

Post-translational modifications

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Post-translational modifications

Many newly-synthesized proteins are functionally inactive

They require some modifications in their structure before they become active

These modifications are known as post-translational modifications

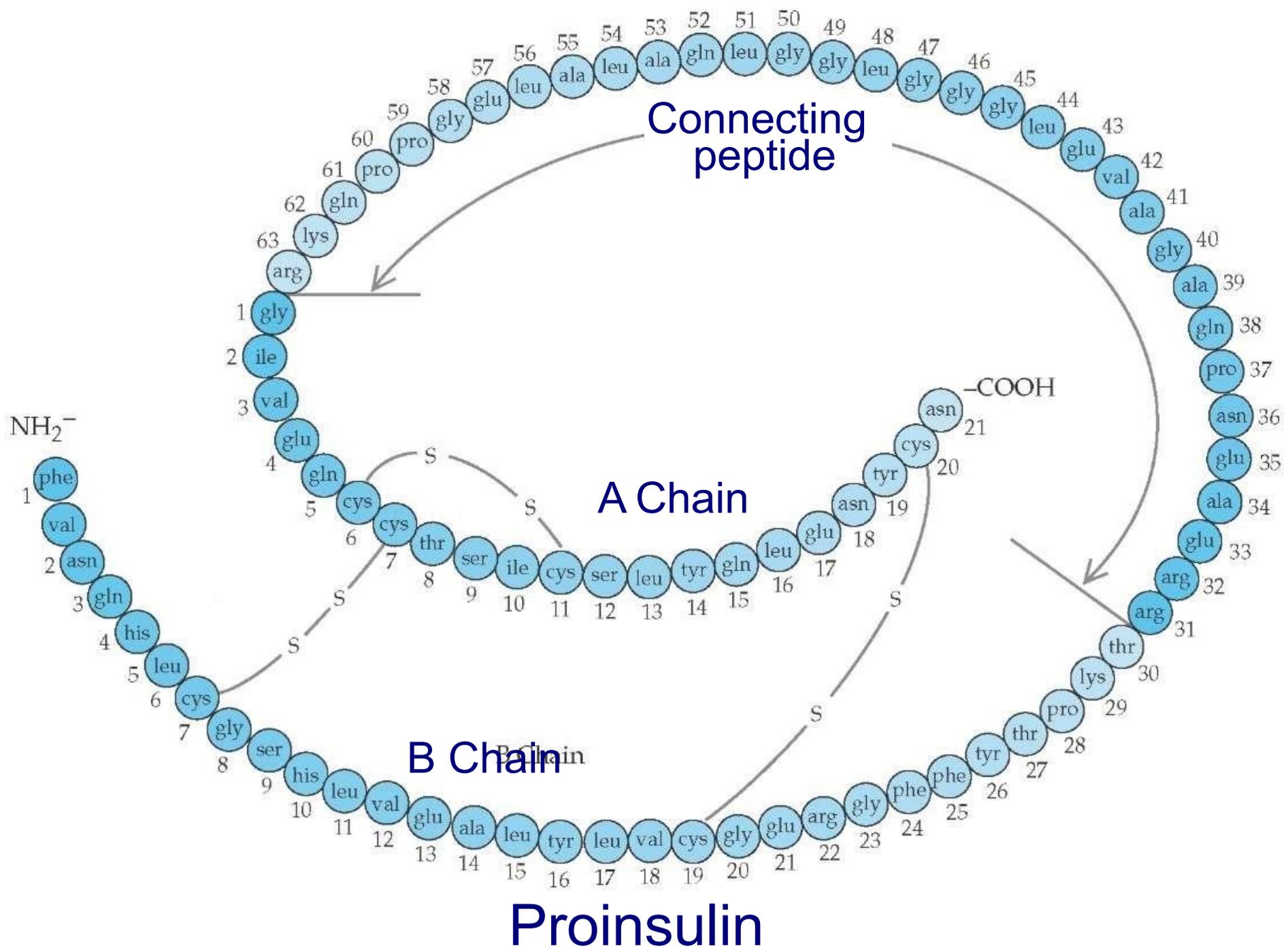
Common post-translational modifications are:

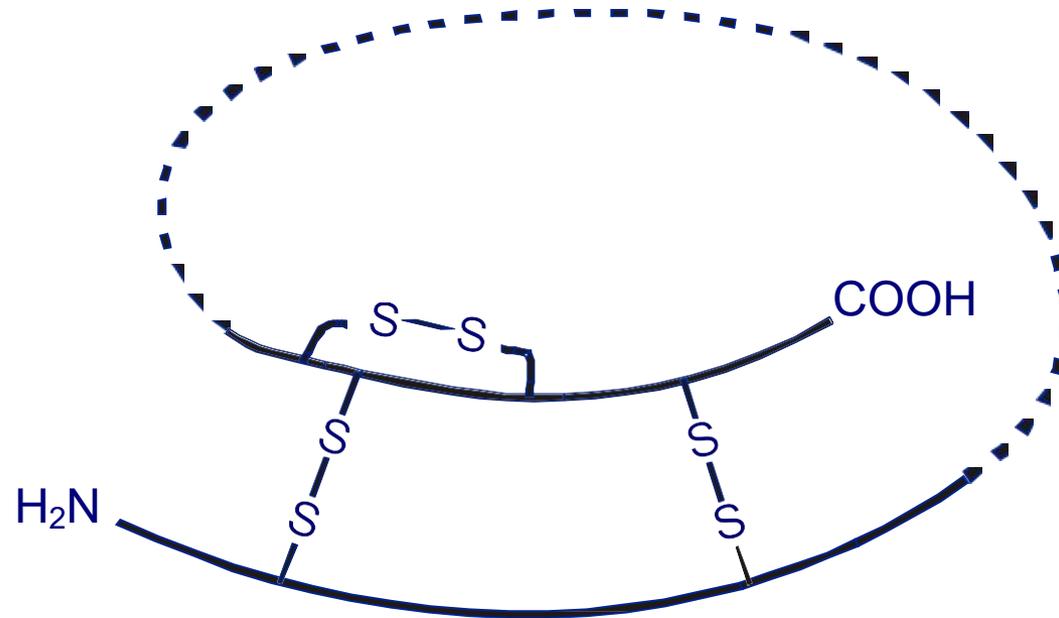
- Cleavage
- Hydroxylation
- Carboxylation
- Phosphorylation
- Glycosylation
- Addition of other prosthetic groups

Cleavage

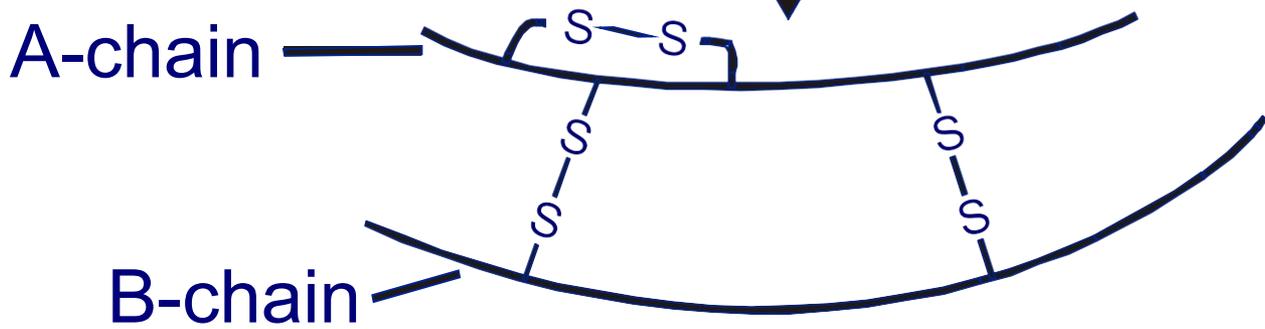
The nascent protein may contain some extra amino acids which are removed

An example is removal of connecting peptide from proinsulin to form insulin





Proinsulin



Insulin

Another example of cleavage is pro-opio-melano-cortin (POMC)

Alternative cleavage of POMC yields eight different peptides

Hydroxylation

Some amino acid residues, e.g. proline and lysine, may be hydroxylated after translation

Hydroxylation of proline and lysine residues is important in the conversion of pro-collagen into collagen

Carboxylation

Glutamate residues of pre-prothrombin are carboxylated after translation

This converts pre-prothrombin into prothrombin

Glutamate residues of several other proteins are also carboxylated

Phosphorylation

Serine, threonine and tyrosine residues of some proteins can be phosphorylated

Phosphorylation is a method used for regulating the activity of some enzymes

Phosphorylation of tyrosine residues is important in intracellular signaling

Glycosylation

Carbohydrate prosthetic groups are added to many proteins

Examples are mucin, immunoglobulins, hCG etc

These can form O-linked, N-linked and GPI-linked glycoproteins

The linkage between carbohydrate portion and protein occurs through:

Hydroxyl group of serine in O-linked glycoproteins

Amide group of asparagine in N-linked glycoproteins

Phosphatidyl inositol in GPI-linked glycoproteins

Addition of other prosthetic groups

Several other groups are added to proteins after translation e.g.

Haem

Flavin nucleotides

Biotin

Retinal

Metals