NADH,NADPH

thumb|Struktura NADHthumb|Struktura NADPHthumb|300px|Oxidace a redukce NAD NADH and NADPH are coenzymes of *oxidation-reduction reactions* in the cell. They are carriers of hydrogen atoms, including electrons. more precisely, both NAD+ and $NADP^+$ accept'' *hydride anion* H^-, accept *two electrons* and ***proton*. Later, they can pass this hydride anion to another molecule along with the release of energy. The formation of NADPH and NADH takes place through various independent pathways that are regulated.**

NADPH (nicotinamide adenine dinucleotide phosphate)

It is a **cofactor of anabolic reactions** (synthesis of lipids, nucleic acids), where it is used as a ***reducing agent*. NADPH is a reduced form of $NADP^+$. The difference between NADPH and NADH is in the presence of a phosphate group on the other carbon ribose, resulting in their different properties and functions in the cell.**

Formation of NADPH

NADPH is generally formed in the reactions described in the figure, where the substrate gives up two hydrogen atoms. The oxidized form of NADP+ then receives one hydrogen atom and an electron (hydride ion), while the H^+ proton from the second hydrogen atom is released into solution. The resulting reduced form of NADPH holds a hydride ion by a high-energy bond, which is then donated to another molecule, and oxidizes itself back to $NADP^+$.

Plants

In plants, NADPH is produced in the last step of the light phase of photosynthesis by ferredoxin-$NADP^+$ reducing agent. Subsequently, NADPH is used as a reducing agent in biosynthetic reactions in the Calvin cycle. It helps convert carbon dioxide into glucose, and is also involved in the reduction of nitrates to ammonia in plants.

Function

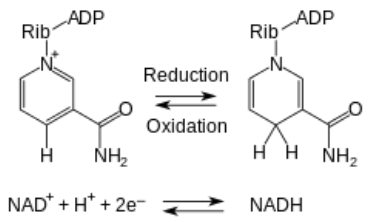
The main source of reduced NADPH for animals and other non-photosynthetic organisms is **pentose phosphate cycle**. The phosphate group contained in NADPH is far from the area of electron transfer and has no effect on this process. However, it gives the NADPH molecule a different structure than NADH and therefore binds to different enzymes. NADPH cooperates primarily with enzymes of *anabolic* reactions, thus **supplying electrons with a high energy content** for the synthesis of energy-rich biomolecules. This process is the synthesis of lipids (cholesterol and fatty acids). NADPH is also indispensable for the formation of free radicals in immune system cells".

NADH (nicotinamide adenine dinucleotide)

Like NADPH, NADH serves as a **carrier of reduction equivalents**. NADH is mainly used in catabolic reactions, where it mediates the oxidation of fuels and transports electrons to the respiratory chain. It is therefore also indispensable for the synthesis of ATP. NADH is also called coenzyme 1 and is a commonly occurring molecule in nature.

Origin and function of NADH

NAD is involved in metabolism as a transporter of electrons from one reaction to another. NAD+ is found in reactions in its form, when it accepts an electron and is reduced to the NADH form, in which it can further function as an electron donor. These reactions are the main function of NAD and NADH. NADH also functions in the catabolic system of reactions that produce ATP from food molecules. The cell contains both an excess of the oxidizing agent NAD+ and the reducing agent NADPH+. NADH molecules are soluble in water and absorb ultraviolet light due to the adenine content. {[1]



References

Related articles

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Literature

1. {Citations |type = book |surname1 = KIDNEY |name1 = Miroslav |surname2 = STOKLASOVÁ |name2 = Alice |surname3 = CERMAN |name3 = Yelan. |publisher = Karolinum Publishing House |degree = Biochemistry for Medical Students, Part I and II |release = Second |year = 2009 |pages = 85-90 |isbn = 978-80-246-1414-4}}