

# Targeting of proteins to mitochondria

Most mitochondrial proteins are synthesized on free cytosolic ribosomes and posttranslationally incorporated into mitochondria. Some proteins are intended for the outer/inner mitochondrial membrane, for the intermembrane space, and for the matrix. The localization of the protein is determined by the sequence of the N-terminal region of the chain, the so-called mitochondrial input sequence, which is rich in basic amino acid residues and serine and threonine. If the protein is to anchor in the outer mitochondrial membrane, then the input sequence is followed by an anchoring sequence and a second positively charged region.

A proton transmembrane gradient is required for the protein to pass 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.

The protein transferred from the cytosol to the matrix first binds by its presequence to the receptor on the outer mitochondrial membrane. At the site of permeation, the outer and inner membranes abut each other and the protein permeates both at the same time. 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 a special protease cleaves them from the intermembrane space. Some intermembrane proteins (cytochrome c) remain bound to the inner membrane.

During passage through the membrane, mitochondrial proteins fully unfold and then restore the tertiary structure.

Bacteria also distribute synthesized proteins using signal sequences. Some of their proteins are destined for the plasma membrane, for the outer membrane, for the periplasmic space, or are rarely released outside the cell. The translocation is driven by a proton gradient. The analogy with mitochondrial targeting is thus obvious.

## References

### Related Articles

- Translation of membrane and secretory proteins (protein sorting, targeting)
- Translation, post-translational processing of proteins in eukaryotes
- Post-translational modifications and protein targeting

### Source

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

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