

# General properties of living systems

System theory: (3 components):

- **substances,**
- **energy,**
- **informative.**

Living systems are dynamic structures, that's why we talk about the flow of substances, the flow of energy and the flow of information.

## Substance flow

- Chemical composition of living matter,
- chemical transformations = metabolism,
- structure of living matter = spatial arrangement of macromolecules.

### Meaning of substances:

- *Water*: basic solvent (enables dynamics, transport and metabolism).
- *Ions*: activation of individual chemical components.
- *nucleic acids*: store information material.
- *Proteins*: products of genetic information.
  - enzymes: they specifically catalyze metabolic reactions.
  - signal receptors (from the external and internal environment).
- *lipids*: structural division of matter (external and internal membranes), or energy reserve.
- *carbohydrates*: the main source of energy.

The general structure is a cell with its mutual interactions between individual components. The internal environment of the cell has a semi-liquid (fluid) character, which enables all dynamic changes.

## Energy flow

A living organism is an energetically **open system**. Energie se tvoří enzymatickou přeměnou substrátů. Energy is created by enzymatic conversion of substrates. Energy is subsequently stored in macroergic phosphate bonds of universal carriers (e.g. **adenosine triphosphate, ATP**). The least variable proteins are histones (maintain the stability of genetic information) and redox enzymes (to release energy).



Hydrolysis of ATP

## Information flow

Transfer of genetic information, transformation into phenotypic traits.

## Links

### related articles

- Energy system of the cell
- Cell
- Ions in drinking water
- Lipoproteins

### Source

- OTOVÁ, Berta. *Lékařská biologie a genetika : 1st part*. Prague 2008 edition. Nakladatelství Karolinum, 2008. ISBN 978-80-246-1594-3.

