

Targeting of mitochondrial proteins

Most mitochondrial proteins are synthesized on free cytosolic ribosomes and post-translationally incorporated into mitochondria. Some proteins are destined for the outer, others for the inner mitochondrial membrane, others for the intermembrane space and for the matrix. Protein localization is determined by the sequence of the N-terminal stretch of the chain, the so-called mitochondrial entry sequence, which is rich in basic amino acid residues and serine and threonine. If the protein is to be anchored in the outer mitochondrial membrane, the anchoring sequence and a second positively charged stretch follow the input sequence.

A proton transmembrane gradient is required to permeate the protein through the inner mitochondrial membrane. Passage through the outer membrane does not require this energy source. The input sequence is proteolytically cleaved after passing through the inner (not outer) membrane.

A protein transferred from the cytosol to the matrix first binds by its presequence to receptor on the outer mitochondrial membrane. At the site of permeation, the outer and inner membranes overlap and the protein permeates both simultaneously. In the matrix, the transferred protein is cleaved from the membrane-anchored presequence.

Intermembrane proteins (e.g. cytochrome b) are first anchored in the inner mitochondrial membrane and then cleaved from the intermembrane space by a specific protease. Some intermembrane proteins (cytochrome c) remain attached to the inner membrane.

During the passage across the membrane, the mitochondrial proteins unfold completely and then resume their tertiary structure.

Also, bacteria send out synthesized proteins using signal sequences. Some of their proteins are destined for the plasma membrane, others for the outer membrane, still others for the periplasmic space, or are rarely released outside the cell. Translocation is driven by a proton gradient. The analogy with mitochondrial targetings is thus obvious.

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Source

- ŠTÍPEK, Stanislav. *Stručná biochemie : uchování a exprese genetické informace*. 1. edition. Prague : Medprint, 1998. ISBN 80-902036-2-0.

References

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