

Protein targeting

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Protein targeting

The proteins synthesized on ribosomes have different destinations such as:

- Mitochondria
- Lysosomes
- Nucleus
- Cell membrane
- Export from the cell

The signal that directs the protein to its destination is inbuilt in the protein molecule

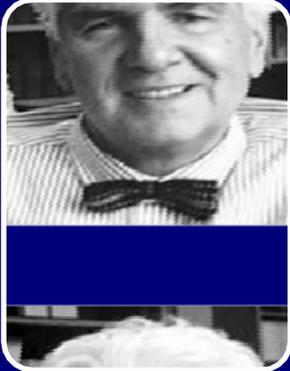
This signal is like an address written on the protein molecule

Addition of mannose-6-phosphate to a protein directs it to lysosomes

If mannose-6-phosphate is not added, lysosomal enzymes fail to reach the lysosomes

This results in inclusion cell disease

Signal hypothesis



Gunter Blobel showed how proteins are exported from the cell

He proposed the signal hypothesis which is now proven

Presence of signal sequence directs the protein to cell membrane or export outside the cell

Signal sequence is also known as leader peptide or signal peptide

It is a sequence of 15-30 amino acids at the N-terminus of the protein

When signal sequence emerges from the ribosome, it is recognized by signal recognition particle

Signal recognition particle (SRP) is a complex of 7S RNA and six polypeptides

SRP binds the signal sequence

SRP also binds to SRP receptor on the endoplasmic reticulum (ER)

SRP receptor is also known as the docking protein

It is present on the external side of ER

The ribosome synthesizing the protein is bound to a ribosome receptor on ER

Ribosome receptor is present on the external surface of ER

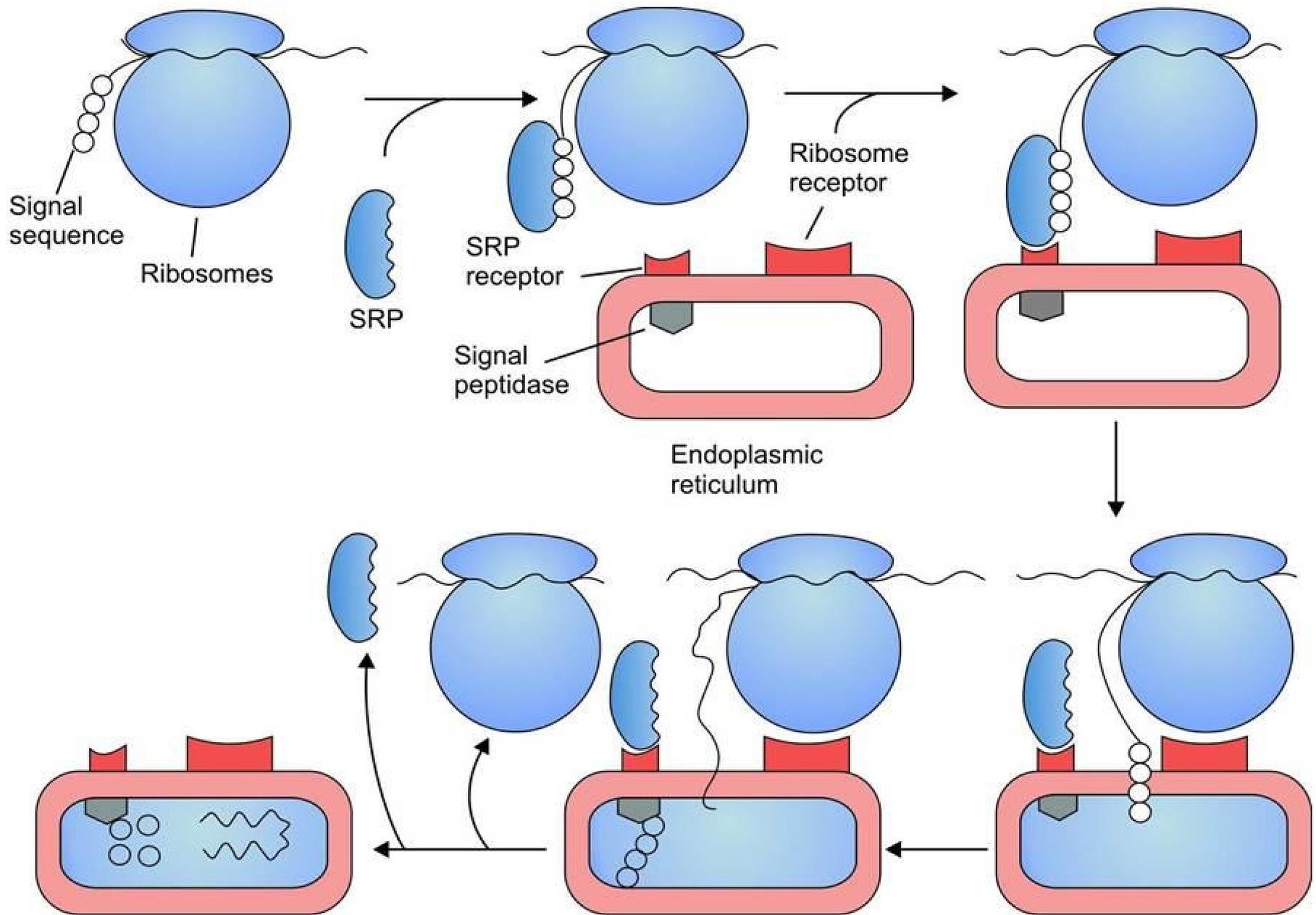
The signal sequence is directed into ER through translocon

Translocon is a protein-conducting channel

The signal sequence is split off by signal peptidase present in ER

The nascent protein is usually glycosylated and transferred to Golgi apparatus

From there, it is either directed to cell membrane or is exported from the cell



Role of signal sequence

Thank you

The background is a solid dark blue. In the bottom right quadrant, there are several thin, white, wavy lines that create a sense of motion or a decorative flourish. The lines are curved and layered, starting from the right edge and moving towards the center.