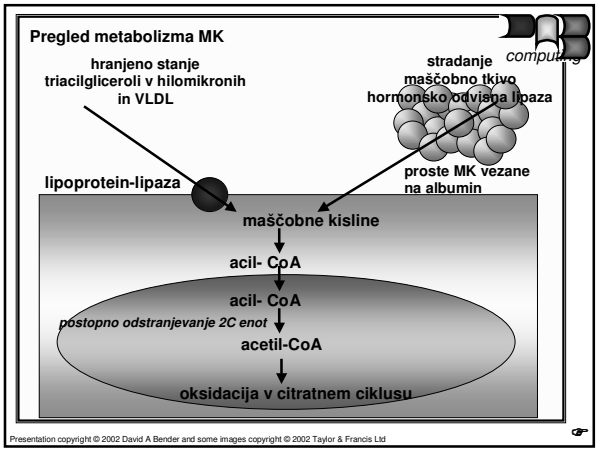
Razgradnja maščobnih kislin

Ketonska telesa

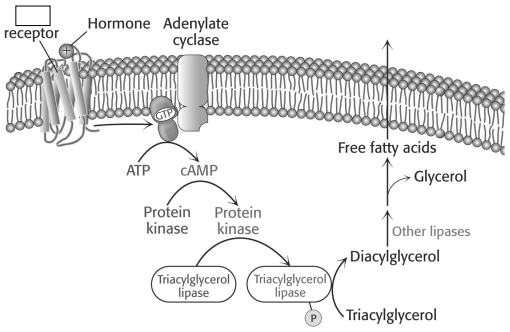
Tissue Utilization of Metabolic Fuels

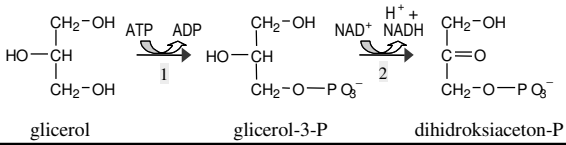
Tissue	Metabolic fuel: glucose	fatty acid	ketone bodies
brain	+		+
erythrocyte	+		
intestinal mucosa	+		+
liver	+	+	
muscle, cardiac	+	+	+
muscle, skeletal	+ (exercise)	+ (resting)	+
renal medulla	+		
renal cortex	+	+	+
retina	+		



Skladiščenje maščob

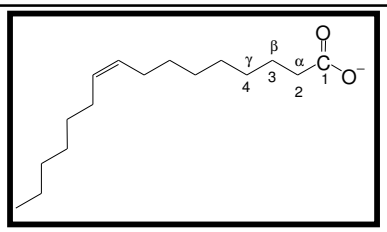
- Zaloge TAG najdemo predvsem v maščevju (v manjši meri tudi v skeletni in srčni mišici).
- Iz zalog TAG se sproste MK ob stimulaciji razgradnje s hormoni.





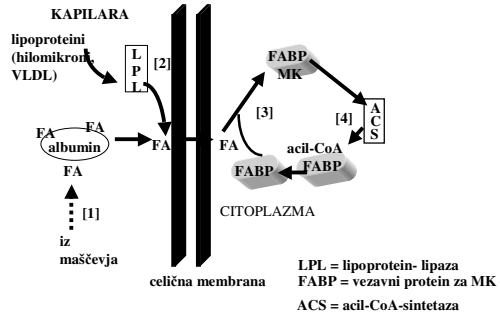
Glicerol se v jetrih pretvori v intermediat glikolize dihidroksiacetonfosfat z encimoma:

- ☐ 1 glicerol- kinazo
- ☐ 2 glicerolfosfat- dehidrogenazo



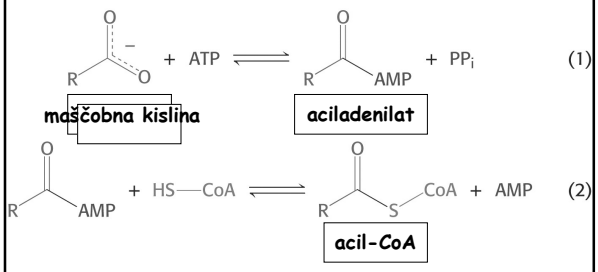
Proste MK imajo v raztopini detergentom podobne lastnosti, po krvi se prenašajo vezane na albumin.

Prenos preko membrane- prosta difuzija, olajšan prenos s pomočjo posebnih proteinov



Prenos MK do celic, aktivacija do acil-CoA

Aktivacija MK



Aktivacija MK

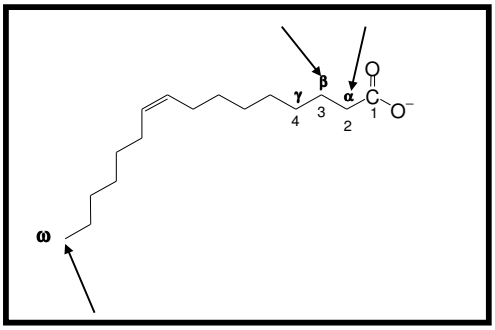
acil-CoA-sintaza

MK + ATP + HS-CoA →

acil-CoA + AMP + PP_i

pirofosfataza

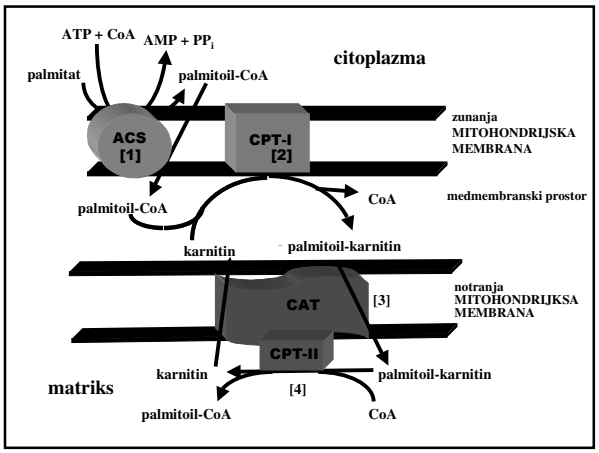
$PP_i + H_2O \rightarrow 2P_i$

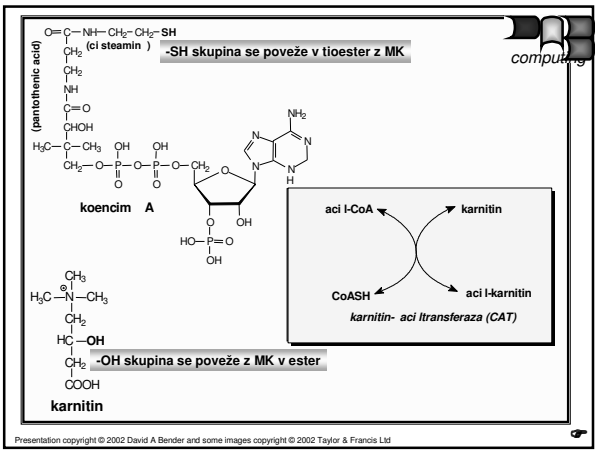


Glavne oblike oksidacije MK

Beta-oksidacija MK

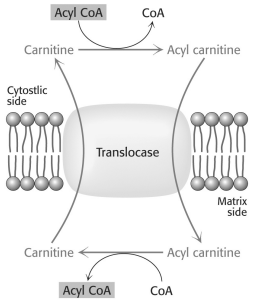
- **Uporaba maščobnih kislin kot metaboličnega goriva je odvisna od tkiva in stanja organizma.**
- **Proces poteka v mitohondrijskem matriksu (v peroksisomih za dolgoverižne MK)**
- **V procesu beta-oksidacije se sprosti 2-C fragment kot acetil-CoA**



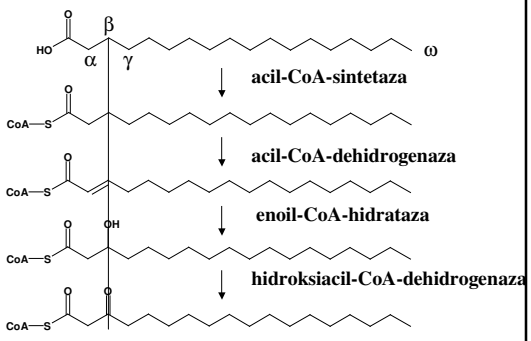


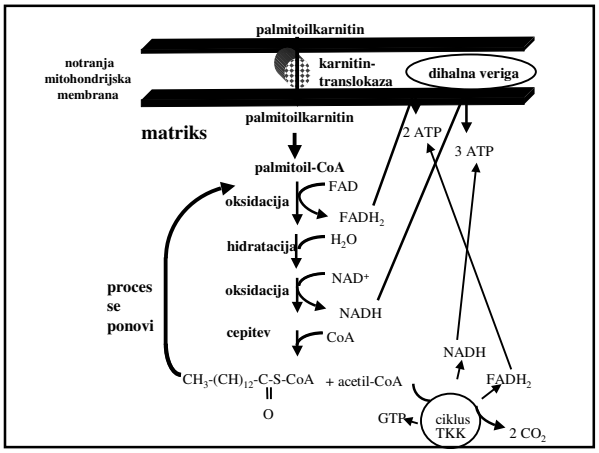
Prenos acil-CoA v mitohondrij

- Acil-CoA se pretvori v acil-karnitin s karnitin-aciltransferazo 1.
- Prenašalec izmenjuje acilkarnitin s karnitinom.
- Acilkarnitin se v matriksu pretvori nazaj v acil-CoA.



Proces β-oksidacije



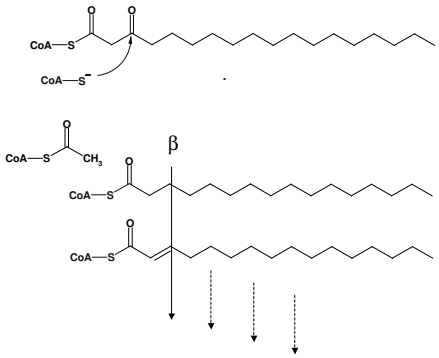


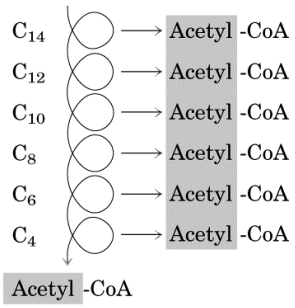
Neto reakcija enega obrata **β**-oksidacije:

acil-CoA + FAD + NAD^+ + HS-CoA →
acil-CoA (-2 C) **+ $FADH_2$ + NADH + H^+**
+ acetil-CoA

β-oksidacija je cikličen proces.

β-oksidacija

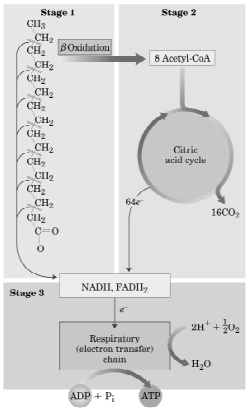


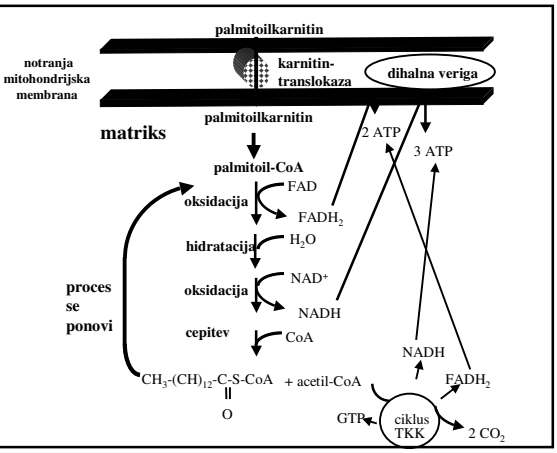


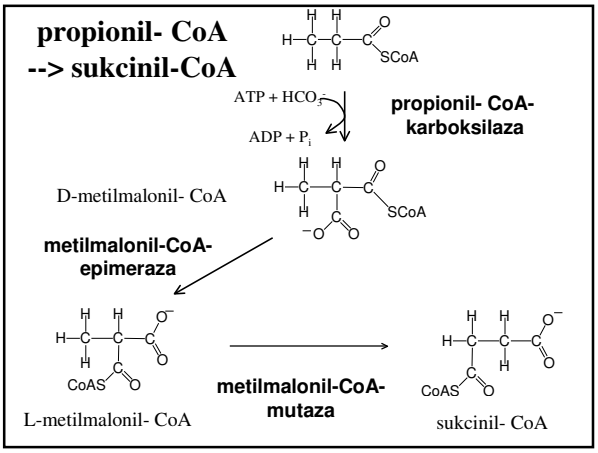
(b)

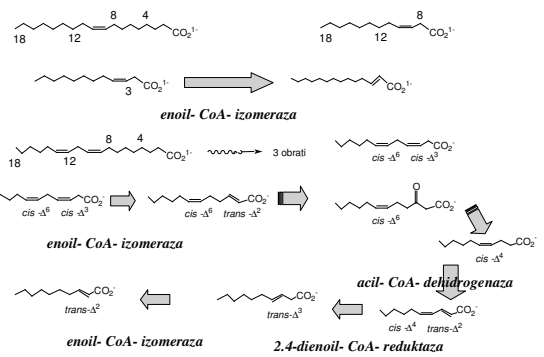
- Acetil-CoA vstopi v Krebsov cikel, dodatno nastanejo 3NADH, $FADH_2$, and GTP.

Oksidacija MK je pomemben vir celičnega ATP.









Uravnavanje razgradnje MK

Hitrost razgradnje določa:

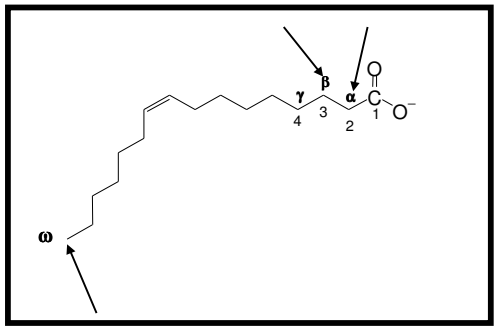
- **1. razpoložljivost MK**

odvisna od sproščanja MK iz zalog oz. iz hrane

vnosa MK v mitohondrij (CPT1-malonil-CoA)

- **2. hitrost same beta oksidacije**

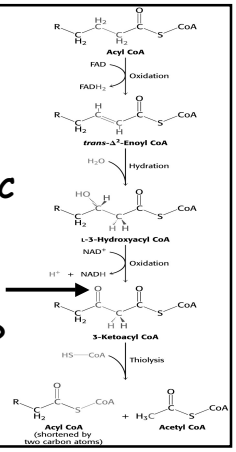
odvisna od NAD^+/NADH (3-hidroksiacil-CoA-DH), acetil-CoA (tiolaza)



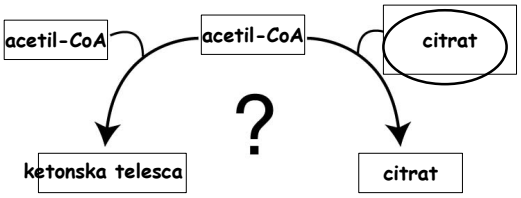
Glavne oblike oksidacije MK

β-oksidacija

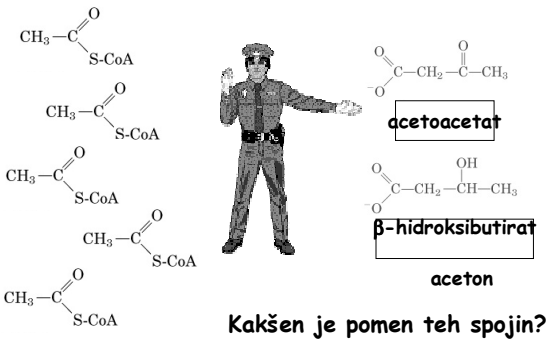
- **Strategija: ustvariti karbonilno skupino na β-C atomu**
- **Kako se razlikuje proces v peroksisomih?**



Vstop v citratni ciklus ali ketogenezo?



Kakšne bodo posledice kopičenja acetil-CoA v mitohondrijskem matriksu?



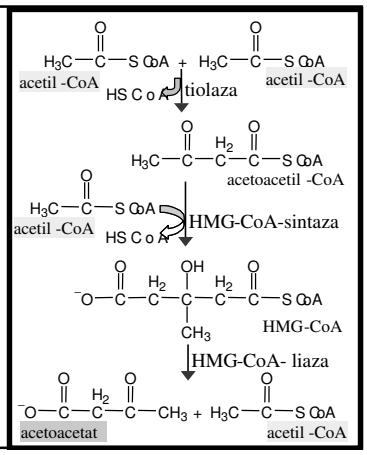
Kakšen je pomen teh spojin?

Sinteza **ketonskih spojin** :

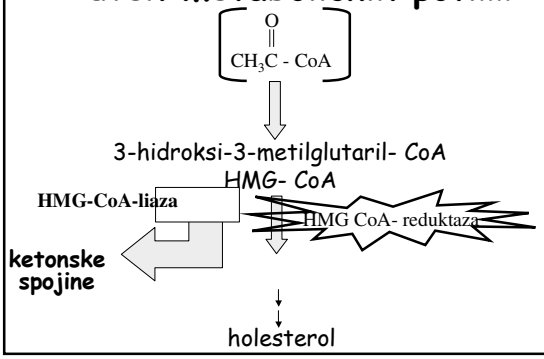
1. β-ketotiolaza

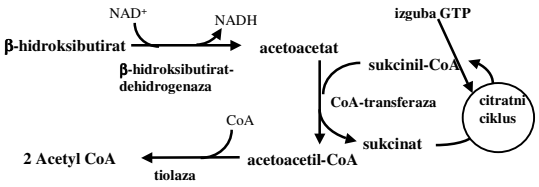
2. HMG-CoA-sintaza

3. HMG-CoA- liaza

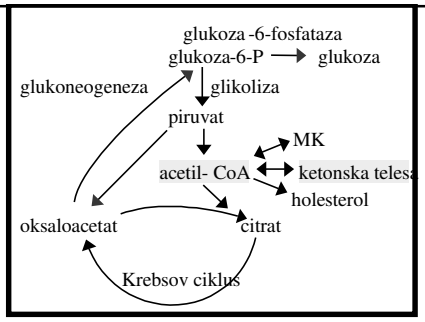


HMG-CoA je intermediat dveh metaboličnih poti!!!!

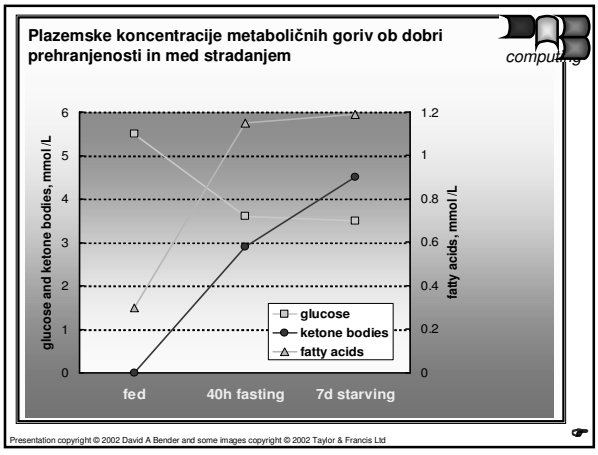




Oksidacija ketonskih telesc
(npr.v možganih, mišicah, ledvicah)



Več ketonskih teles se tvori, kadar je:
stimulirana lipoliza v maščevju
stimulirana razgradnja MK v jetrih
v jetrih poteka proces glukoneogeneze



Tissue Utilization of Metabolic Fuels

Tissue	Metabolic fuel: glucose	fatty acid	ketone bodies
brain	+		+
erythrocyte	+		
intestinal mucosa	+		+
liver	+	+	
muscle, cardiac	+	+	+
muscle, skeletal	+ (exercise)	+ (resting)	+
renal medulla	+		
renal cortex	+	+	+
retina	+		