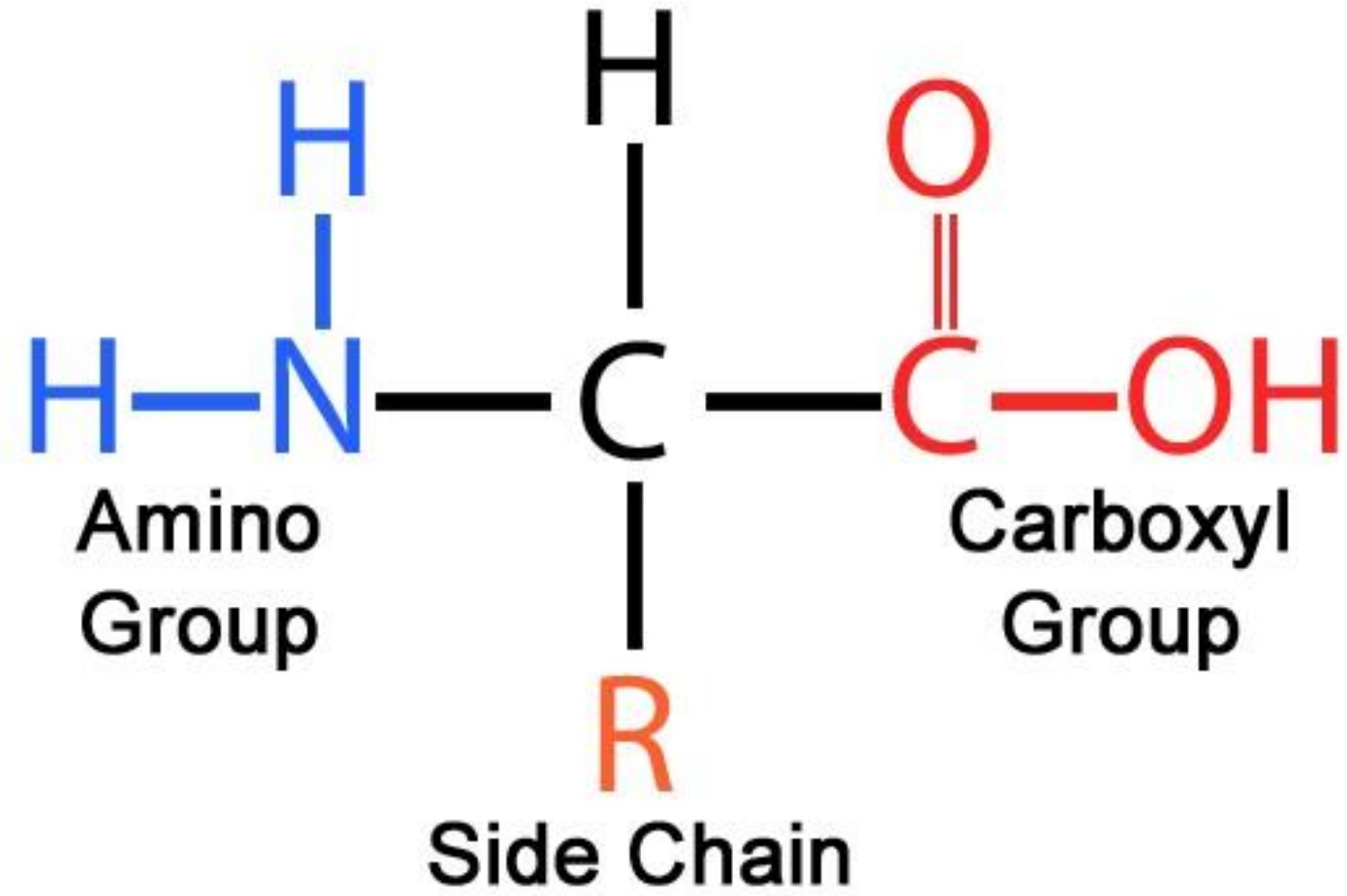
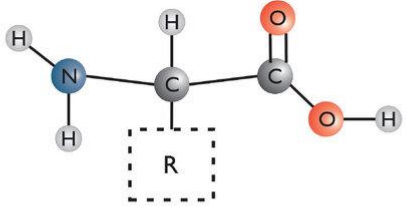
# پروتئین

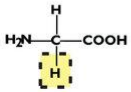
Designed by: Mohsen Ebrahimi (Assistant Professor Of Semnan University)


H
H
O
H—N—C—C—OH
Amino Group
Carboxyl Group
R
Side Chain

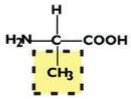



## Nonpolar

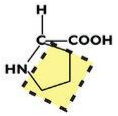
Glycine (G)



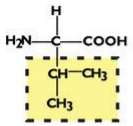
Alanine (A)



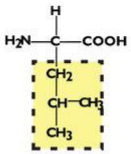
Proline (P)



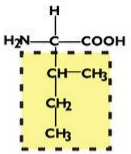
Valine (V)



Leucine (L)

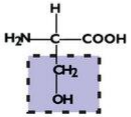


Isoleucine (I)

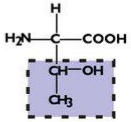


## Polar

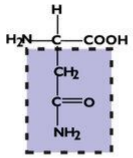
Serine (S)



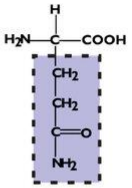
Threonine (T)



Glutamine (Q)

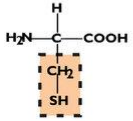


Asparagine (N)

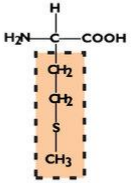


## Sulfur containing

Cysteine (C)

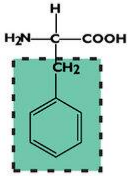


Metionine (M)

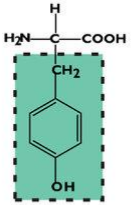


## Aromatic

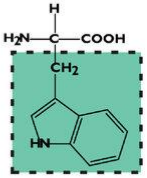
Phenylalanine (F)



Tyrosine (Y)

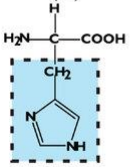


Tryptophan (W)

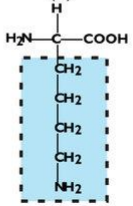


## Positively charged*

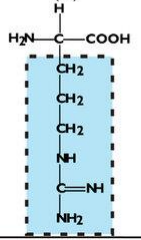
Histidine (H)



Lysine (L)

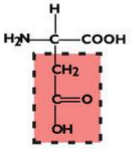


Arginine (R)

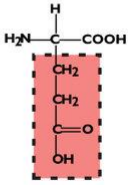


## Negatively charged*

Aspartic acid (D)



Glutamic acid (E)



| Essential | Conditionally Non-Essential | Non-Essential |
| --- | --- | --- |
| Histidine | Arginine | Alanine |
| Isoleucine | Cystine | Asparagine |
| Leucine | Glutamine | Aspartate |
| Lysine | Glycine | Glutamate |
| Methionine | Proline | Serine |
| Phenylalanine | Tyrosine | |
| Threonine | | |
| Tryptophan | | |
| Valine | | |

# انواع اسید های آمینه

**TABLE 4.1** The 21 Proteinogenic Amino Acids

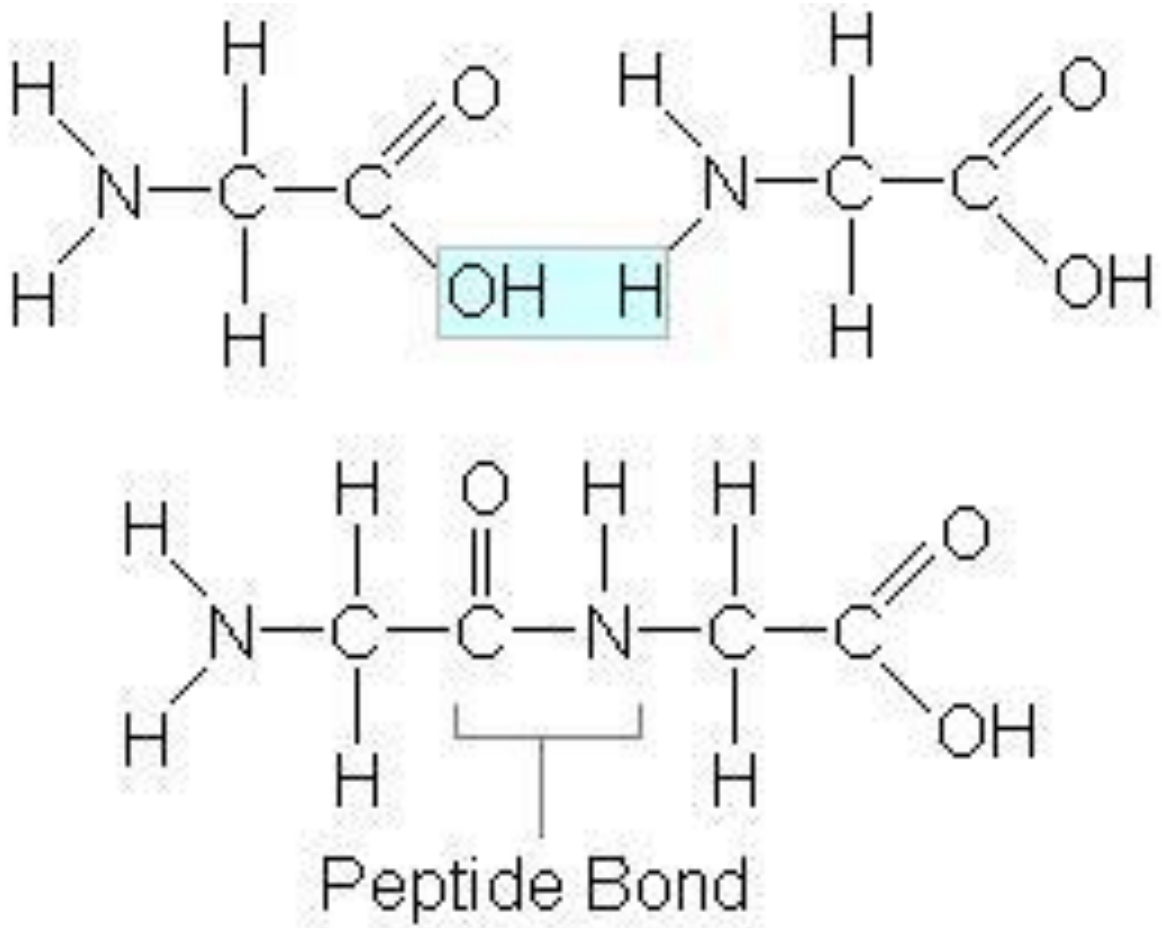
| Essential (9) | Conditionally essential (7) | Nonessential (5) |
|---|---|---|
| Histidine (H) | Arginine (R) | Alanine (A) |
| Isoleucine (I) | Cysteine (C) | Aspartic acid (D) |
| Leucine (L) | Glutamine (Q) | Asparagine (N) |
| Lysine (K) | Glycine (G) | Glutamic acid (E) |
| Methionine (M) | Proline (P) | Selenocysteine (U) |
| Phenylalanine (F) | Serine (S) | |
| Threonine (T) | Tyrosine (Y) | |
| Tryptophan (W) | | |
| Valine (V) | | |

**TABLE 4.2** Examples of Common Nonproteinogenic Amino Acid Supplement Ingredients

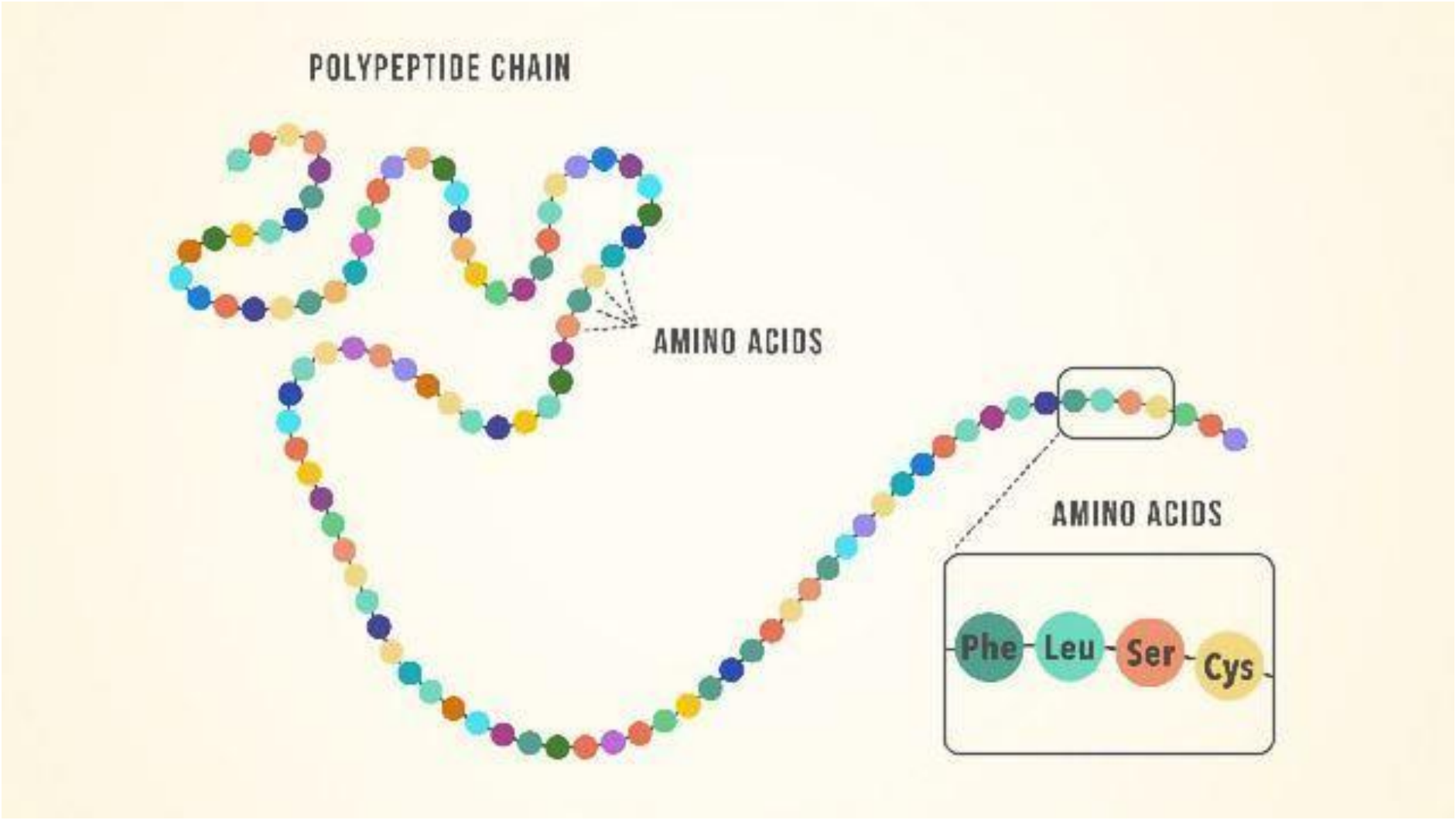
| |
|---|
| Beta-alanine |
| Carnosine* |
| Citrulline |
| D-aspartic acid |

اسیدهای آمینه ضروری، غیرضروری، نیمه ضروری و اسید های آمینه غیرپروتئینی

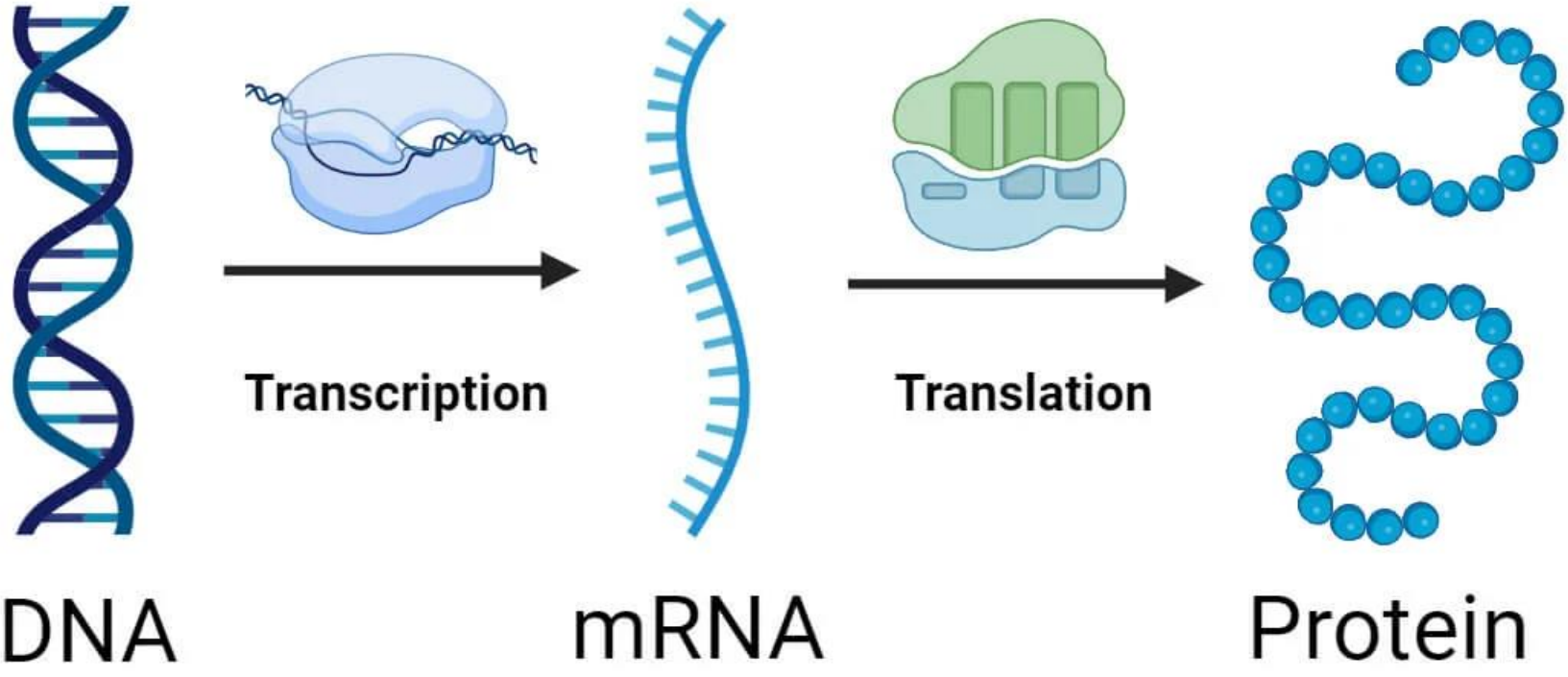
# پیوند پپتیدی

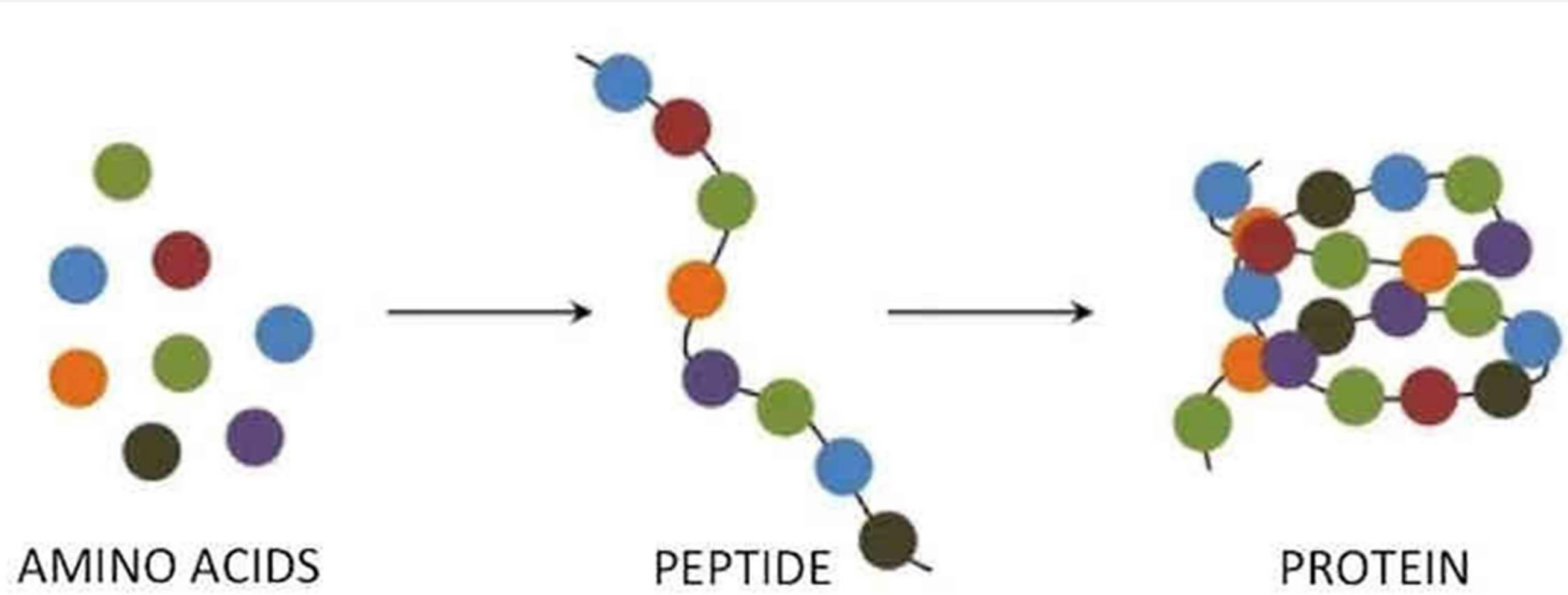


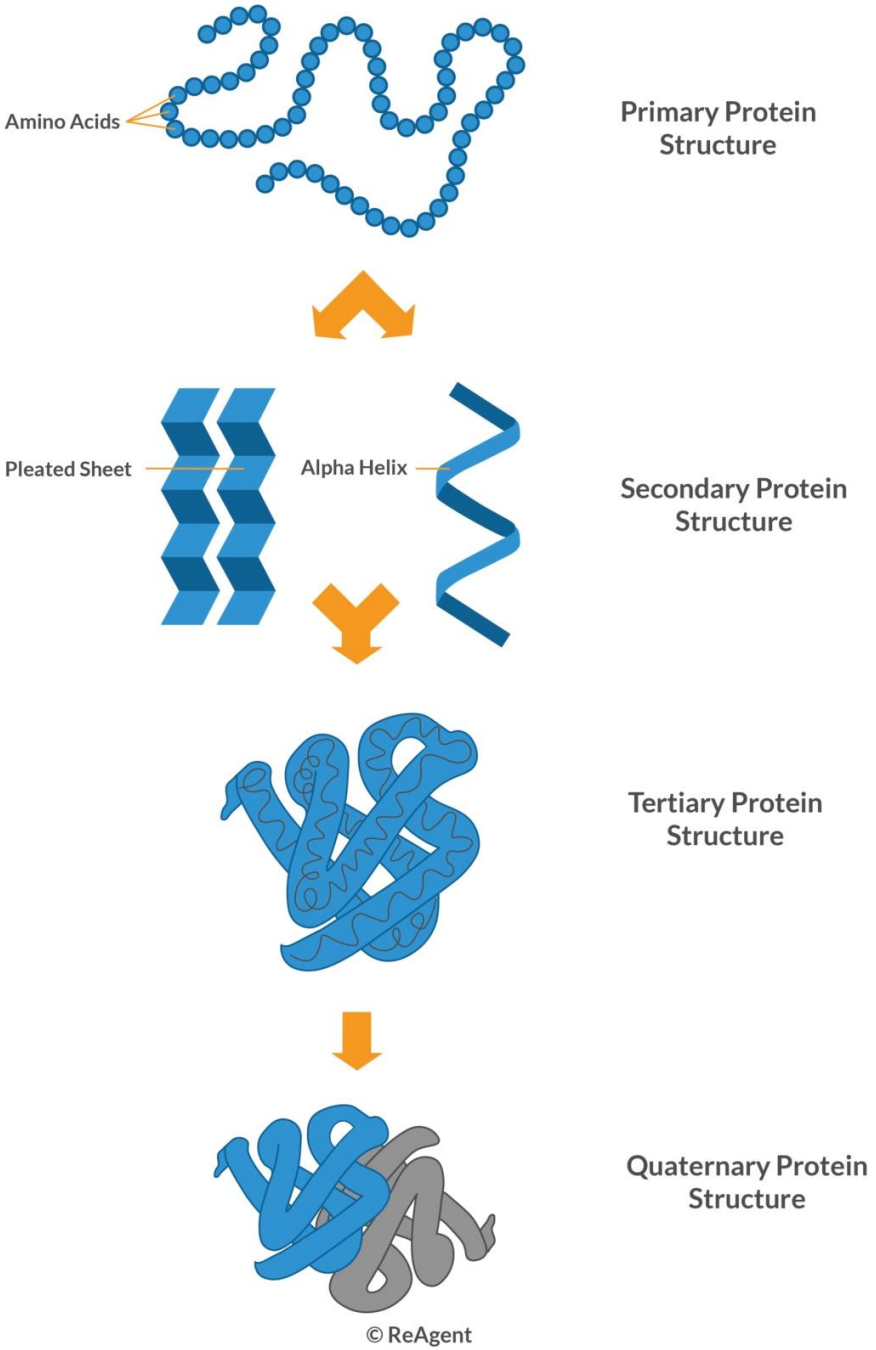

A molecule of water is removed from two glycine amino acids to form a peptide bond.


POLYPEPTIDE CHAIN
AMINO ACIDS
AMINO ACIDS
Phe
Leu
Ser
Cys

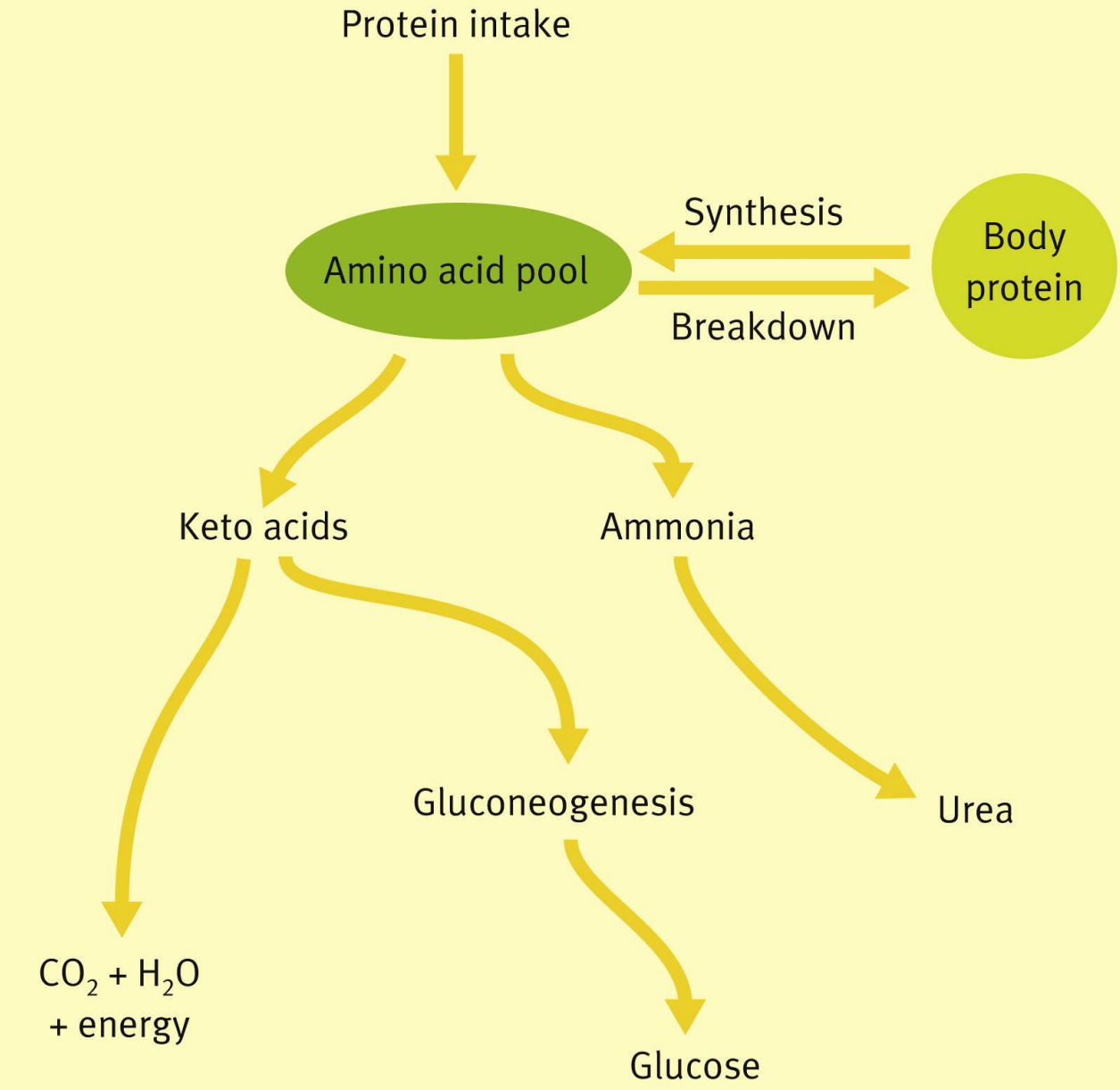
# Gene Expression

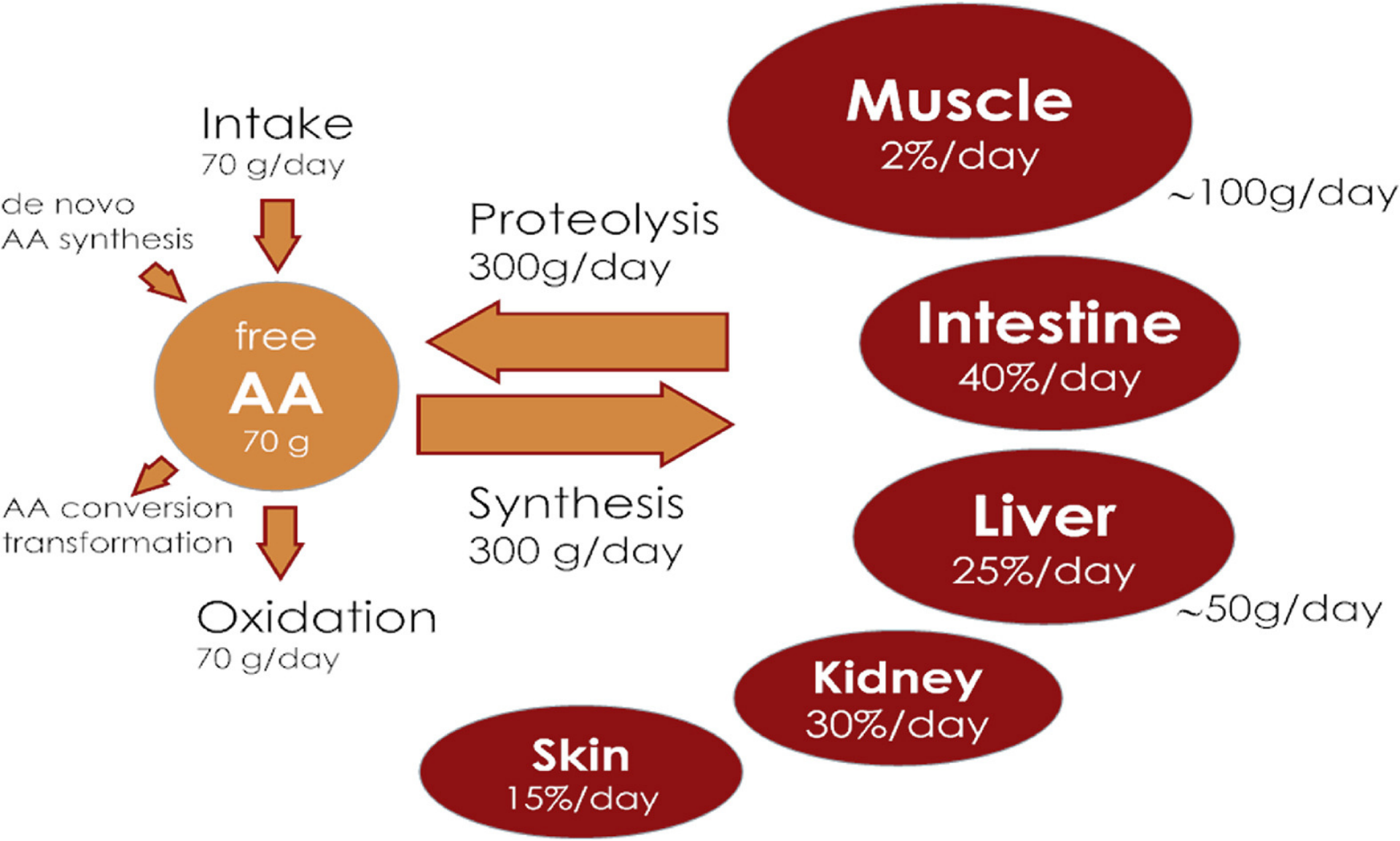



AMINO ACIDS
PEPTIDE
PROTEIN


Amino Acids
Primary Protein Structure
Pleated Sheet
Alpha Helix
Secondary Protein Structure
Tertiary Protein Structure
Quaternary Protein Structure
© ReAgent

## Protein metabolism

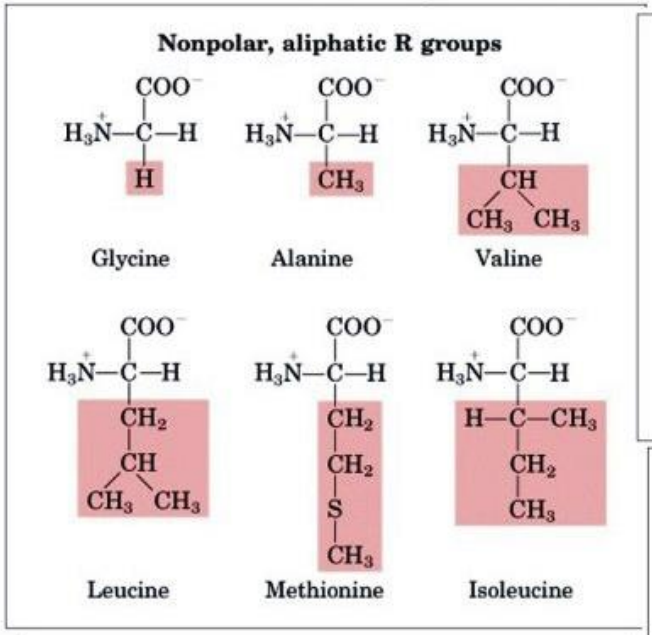


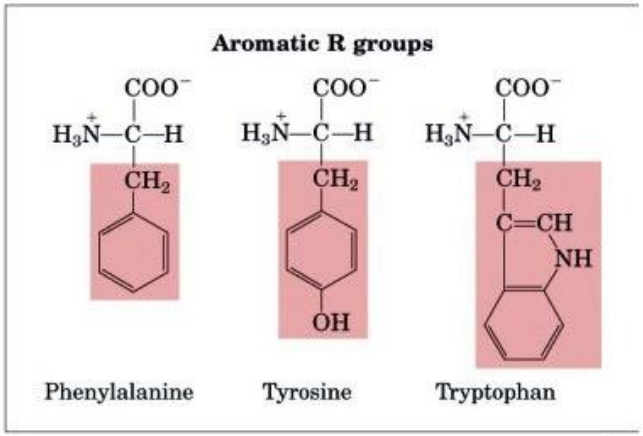

Intake
70 g/day
de novo
AA synthesis
free
AA
70 g
AA conversion
transformation
Oxidation
70 g/day
Proteolysis
300g/day
Synthesis
300 g/day
Muscle
2%/day
~100g/day
Intestine
40%/day
Liver
25%/day
~50g/day
Kidney
30%/day
Skin
15%/day

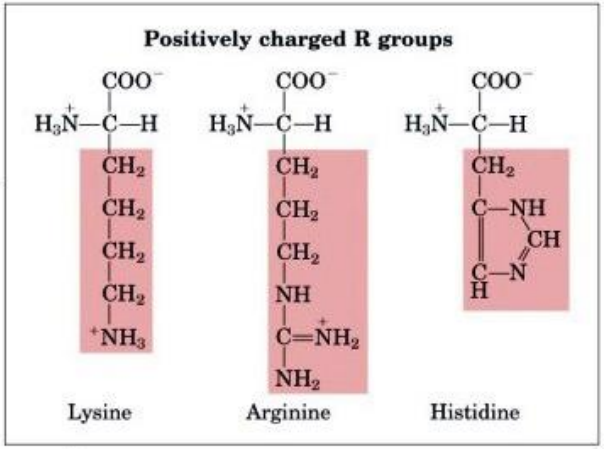
# سوخت پروتئین

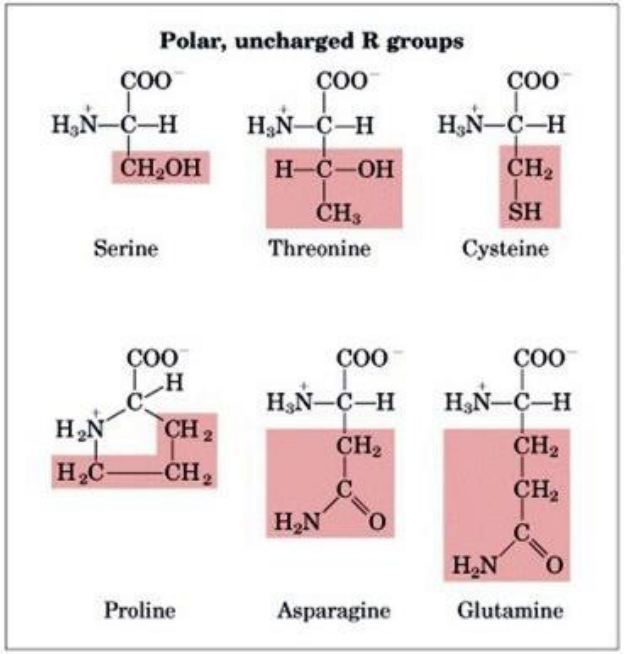
Designed by: Mohsen Ebrahimi (Assistant Professor Of Semnan University)

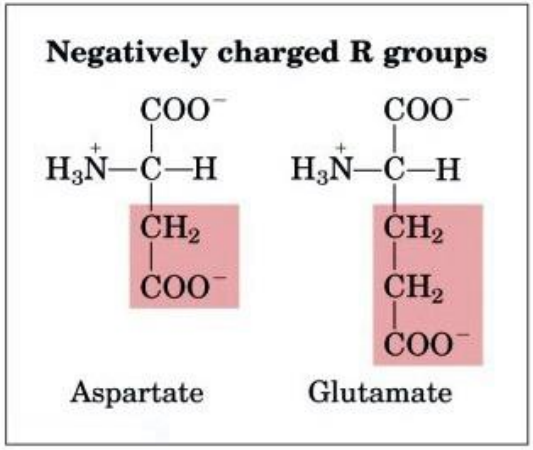
# Twenty standard Amino Acids

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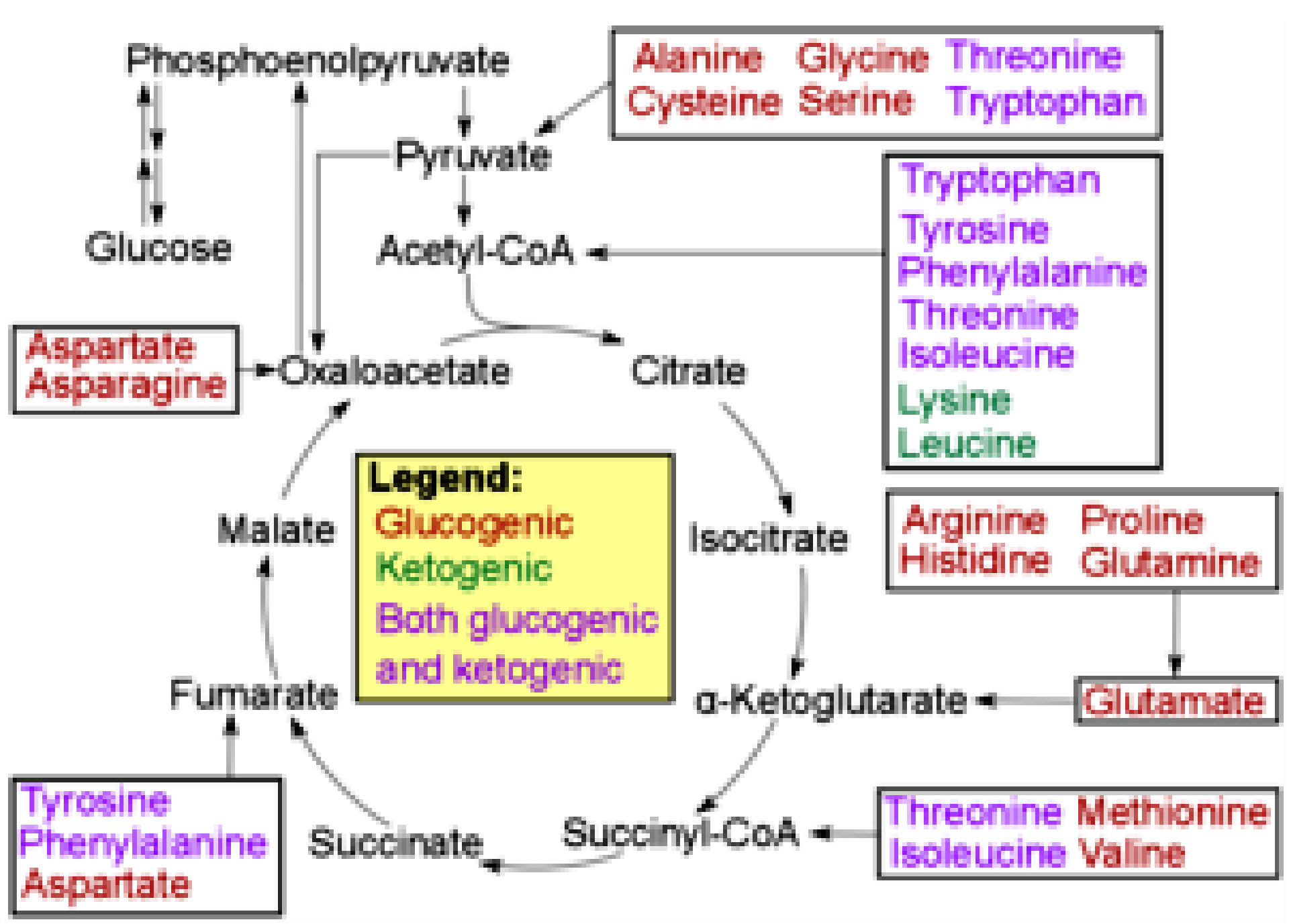
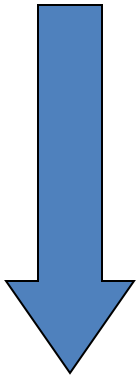



Designed by: Mohsen Ebrahimi (Assistant Professor Of Semnan University)

# کاتابولیسم اسید های آمینه

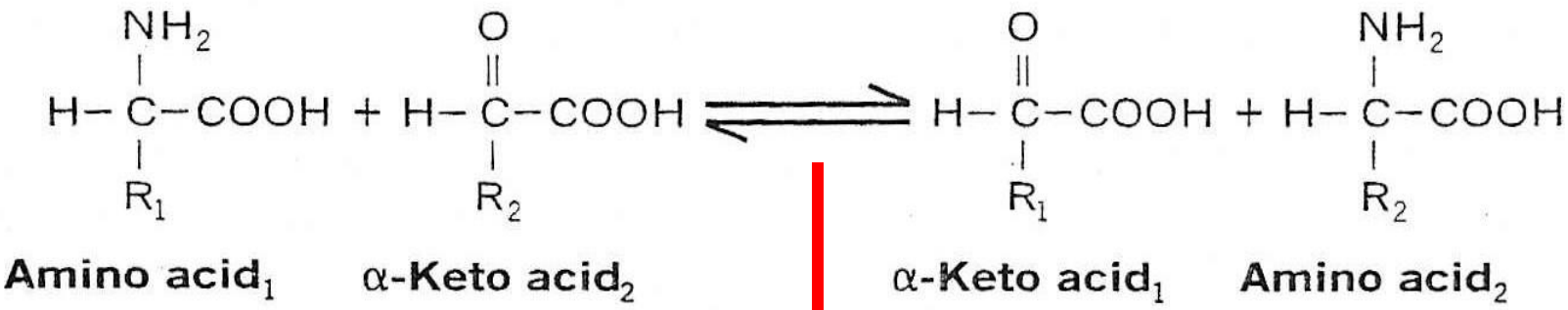


1) Transamination
2) Deamination
3) Disposal of Ammonia

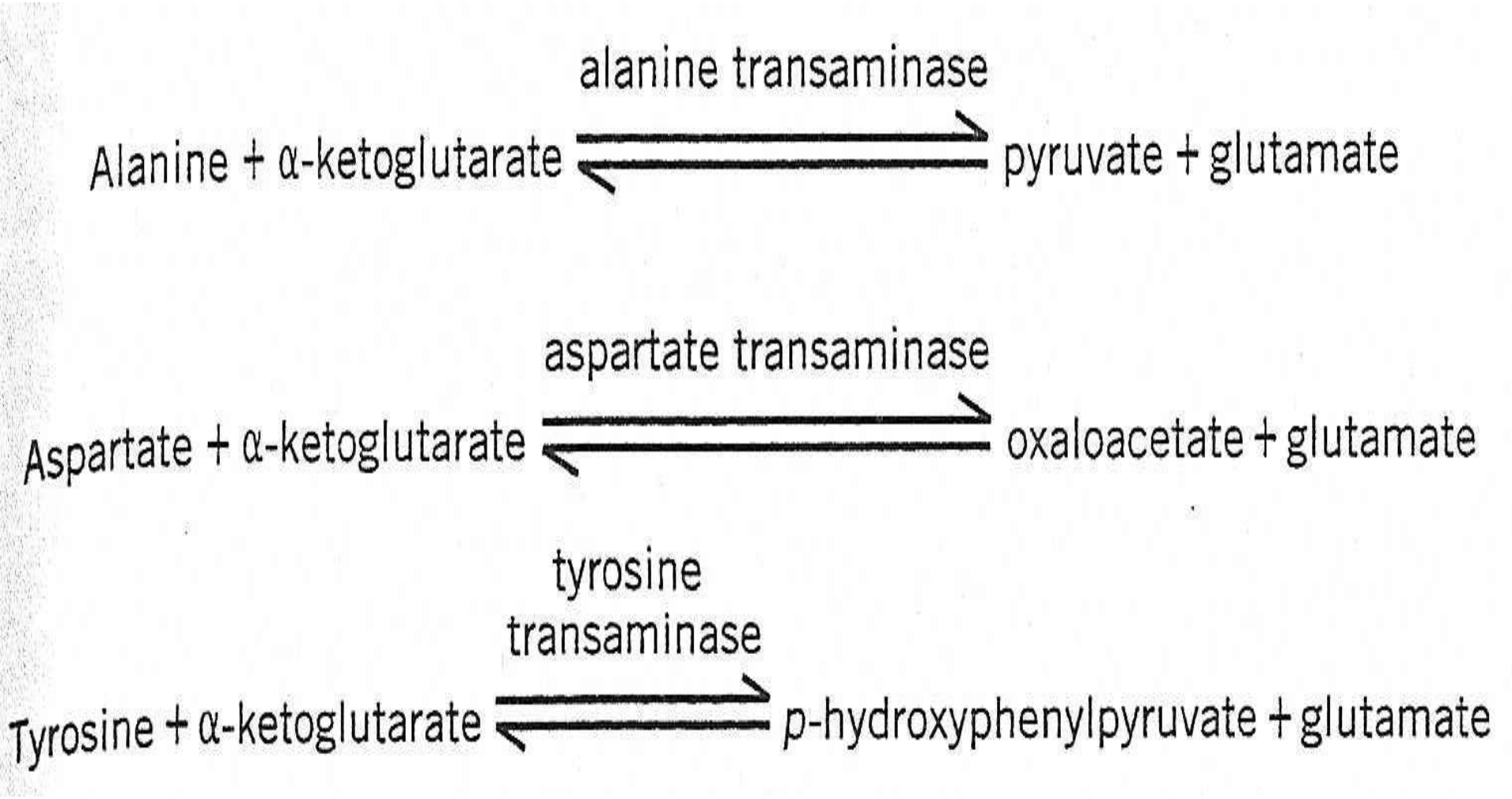
Designed by: Mohsen Ebrahimi (Assistant Professor Of Semnan University)

# Transamination

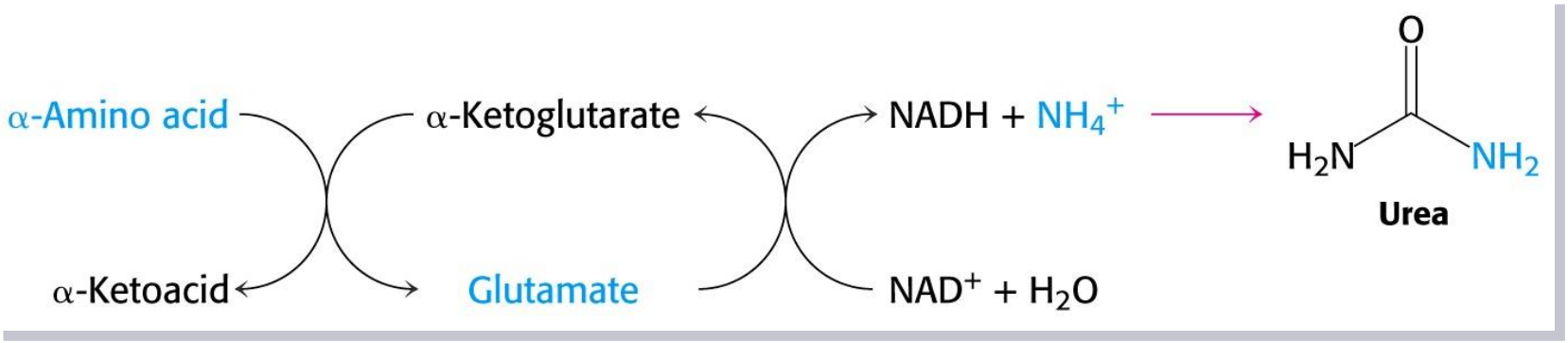
## انتقال گروه آمین اسیدهای آمینه به آلفا کتو اسیدها



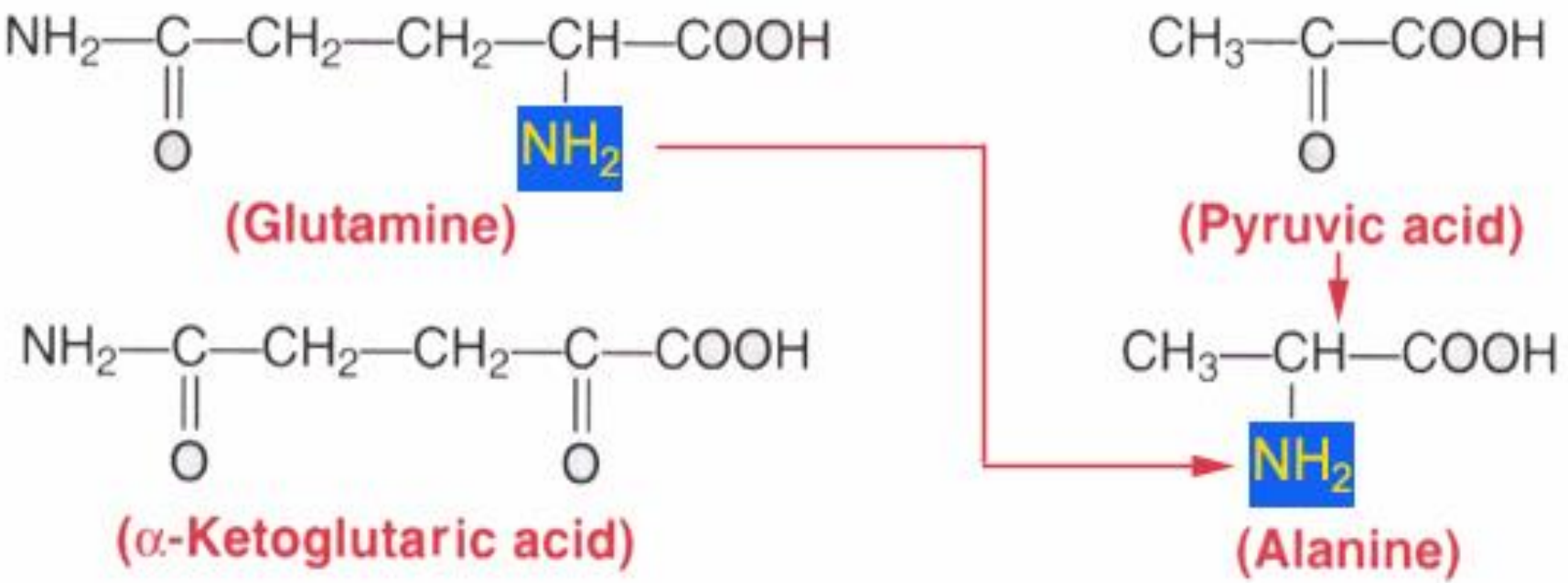

## ترانس آمیناز


alanine transaminase
Alanine + α-ketoglutarate
pyruvate + glutamate
aspartate transaminase
Aspartate + α-ketoglutarate
oxaloacetate + glutamate
tyrosine
transaminase
Tyrosine + α-ketoglutarate
p-hydroxyphenylpyruvate + glutamate

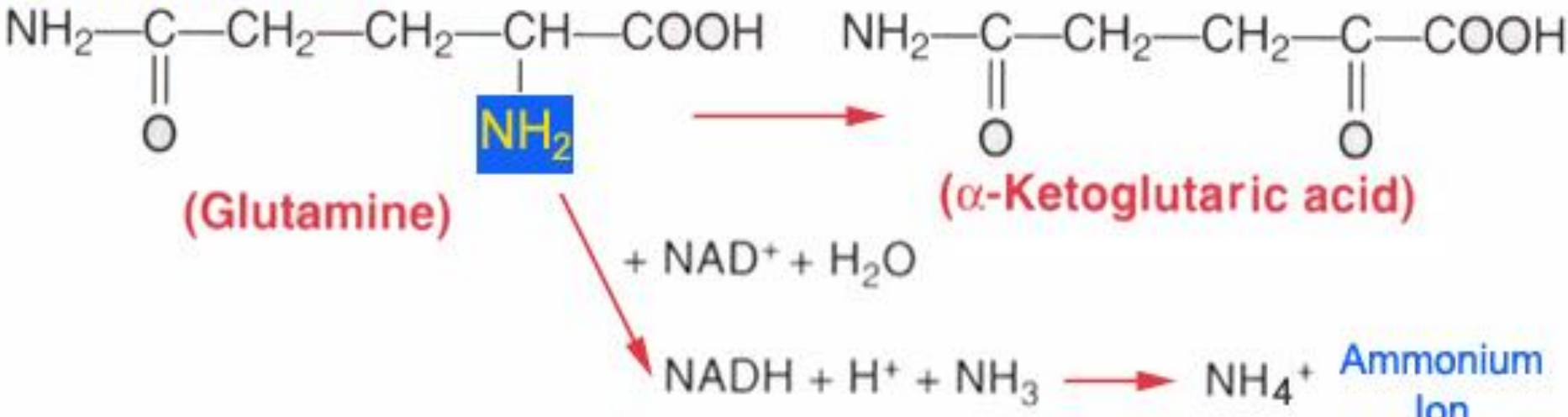
# Deamination (oxidative)



# Transamination

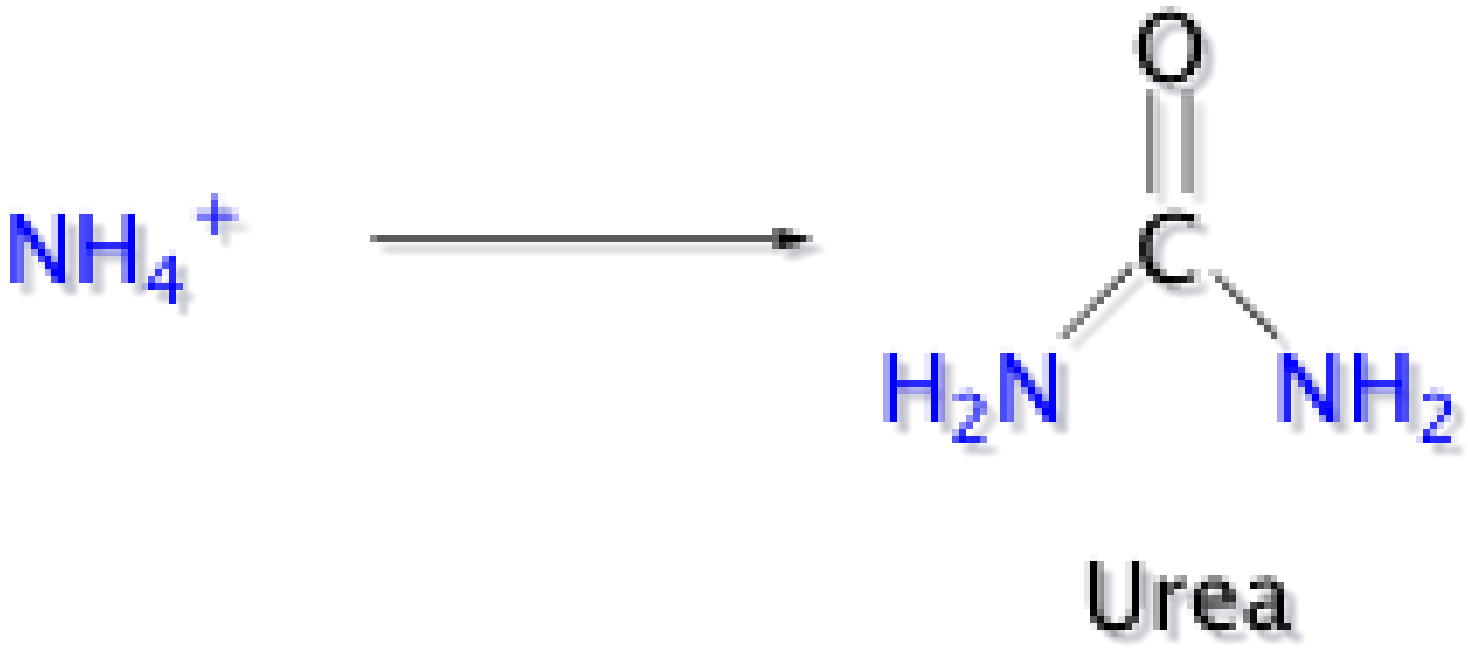



# Deamination

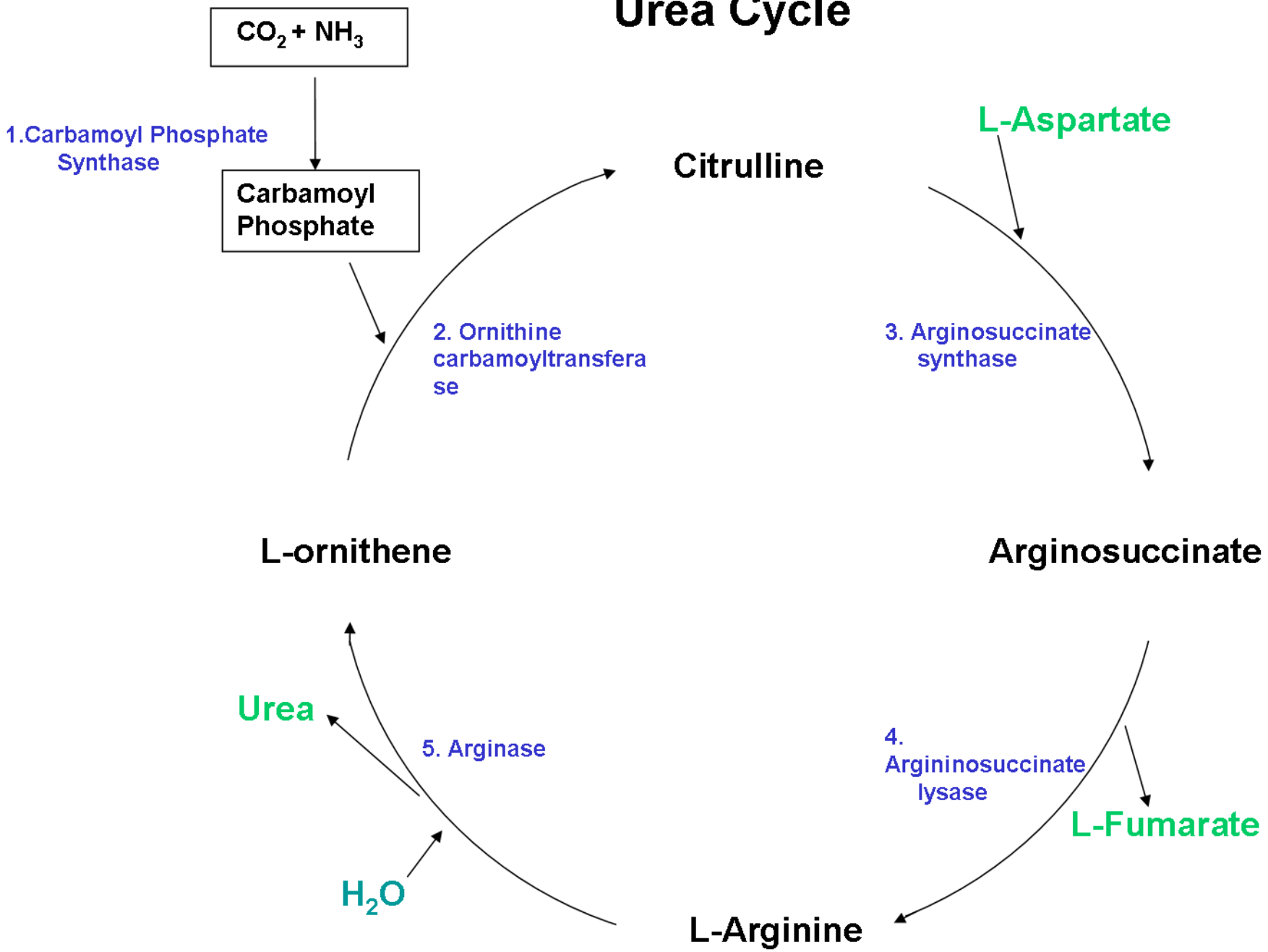



Designed by: Mohsen Ebrahimi (Assistant Professor Of Semnan University)

# Ammonium Ion



# Urea Cycle

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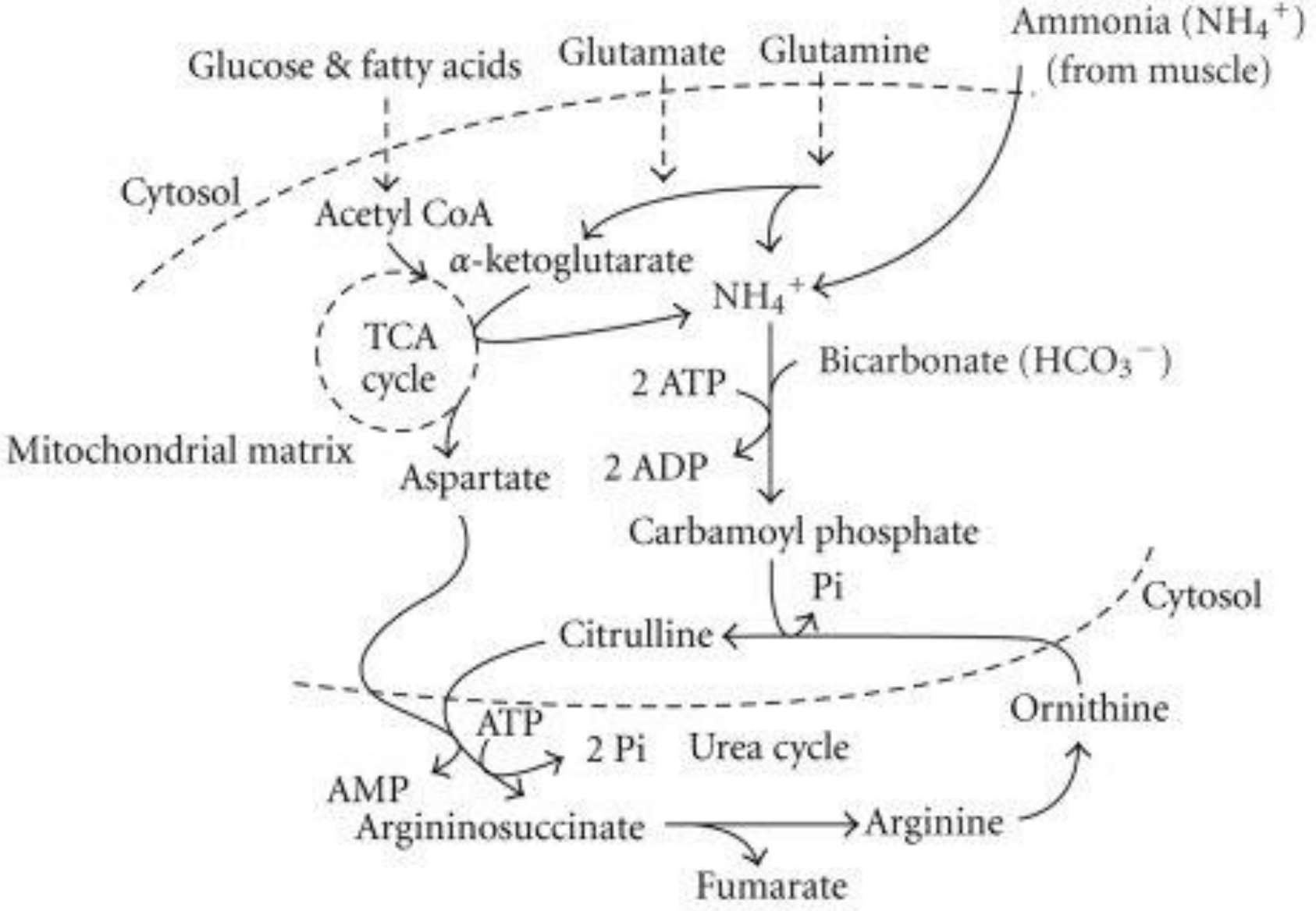
Glucose & fatty acids
Glutamate
Glutamine
Ammonia ($NH_4^+$)
(from muscle)
Cytosol
Acetyl CoA
α-ketoglutarate
$NH_4^+$
TCA
cycle
Bicarbonate ($HCO_3^-$)
2 ATP
Mitochondrial matrix
Aspartate
2 ADP
Carbamoyl phosphate
Pi
Cytosol
Citrulline
Ornithine
ATP
2 Pi
Urea cycle
AMP
Argininosuccinate
Arginine
Fumarate

# چرخه گلوکز– آلانین