

M U N I
S C I

C5730 Biochemie - seminář

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podzim 2024

M U N I
S C I

Signalizace a regulace

Buněčná signalizace

- komunikace mezi buňkami nebo v rámci buněk
- slouží nejen ke koordinaci buněčných funkcí, ale také k vývoji, růstu a dělení buněk

➤ typy signalizace:

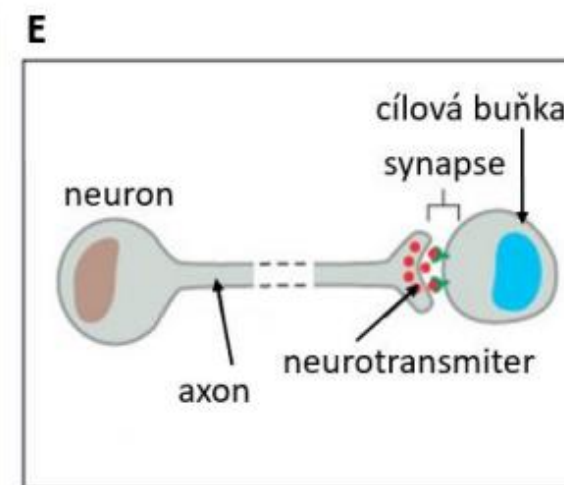
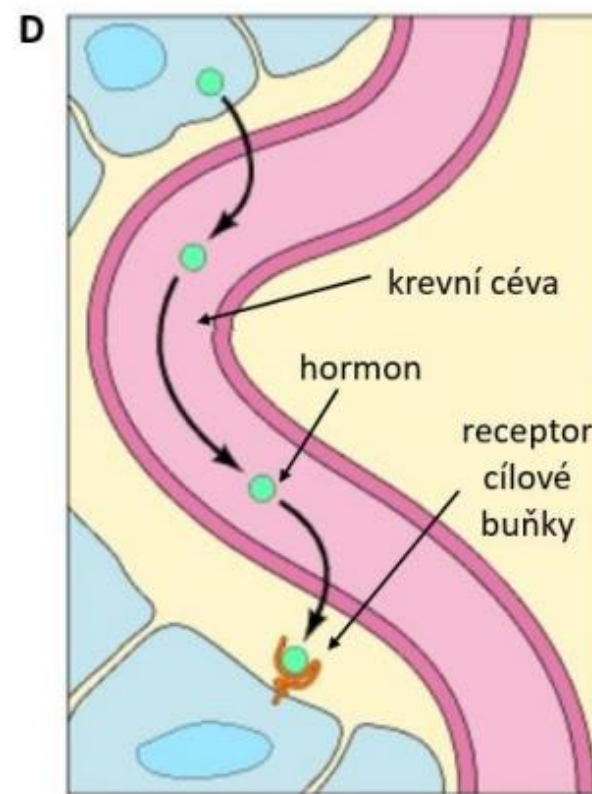
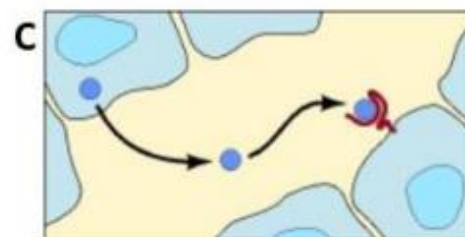
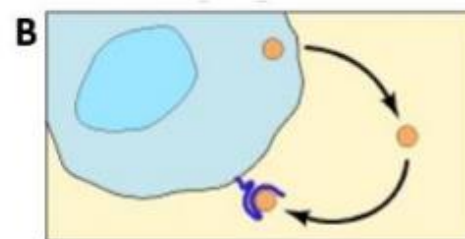
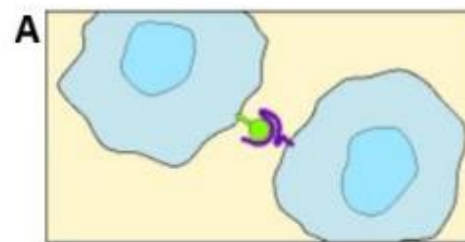
A. juxtakrinní

B. autokrinní

C. parakrinní

D. endokrinní (hormonální)

E. synaptická



Signální molekuly

- lipofilní: steroidní a thyroïdní hormony, eikosanoidy, retinoidy
- peptidové/proteinové: peptidové hormony, růstové faktory a cytokiny
- deriváty aminokyselin: hormony (adrenalin, dopamin), neurotransmitery (GABA, histamin)
- nukleotidy: cAMP, cGMP
- malé anorganické molekuly a ionty: CO, NO, Ca²⁺

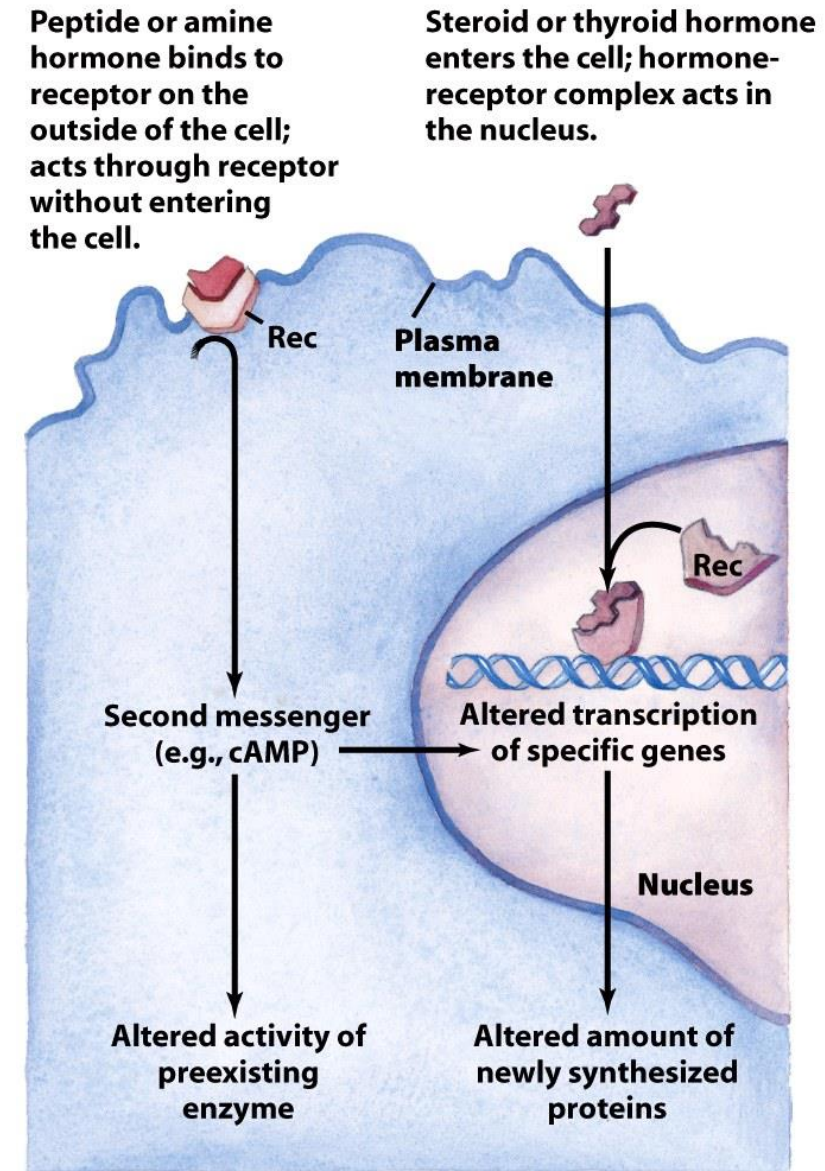
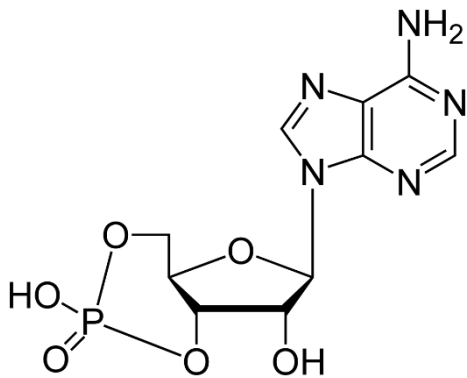


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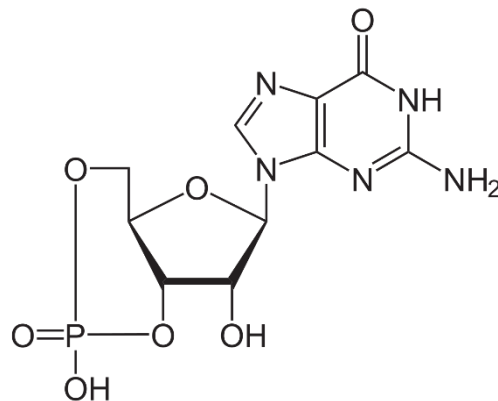
Druzí poslové

- většinou malé ve vodě rozpustné molekuly
- v rámci signální dráhy přichází na řadu až po vazbě signální molekuly na membránový receptor
- zástupci: cAMP, gGMP, DAG, IP₃, Ca²⁺

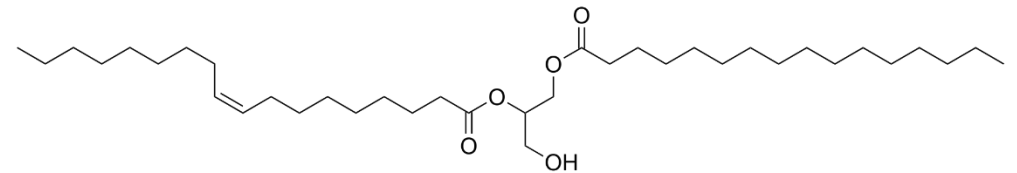
**cyklický
adenosinmonofosfát**



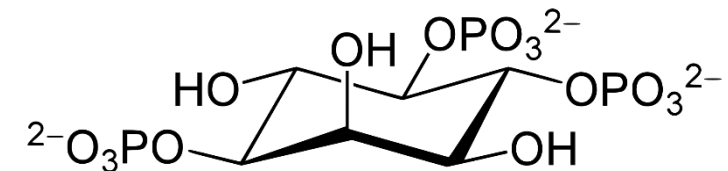
**cyklický
guanosinmonofosfát**



1,2-diacylglycerol (DAG)

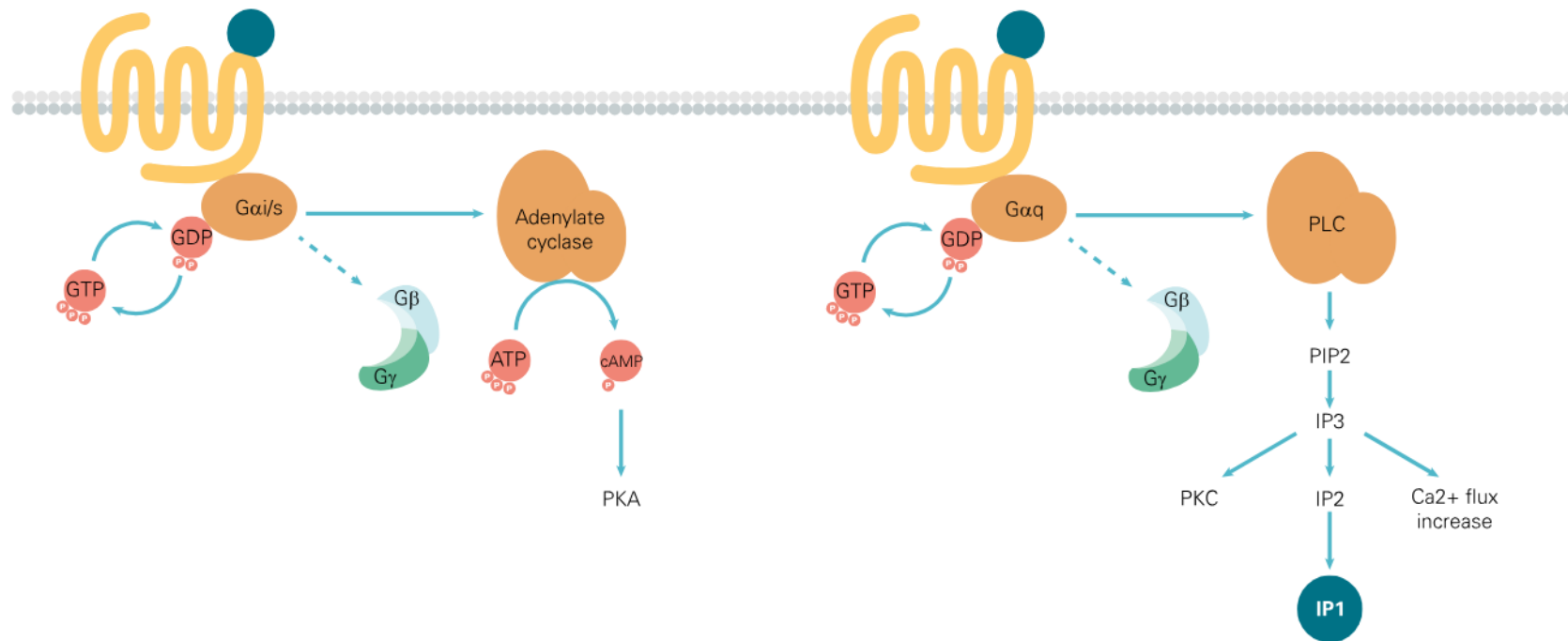


inositol-trisfosfát (IP3)



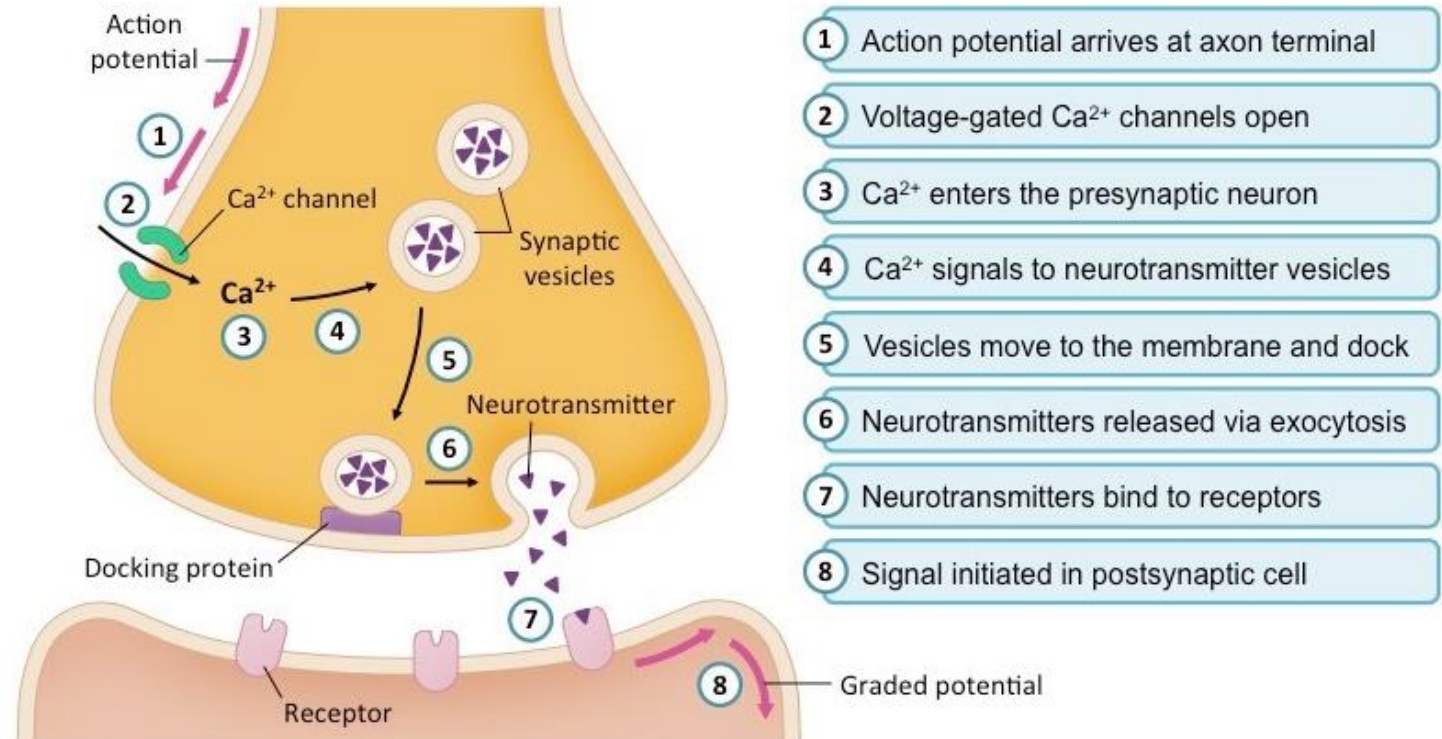
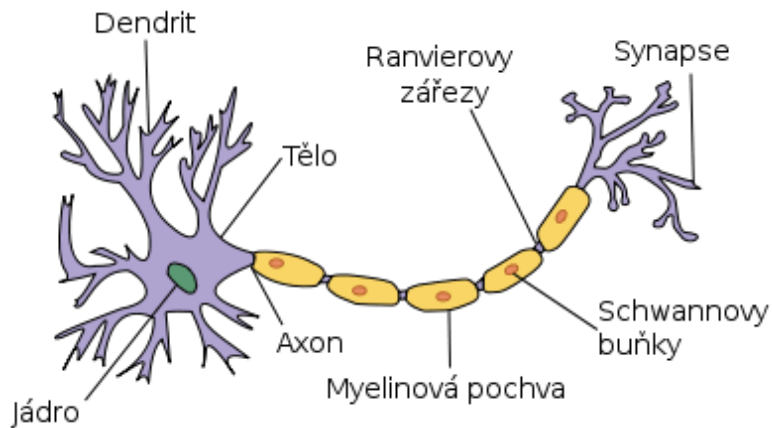
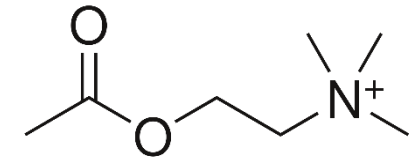
Membránové receptory

- receptory spřažené s **enzymy** (např. s tyrosinkinasovou aktivitou)
- receptory spřažené s **iontovými kanály**
- receptory spřažené s **G-proteinem**

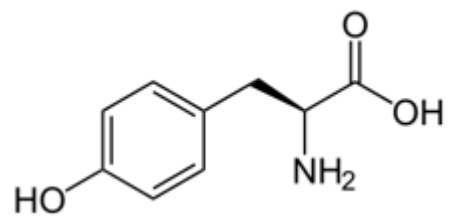


Funkce neurotransmiterů

- signální molekuly přenášející nervový vzruch mezi neurony (či mezi neuronem a svalovou buňkou)
- příklady: noradrenalin, adrenalin, histamin, serotonin, dopamin, GABA, **acetylcholin**

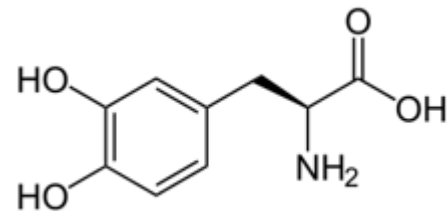


Syntéza katecholaminů



tyrosin

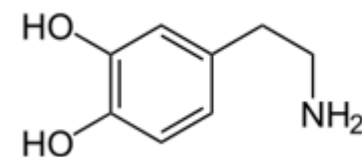
tyrosin hydroxylasa



dihydroxyfenylalanin
(DOPA)

DOPA dekarboxylasa

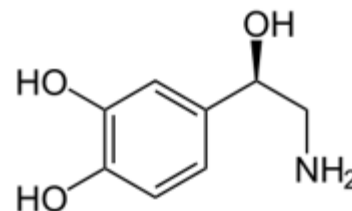
CO₂



dopamin

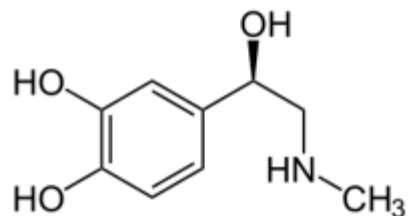
k. askorbová

dopamin β-hydroxylasa



noradrenalin

N-methyltransferasa

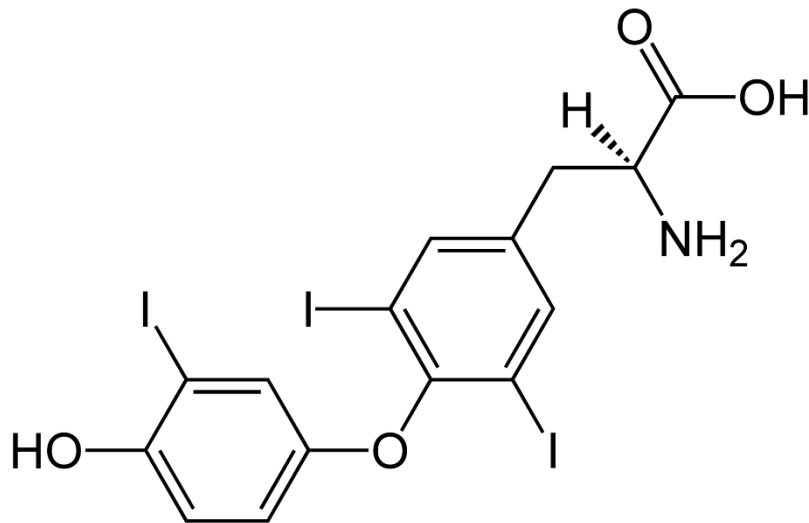


adrenalin

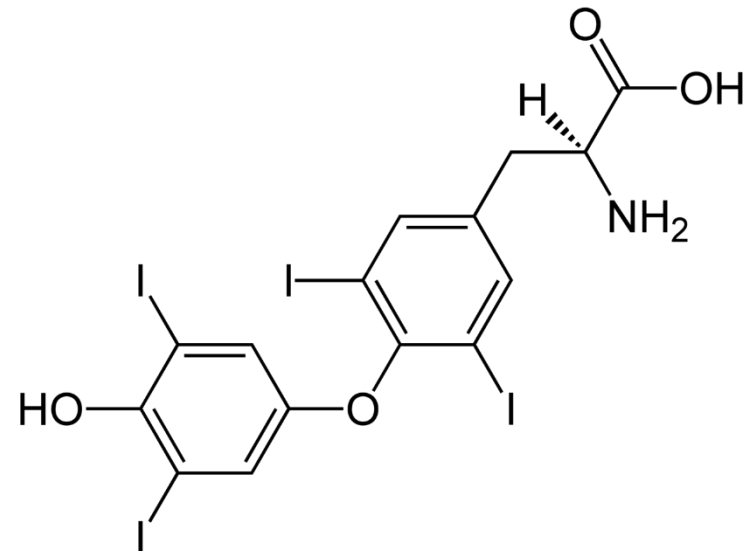
Thyroidní hormony

➤ hormony štítné žlázy jsou odvozené od tyrosinu

**trijodtyronin
(T3)**



**tetraiodtyronin
(tyroxin, T4)**



Vznik aktivního insulínu

- se syntézou aktivního insulínu se do krve uvolňuje i C-peptid
- C-peptid je důležitým markerem produkce insulínu

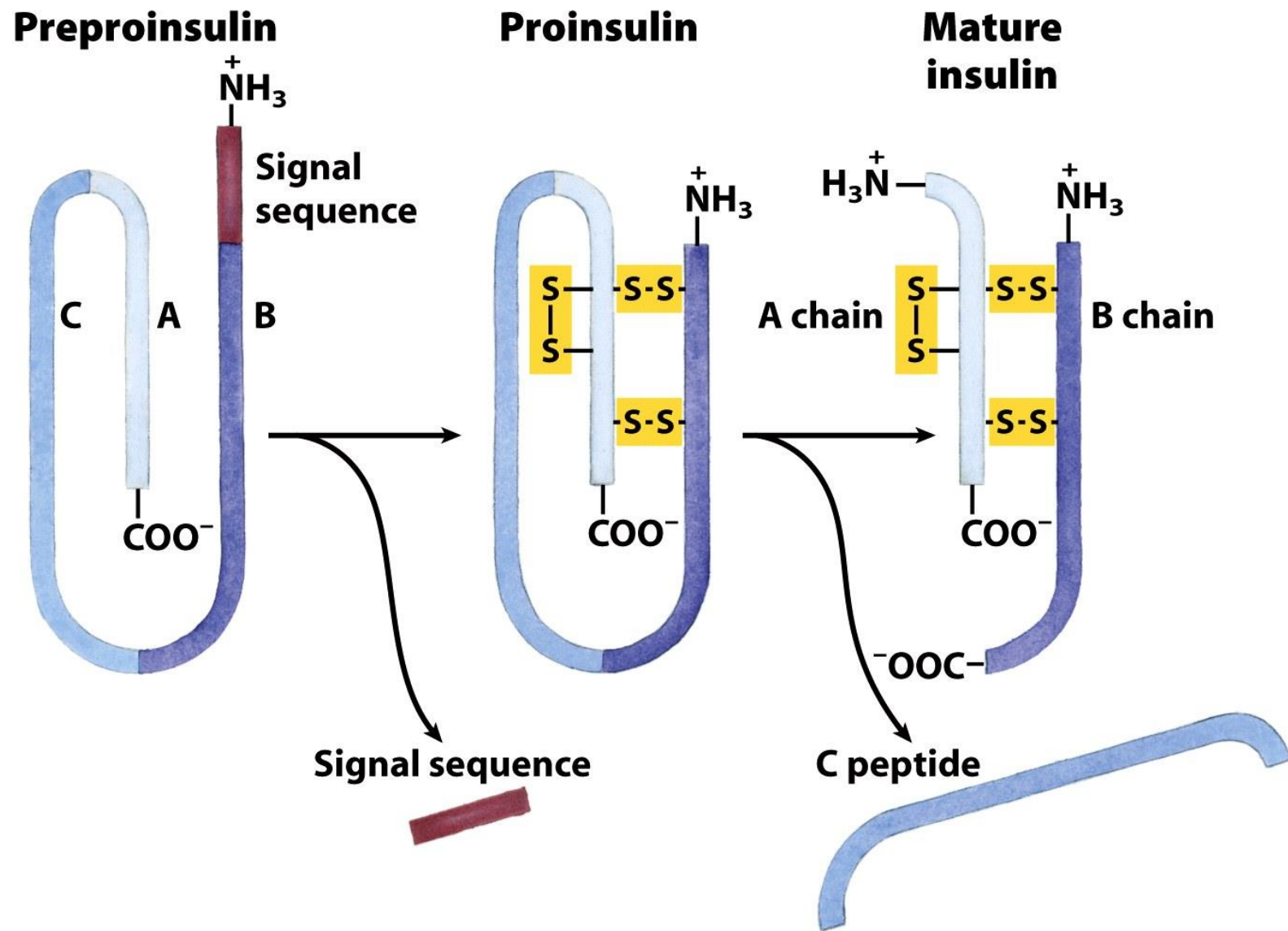
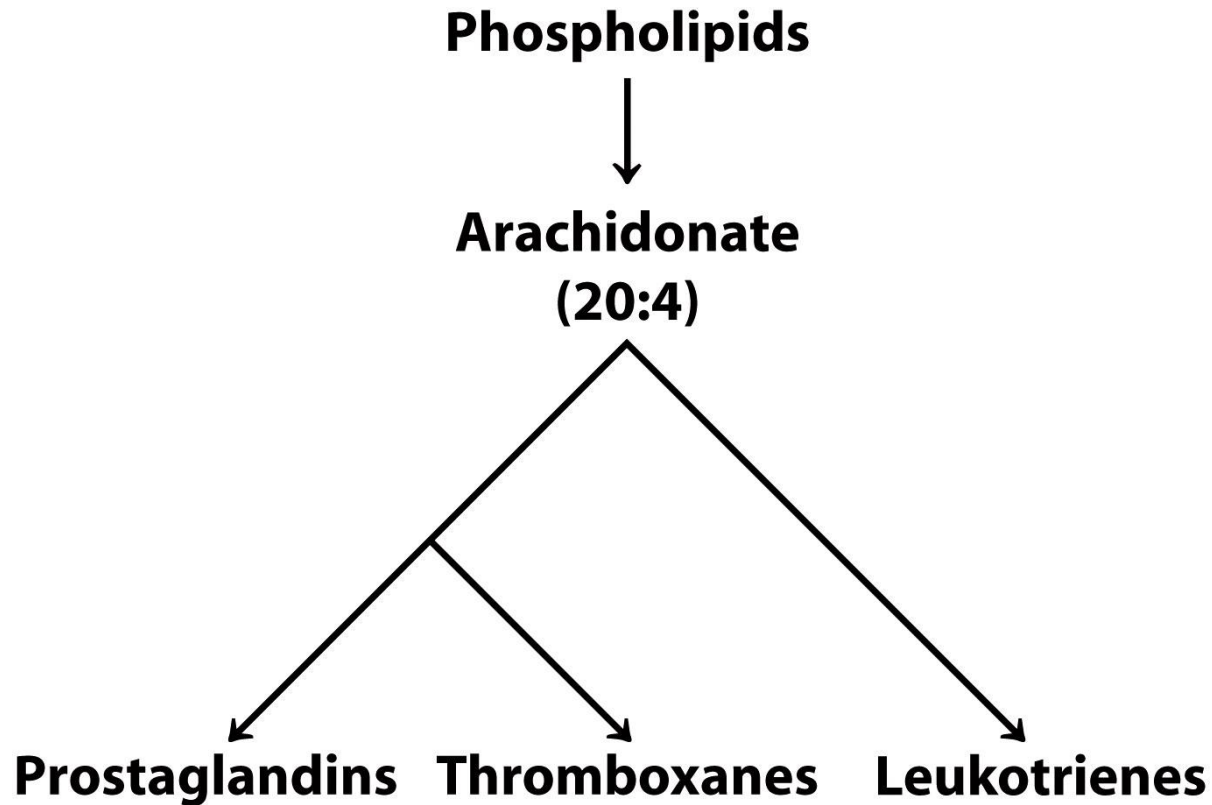


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Vznik dalších signálních molekul



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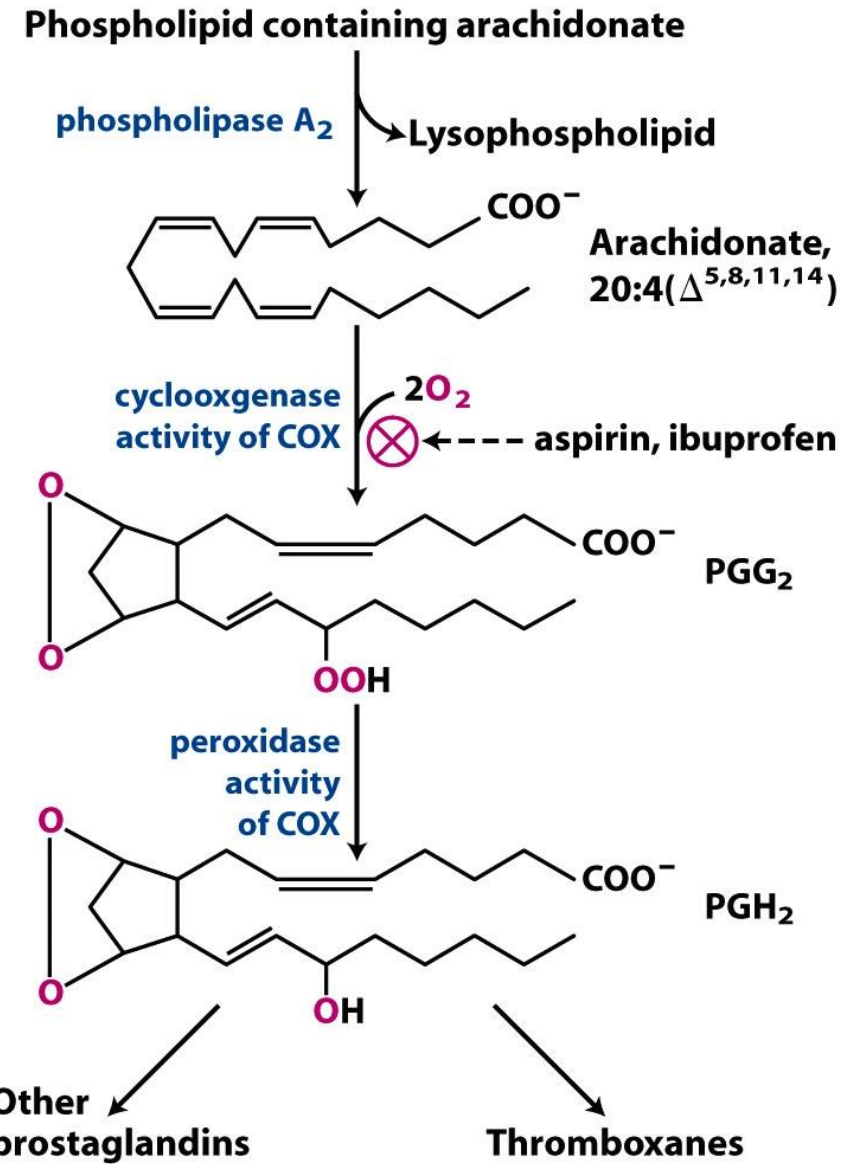


Figure 21-15a
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**Inhibice
cyklooxygenasy**

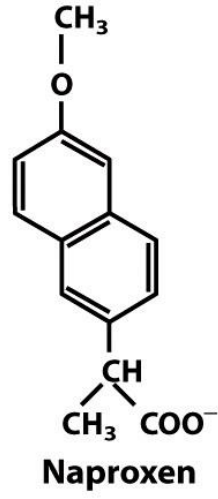
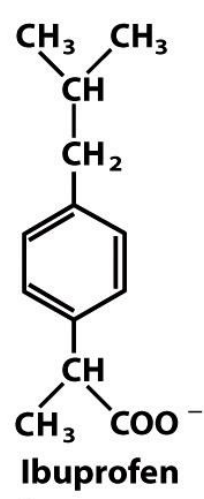
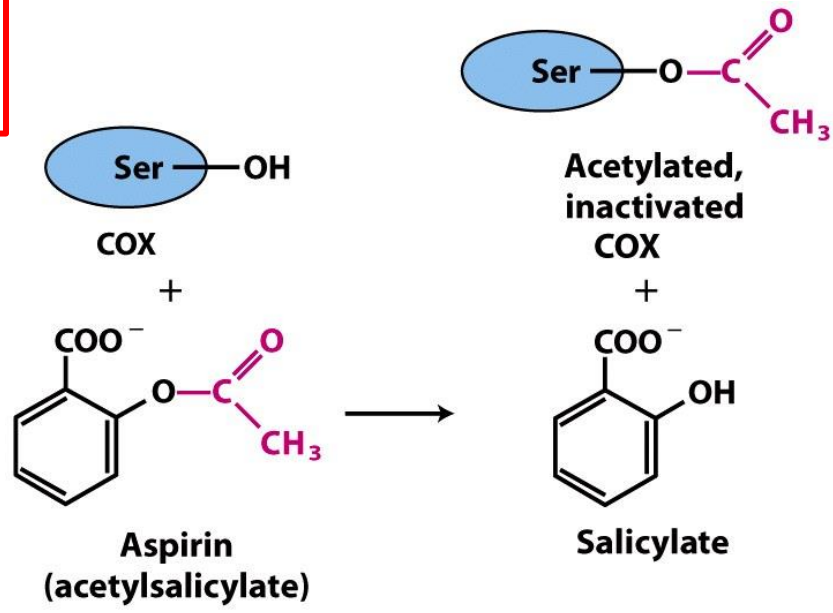


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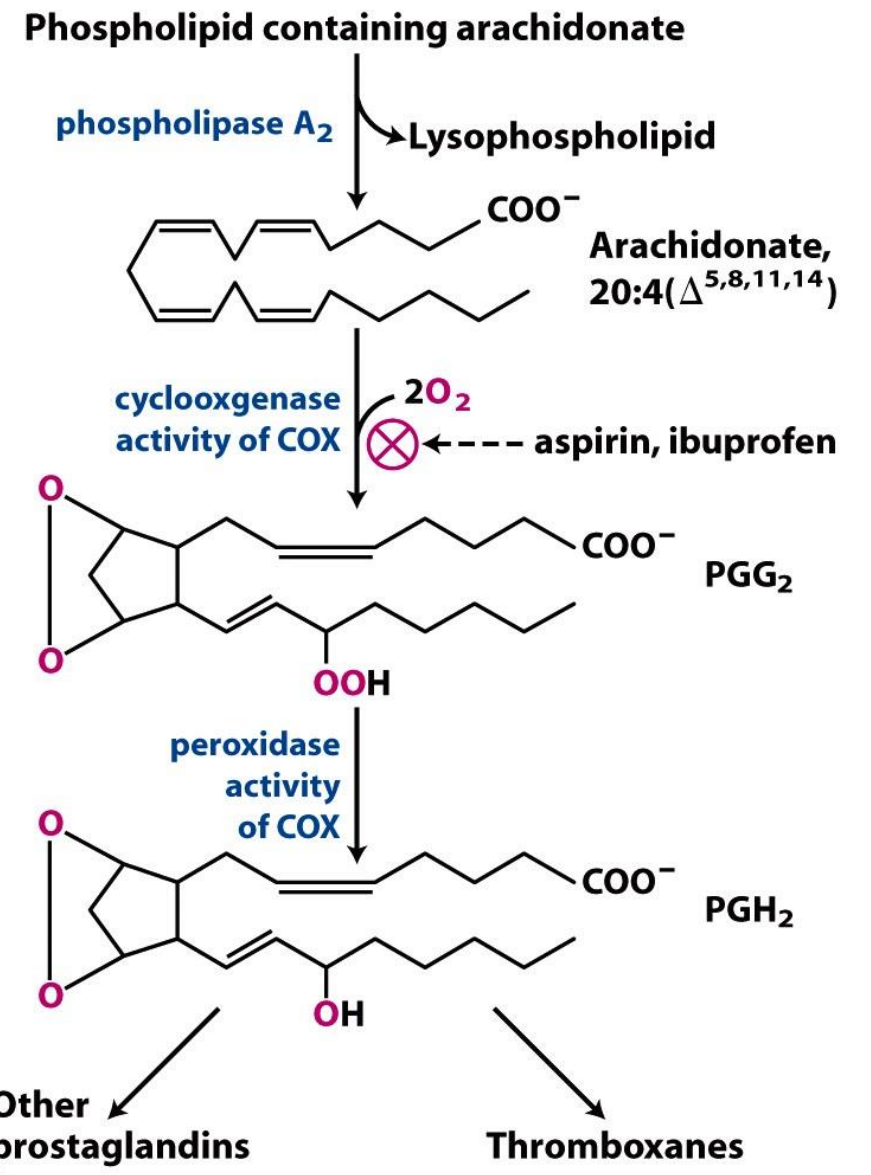


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Vznik dalších signálních molekul

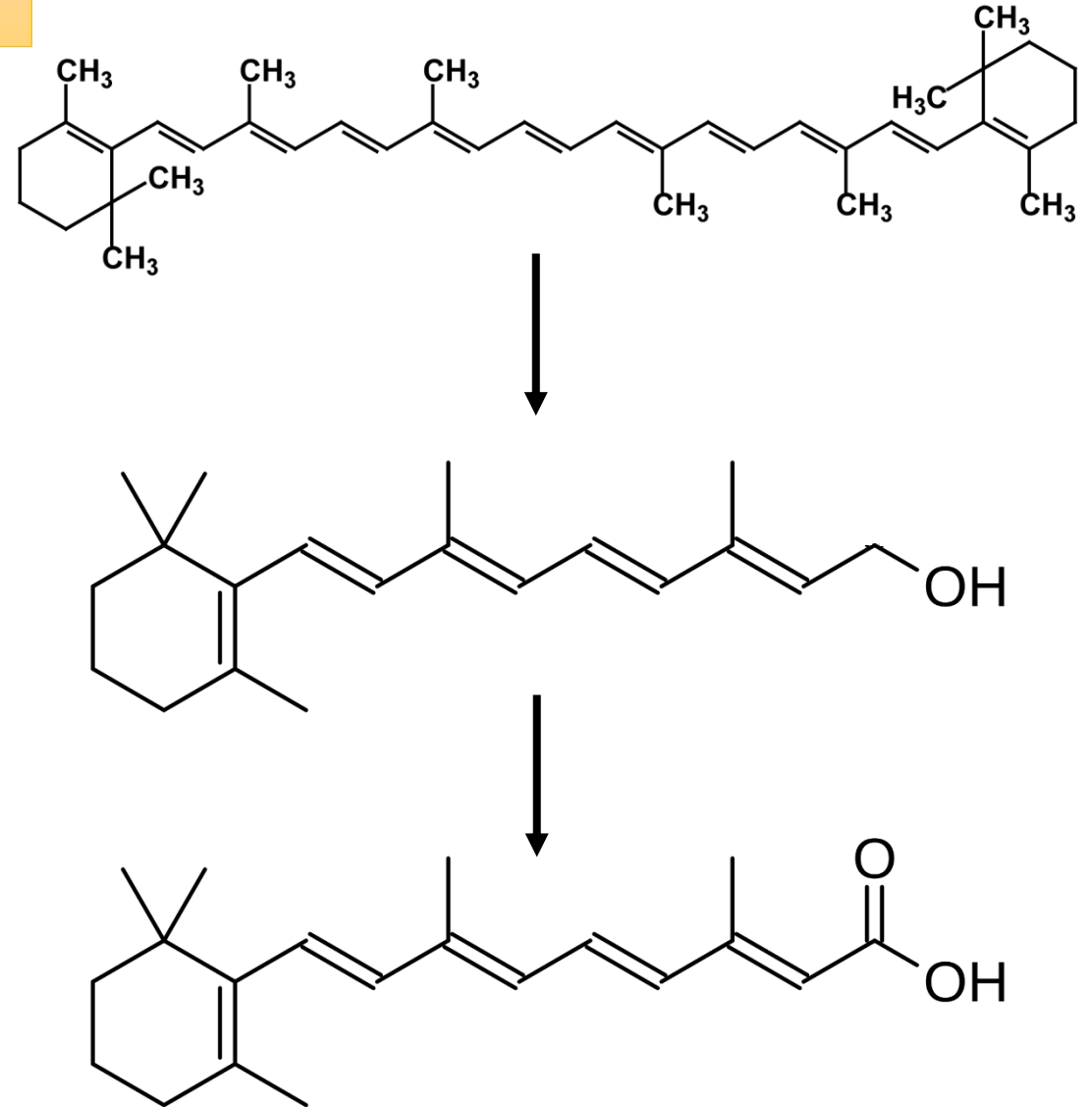
β -Carotene



**Vitamin A₁
(retinol)**

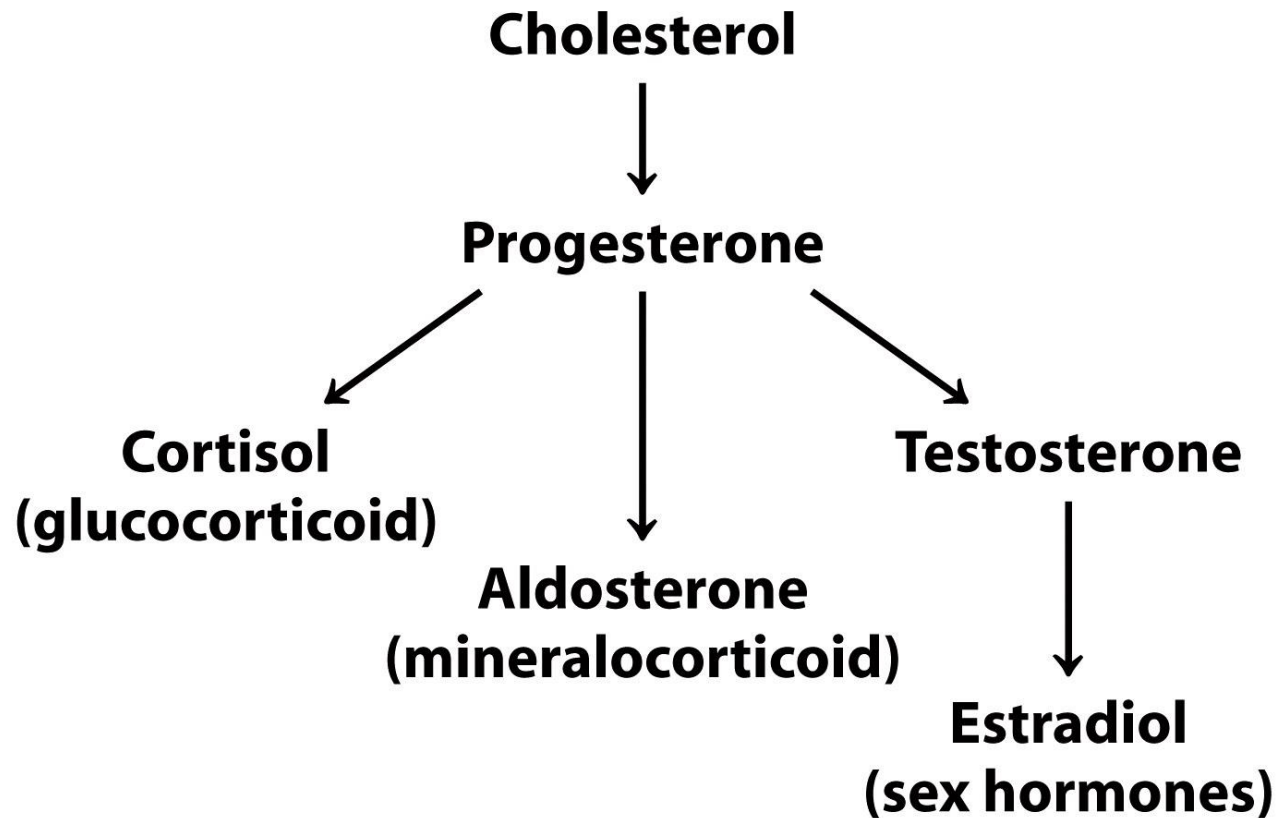


Retinoic acid



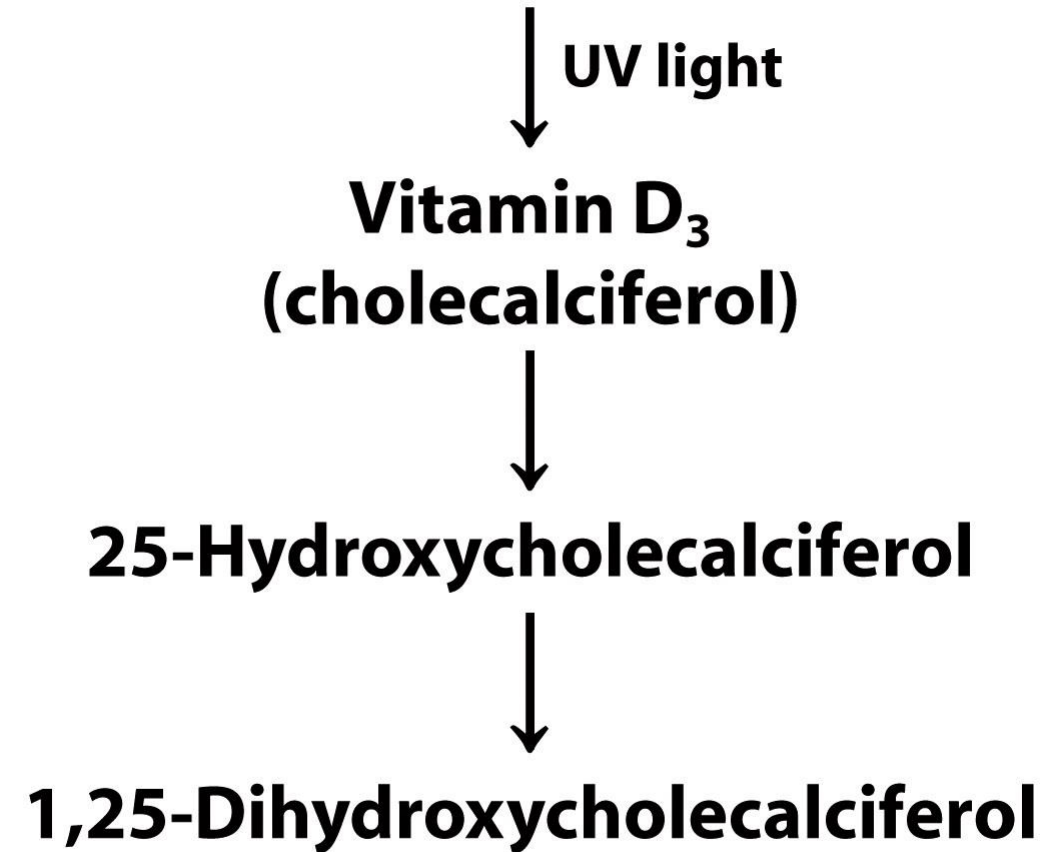
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Vznik dalších signálních molekul



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7-Dehydrocholesterol



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Endokrinní orgány

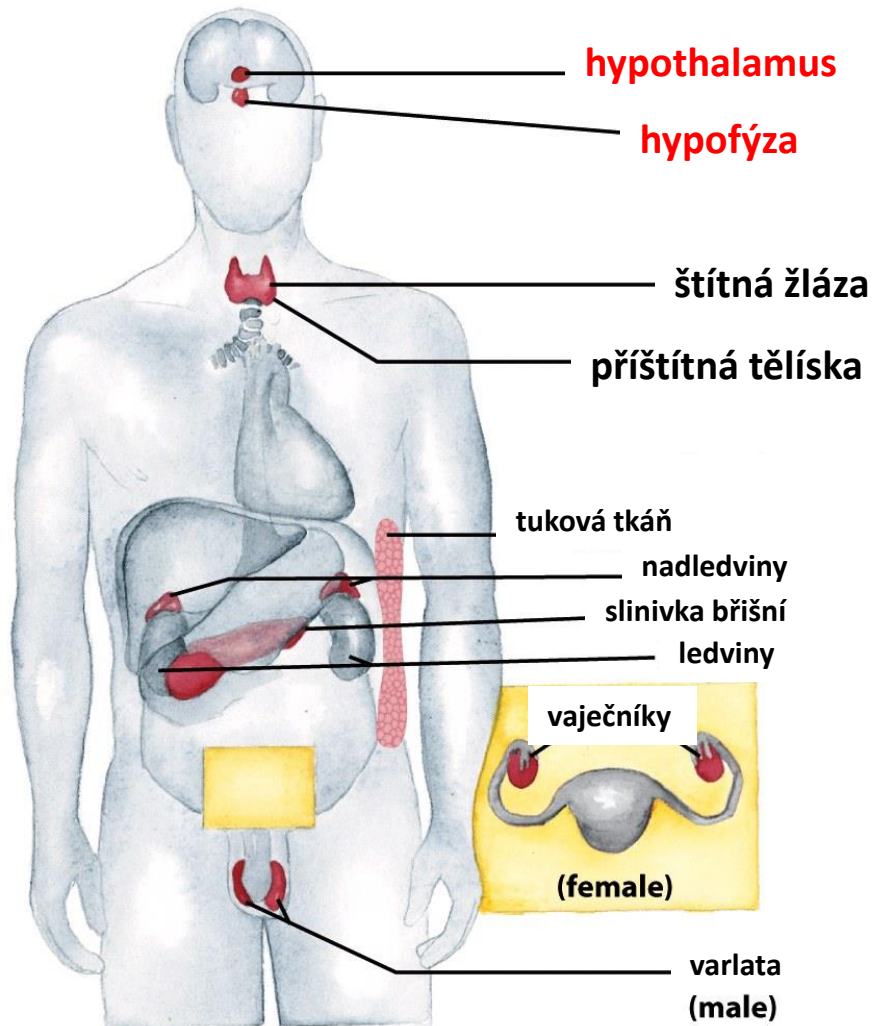


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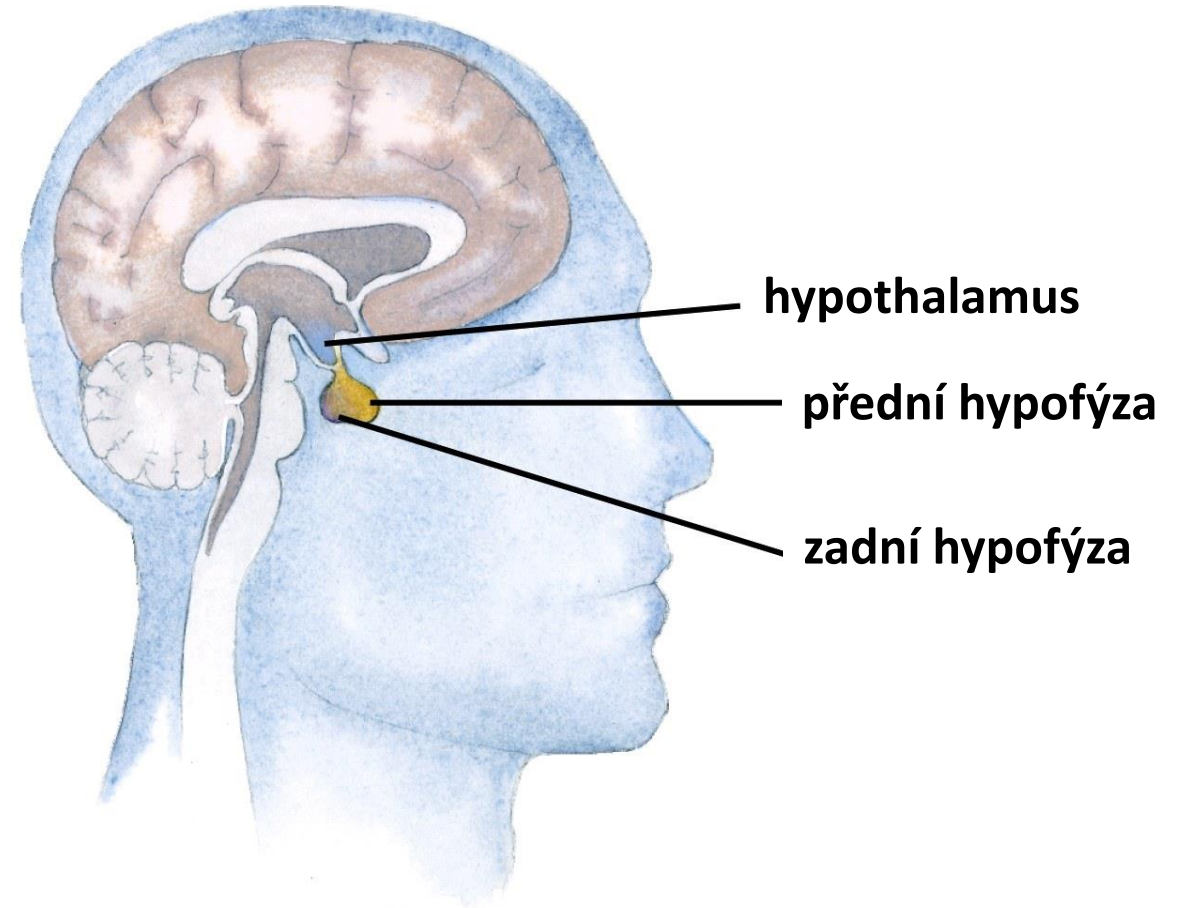


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Hierarchie endokrinního systému

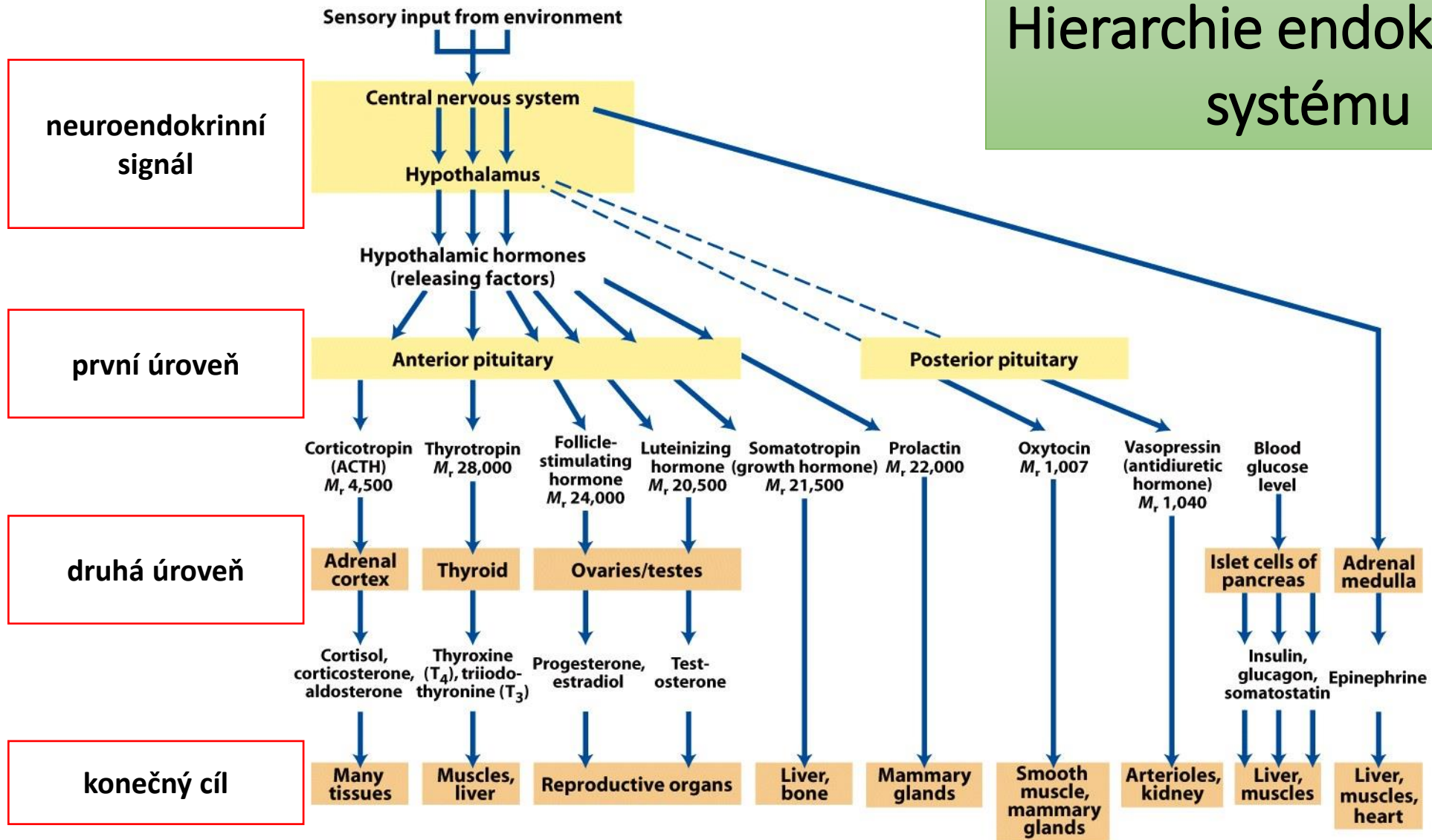


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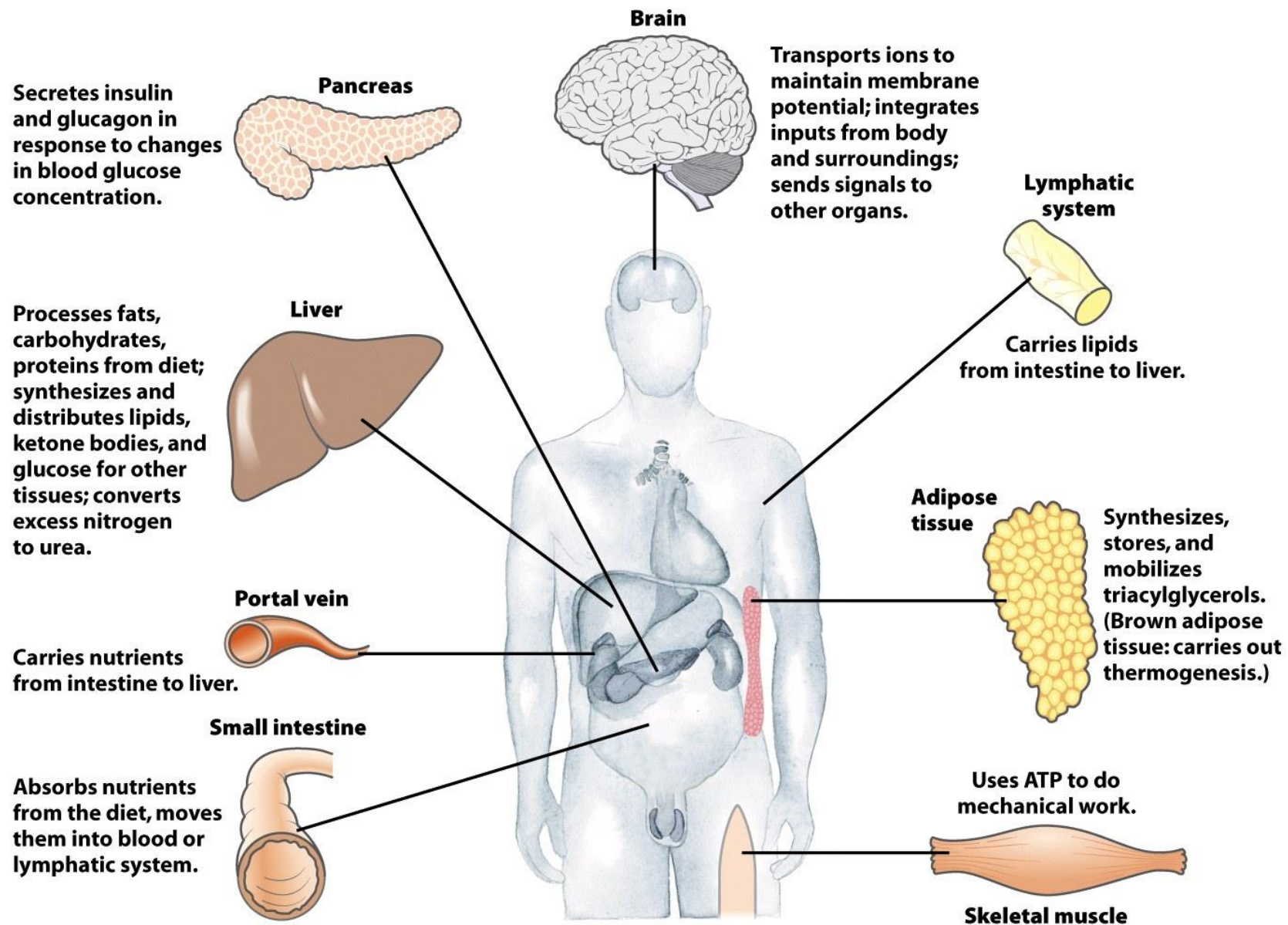


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metabolismus AMK v játrech

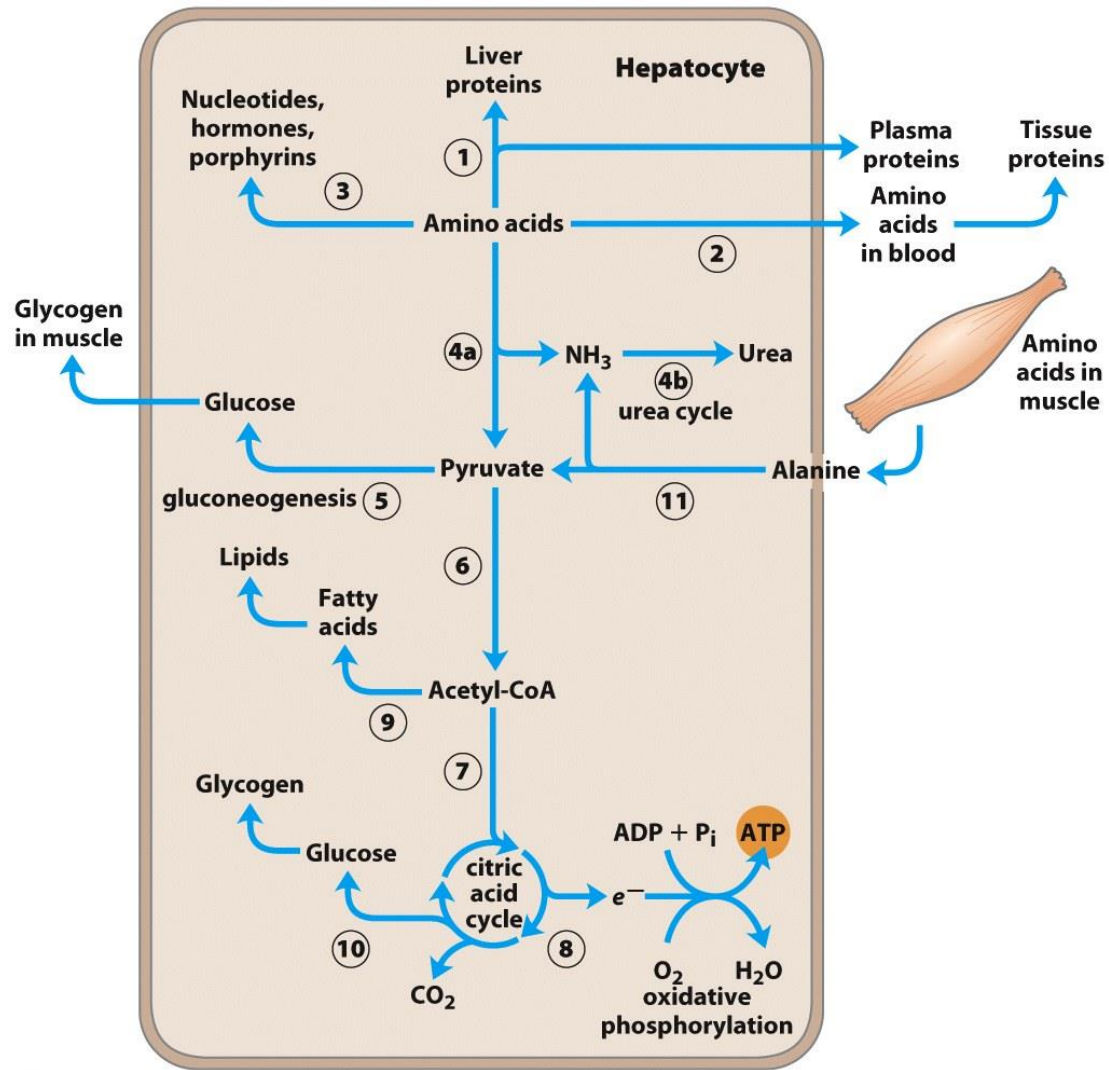


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metabolismus MK v játrech

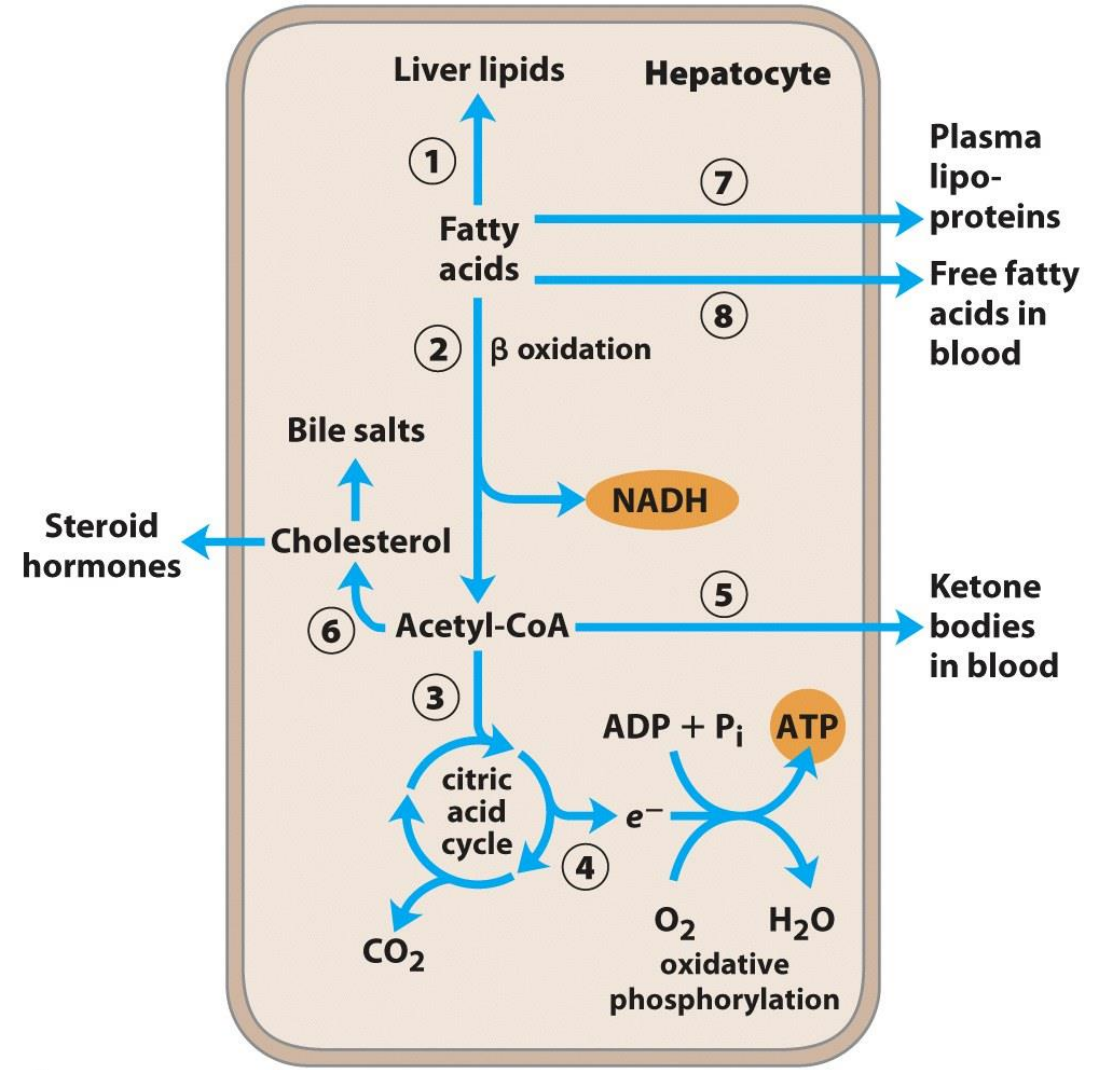


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Stav nasycení

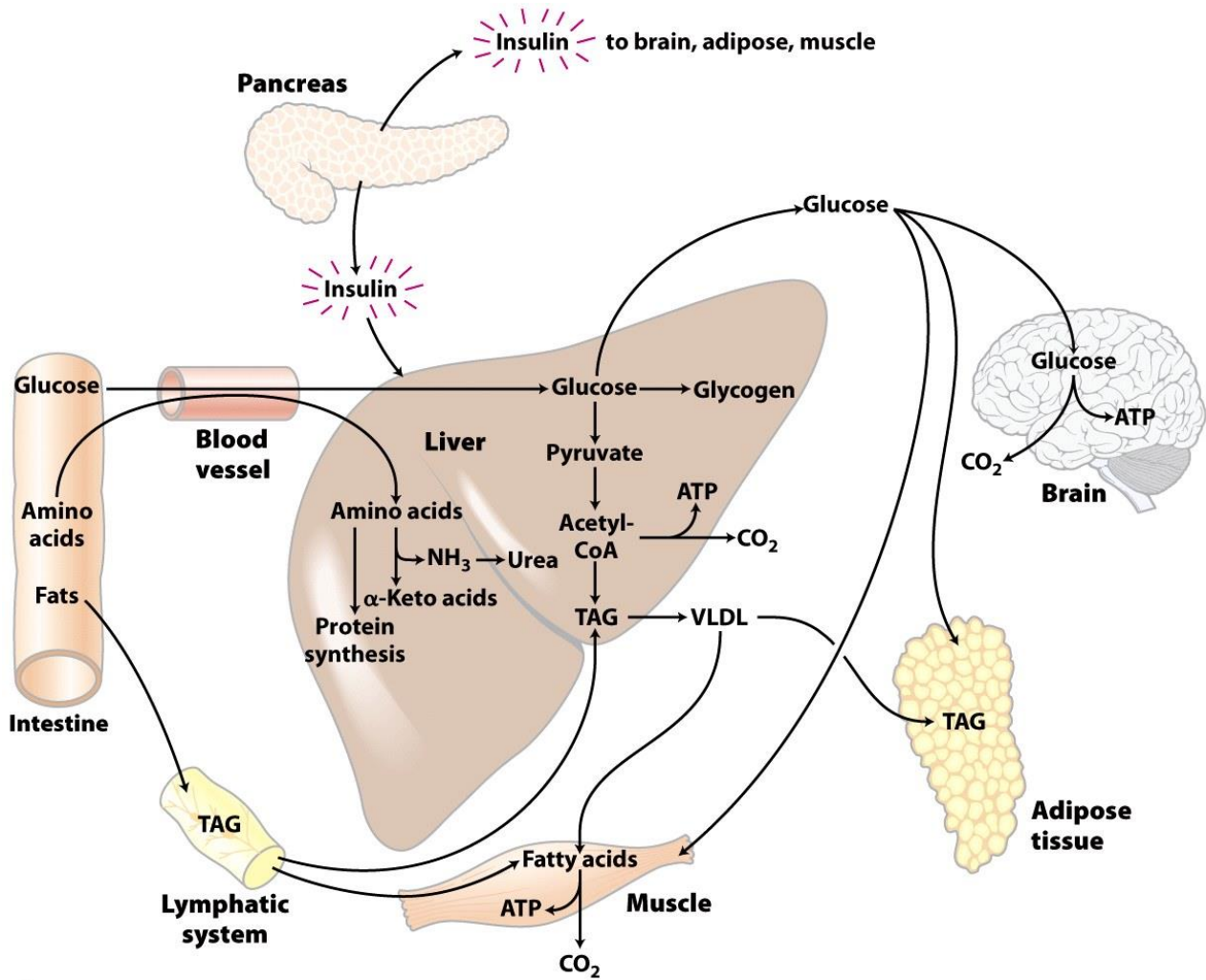


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Stav hladovění

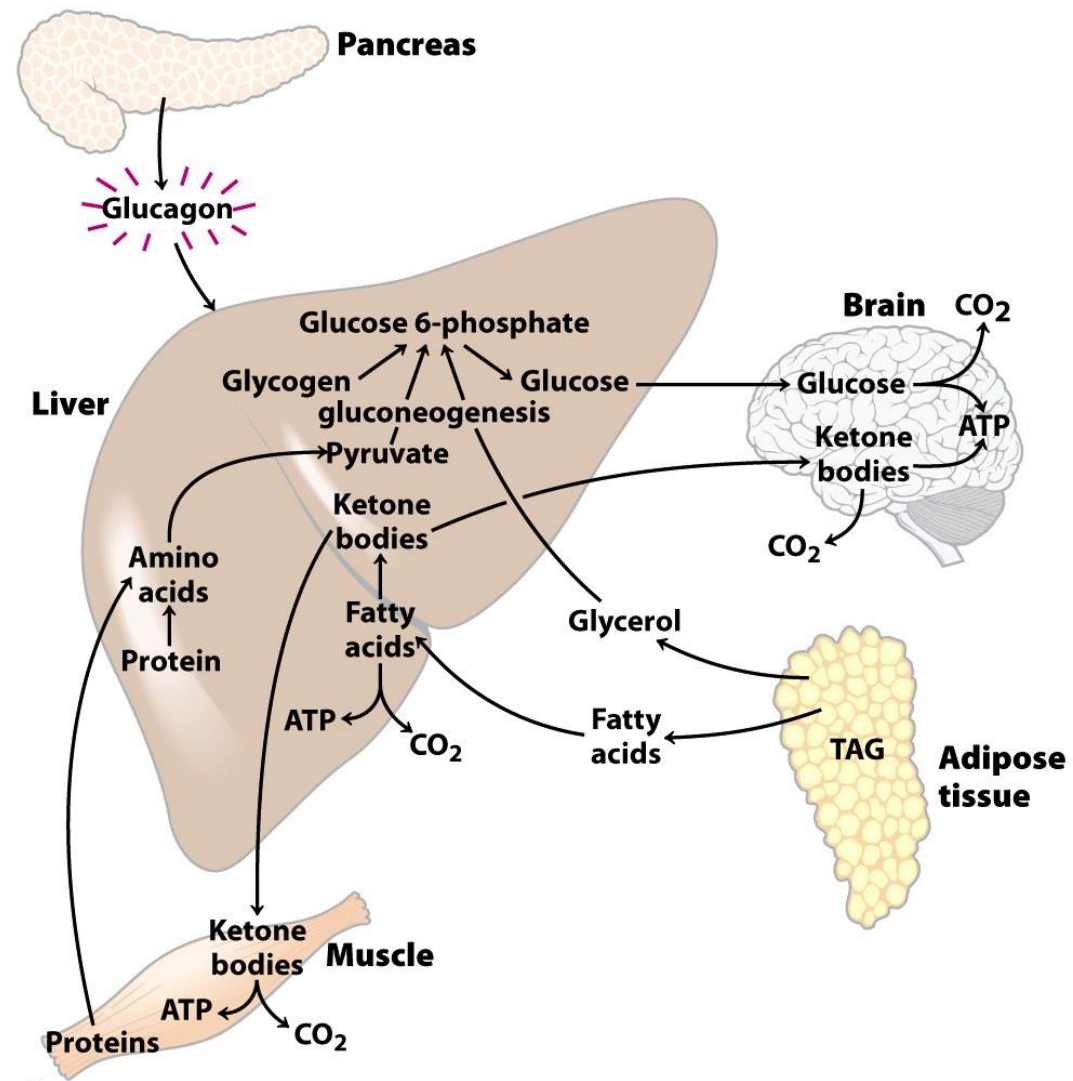


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Regulace příjmu a výdeje potravy

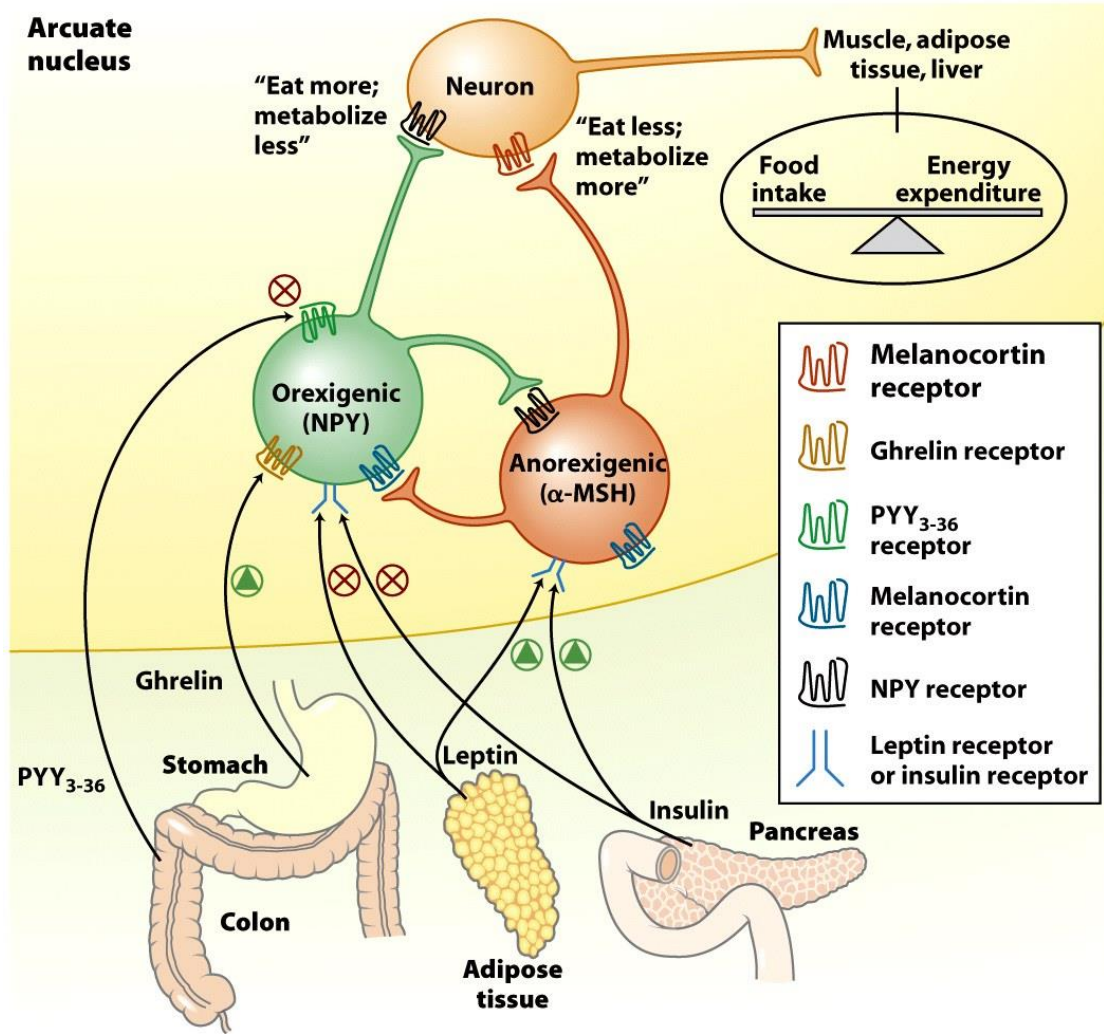


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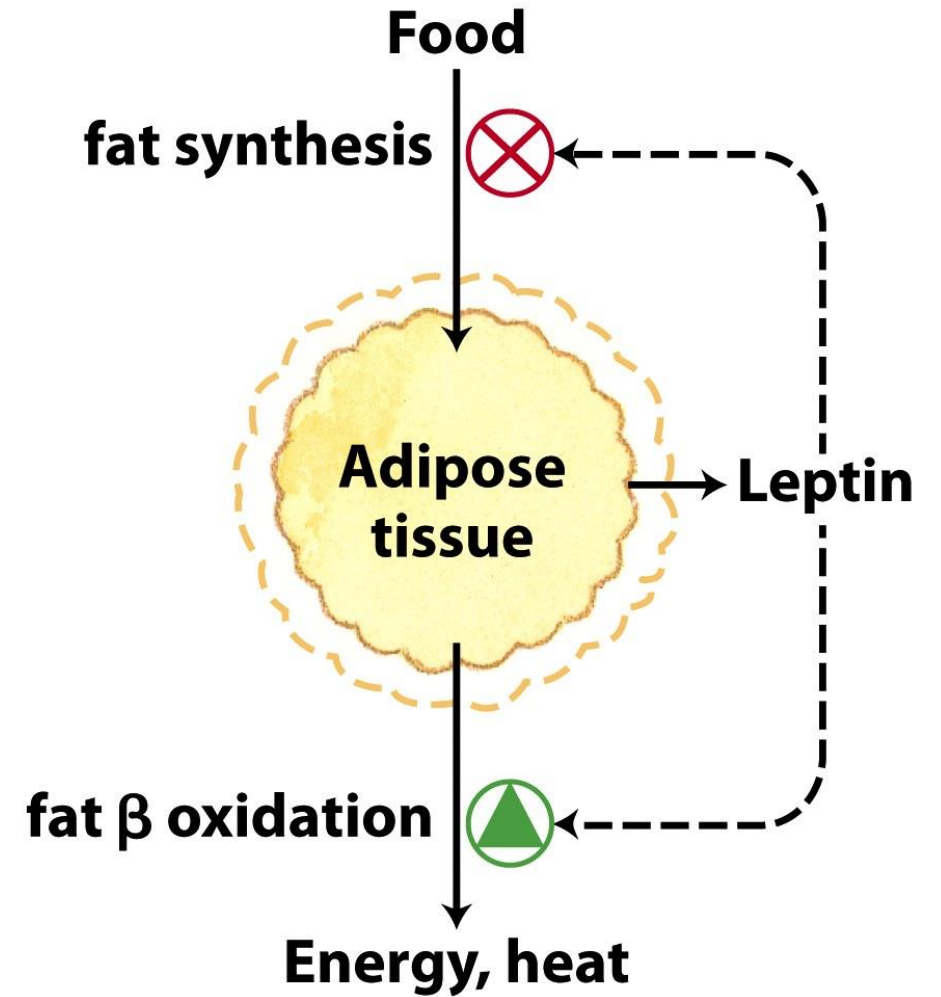


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Regulace příjmu a výdeje potravy

Arcuate nucleus

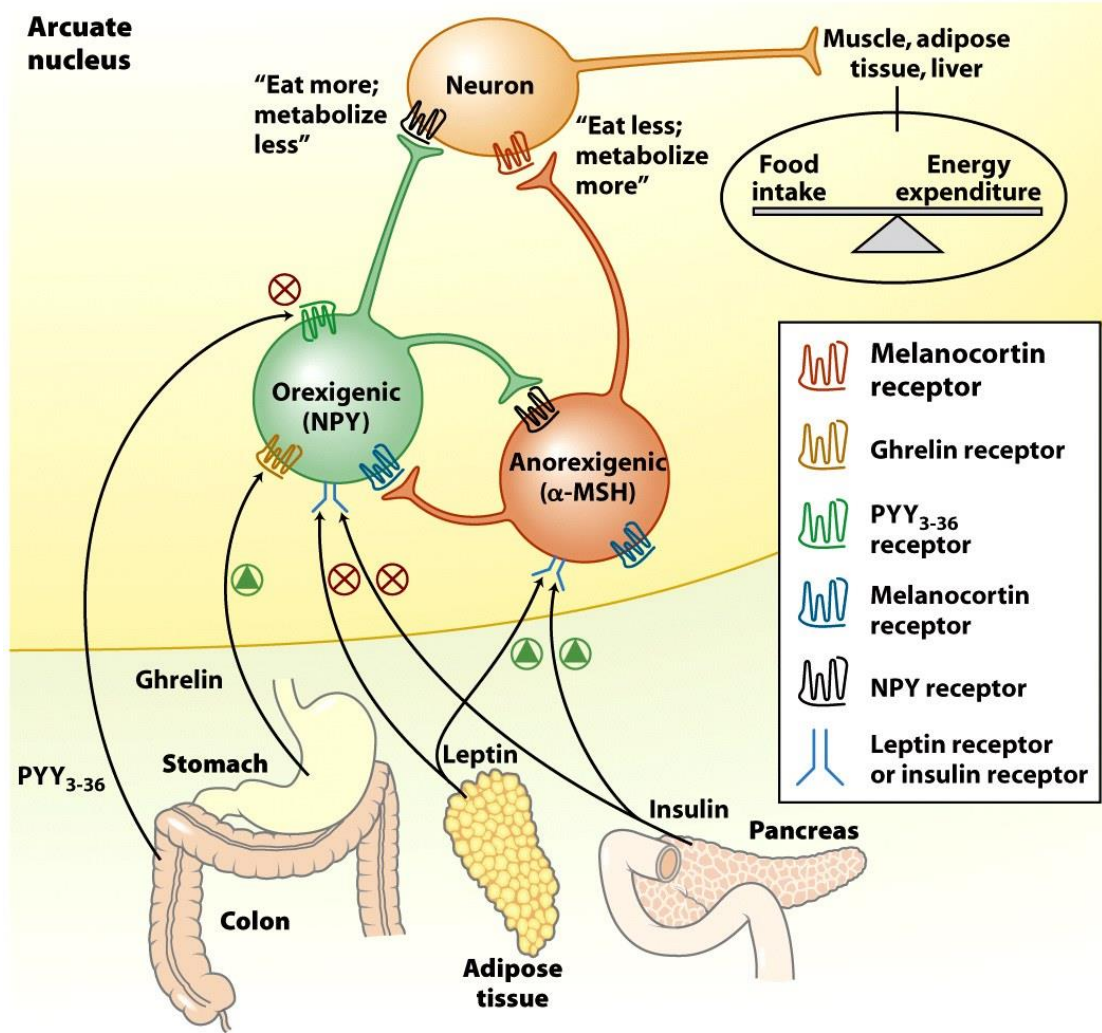


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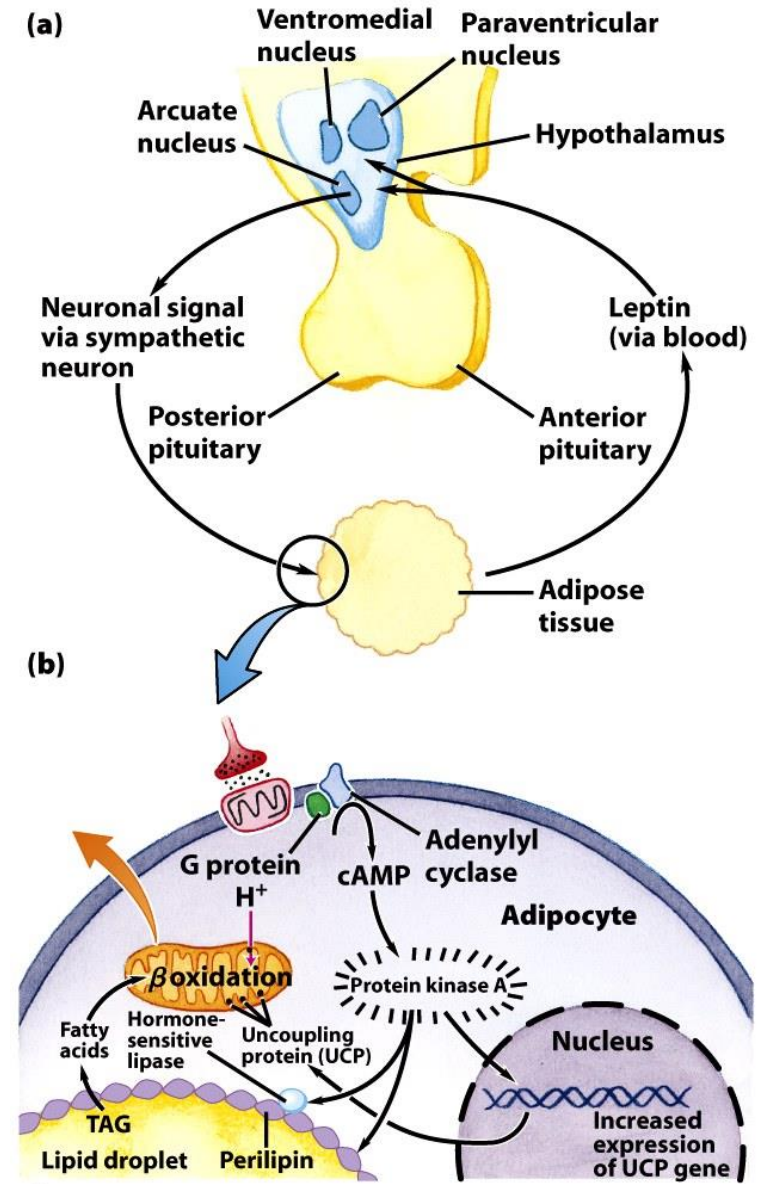


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Role AMP-aktivované proteinkinasy (AMPK) v regulaci metabolismu ATP

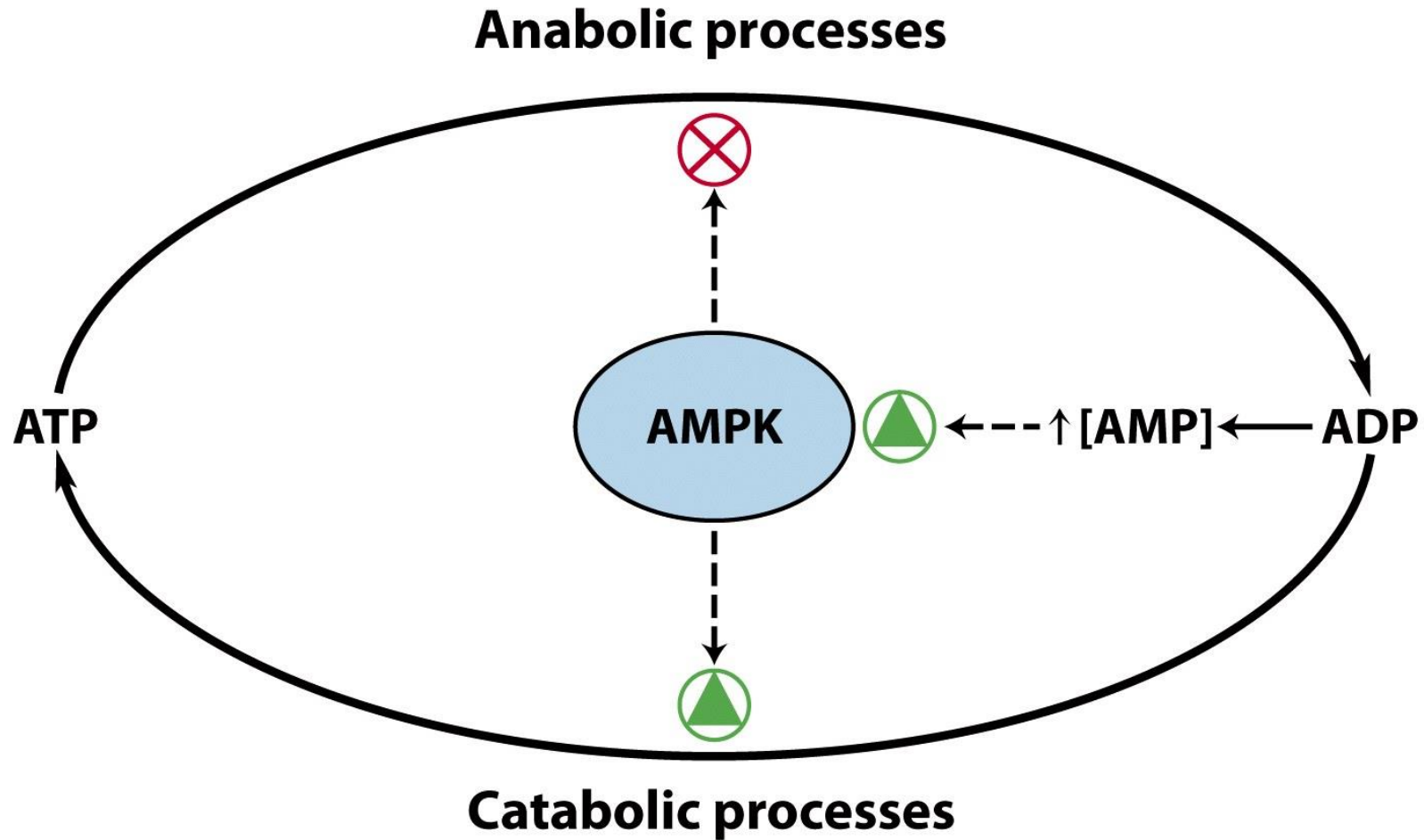


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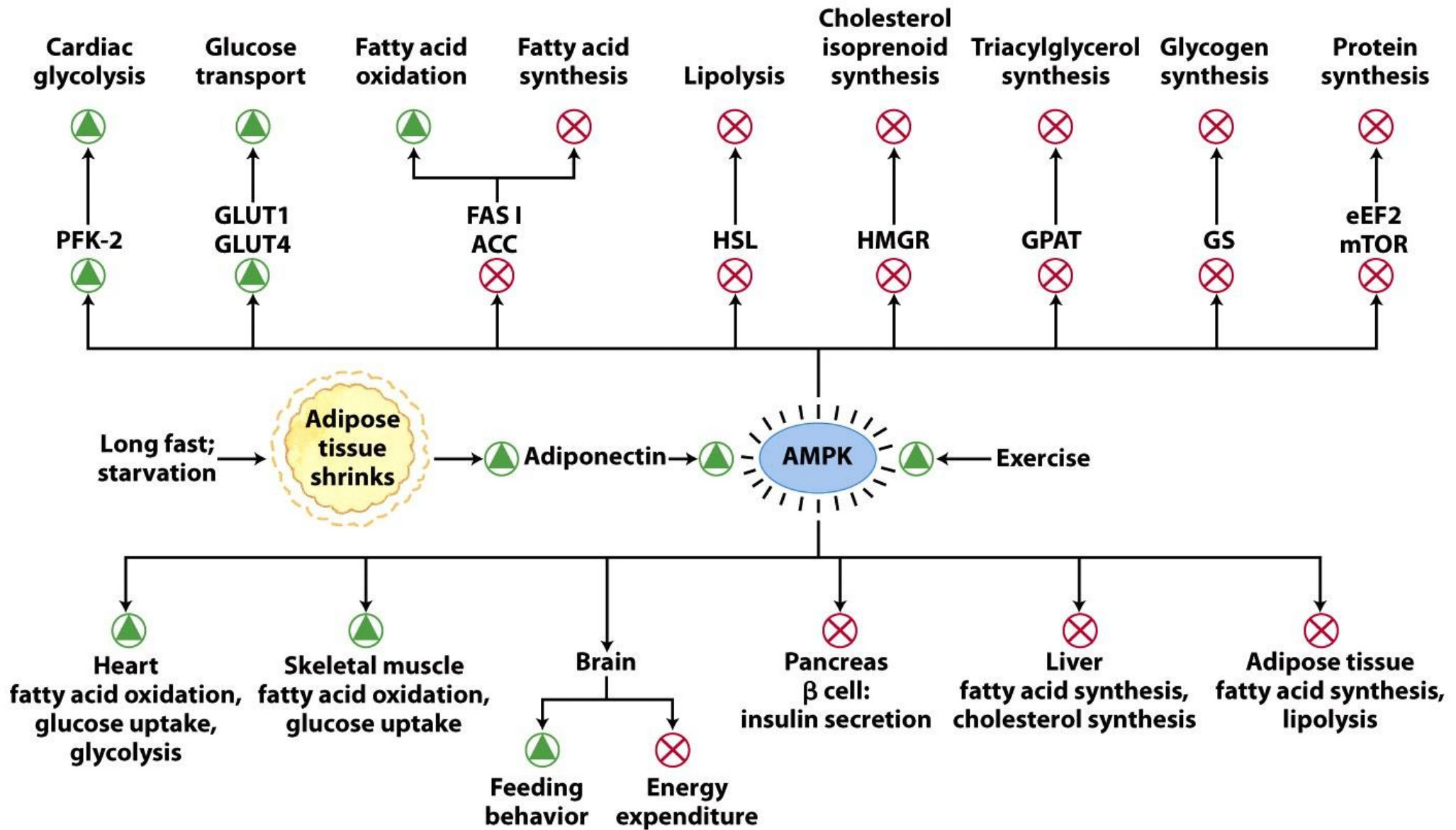


Figure 23-40

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