

Univerzitet u Beogradu – Fakultet veterinarske medicine

20I1009 BIOHEMIJA #09

ENZIMI #2

Priredio:

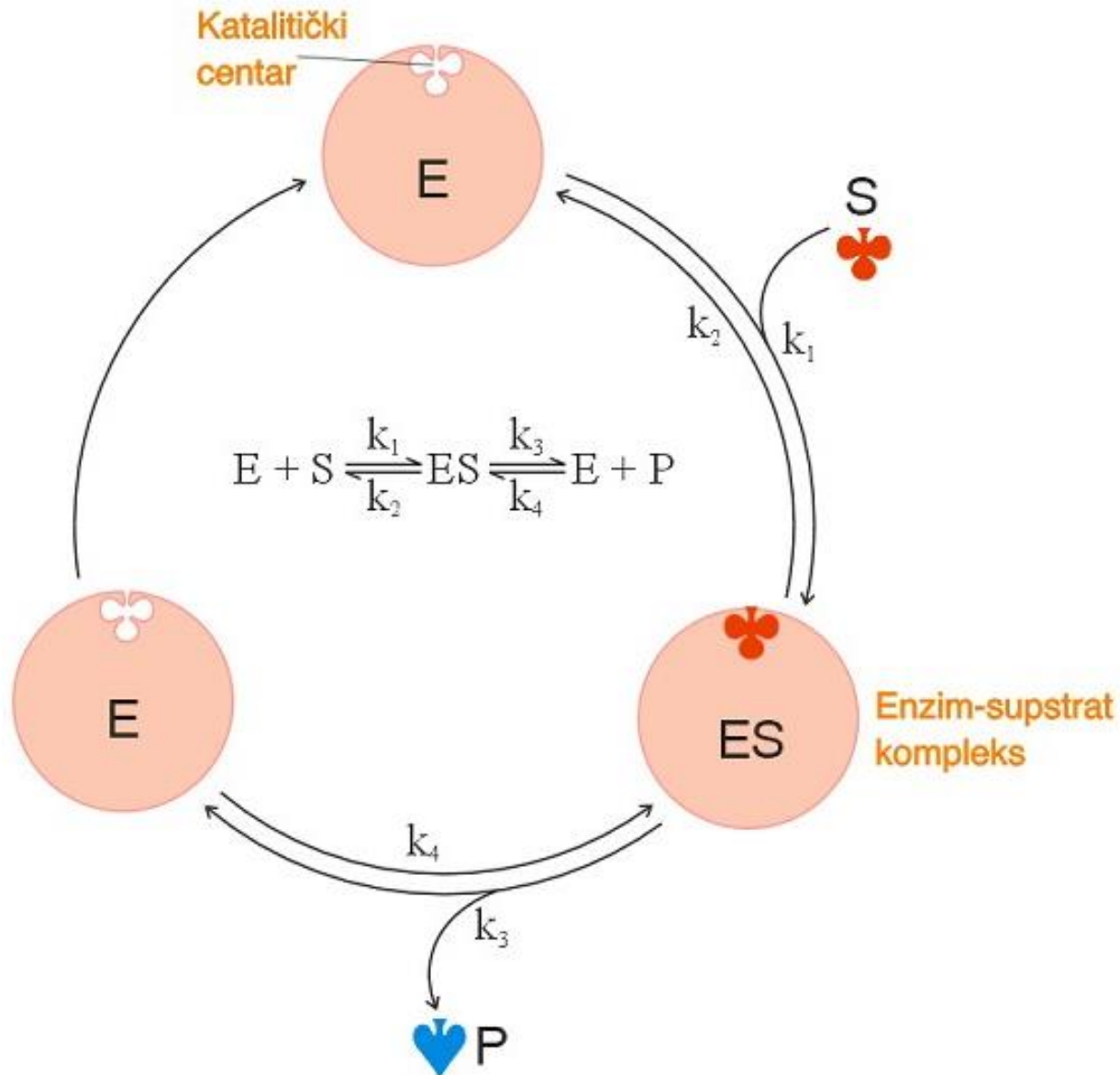
Prof. dr Ivan B. Jovanović



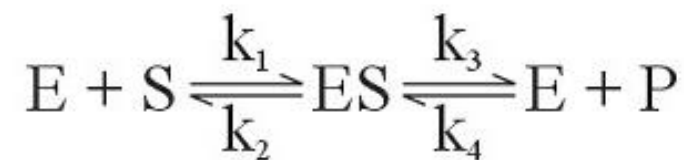
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ENZIMSKA REAKCIJA



MICHAELIS - MENTEN (1913) TEORIJA ENZIMSKE KINETIKE



$$ES = k_1[E][S]$$

Brzina stvaranja
ES kompleksa

$$ES = (k_2 + k_3)[ES]$$

Brzina razlaganja
ES kompleksa

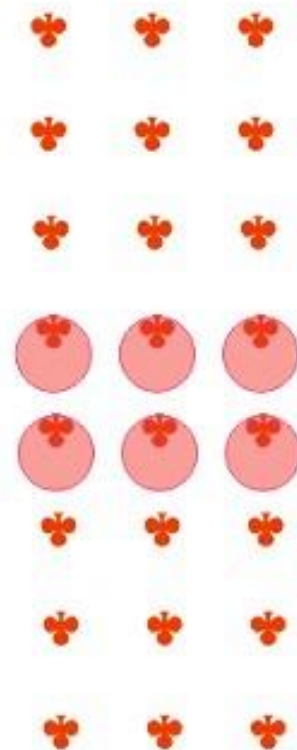
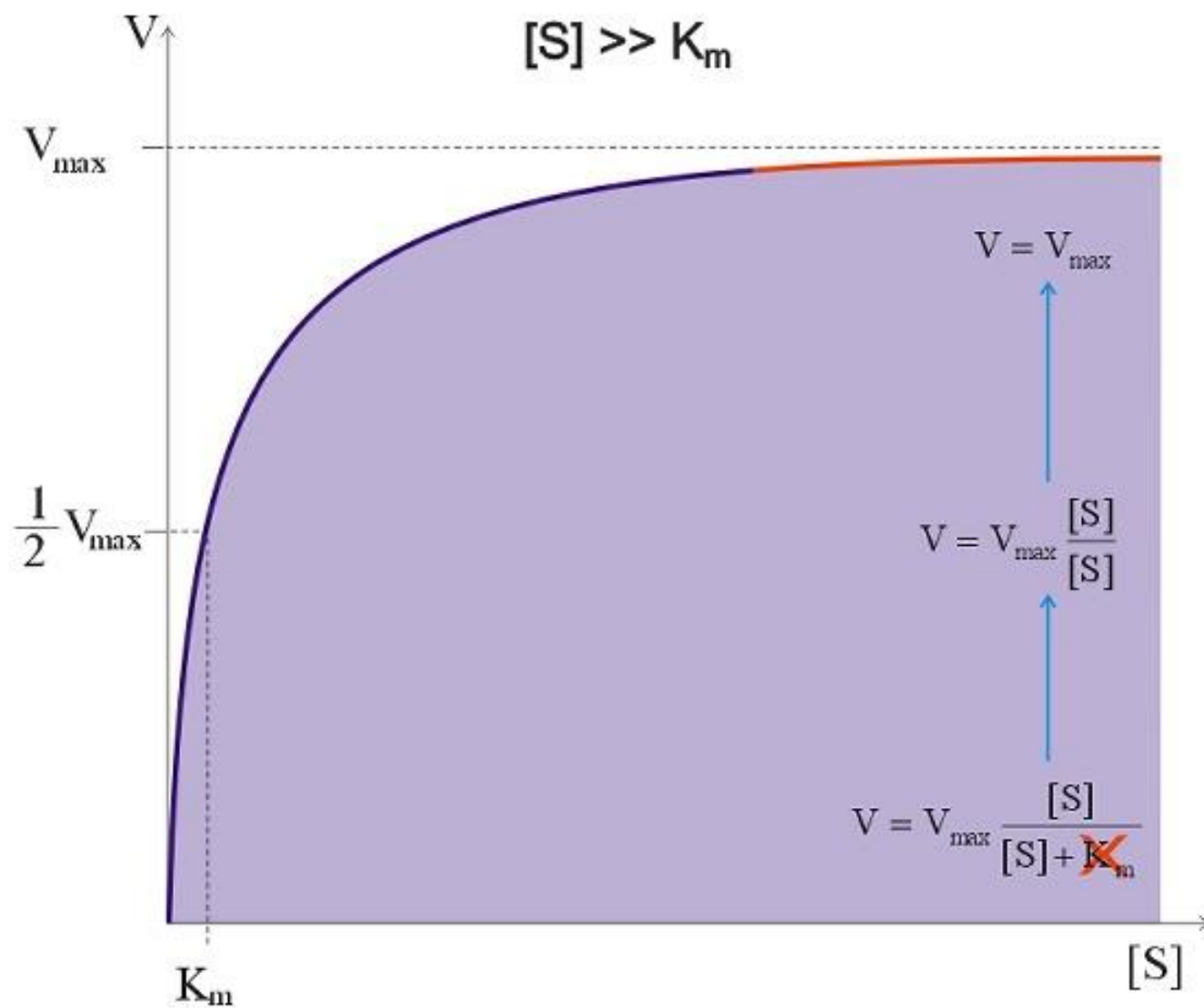
$$k_1[E][S] = (k_2 + k_3)[ES]$$

Kada se uspostavi ravnoteža

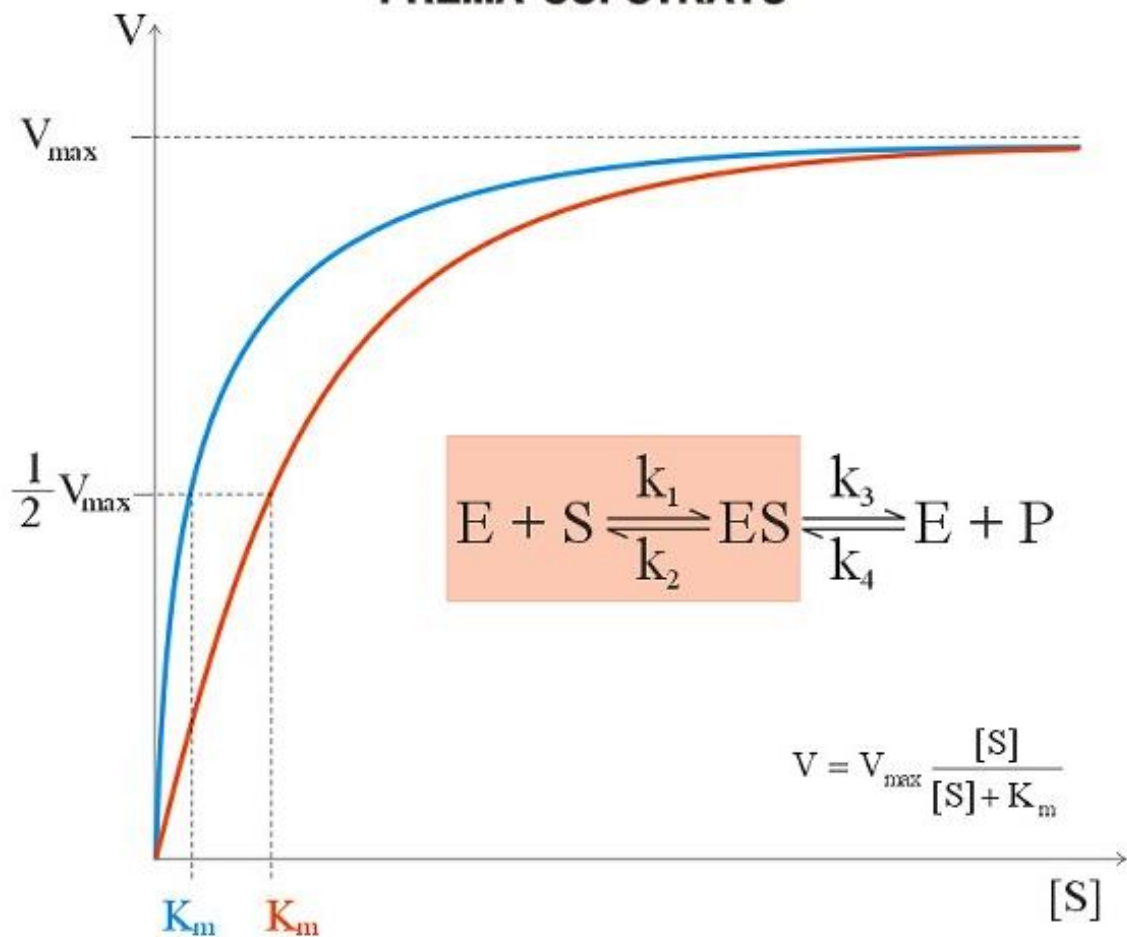
$$V = V_{\max} \frac{[S]}{[S] + K_m}$$

Jednačina brzine enzimske reakcije

MICHAELIS - MENTEN KINETIČKA KRIVA



**MICHAELIS - MENTEN KONSTANTA (K_m)
JE MERA **AFINITETA** ENZIMA
PREMA SUPSTRATU**

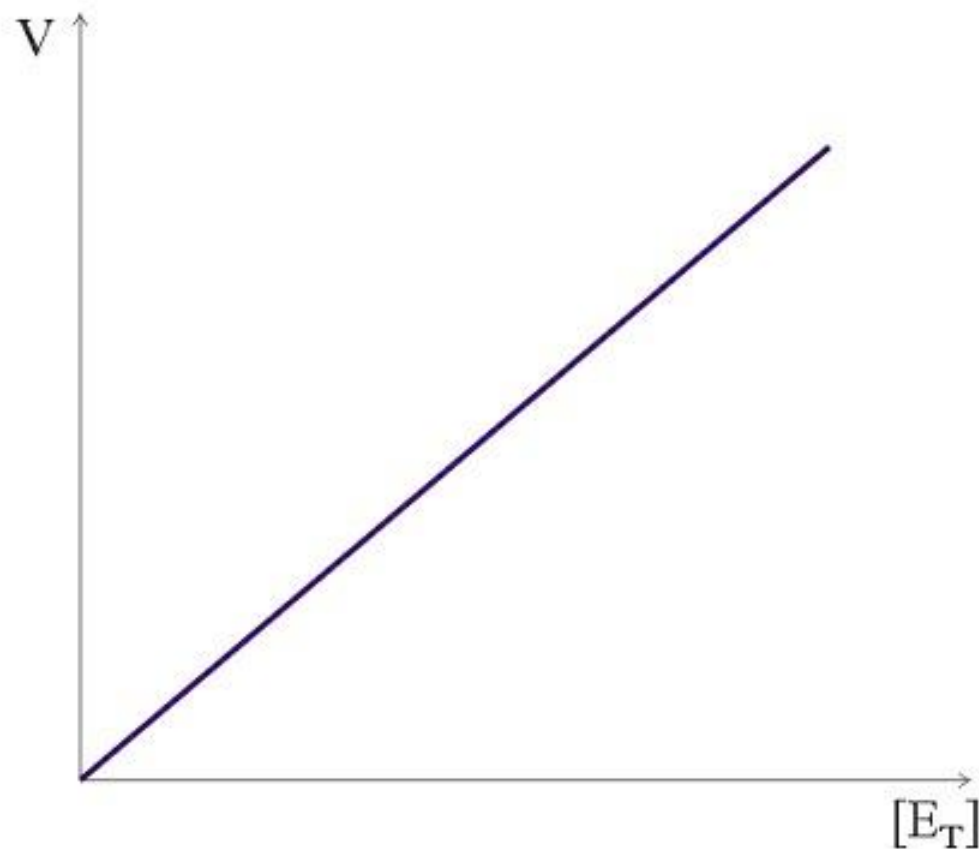
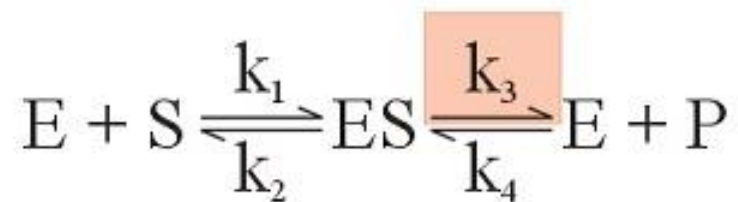


Vrednost K_M za neke enzime

Enzim	Supstrat	K_M u mmol
Katalaza	H_2O_2	25
Heksokinaza	Glukoza	0.15
	Fruktoza	1.5
Glutamat dehidrogenaza	Glutamat	0.12
	α -ketoglurat	2.0
	NH_4^+	57
Aspartat aminotransferaza	Aspartat	0.9
	α -ketogulurat	0.1
	Oksalacetat	0.04
	Glutamat	4.0

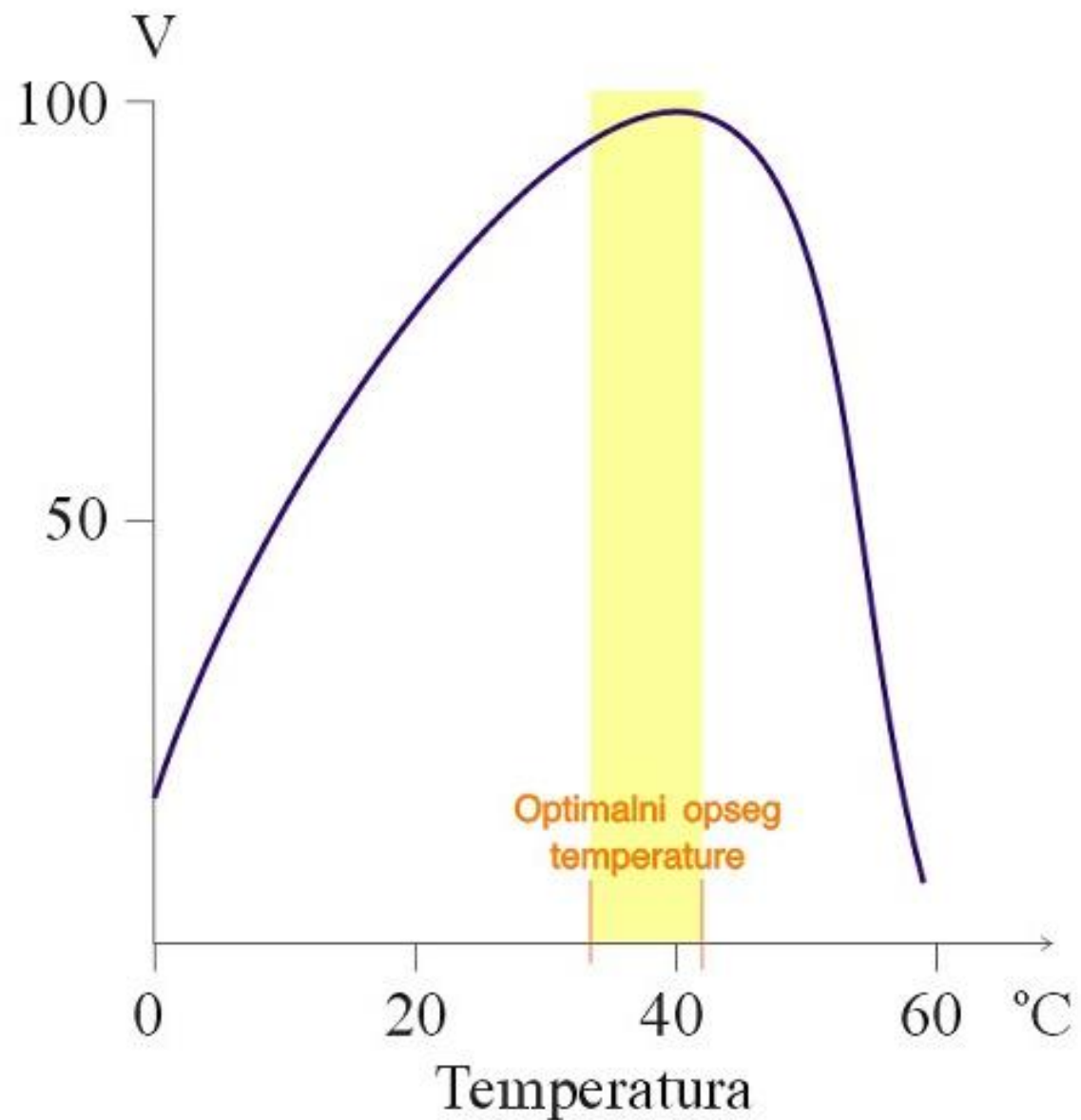
**MAKSIMALNA BRZINA ERNZIMSKE REAKCIJE (V_{\max})
ZAVISI JEDINO OD UKUPNE KOLIČINE ENZIMA**

$$V_{\max} = k_3[E_T]$$

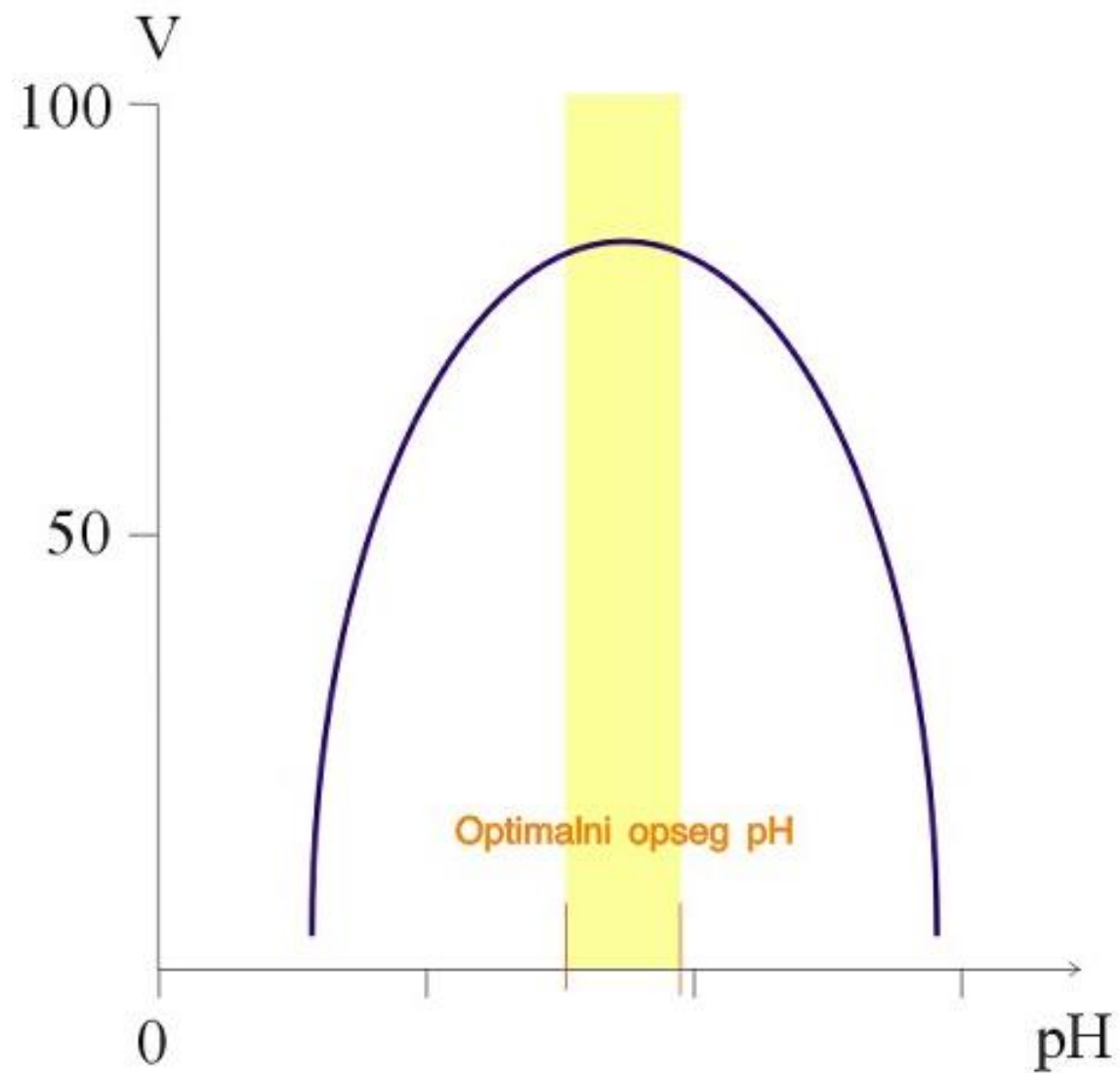


Kliničko određivanje
enzimske aktivnosti

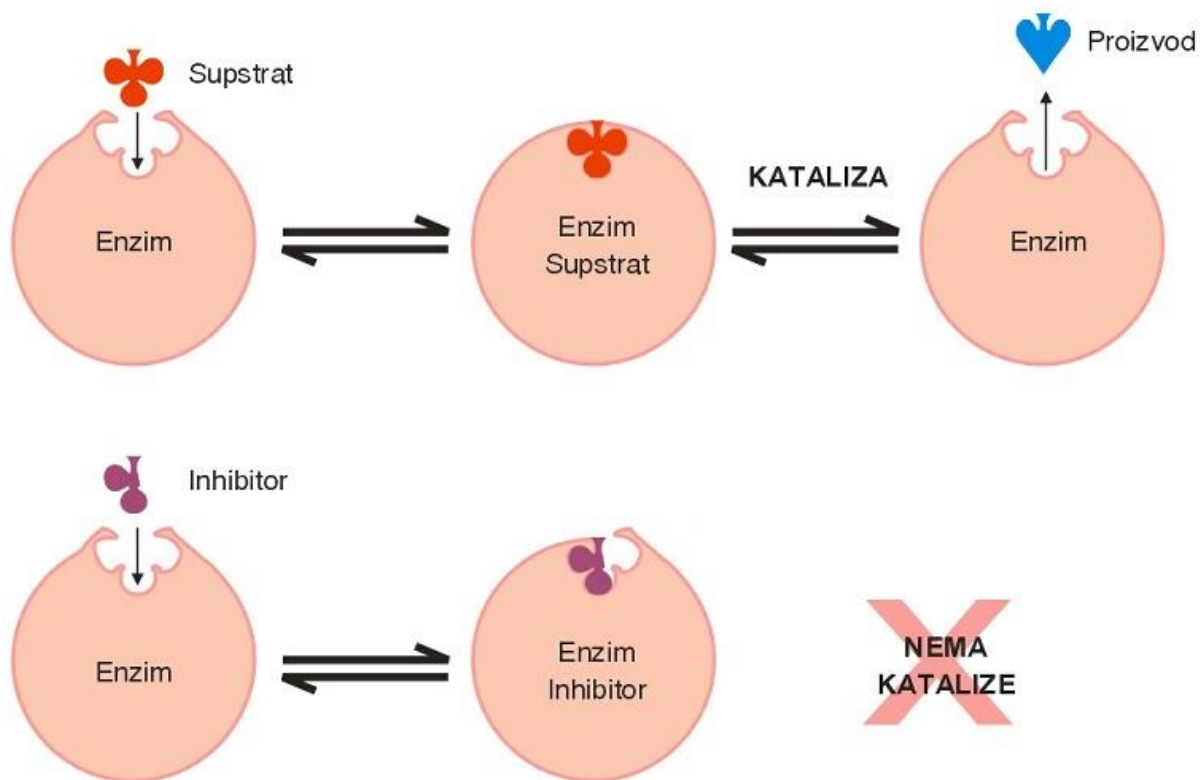
UTICAJ TEMPERATURE NA BRZINU ENZIMSKE REAKCIJE



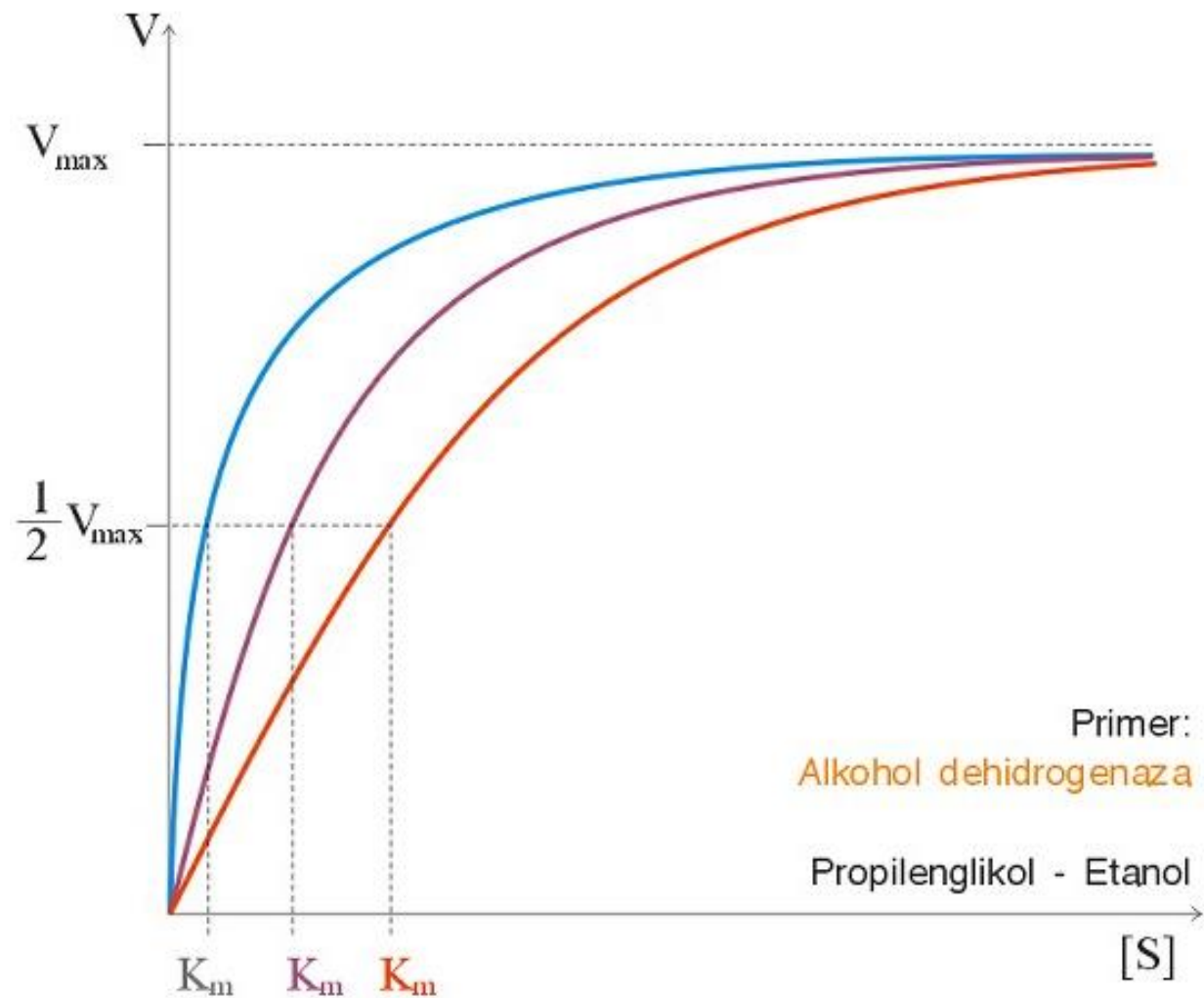
UTICAJ pH NA BRZINU ENZIMSKE REAKCIJE



INHIBICIJA ENZIMSKE REAKCIJE Kompetitivna inhibicija



INHIBICIJA ENZIMSKE REAKCIJE Kompetitivna inhibicija

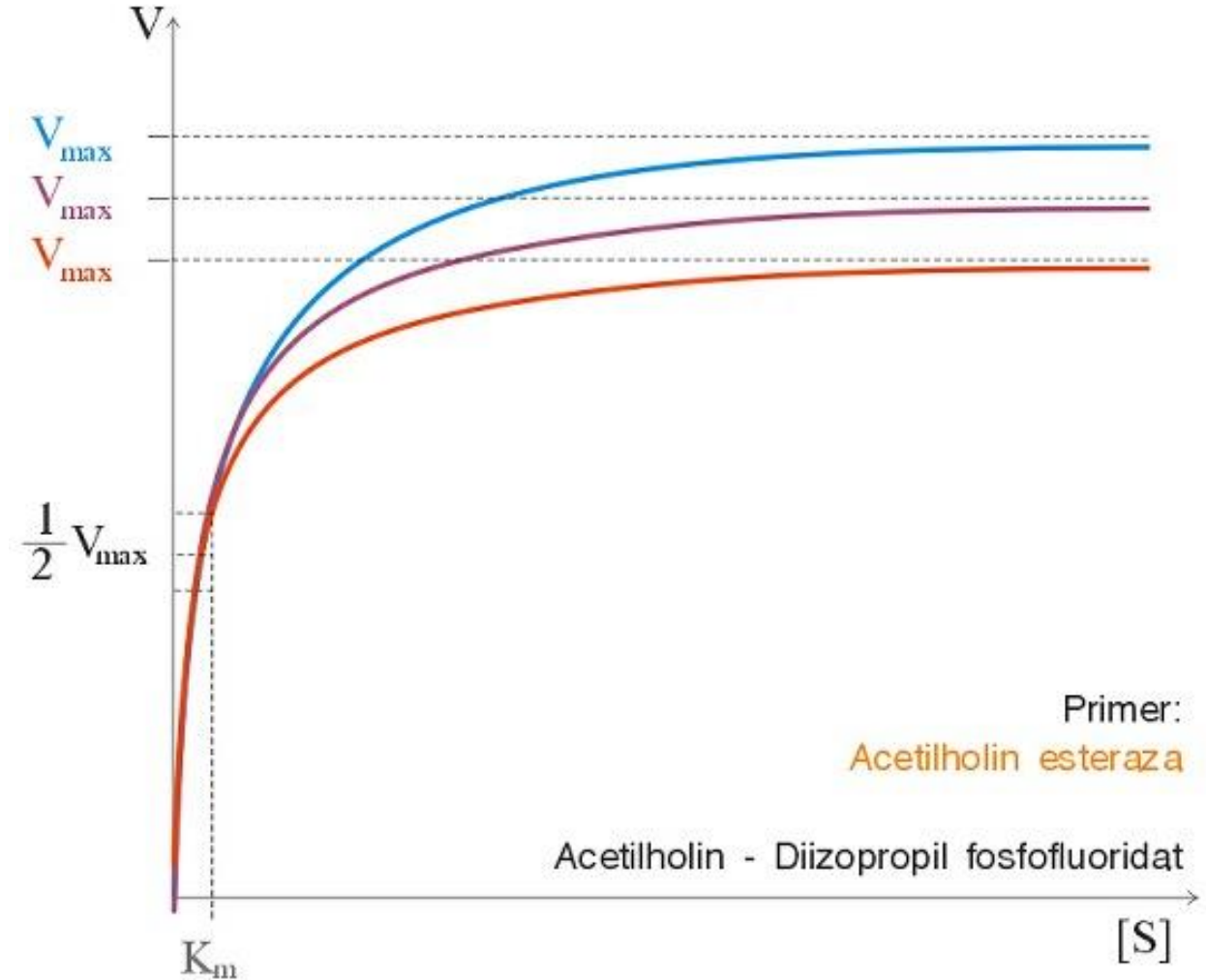
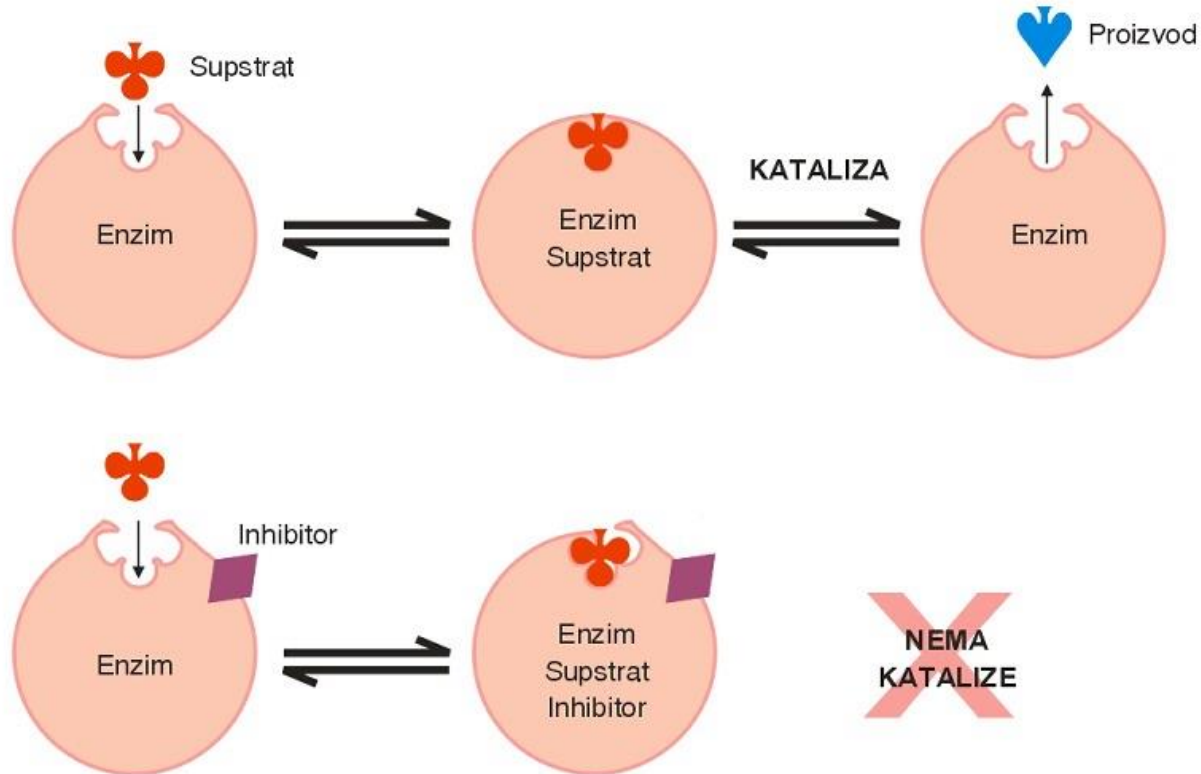


INHIBICIJA ENZIMSKE REAKCIJE

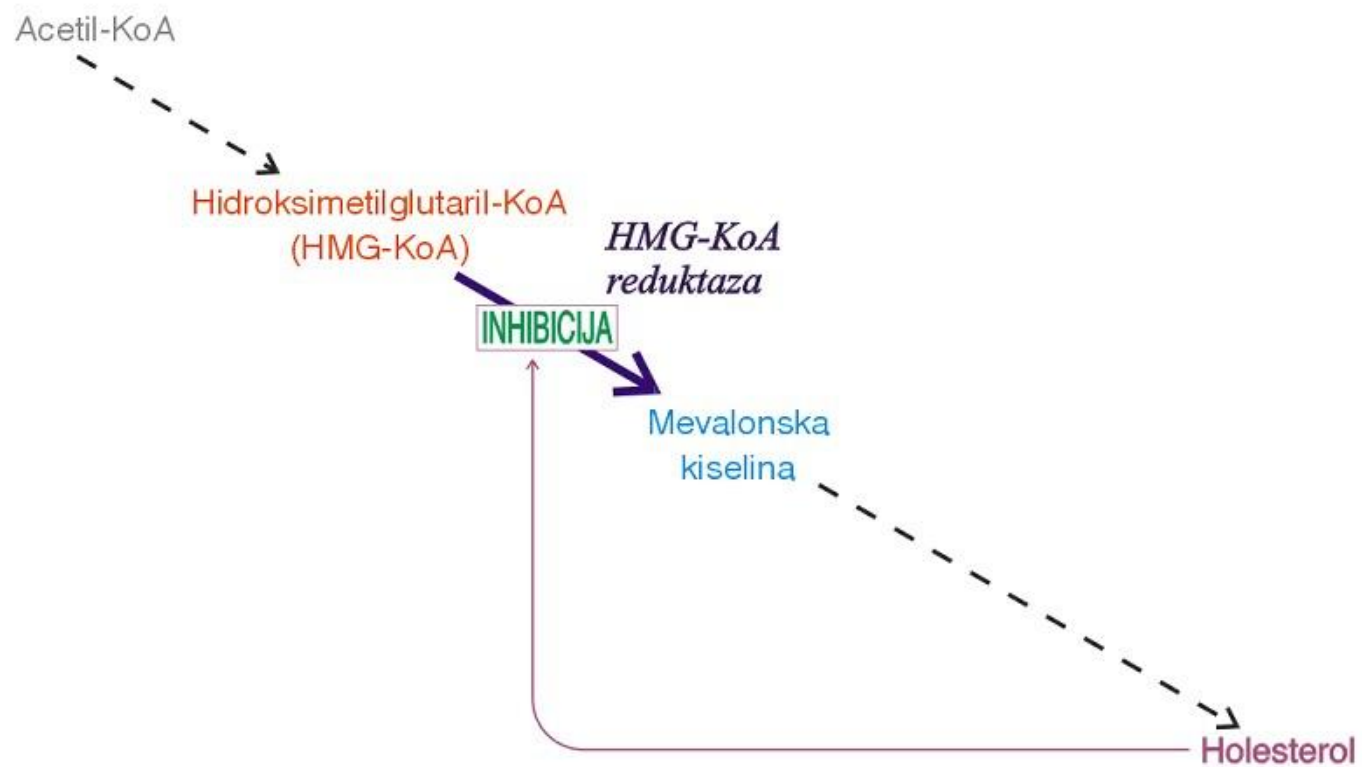
Nekompetitivna inhibicija

INHIBICIJA ENZIMSKE REAKCIJE

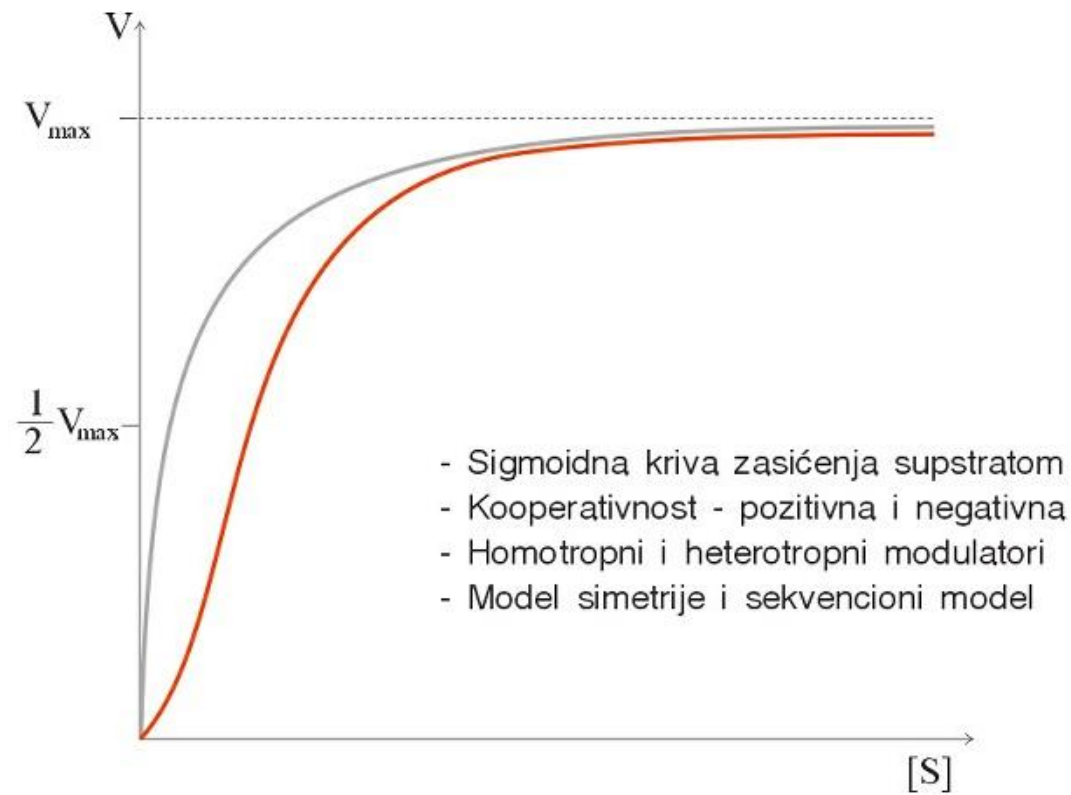
Nekompetitivna inhibicija



REGULACIJA ENZIMSKE AKTIVNOSTI Alosterna regulacija



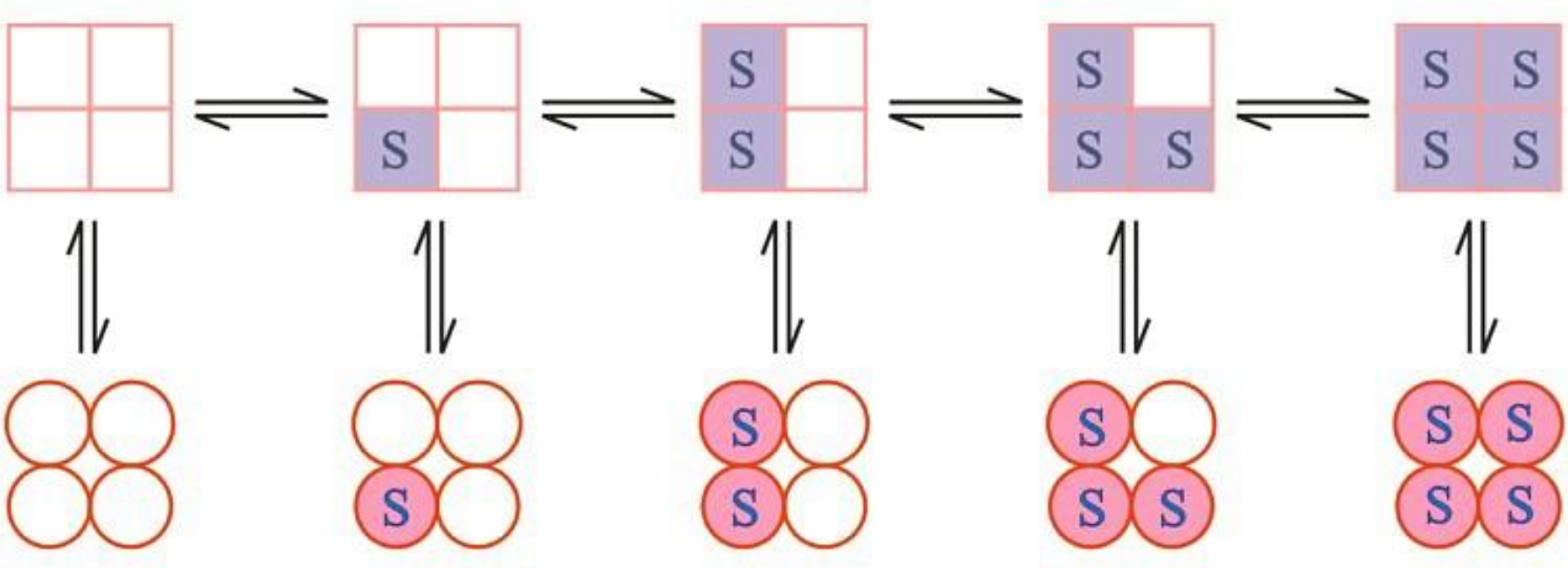
REGULACIJA ENZIMSKE AKTIVNOSTI Alosterna regulacija



ALOSTERNA REGULACIJA

model simetrije (sve ili ništa)

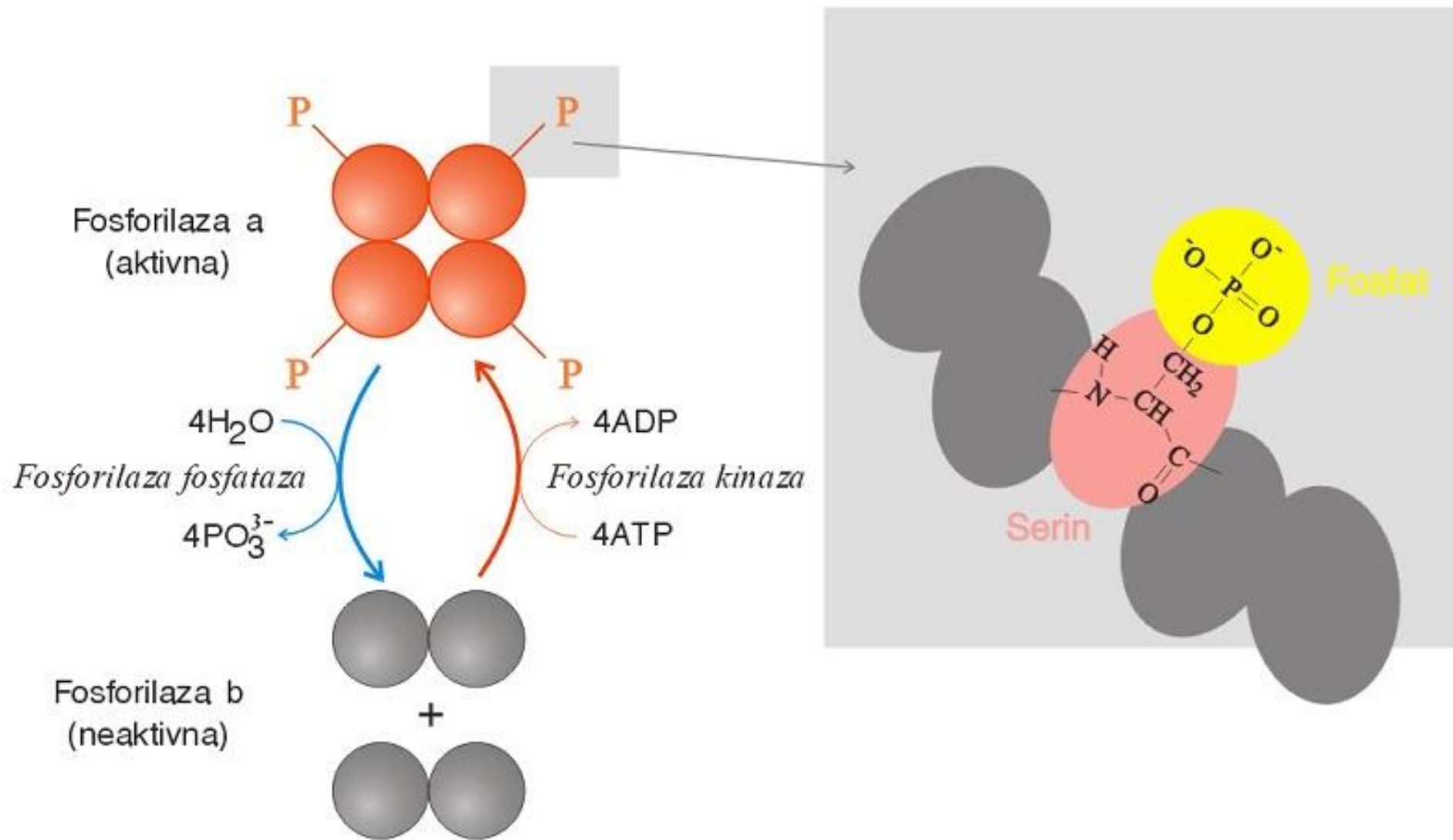
Stanje niskog afiniteta



Stanje visokog afiniteta

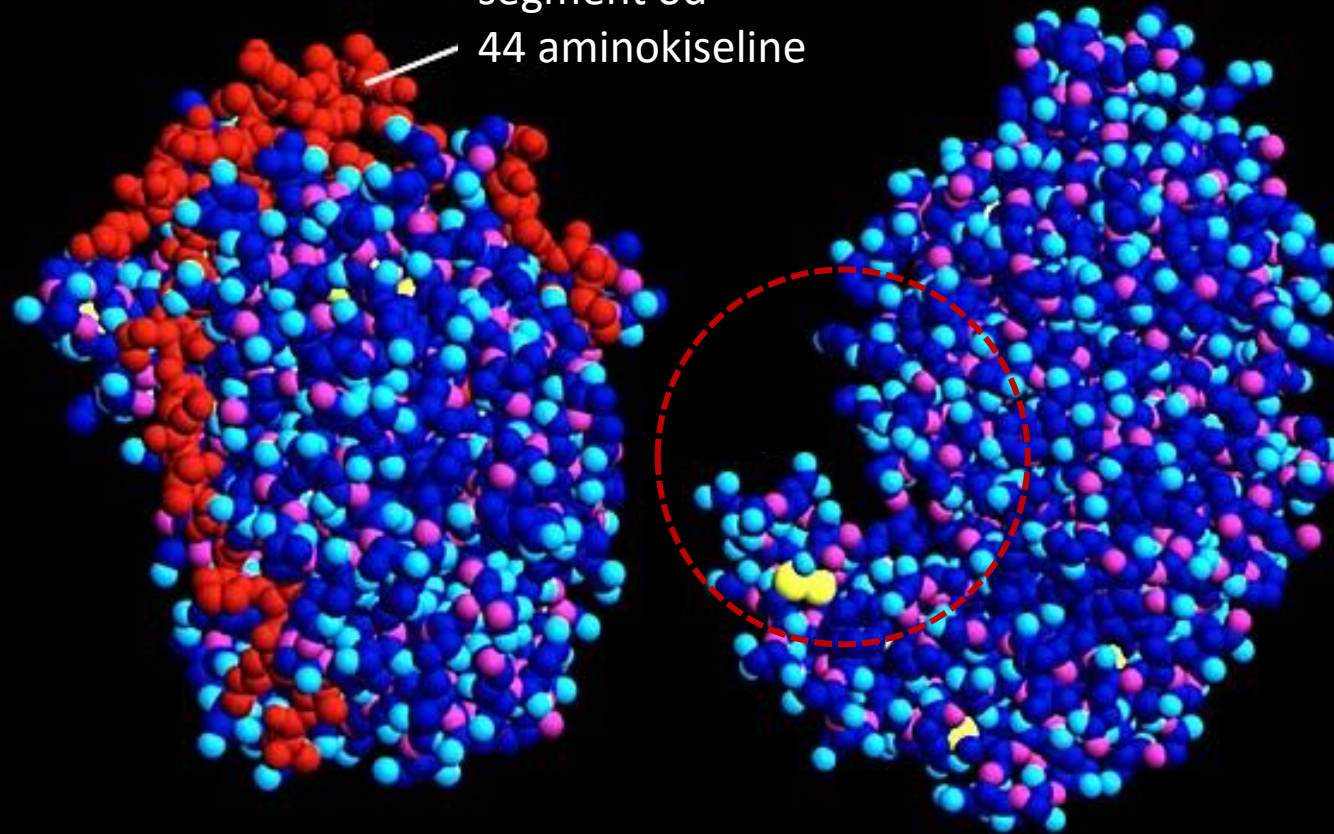
REGULACIJA ENZIMSKE AKTIVNOSTI

Kovalentna modulacija



ZIMOGENI (PROENZIMI)

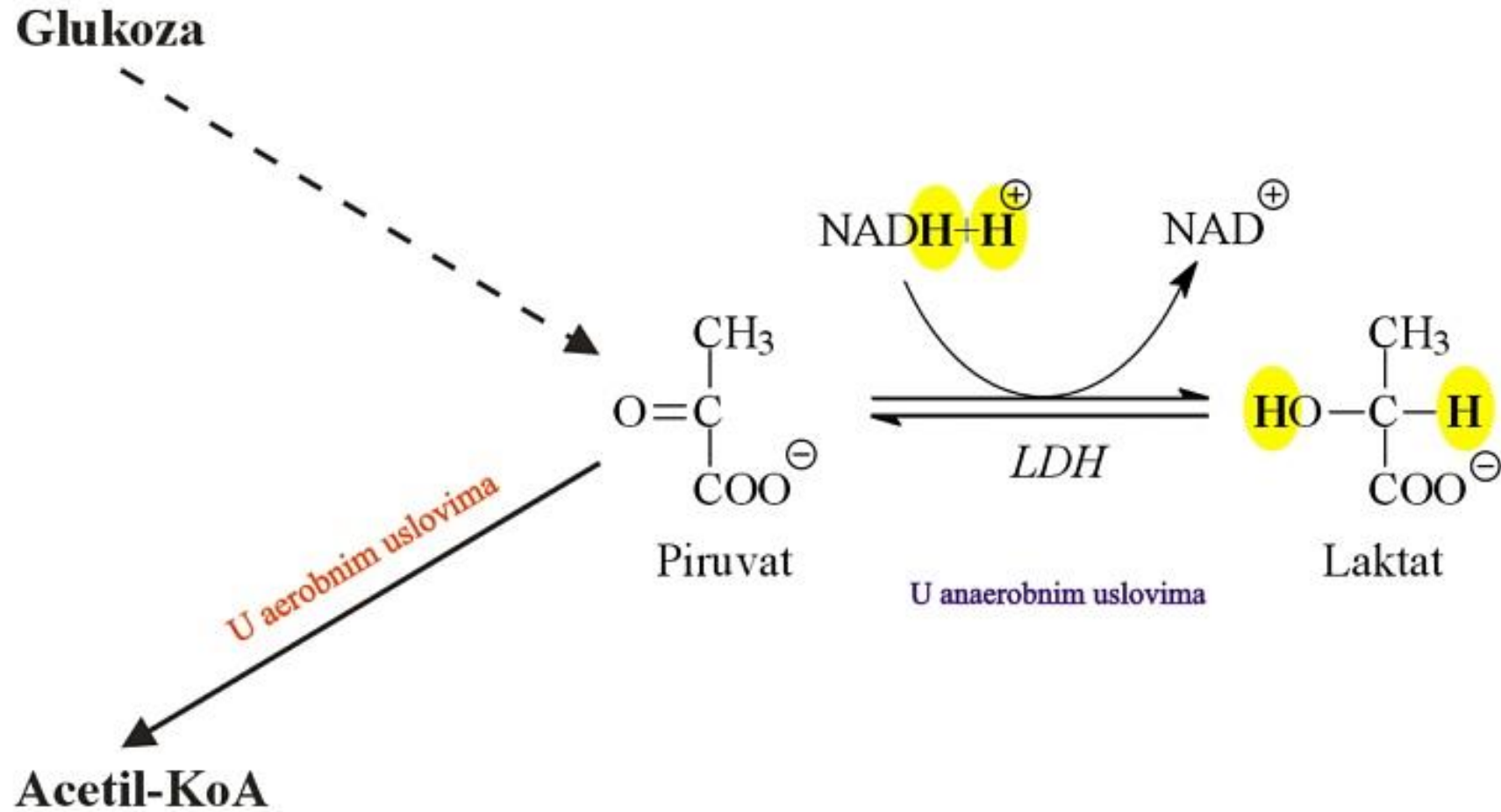
Pri pH 5 odvaja se
segment od
44 aminokiseline



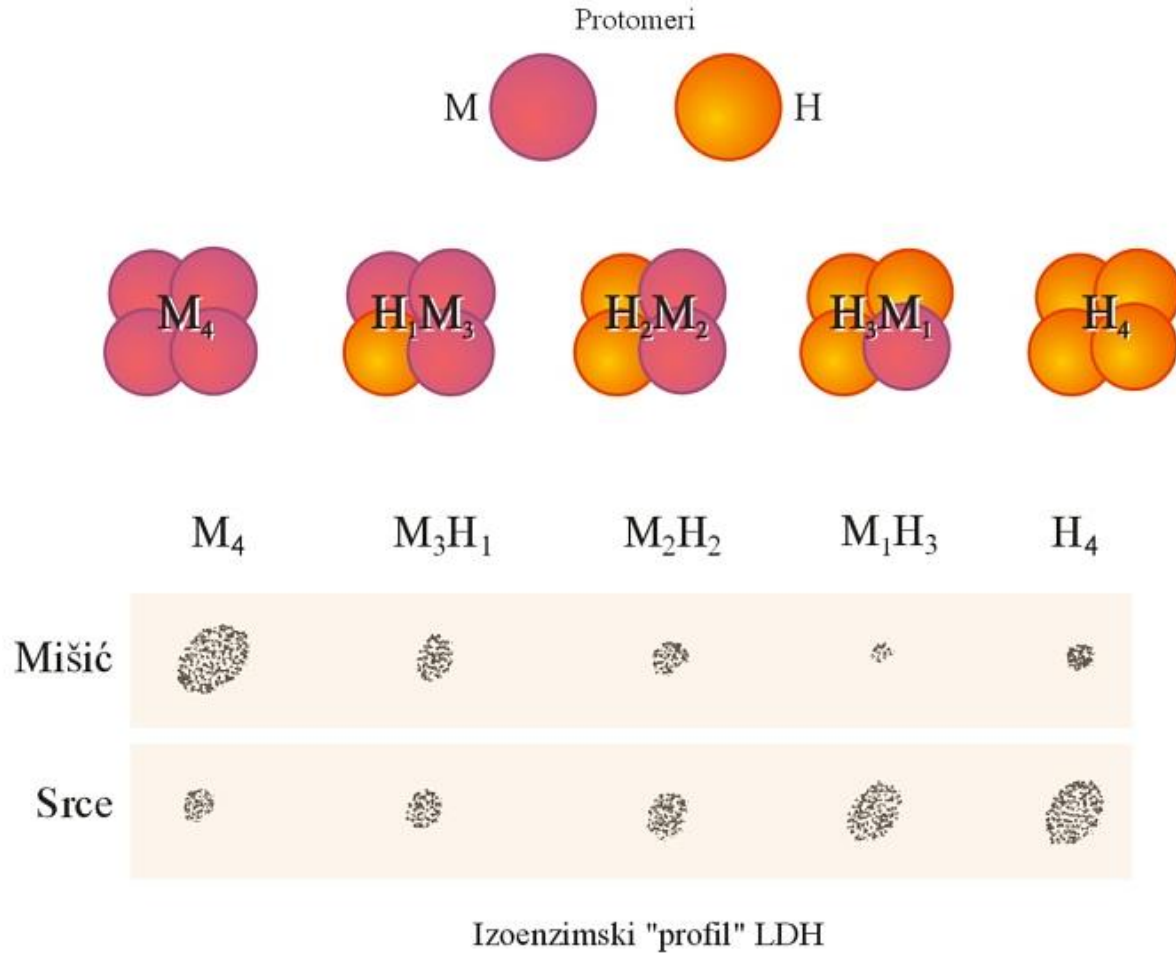
Pepsinogen

Pepsin

IZOENZIMI - LAKTAT DEHIDROGENAZA



IZOENZIMI - LAKTAT DEHIDROGENAZA



IZOENZIMI – LAKTAT DEHIDROGENAZA

H₄ (SRČANA)

Kinetička svojstva: - visok afinitet prema piruvatu i laktatu
- inhibira se u višku piruvata

Biološka uloga: Maksimalno iskorišćavanje piruvata u aerobnim uslovima

M₄ (MIŠIĆNA)

Kinetička svojstva: - 10 puta niži afinitet prema piruvatu
(nepromenjen prema laktatu)
- **ne** inhibira se u višku piruvata

Biološka uloga:

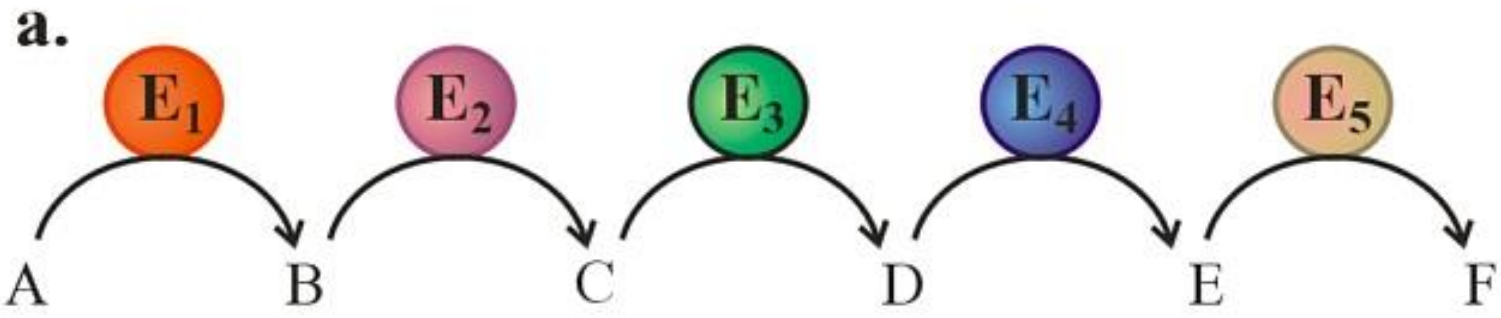
- **U skeletnim mišićima:**

Pri anaerobnom katabolizmu prevodi velike količine piruvata u laktat

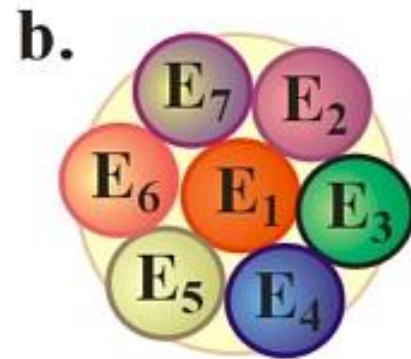
- **U jetri:**

Omogućava glukoneogenezu iz laktata nastalog u tkivima

MULTIENZIMSKI KOMPLEKSI



Više pojedinačnih enzima



Multienzimski kompleks

MULTIENZIMSKI KOMPLEKS PIRUVAT DEHIDROGENAZA

