Sex hormone binding globulin

What it does and how it's made.

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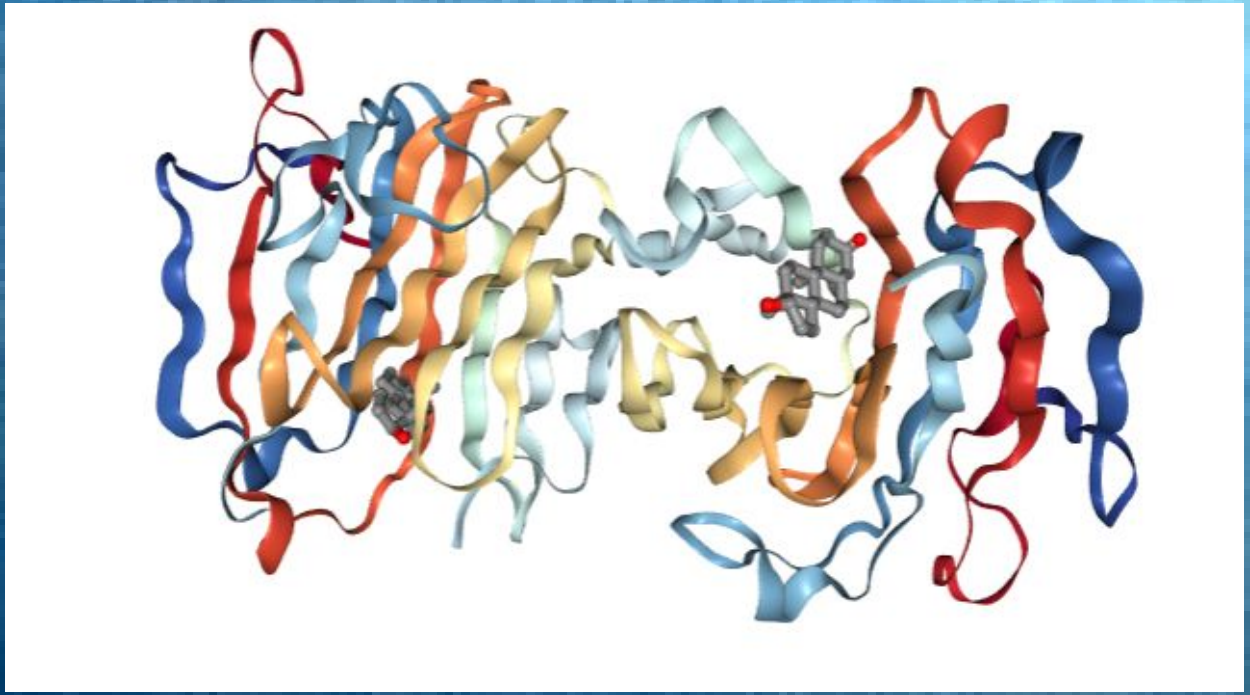
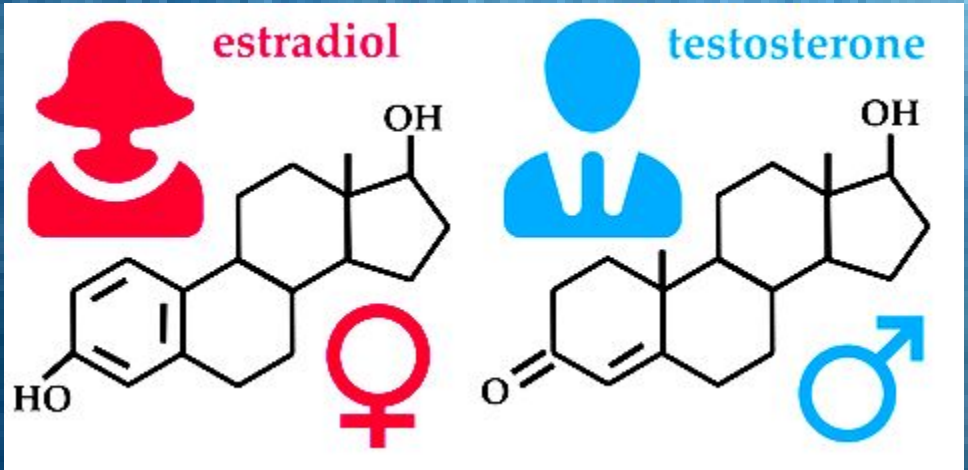
Structure of SHBG



PPAVHLSNGPGQEPIAVMTFDLTKITKTSSSFEVRTWDPEGVIFYGDTNPKDDWFMLGLRDGRPEI
QLHN

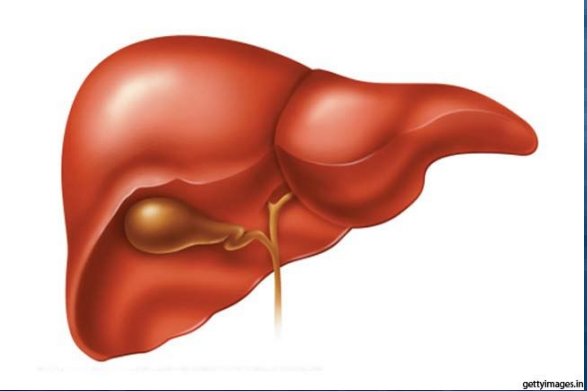
Purpose of SHBG

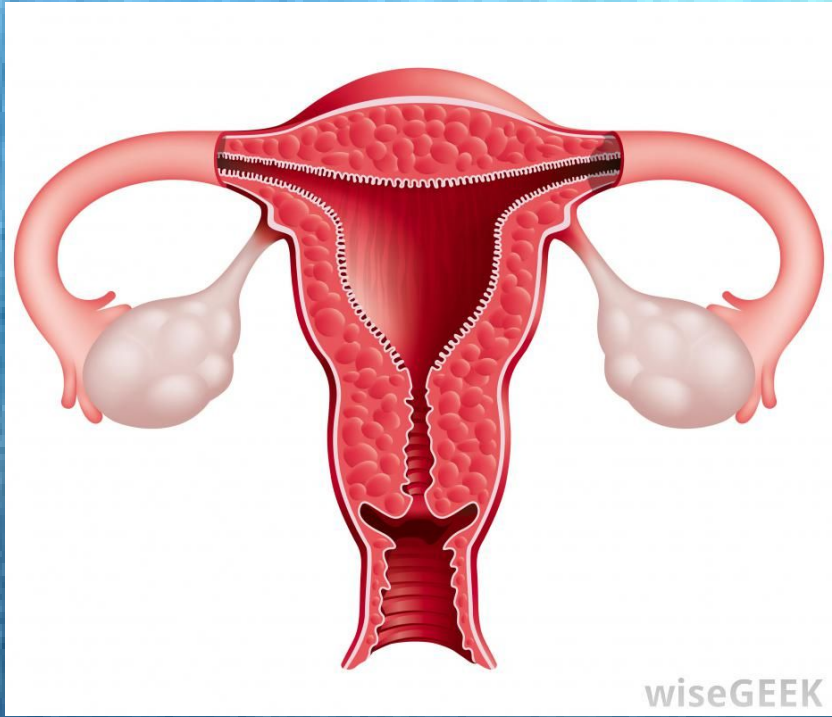
Sex hormone binding globulin binds with 3 sex hormones: estrogen; dihydrotestosterone (DHT), and testosterone. It renders them temporarily inactive, allowing them to be transported through the bloodstream.



Where in the body

- Made in liver
- Found in
  - Brain
  - Testes
  - Uterus
  - Placenta





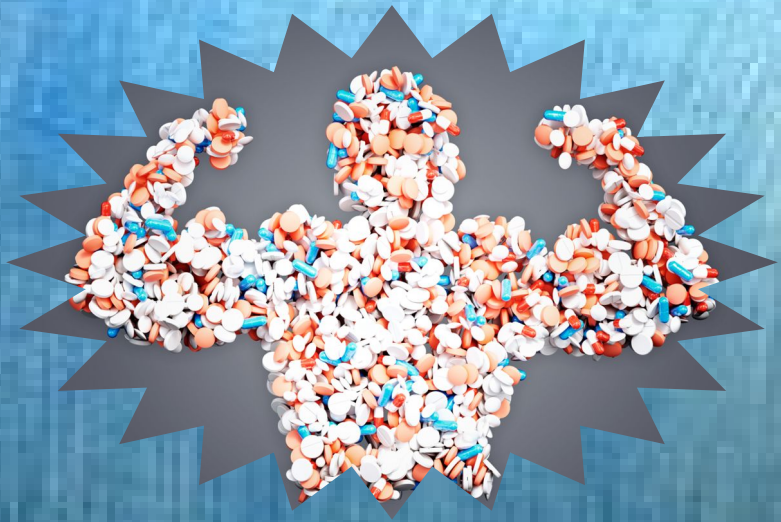
What would happen without it?

- Estrogen and testosterone will become “free” or “bioavailable” (total testosterone)
- They can freely exert their effects on your body

Higher chance of cardiovascular disease, Anemia, Depression, Decreased bone density, Lack of energy or fatigue, Loss of muscle mass, Poor concentration, Erectile Dysfunction, Infertility, and Loss of Libido

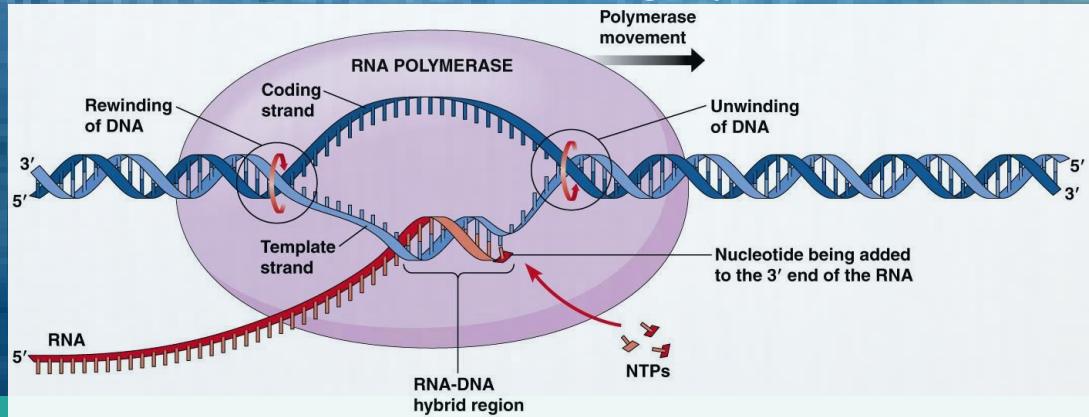
Causes of Decrease?

- Obesity
- Pregnancy
- Malnourishment
- Use of oral contraceptives - birth control
- Menopause
- Polycystic ovary syndrome
- Androgen (steroid) use



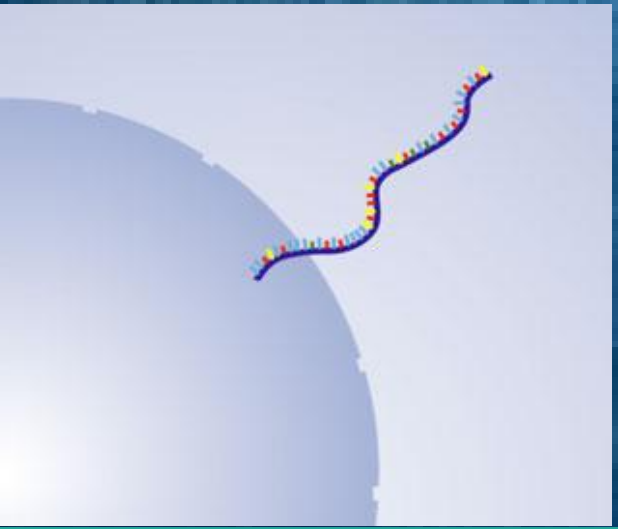
How it's made, Pt.1

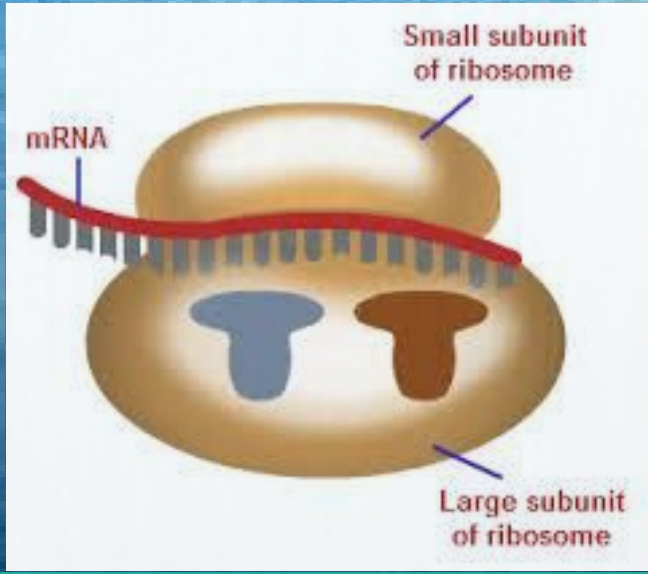
SHBG's production begins in the nucleus, like all proteins. There, a strand of DNA is turned on, and binds to a RNA polymerase. The RNA polymerase splits the DNA, and uses some of the free mRNA bases floating around in the nucleus to make the opposite of one of the strands. Since mRNA doesn't use the base Thymine(T), it substitutes a special base called uracil(U). Other than this abnormality, mRNA uses Guanine(G), Cytosine(C), and Adenine(A), like DNA. The RNA polymerase matches A with U and G with C. It uses this method to create the strand of mRNA. This newly formed mRNA strand is then modified slightly.



How it's made, Pt. 2

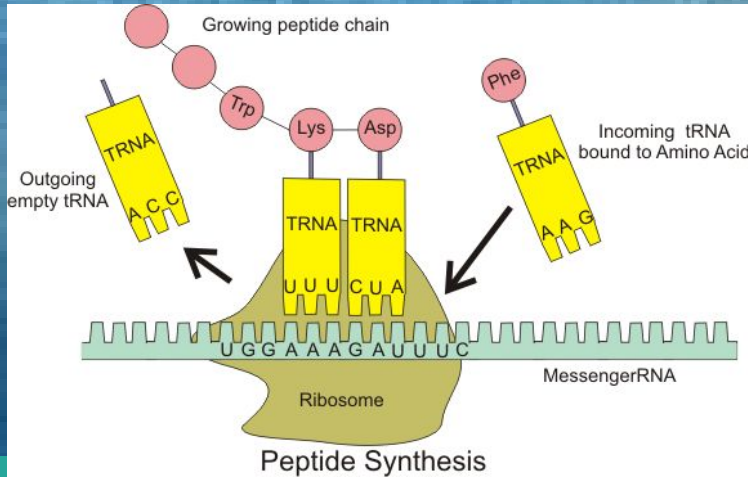
The mRNA leaves the nucleus and enters the cytoplasm, where it binds with a ribosome.





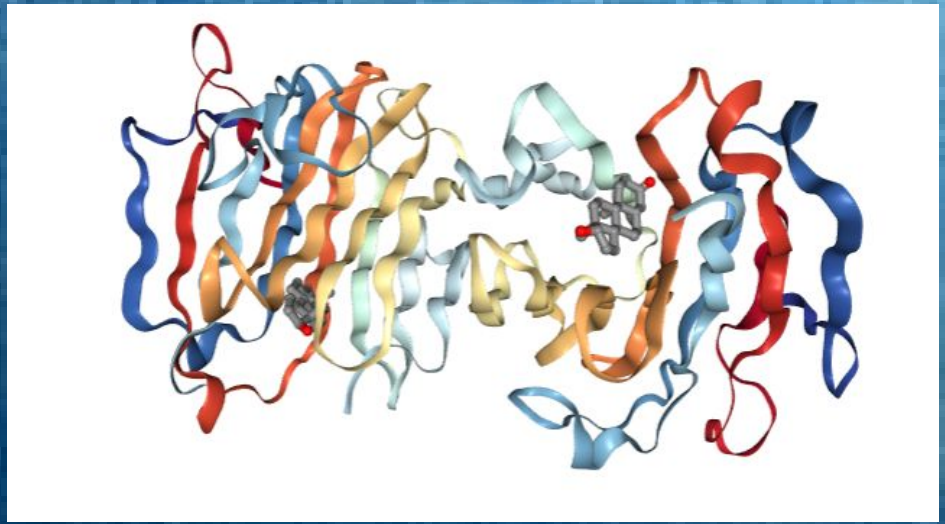
How it's made, Pt.3

The ribosome detects codons (groups of three nucleotides) in the mRNA. It then signals tRNA with the complementary codons. Codons are complementary when they use the same base pairs discussed in part one, having an A for the opposite codon's U, and a G for their pair's C. When the tRNA arrives and binds with the codons of the mRNA, the amino acid the tRNA was carrying is added to a chain of amino acids.



How it's made, Pt.4

When the ribosome reaches a stop codon, such as the UAG codon, the chain of amino acids is complete and translation stops. The ribosome then releases the chain, which folds itself into a 3-dimensional structure, creating SHBG.



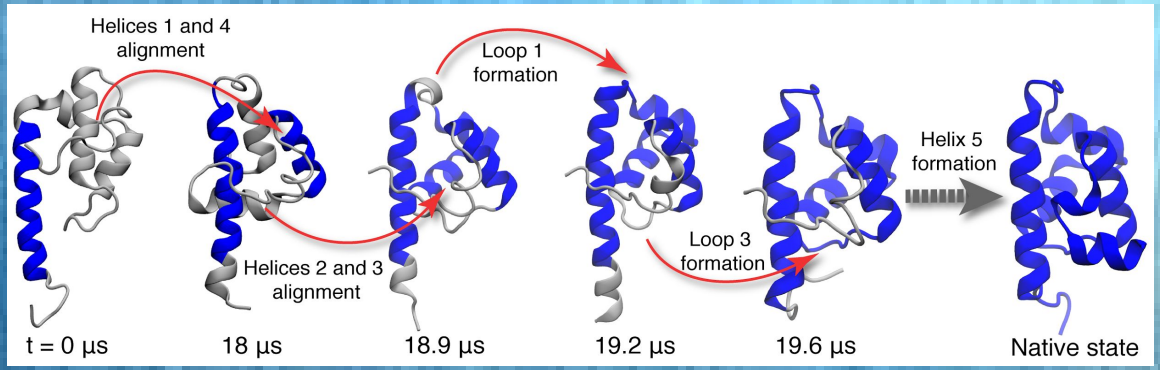
Protein Folding

The shape is determined by the amino acid sequence. To start the folding the polypeptide chain is synthesized by a ribosome.

4 Structures

1)Sequence of Amino Acid

2)Helix or a B sheet

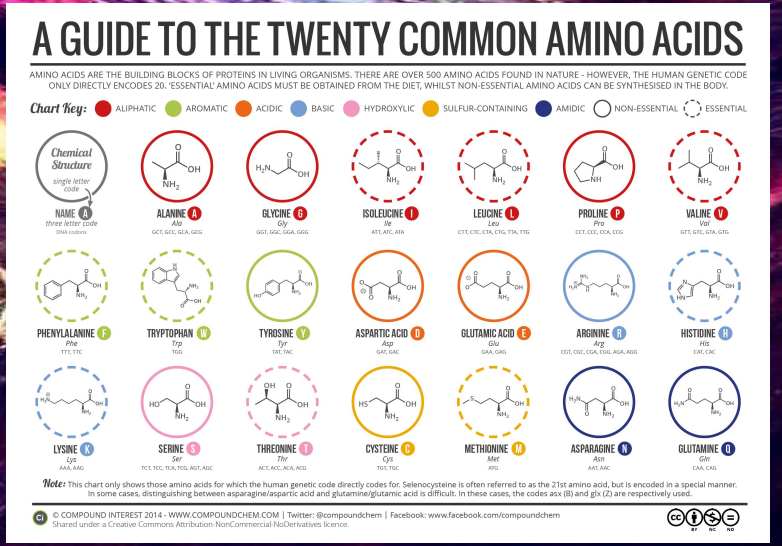


3)Fold into compact globular structures called Domains

4)This maintains the Third Structure

Stage 1

The sequence of the amino acid in its polypeptide chain

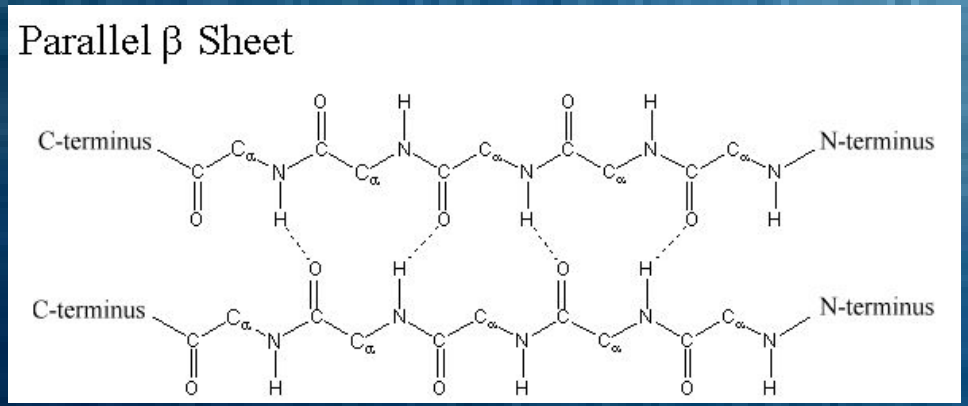


Stage 2

Arrangements of the amino acids

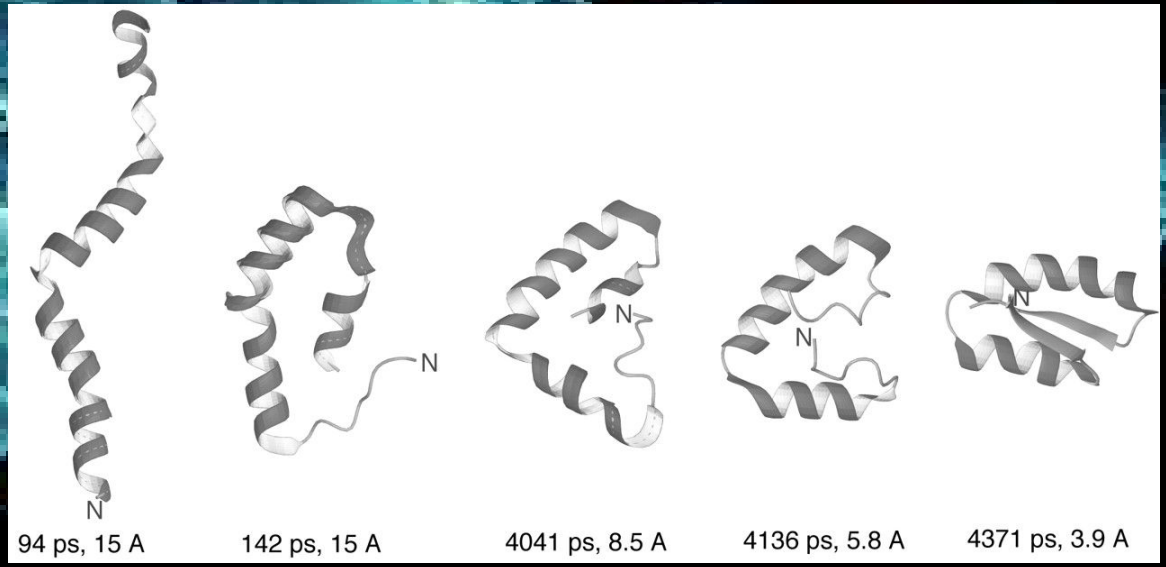
Helix is formed when a region of a polypeptide chain coils around itself

B Sheet if formed when two parts of a polypeptide chain lie side by side with hydrogen bonds between them.



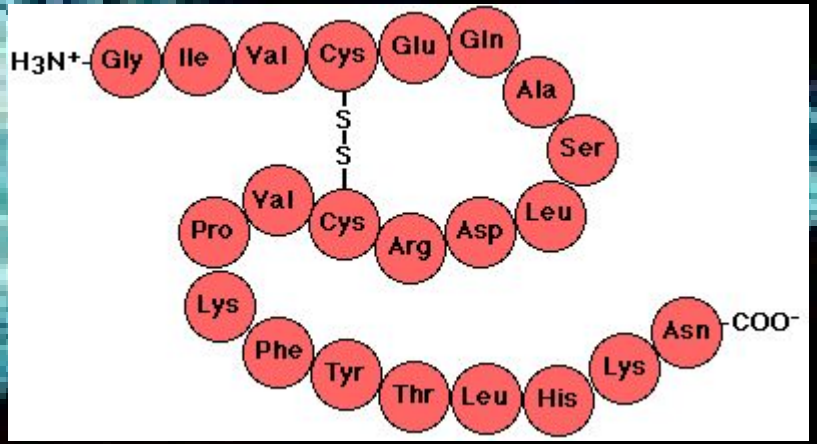
Stage 3

The folding of the polypeptide chain as a result of interactions between the side chains of amino acids that lie in different areas.



Stage 4

This stage consists interactions between different polypeptide chains in the protein composed of more than one polypeptide.



Citations

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