WELCOME

marks

course

about

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PROTEOMICS
BTC 357

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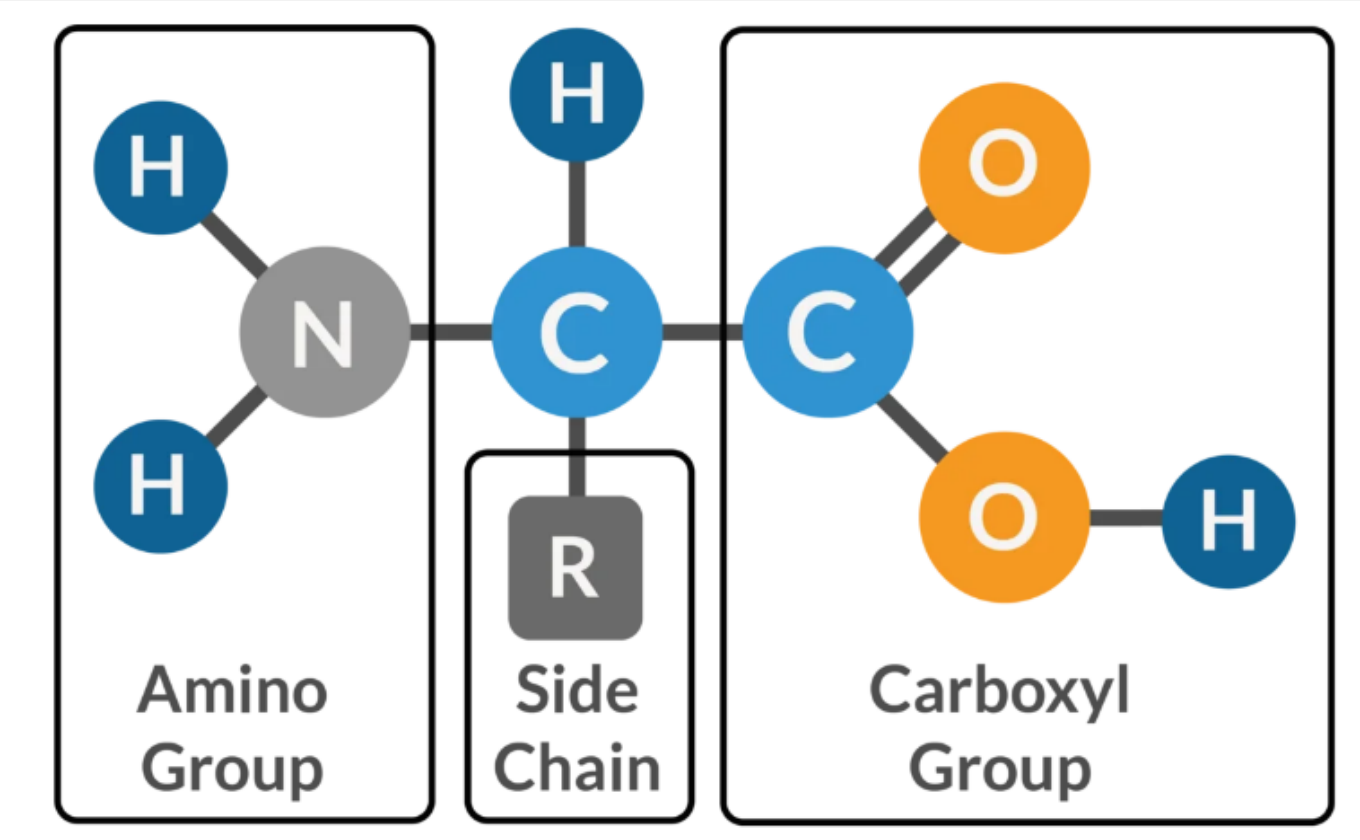
Amino Acids

Amino acid is the monomer of protein and serves as a component of body tissues, enzymes, some hormones, etc., and is also an essential substance as a nutrient and as a source of energy. The nutritional value of protein is mainly determined by the types and amount of constituent amino acids.

Table 1: The 20 Common Amino Acids

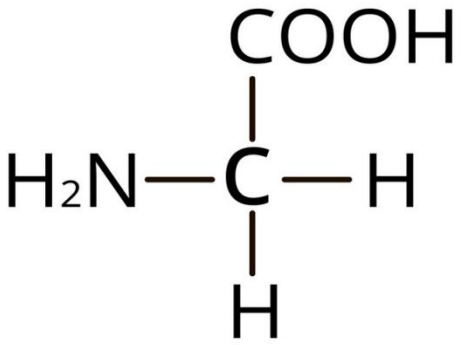
Amino Acids	Three-letter abbreviations	One-letter symbol
1. Glycine	Gly	G
2. Alanine	Ala	A
3. Proline	Pro	P
4. Valine	Val	V
5. Leucine	Leu	L
6. Isoleucine	Ile	I
7. Methionine	Met	M
8. Phenylalanine	Phe	F
9. Tyrosine	Tyr	Y
10. Tryptophan	Trp	W
11. Serine	Ser	S
12. Threonine	Thr	T
13. Cysteine	Cys	C
14. Asparagine	Asn	N
15. Glutamine	Gln	Q
16. Lysine	Lys	K
17. Arginine	Arg	R
18. Histidine	His	H
19. Aspartate	Asp	D
20. Glutamate	Glu	E

Structure of the amino acids

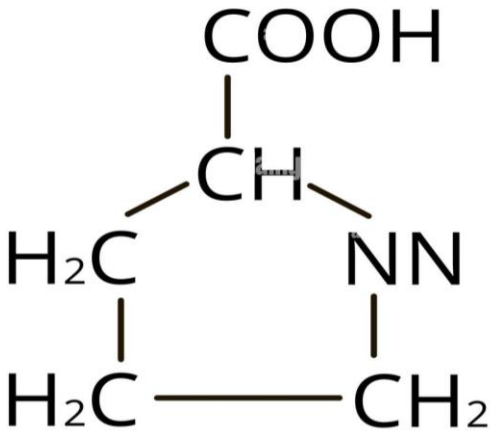


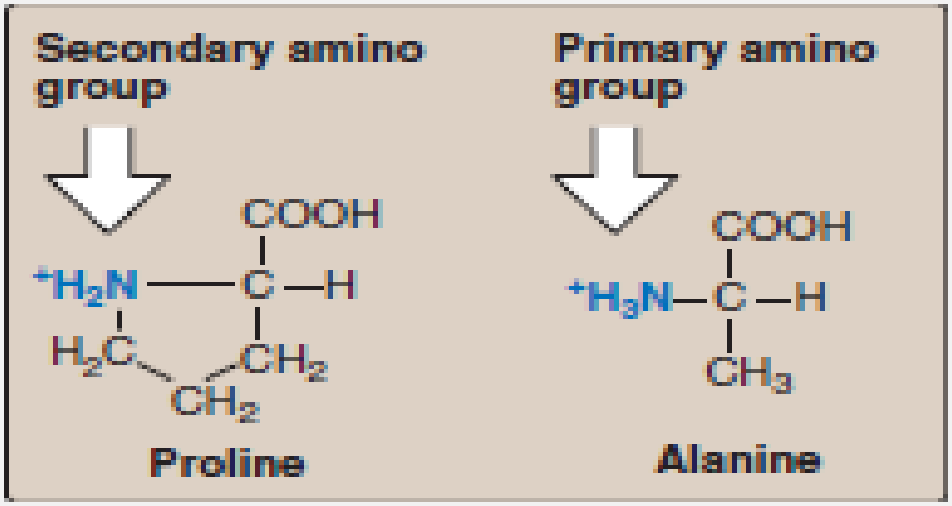
EXCEPTION

Glycine

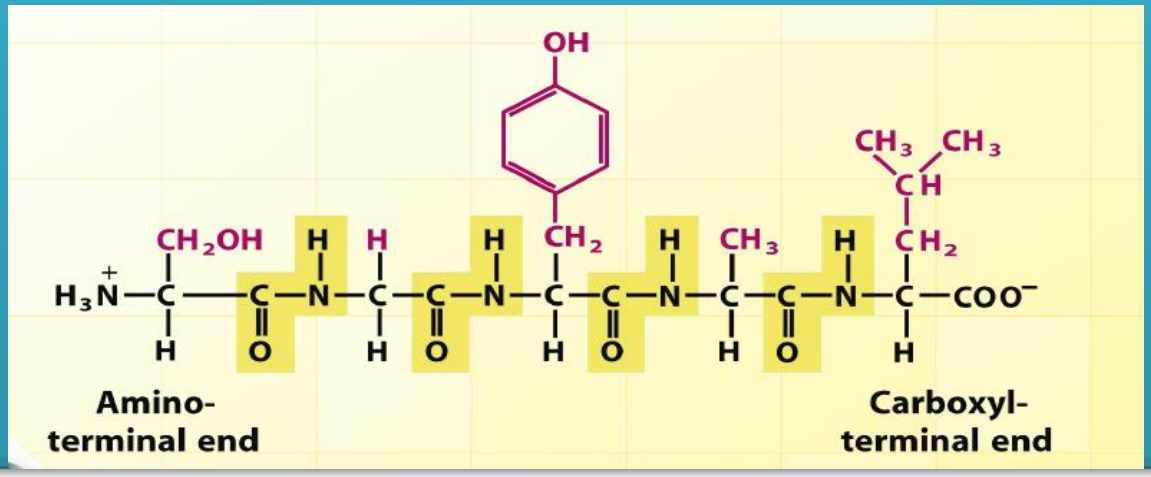


Proline





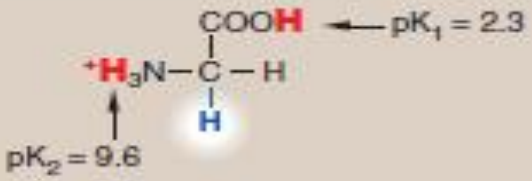
- At physiologic pH (approximately pH 7.4), the carboxyl group is dissociated, forming the negatively charged carboxylate ion ($–COO^-$), and the amino group is protonated ($–NH3^+$).
- In proteins, almost all of these carboxyl and amino groups are combined through peptide linkage and, in general, are not available for chemical reaction except for hydrogen bond formation.



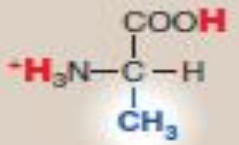
Chemical classification of amino acids

1. Amino acids with nonpolar side chains:

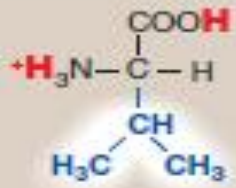
Each of these amino acids has a nonpolar side chain that does not gain or lose protons or participate in hydrogen or ionic bonds. The side chains of these amino acids can be thought of as “oily” or lipid-like, a property that promotes hydrophobic interactions.



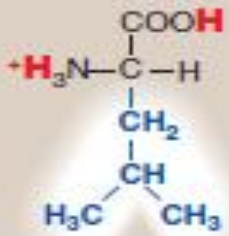
Glycine



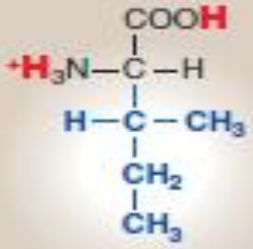
Alanine



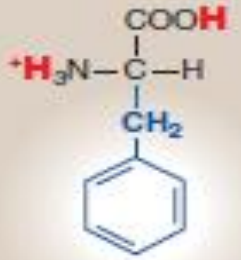
Valine



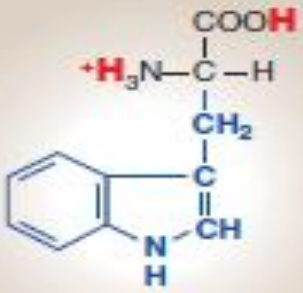
Leucine



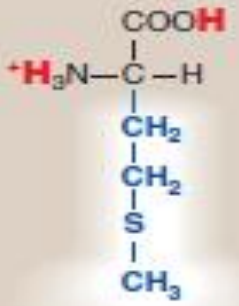
Isoleucine



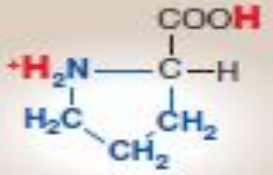
Phenylalanine



Tryptophan



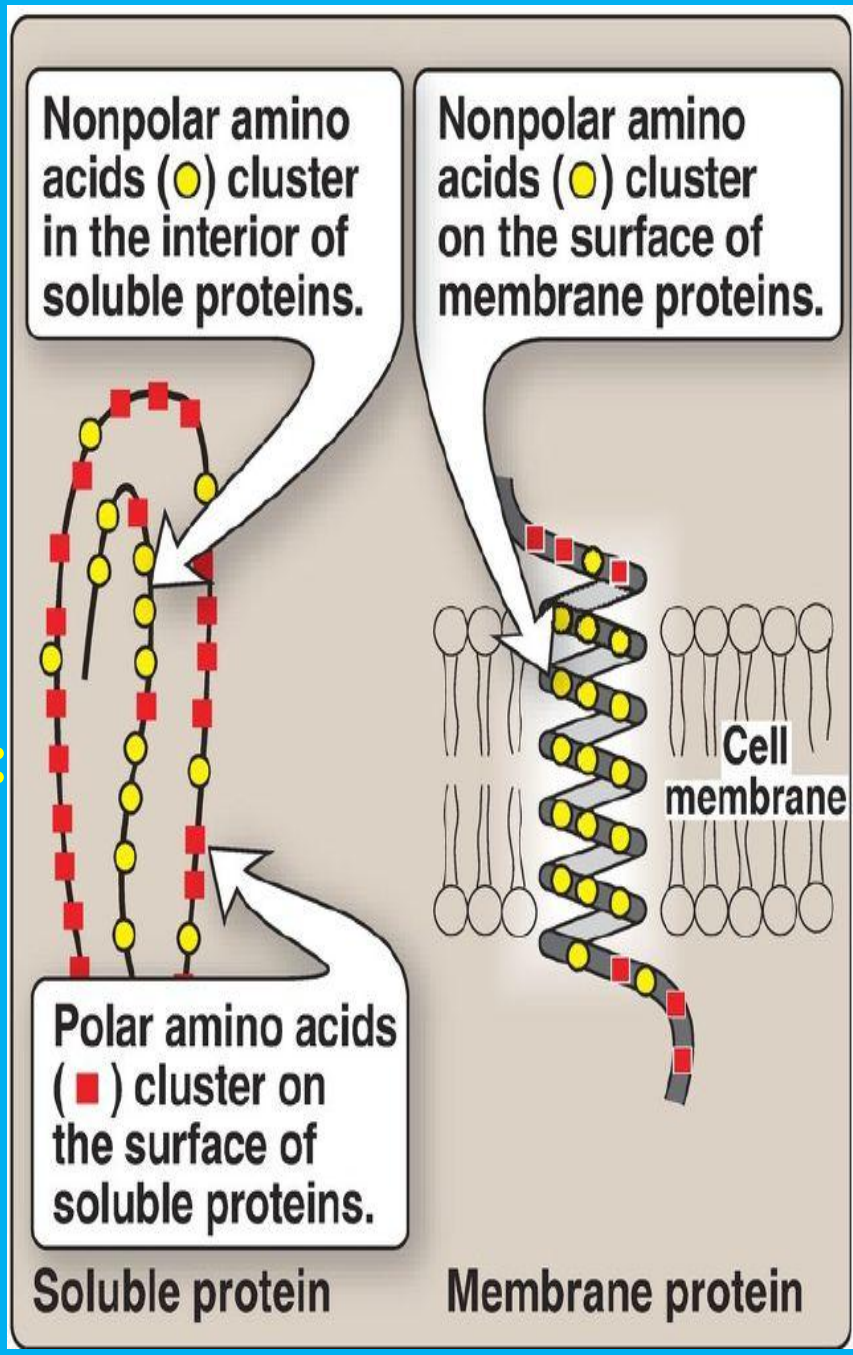
Methionine



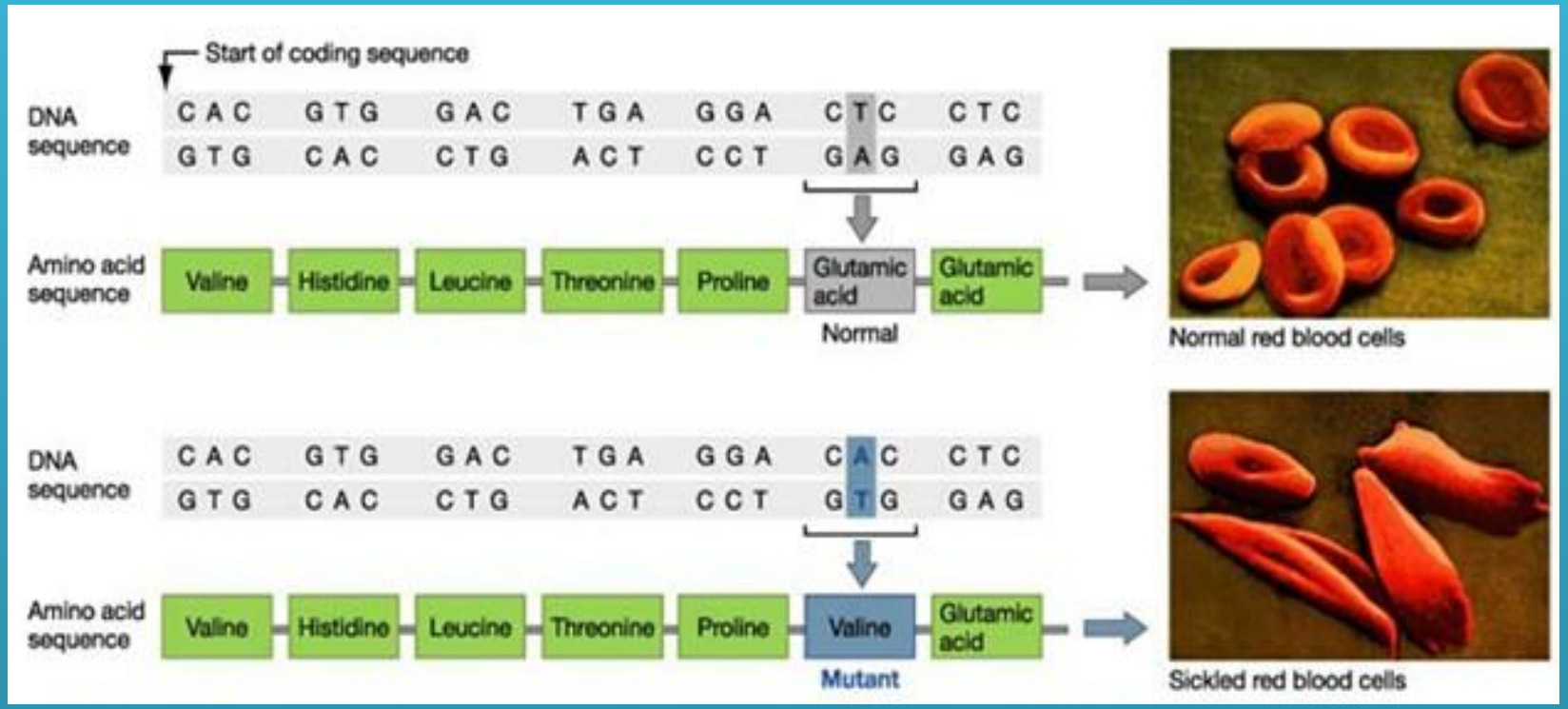
Proline

➢**In aqueous environment:**
the side chains of the nonpolar amino acids tend to cluster together in the interior of the protein.

➢**In a hydrophobic environment:**
the nonpolar amino acid are found on the outside surface of the protein, interacting with the lipid environment.



Sickle cell anemia: a sickling disease of red blood cells, results from the substitution of polar glutamate by nonpolar valine at the sixth position in the β subunit of hemoglobin.



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