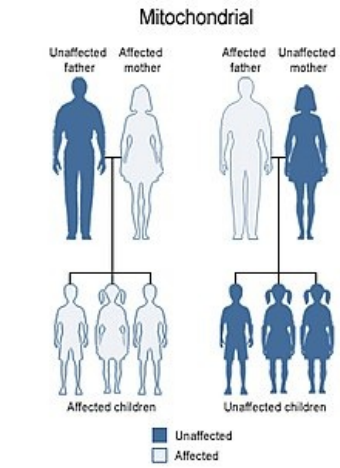
Matroclinic inheritance

Matroclinal inheritance is inheritance that is **mitochondrially linked**. It is then inherited only **through the maternal line** (only from the mother). The father's mitochondria are used as energy for the sperm to be able to reach the egg. Excess paternal mitochondria are destroyed by the mother's organism.

Mitochondria



Matroclinic (mitochondrial) inheritance

Mitochondria are organelles of eukaryotes with a key importance in the **release of chemical energy'**, in its transfer and use. They arise by self-reproduction. They contain small amounts of specific **circular DNA**. mtDNA and plastid DNA share a number of common features. Both of these DNAs are present in the given organelles in the form of free molecules. Mitochondrial DNA (and ctDNA) have a **cyclic double helix** structure (opposite ends of the DNA macromolecule chain are connected to each other). Such a molecule then has neither beginning nor end and can be drawn as a circle. It is usually found in the mitochondrial matrix and is occasionally attached to the inner mitochondrial membrane.

Mitochondrial genes are clustered close together, **do not contain intron sections**. In mitochondria we find other stop codons **AGA,** *AGG*. UGA – encodes Trp, AUA – Met, CUA – Thr. Histone-type proteins are not present. It takes place **faster and more numerous DNA Replication** than in eukaryotic DNA. It has no repair systems.

The genes contained in the mtDNA molecule code for the proteins of the respiratory chain, units of the ATPase complex, subunits of the NADH-dehydrogenase complex, two genes for ribosomal RNA- ase' **and 22 genes for** tRNA **molecules.**

Mitochondrial diseases

Mitochondrial diseases are chronic diseases often with a late onset. They can affect directly **the mitochondria themselves** or part of their **genes stored in the nucleus** of the cell. The molecular genetic basis of mitochondrial pathologies can be either deletions (a 5 kb region between the genes for ND5 - NADH-dehydrogenase subunit 5, ATPase 8 - ATPase subunit 8) or point mutations (mostly changing the sense of codon reading - missense or substitution).

Deletion diseases

Kearns-Sayre syndrome. It is characterized by characteristic progressive external ophthalmoplegia, pigmentary retinal degeneration, and cardiac and cerebellar complications.

Diseases caused by a point mutation

LHON (Leber's Hereditary Optic Neuropathy). The disease is characterized by blindness in men under the age of 25. The penetrance of the disease is 3-4 times higher in men than in women. **MELAS syndrome** (Mitochondria Myopathy, Encephalopathy, Lactic Acidosis, Stroke-like episodes). The first symptoms appear between the 5th and the 15th. year of an individual's life. The genetic basis is a 1-nucleotide substitution in the leucine tRNA gene (position 3243). **MERF Syndrome** (Myoclonic Epilepsy with Ragged red Fibers). It manifests in affected persons between the ages of 5 and 12. year of an individual's life.

Links

Related articles

- Types of inheritance
  - Autosomal recessive inheritance
  - Autosomal dominant inheritance
  - Gonosomal recessive inheritance
  - Gonosomal dominant inheritance
  - X-linked inheritance
  - Y-linked inheritance
  - Multifactorial inheritance
- Non-Mendelian inheritance

Source

- ŠTEFÁNEK, Jiří. *Medicína, nemoci, studium na 1. LF UK* [online]. [cit. 11.02 2010]. <https://www.stefajir.cz/>.

Used literature

- KOHOUTOVÁ, Milada. *Lékařská biologie a genetika (II. díl).* 1. edition. Nakladatelství Karolinum, 2013. 202 pp. ISBN 978-80-246-1873-9.