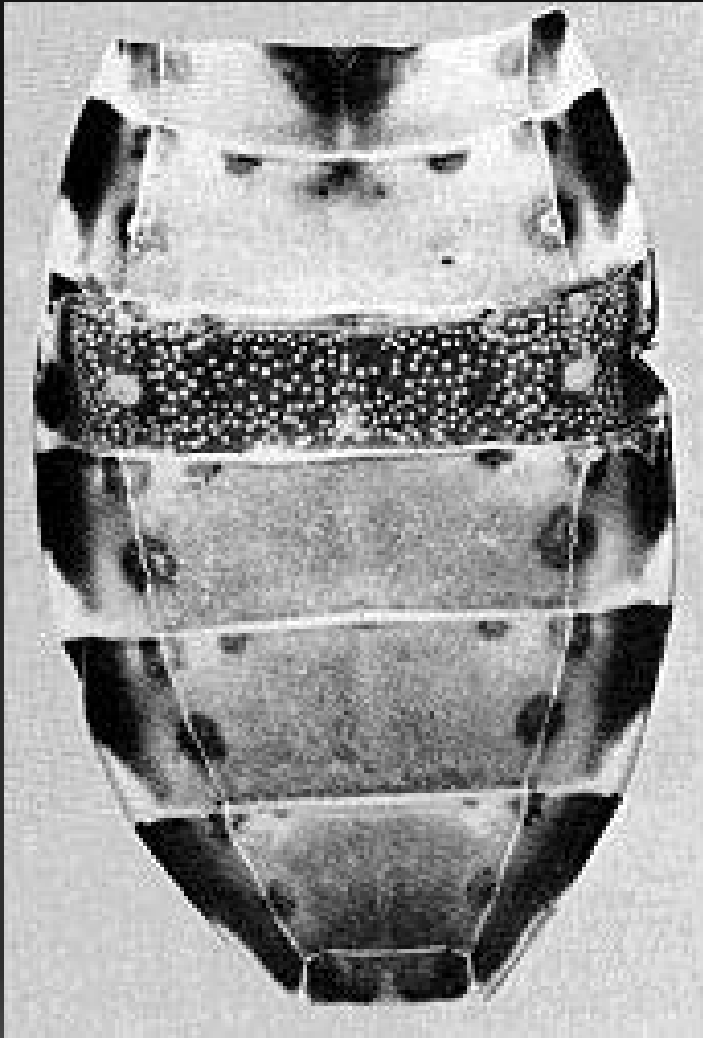
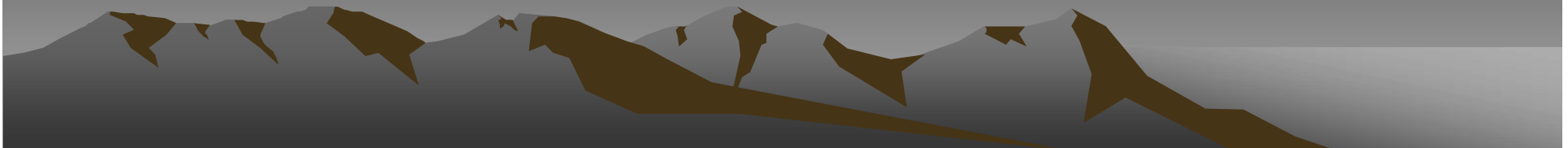


FIGURE 1.2 An experiment performed by Kopeć. When a caterpillar was ligated early during the last larval instar, only the anterior half later pupated. However, when ligated late during the last larval instar, both halves pupated. Adapted from Cymborowski (1992). Reprinted with permission.





sir Vincent B. Wigglesworth



Hypotalamus:		Adenohypofýza		Neurohypofýza	
Kortikoliberin	CRH	Kortikotropin	ACTH	Oxytocin	
Gonadoliberin	Gn-RH	Folitropin	FSH	Adiuretin	ADH
Melanoliberin	MRH	Lutropin	LH		
Melanostatin	MIH	Melanotropin	MSH		
Prolaktostatin = Dopamin	PIH	Somatotropin	STH		
Somatoliberin	SRH	Tyrotropin	TSH		
Somatostatin	SIH	Prolaktin	PRL		
Tyreoliberin	TRH				

Hypotalamus

Liberiny, Statingy

ADH, Oxytocin

Chiasma opticum

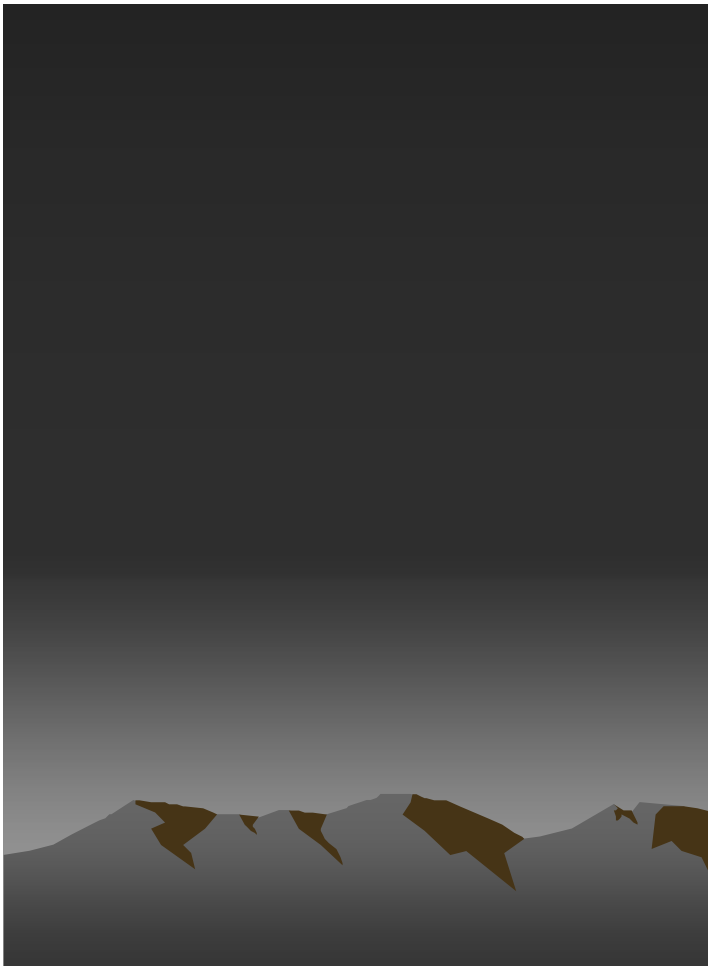
Axonální transport

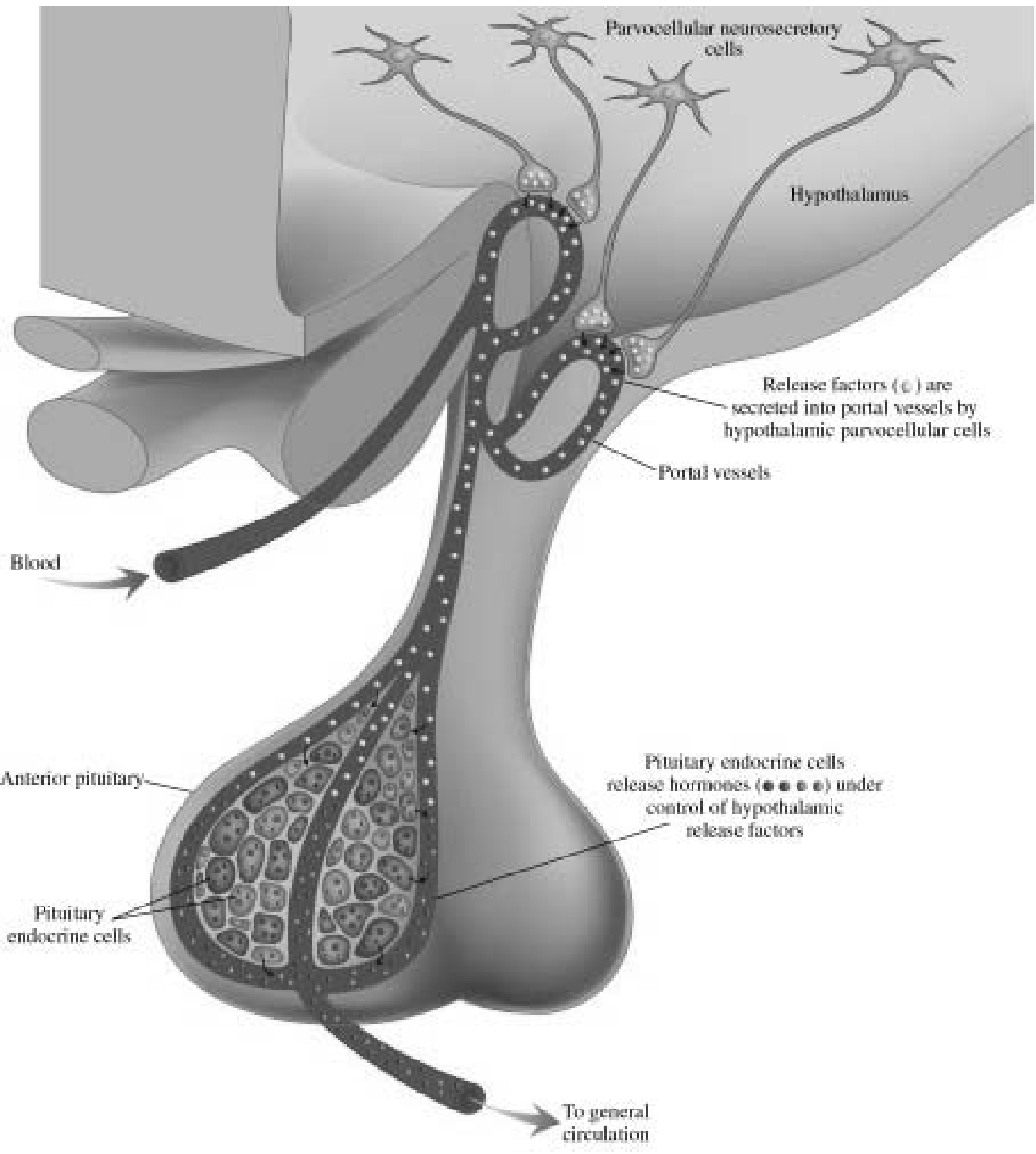
Adenohypofýza

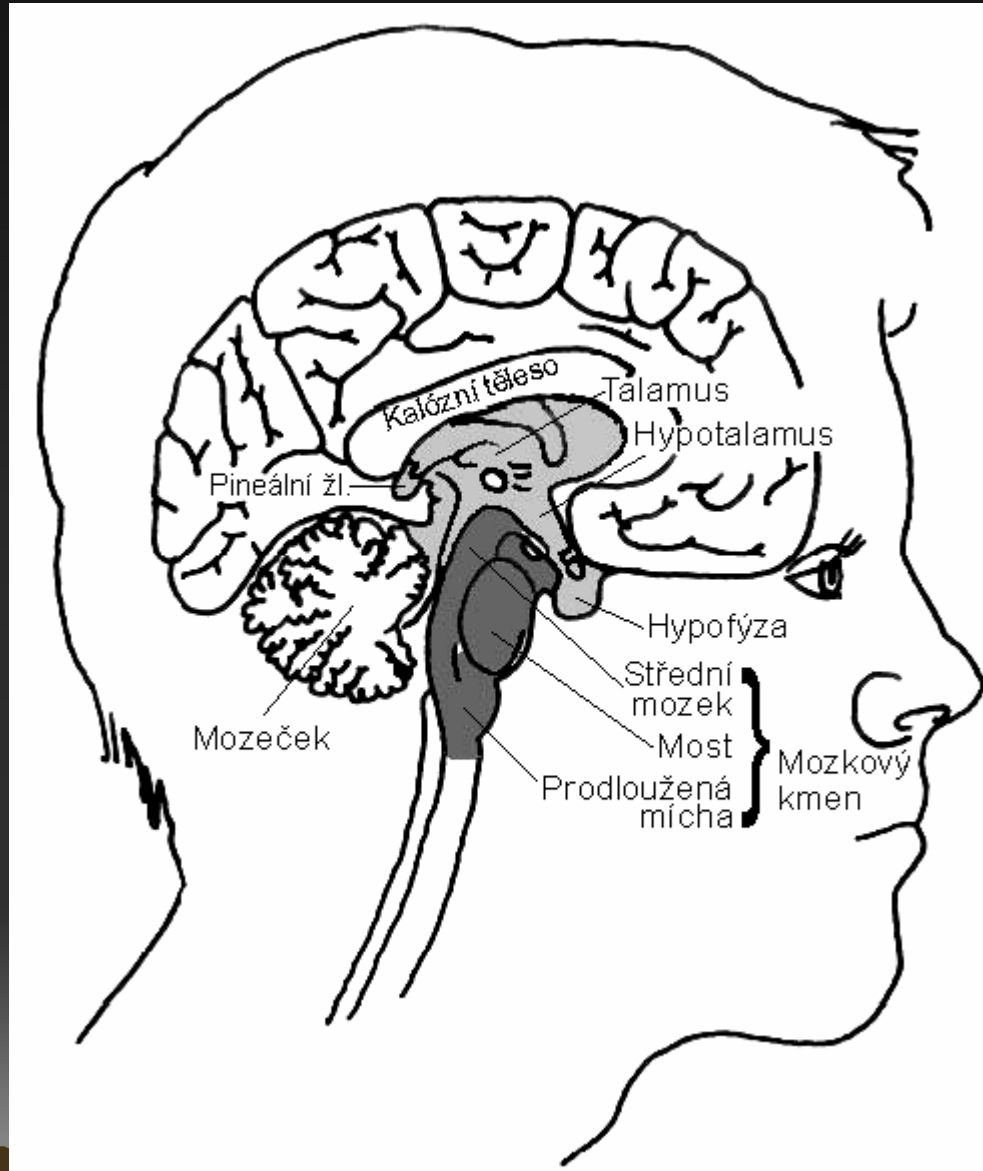
Neurohypofýza

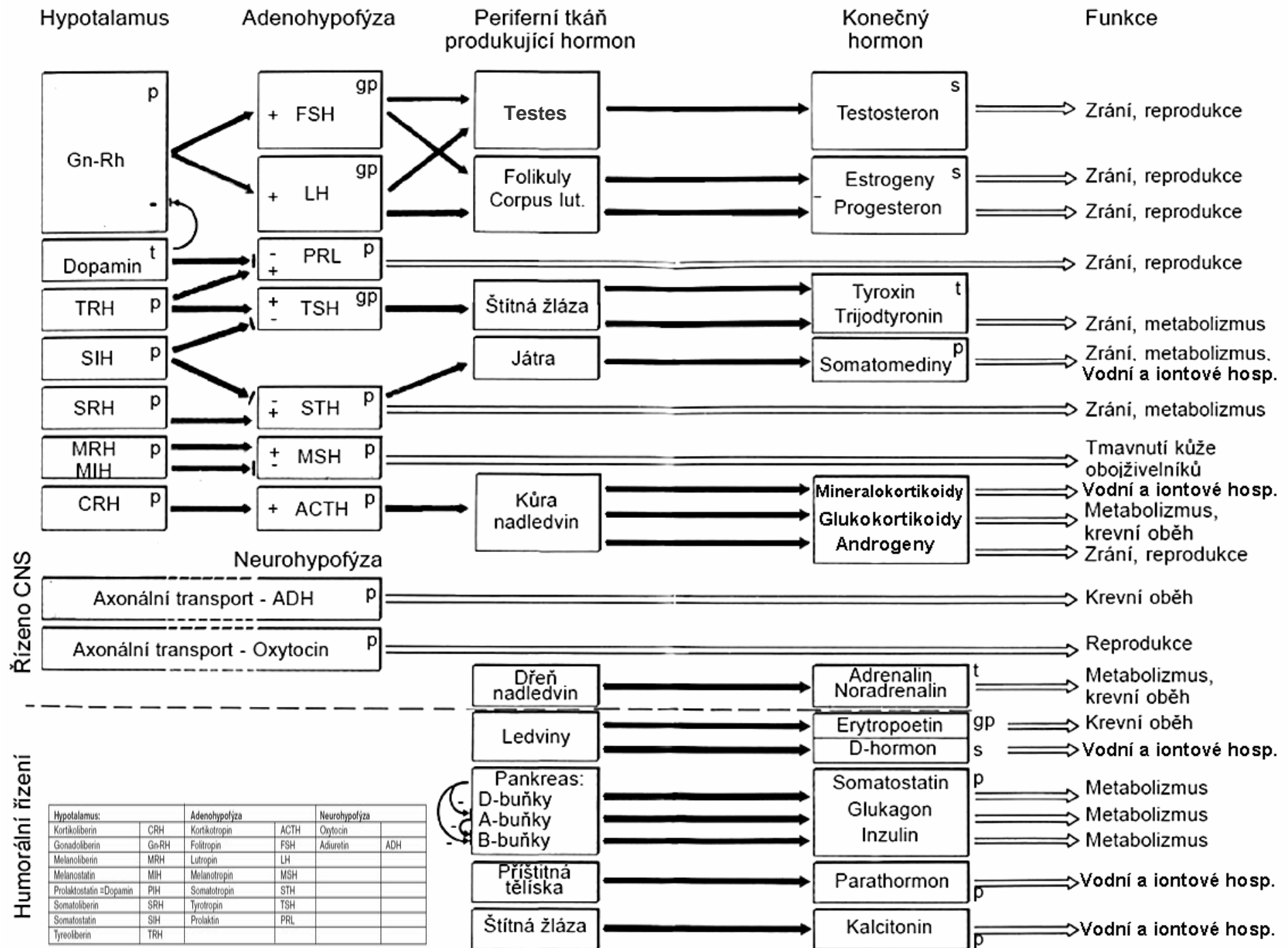
ADH, Oxytocin

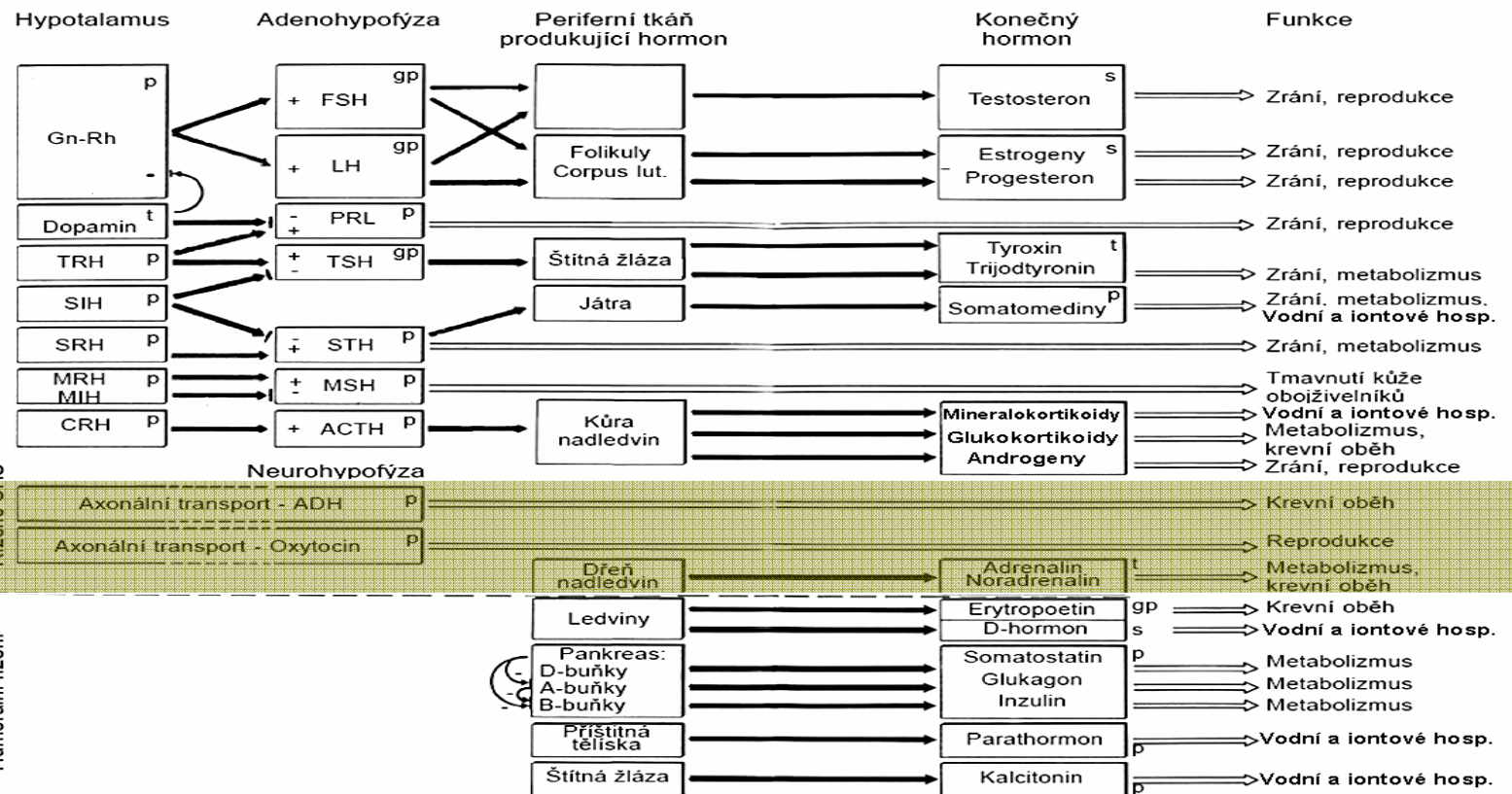
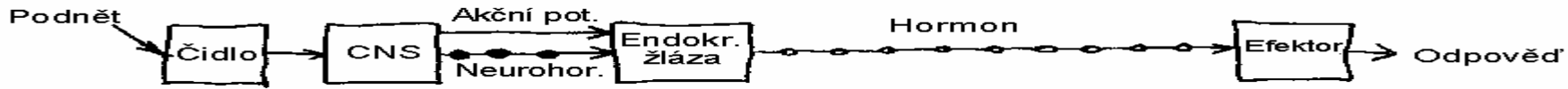
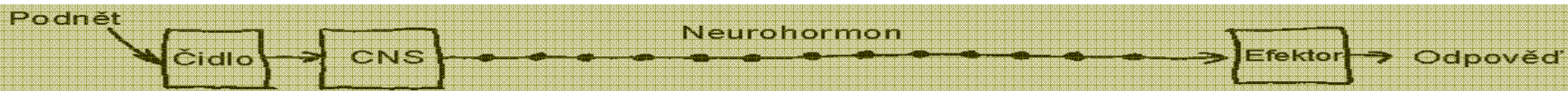
Tropní hormony
FSH, LH, PRL,
TSH, STH, MSH,
ACTH

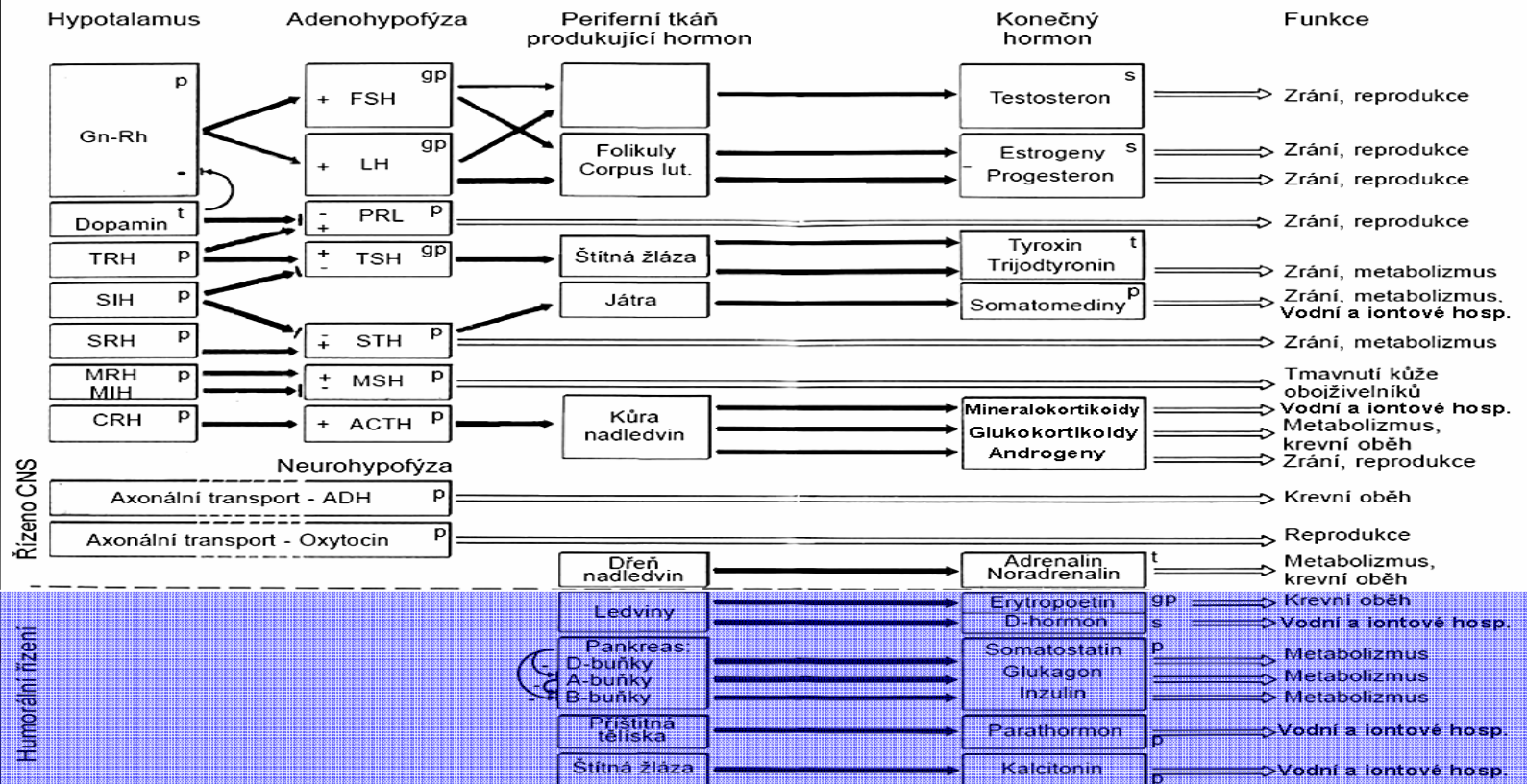
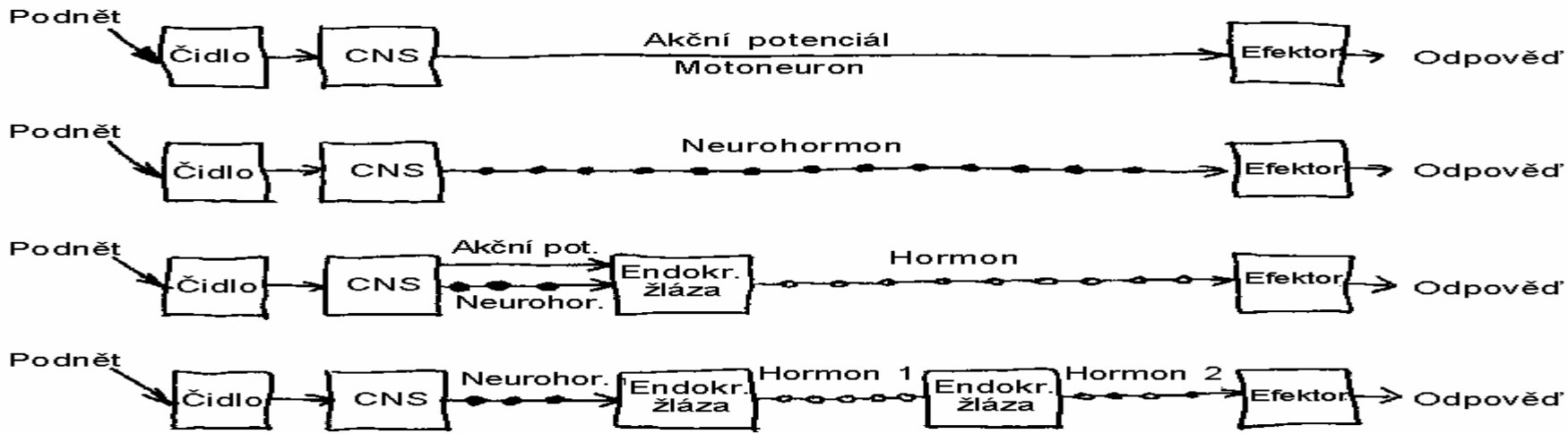


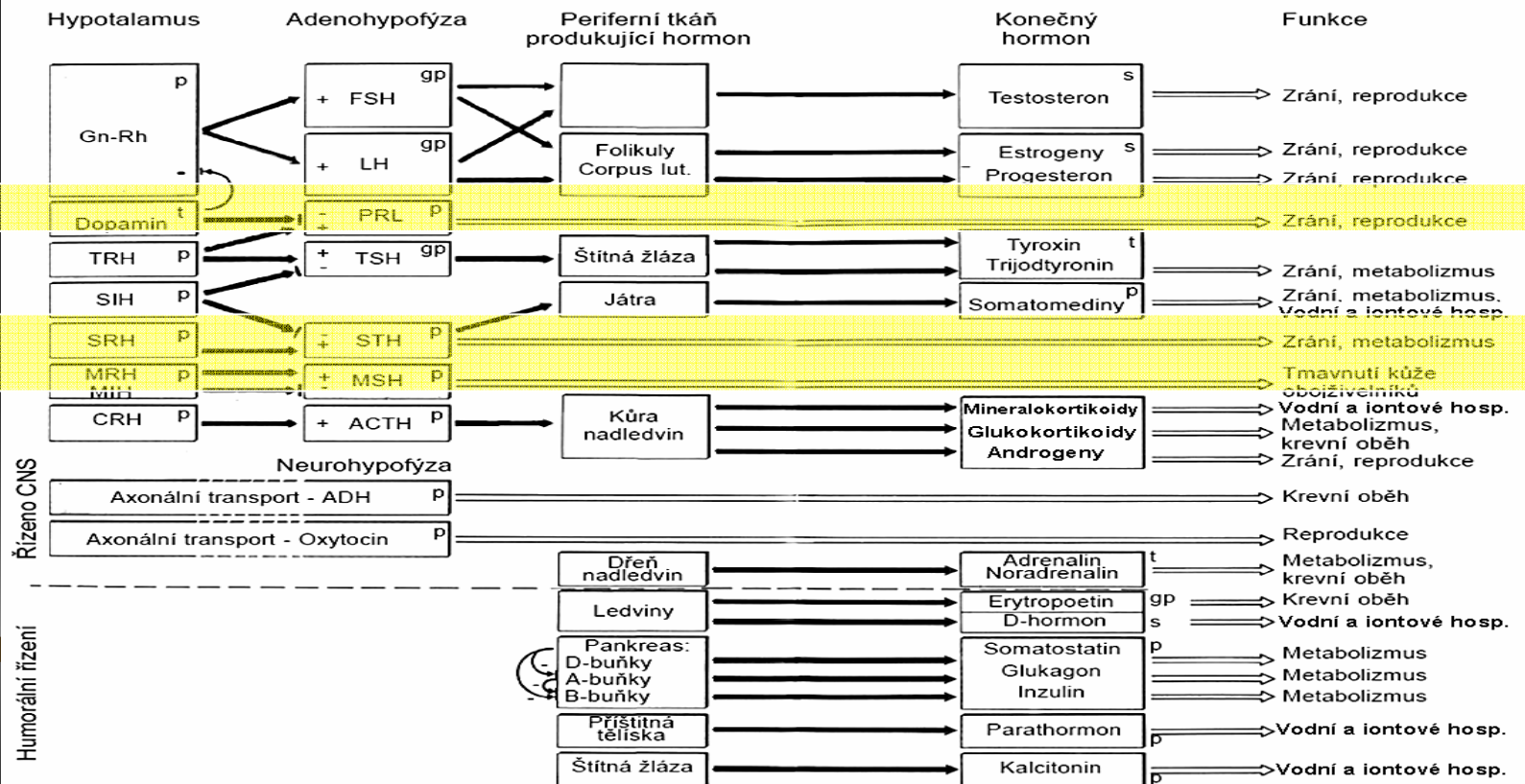
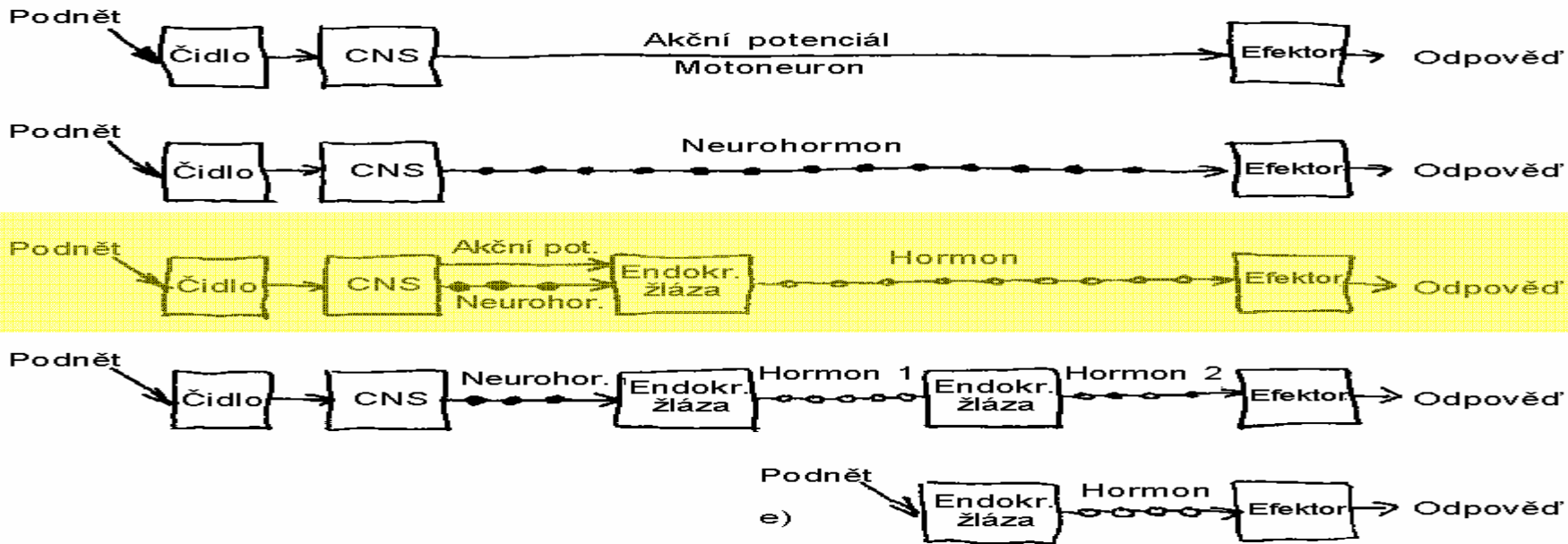


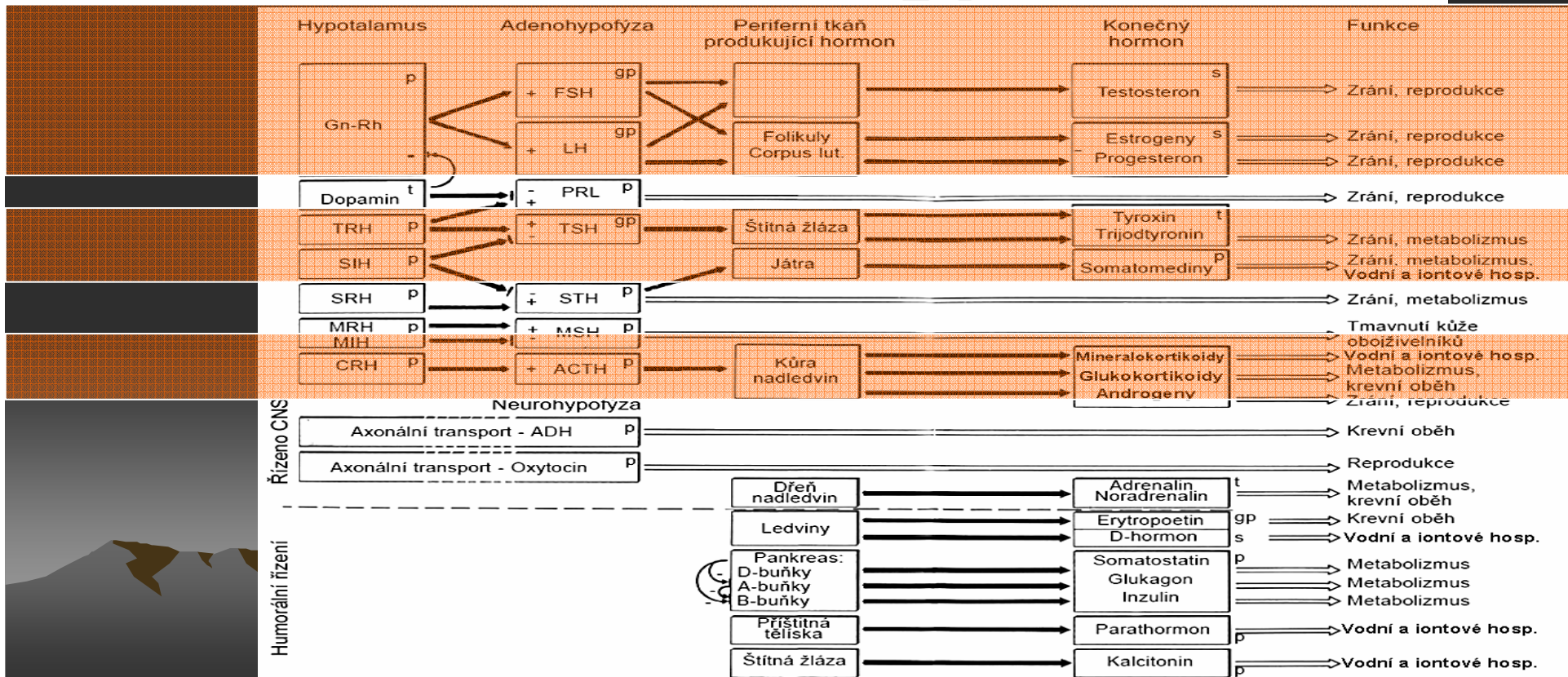
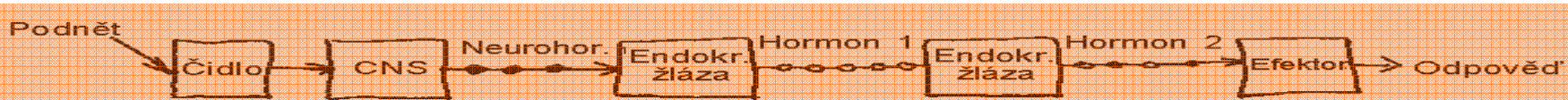
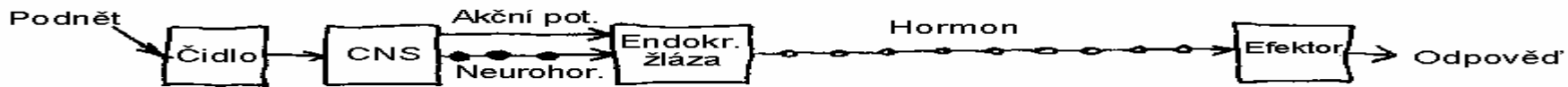




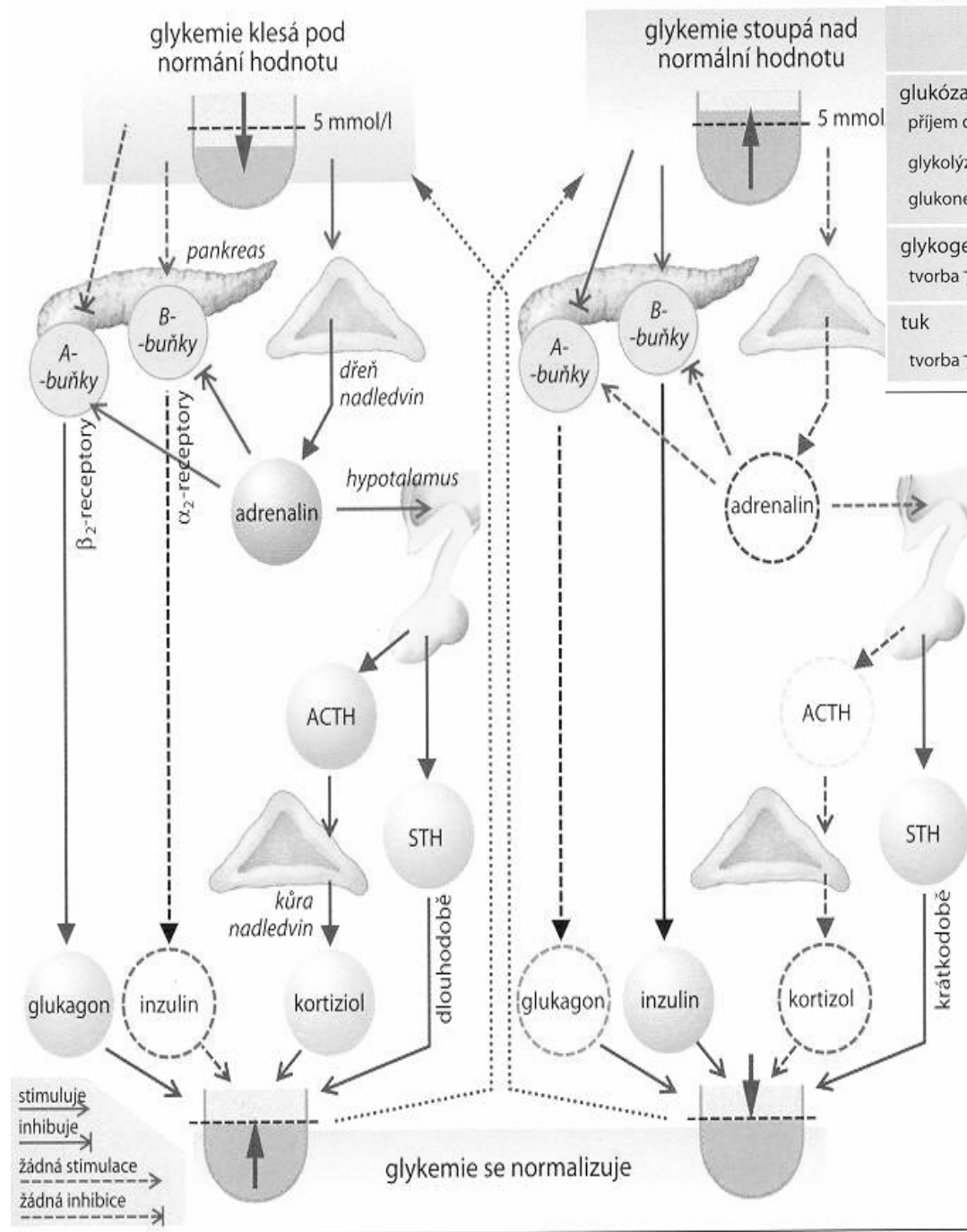






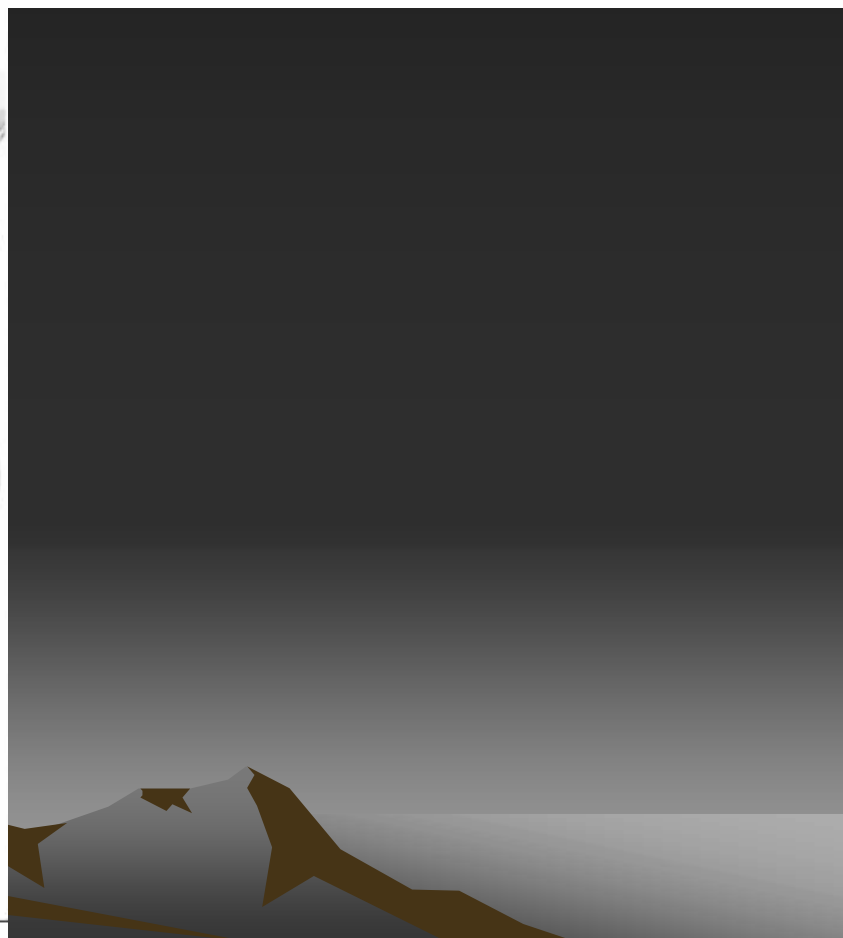


B. Hormonální regulace koncentrace glukózy v krvi

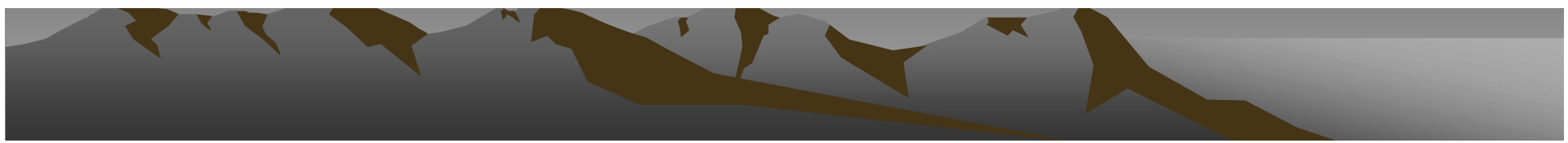
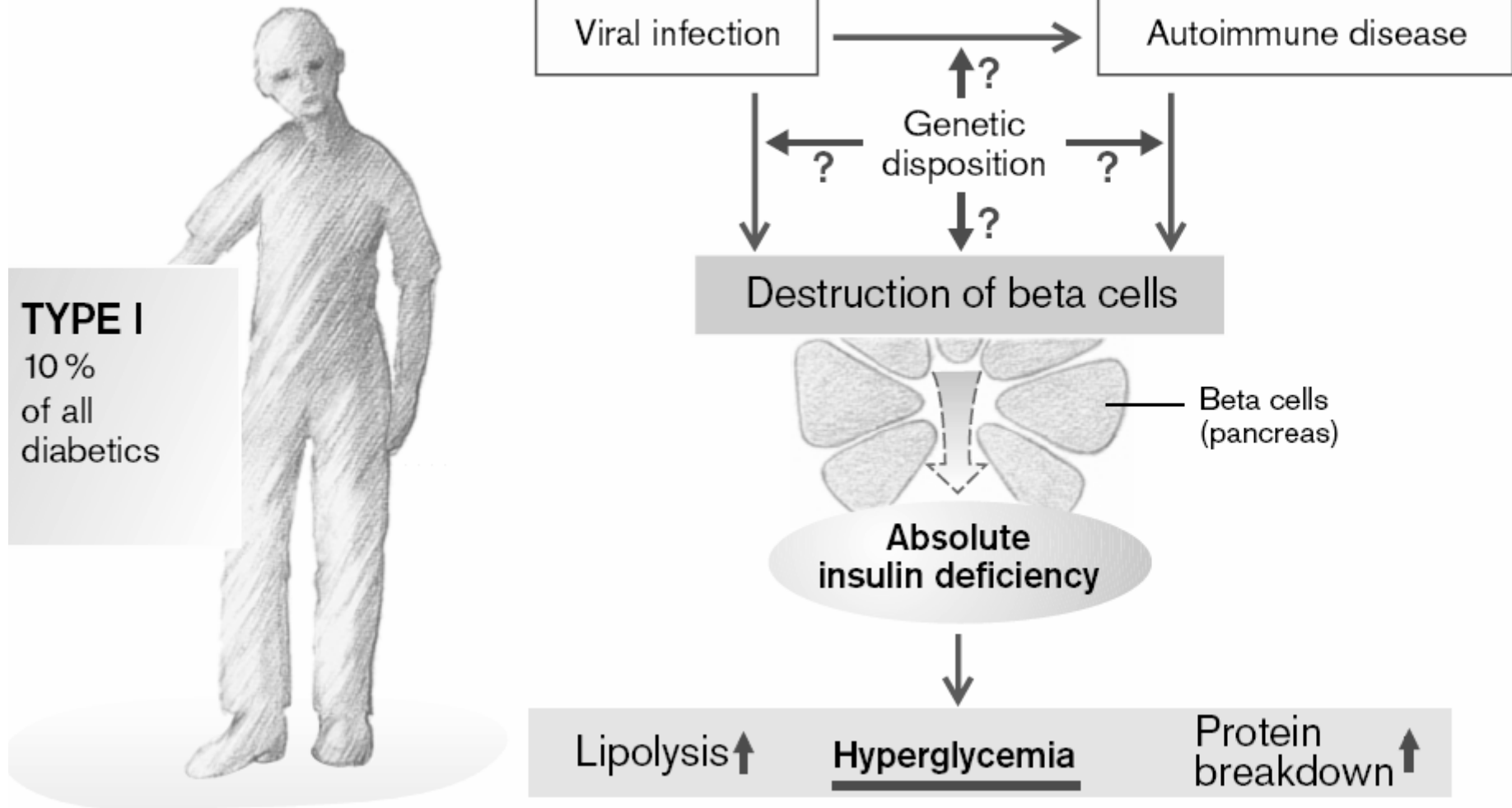


C. Účinky hormonů na metabolismus sacharidů a tuků

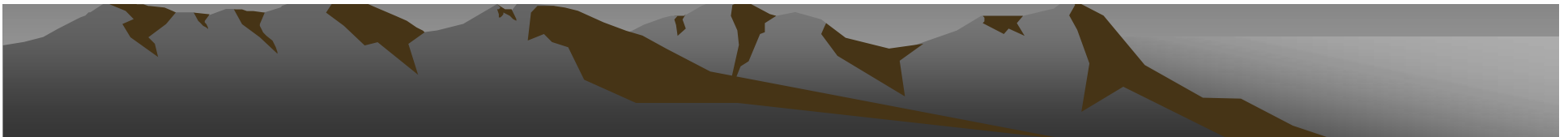
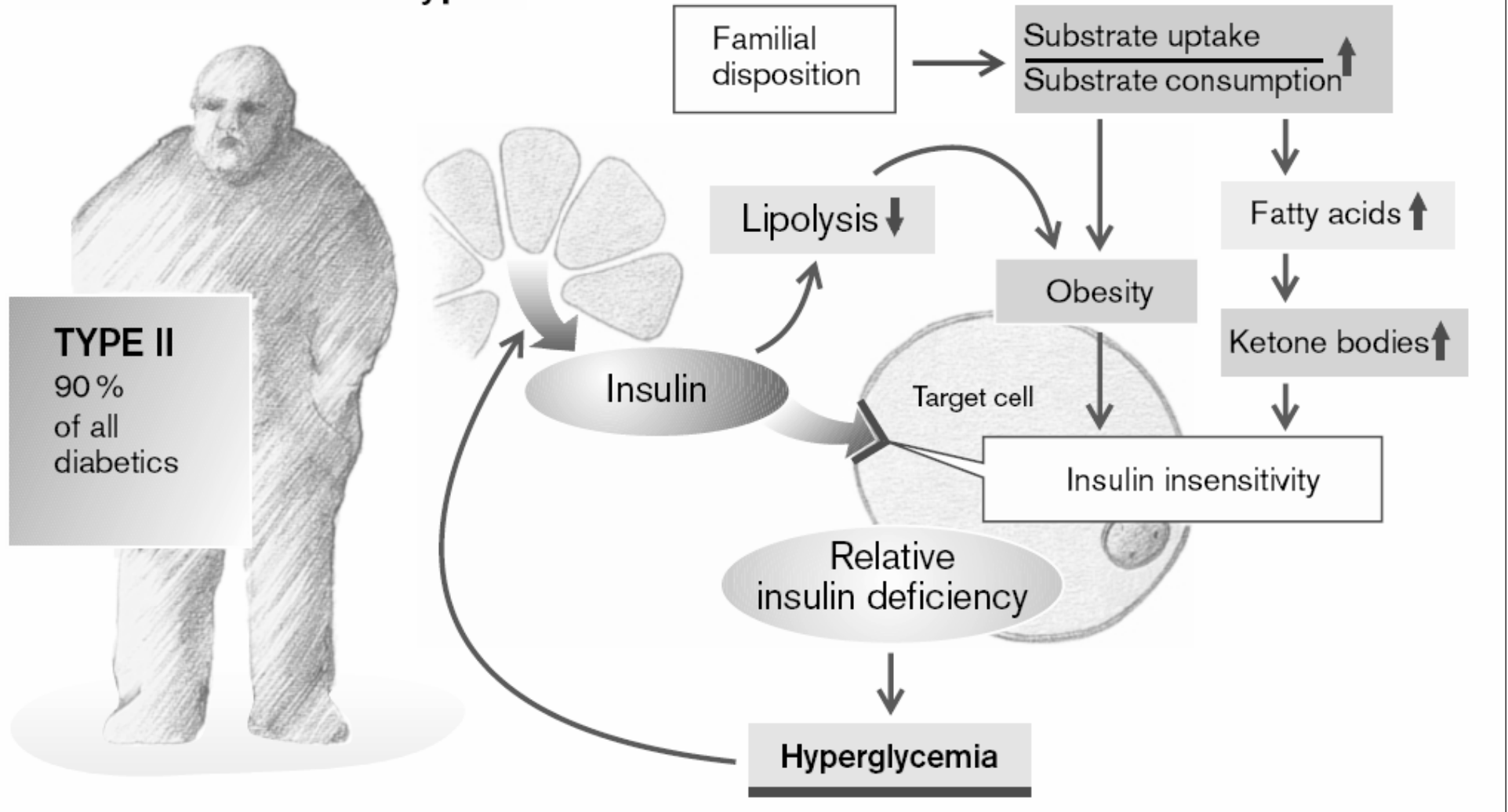
hormon funkce	inzulin sytost ← pufr	glukagon → hlad	adrenalin poplach, námaha	kortizol pohotovost
glukóza přijem do buňky	+ svaly, tuková tkáň		+ svaly	- svaly, tuková tkáň
glykolýza	+	-	+	-
glukoneogeneze (játra)	-	+	+	+
glykogen tvorba ↔ odbourávání	játra, svaly ←	játra →	játra, svaly →	játra ←
tuk tvorba ↔ odbourávání	játra, tuková tkáň ←	tuková tkáň →	tuková tkáň →	tuková tkáň →



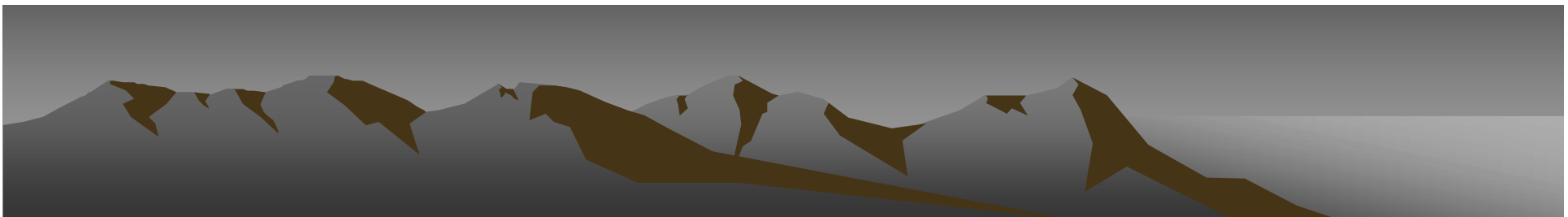
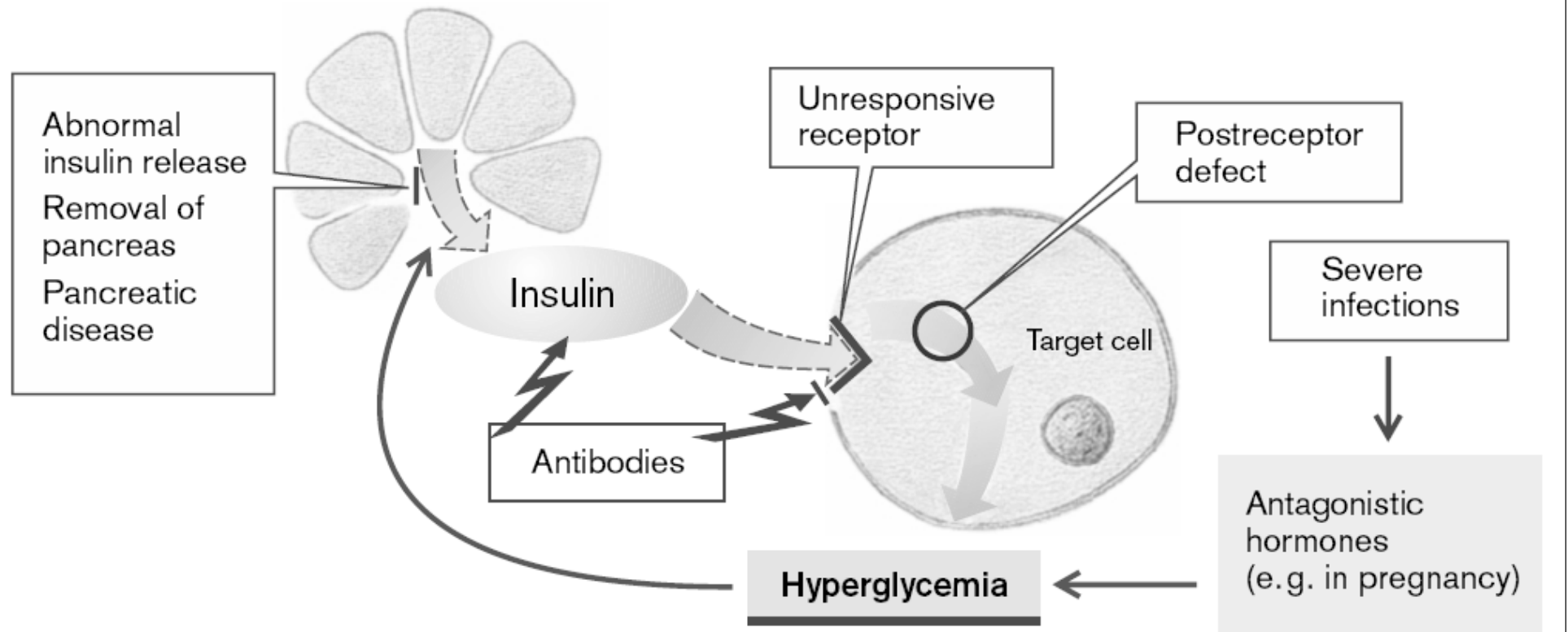
A. Diabetes Mellitus: Type I



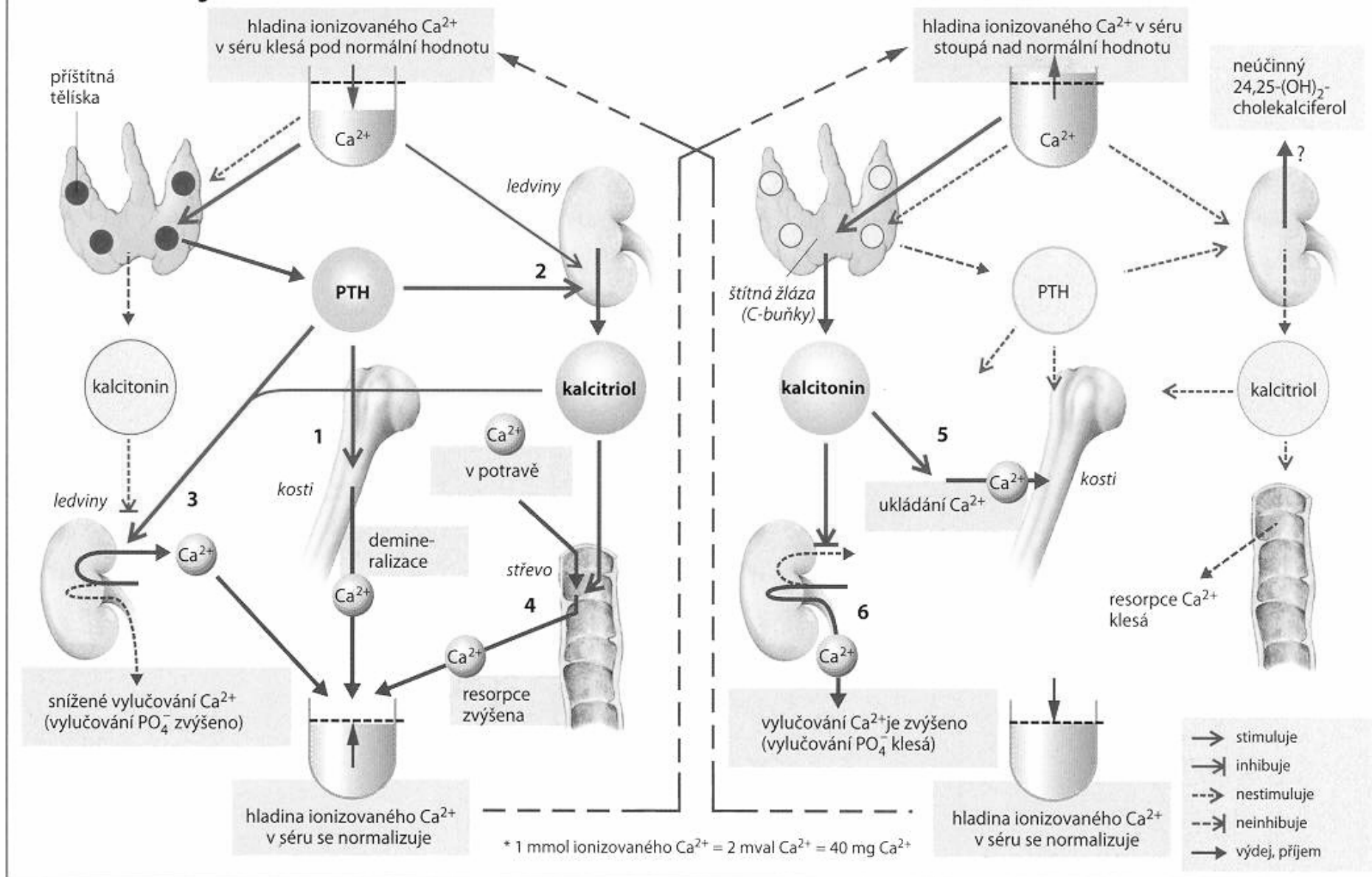
- B. Diabetes Mellitus: Type II



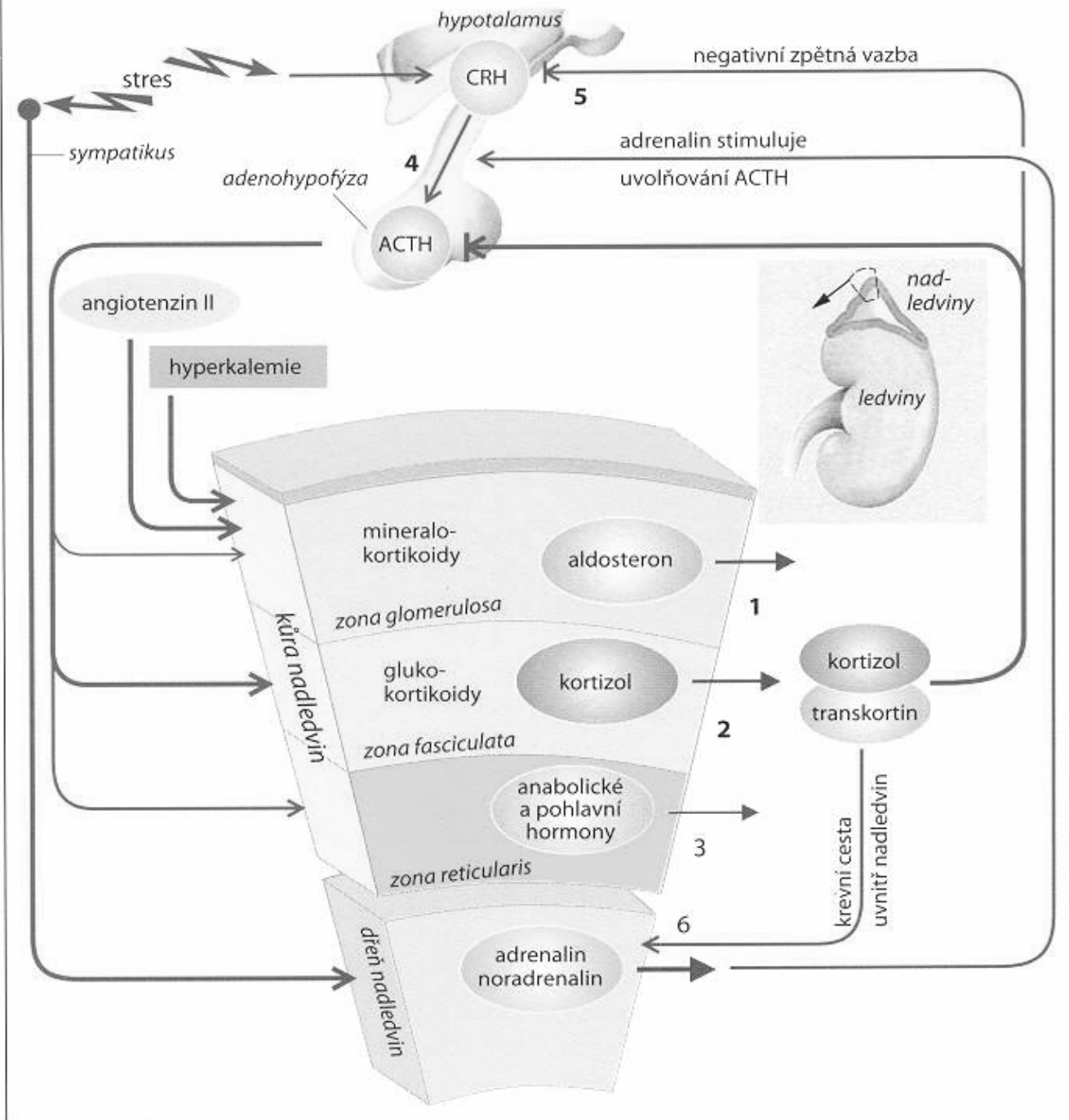
- C. Other Causes of Diabetes Mellitus

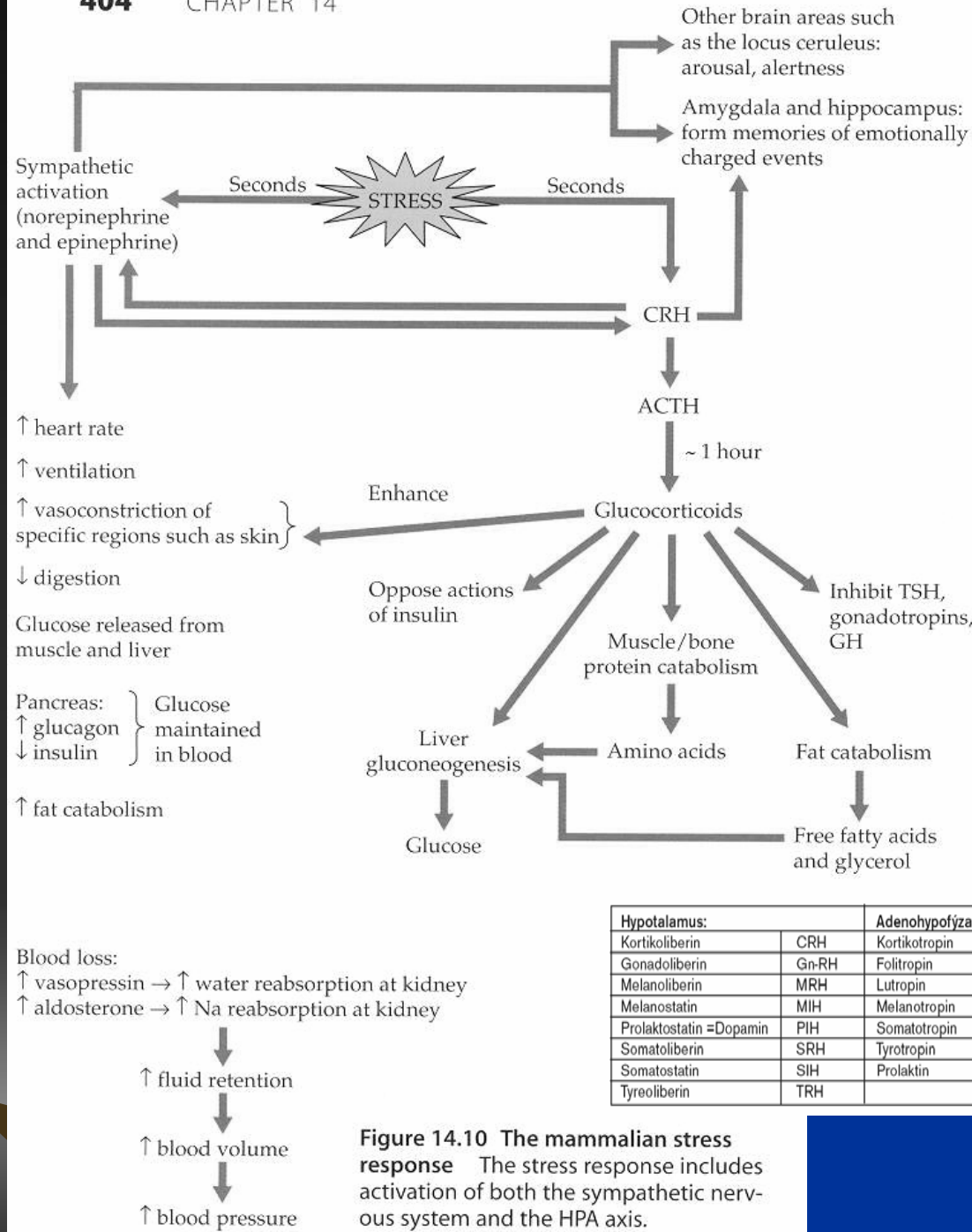


D. Hormonální regulace koncentrace Ca^{2+} v krvi



A. Hormony kůry nadledvin

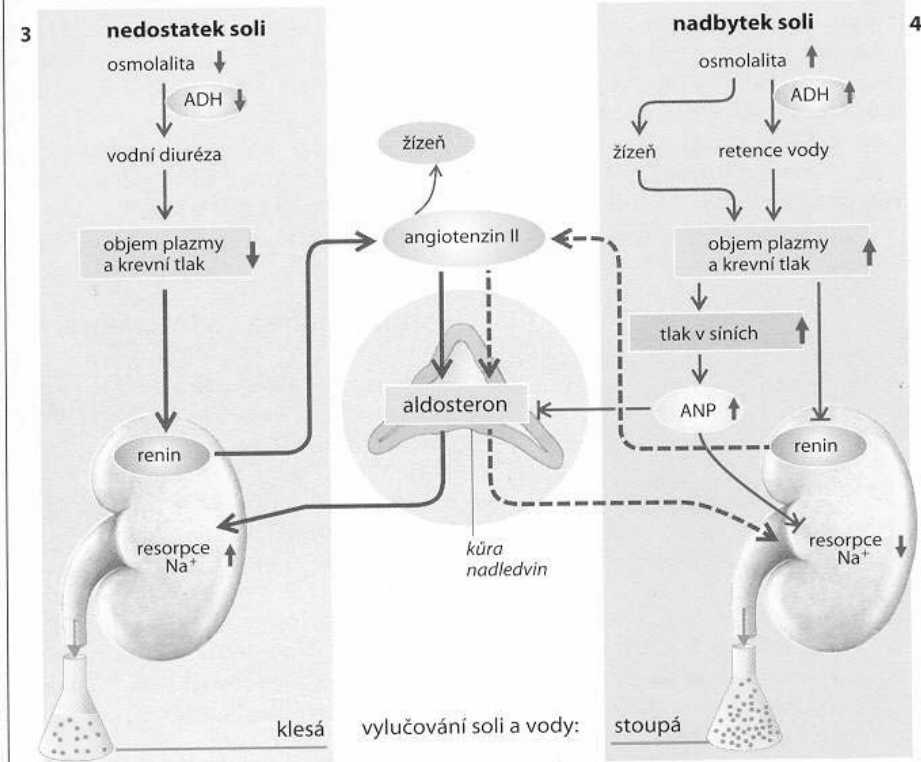
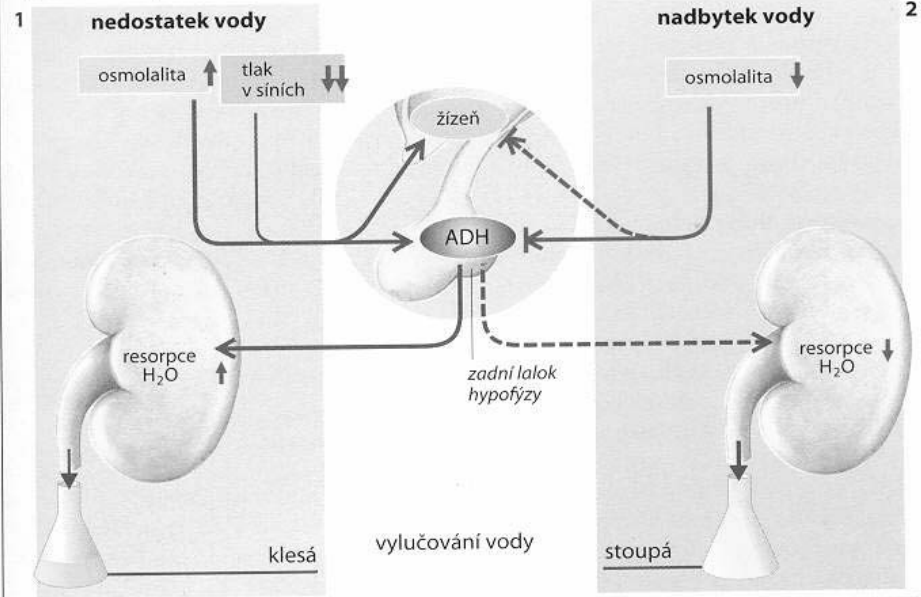


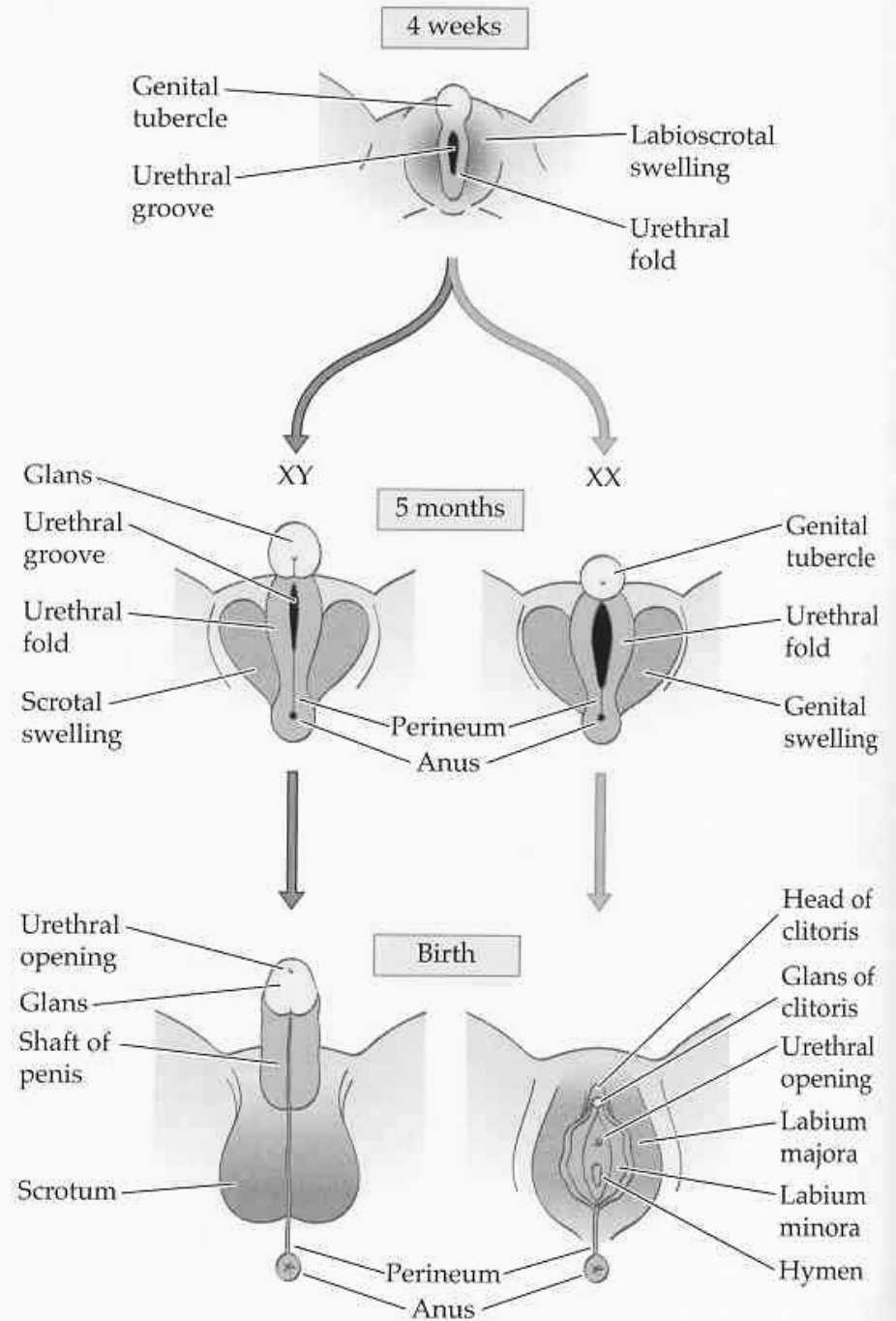
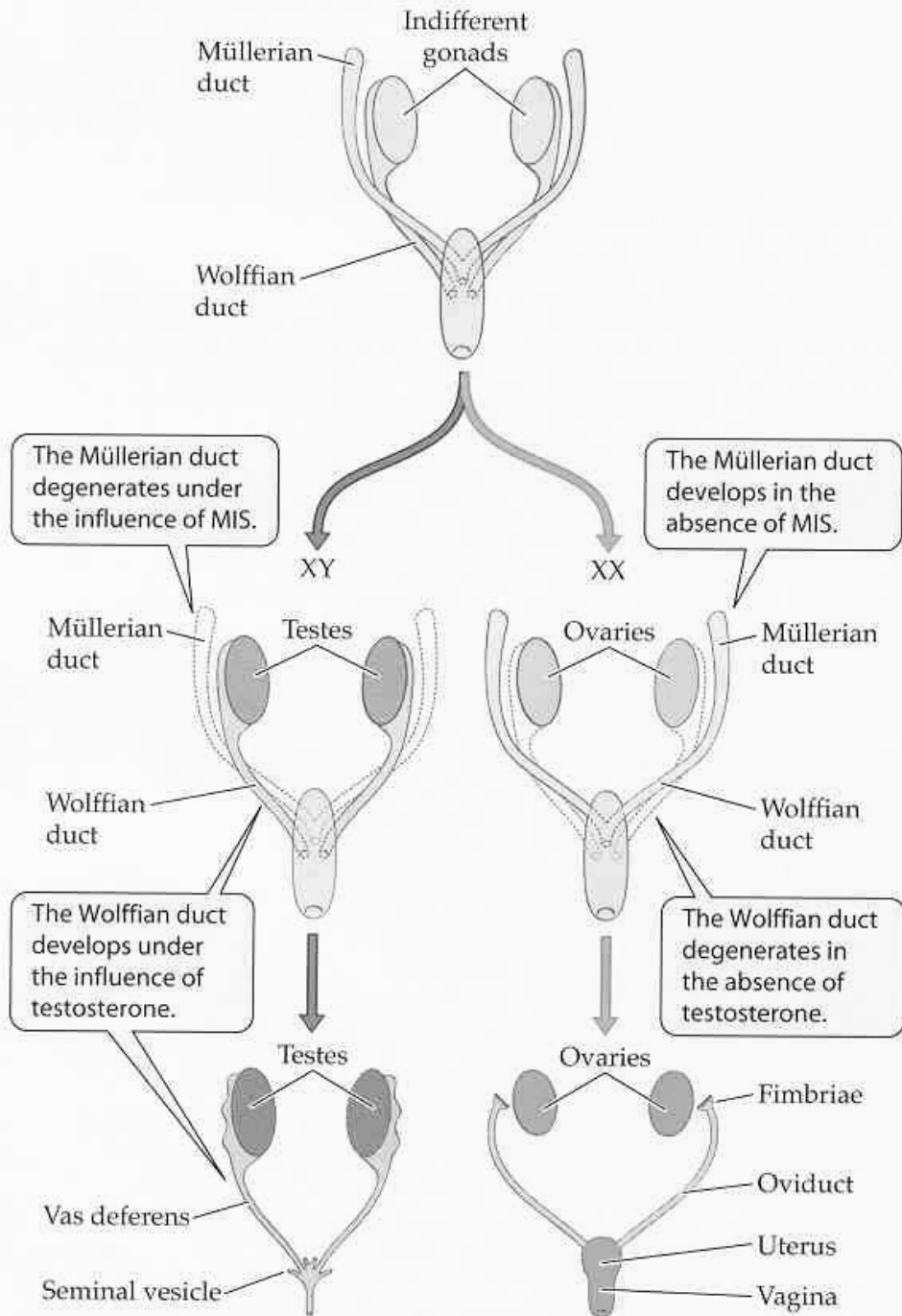


Hypothalamus:		Adenohypofyza		Neurohypofyza	
Kortikoliberin	CRH	Kortikotropin	ACTH	Oxytocin	
Gonadoliberin	Gn-RH	Folitropin	FSH	Adiuretin	ADH
Melanoliberin	MRH	Lutropin	LH		
Melanostatin	MIH	Melanotropin	MSH		
Prolaktostatin = Dopamin	PIH	Somatotropin	STH		
Somatoliberin	SRH	Tyotropin	TSH		
Somatostatin	SIH	Prolaktin	PRL		
Tyreoliberin	TRH				

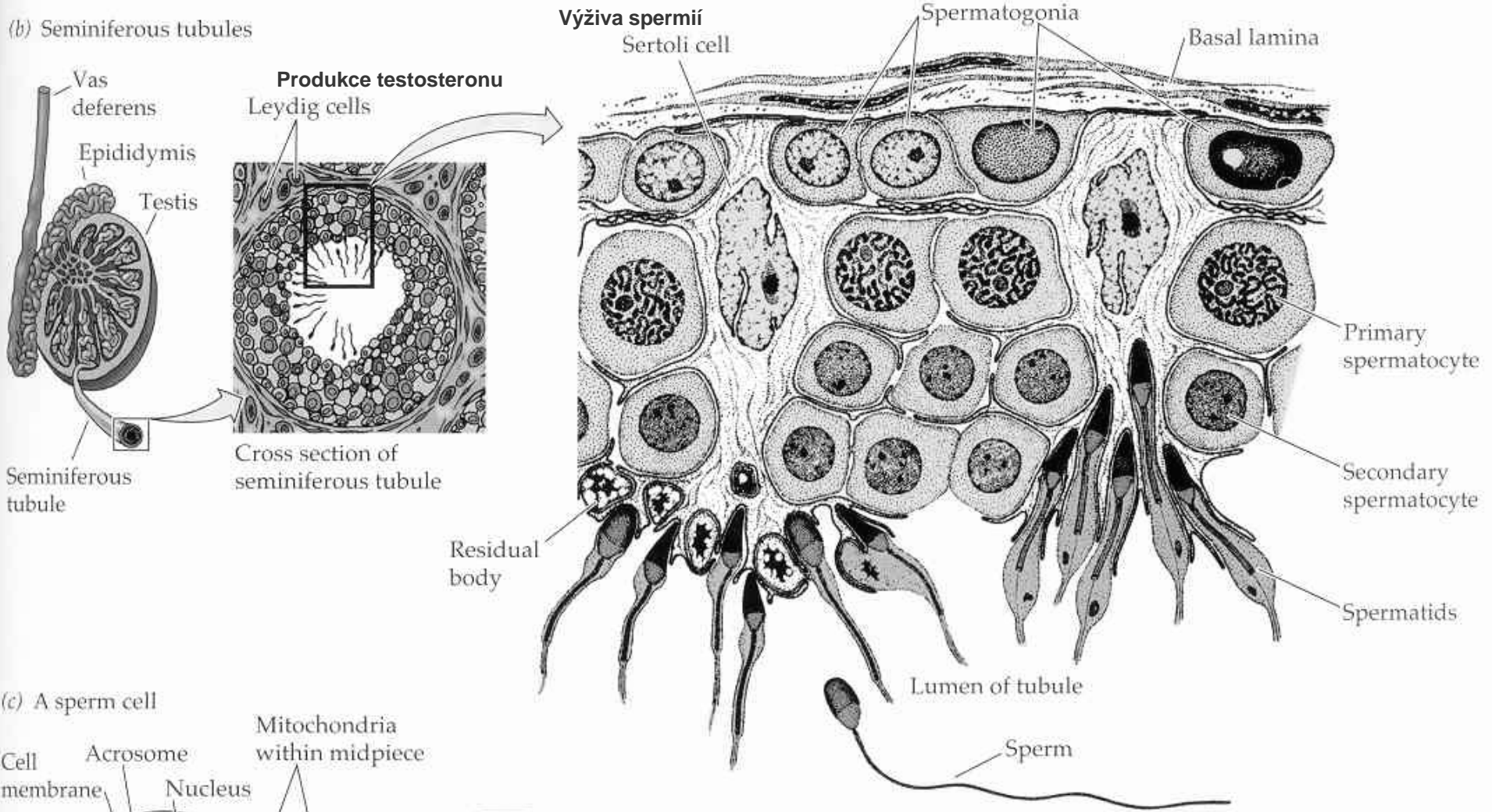
Figure 14.10 The mammalian stress response The stress response includes activation of both the sympathetic nervous system and the HPA axis.

A. Řízení hospodaření solemi a vodou

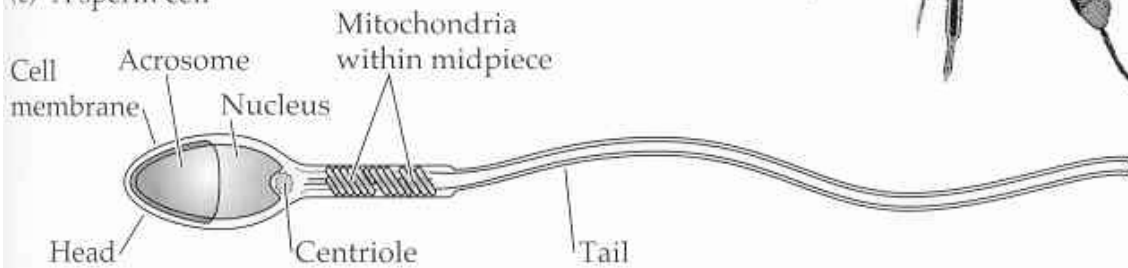




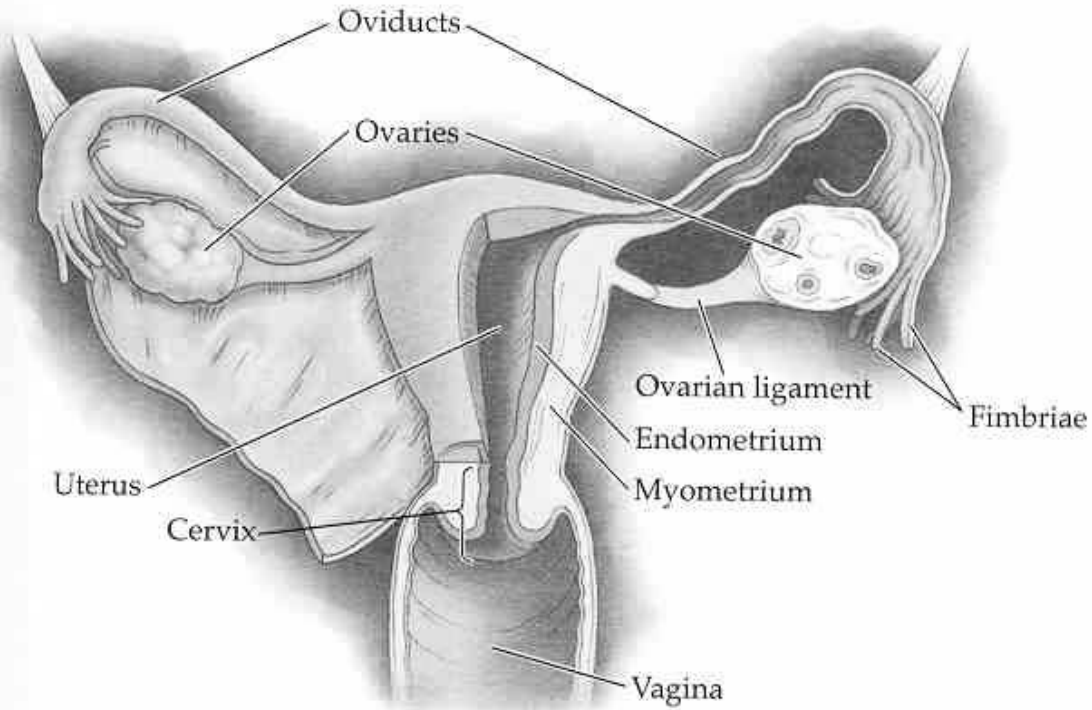
(b) Seminiferous tubules



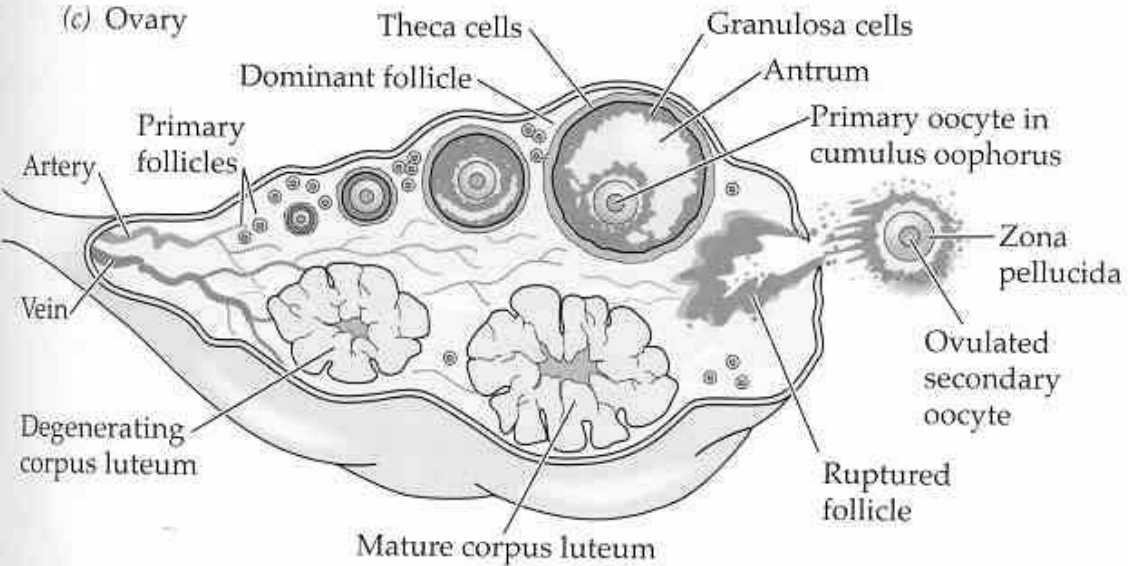
(c) A sperm cell

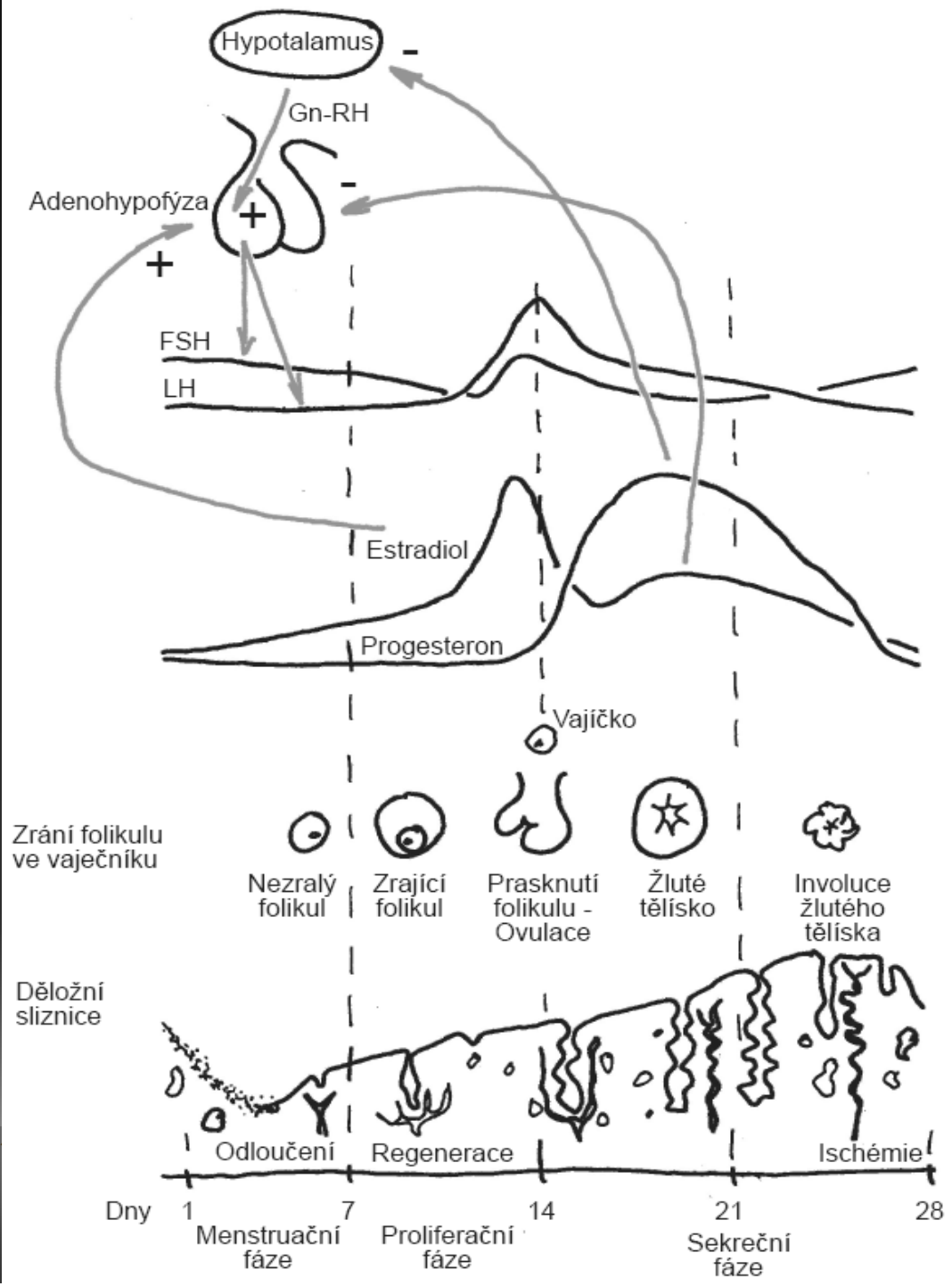


(b) Internal organs (frontal view)



(c) Ovary





Zrání folikulu ve vaječniku

Děložní sliznice

Dny 1 7 14 21 28
 Menstruační fáze Proliferační fáze Sekreční fáze

Hypotalamus

Gn-RH

Adenohypofýza

FSH

LH

Estradiol

Progesteron

Vajíčko

Nezralý folikul

Zrající folikul

Prasknutí folikulu - Ovulace

Žluté tělísko

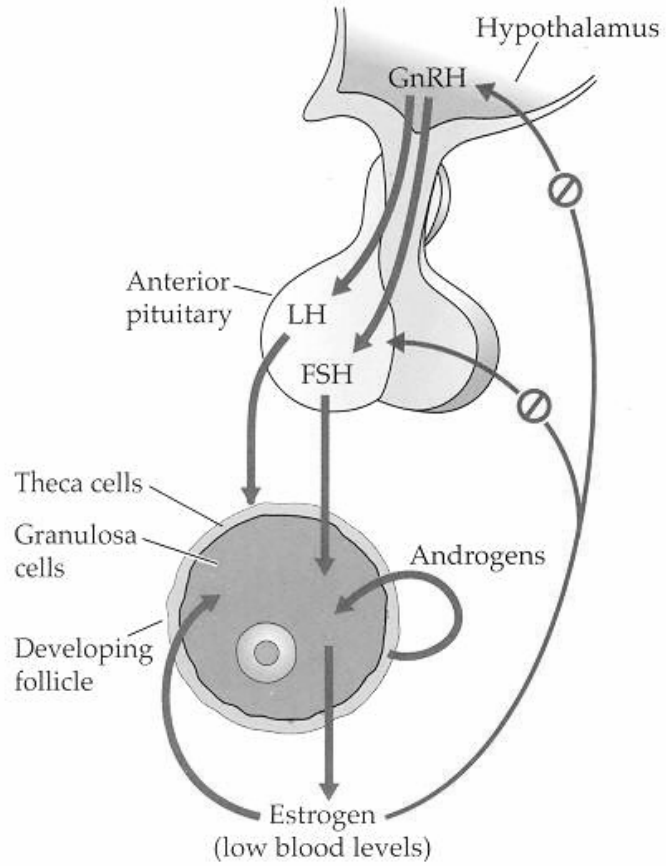
Involuce žlutého tělíska

Odloučení

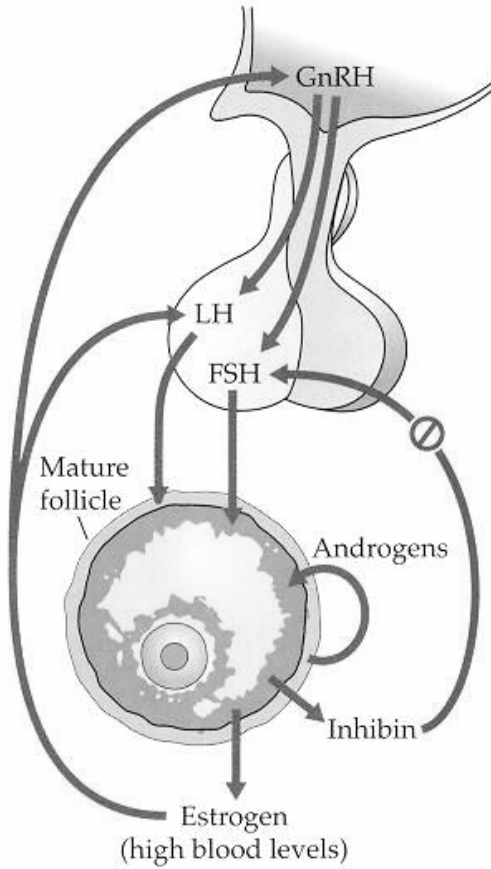
Regenerace

Ischémie

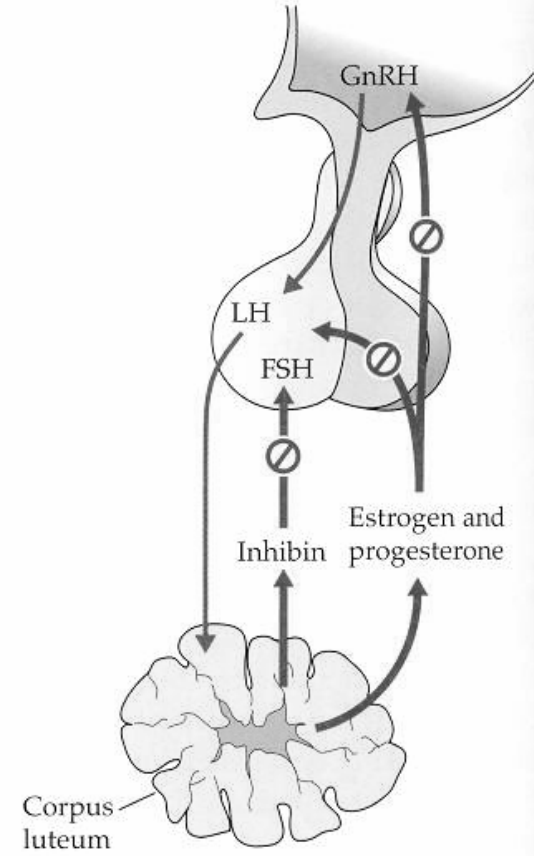
(a) Follicular phase



(b) Just before ovulation



(c) Luteal phase



(a) Early development

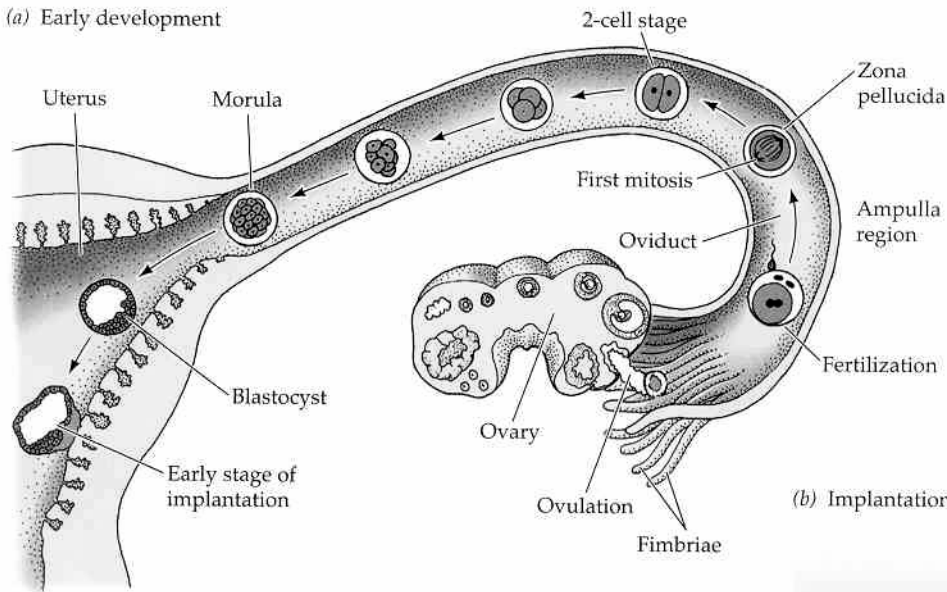
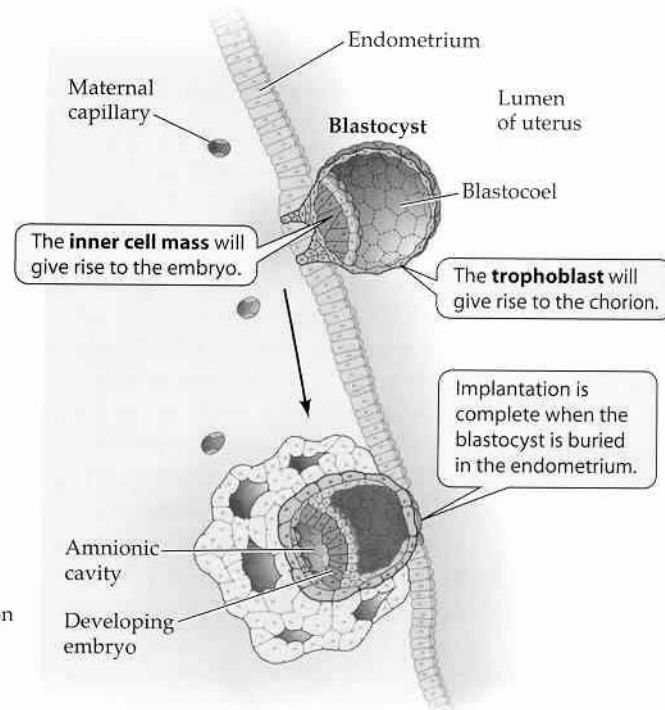


Figure 15.11 From fertilization to implantation (a) Fertilization occurs in the ampulla region of the oviduct, and mitotic cell divisions to the blastocyst stage take place en route to the uterus. (b) The trophoblast cells initiate implantation and development of the placenta. In humans, implantation is complete about 10 days after fertilization. (c) Embryonic blood moves to and from the placenta through the umbilical cord. Maternal blood percolates around projections of the chorion (villi) that contain capillaries.

(b) Implantation of the blastocyst



(c) The placenta

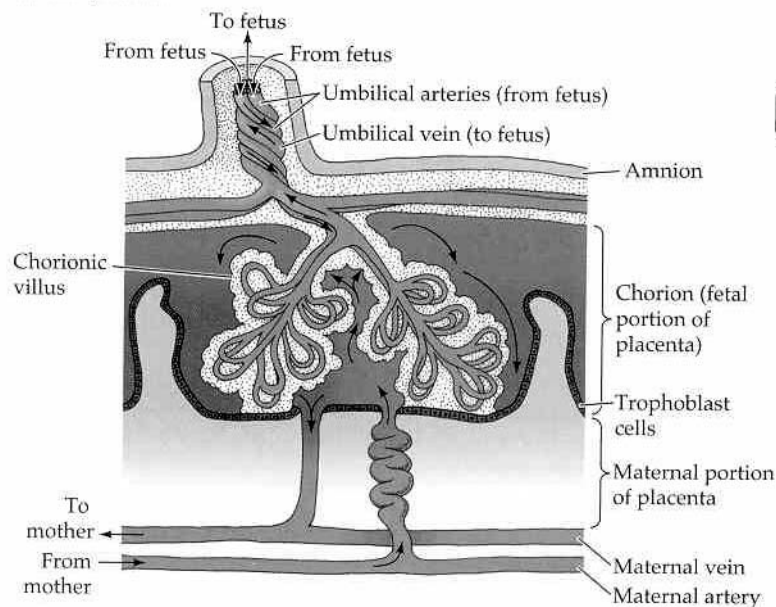
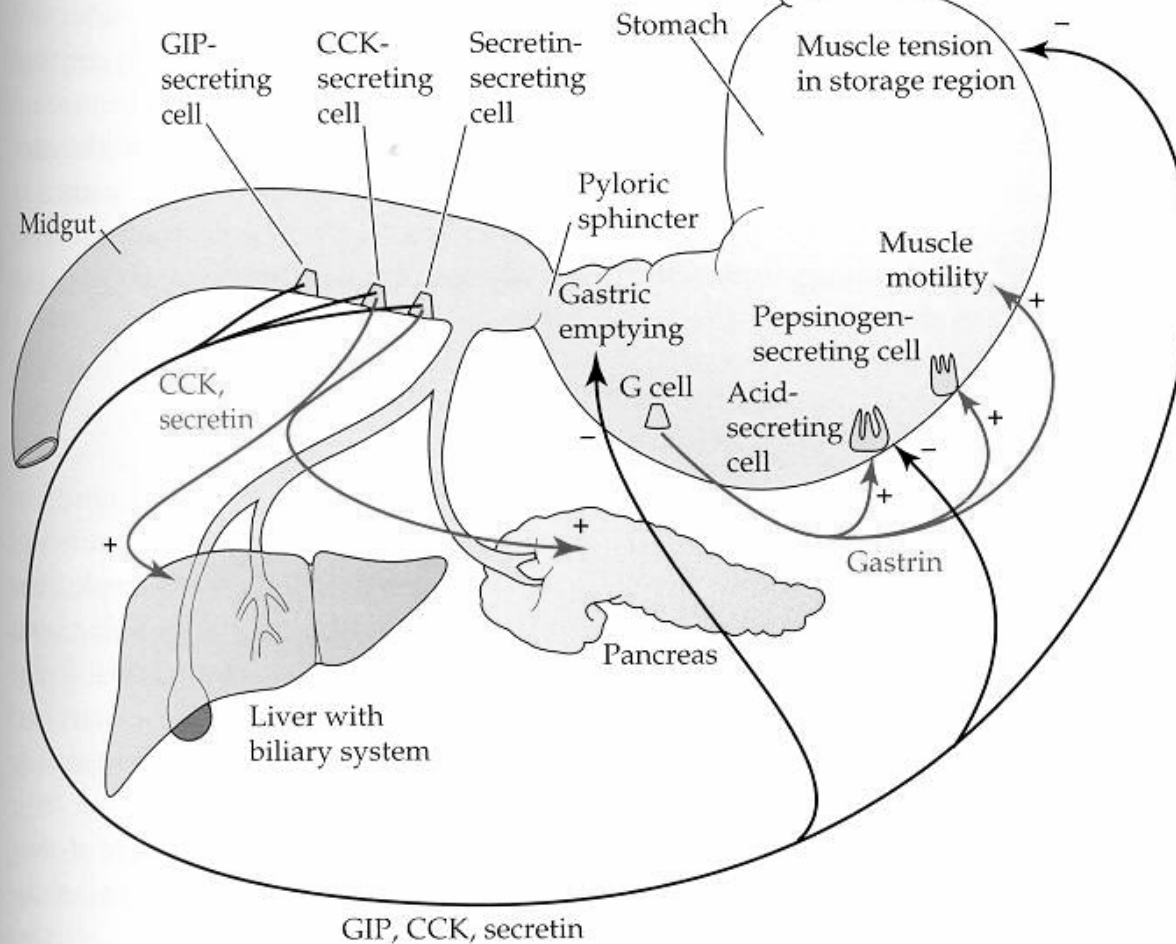


Figure 4.20 Gastrointestinal function after a meal is coordinated in part by hormones secreted by endocrine cells in the gut epithelium. The arrows represent hormones traveling by way of blood transport from endocrine cells to target cells. Red and blue arrows marked with plus (+) signs symbolize stimulatory effects on target cells. Black arrows marked with minus (-) signs symbolize inhibitory effects. The controls shown here are only a small fraction of the total set of nerve, endocrine, and paracrine controls that coordinate the processes activated by eating.



and midgut material is appropriate passing along arterial being the stomach. The midgut digestion

