

# Parameters of hepatocyte damage

- Membrane permeability and integrity tests.

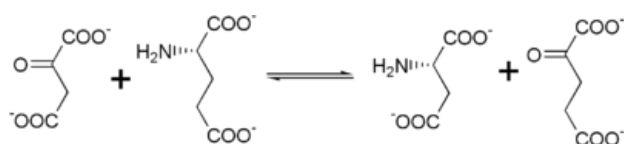
## Aminotransferases

 For more information see *Aminotransferases*.

- The most sensitive and the fastest telling.

### Aspartate aminotransferase (AST)

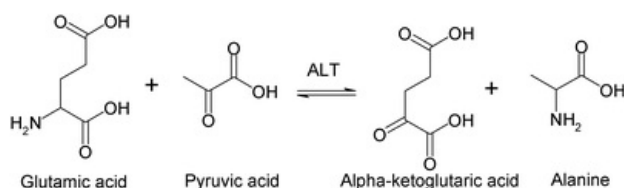
- Transfers an amino group from aspartate to oxoglutarate to form glutamate and oxalacetate.
- It is present not only in liver cells, but also elsewhere (muscles, kidneys, pancreas and in erythrocytes – during hemolysis the activity of AST in the blood increases).
- Two forms - one is in mitochondria and the other is in cytosol (35 %).
- **S-AST** = 0.66  $\mu\text{cat/l}$ .



Transamination reaction.

### Alanine aminotransferase (ALT)

- Catalyzes the transfer of an amino group from alanine to oxoglutarate, resulting in glutamate and pyruvate.
- It is in the highest concentration in the liver and kidneys.
- Present only in the cytoplasm.
- The half-life of ALT is about 48 hours, the coenzyme is pyridoxal phosphate – when determining enzyme activity, its amount is limiting.
- That is why we mostly measure turbidity (change in absorbance of NADH).
- **S-ALT** = 0.73  $\mu\text{cat/l}$ .



Transamination reaction.

- For interpretation, ALT is a sensitive indicator of membrane damage, a greater rise in AST occurs only after cell necrosis.
- ALT - sensitivity (83 %), specificity towards individuals with the disease (84 %), AST - about 70 %.
- The so-called **de Ritis coefficient** – AST/ALT ratio, prognostically more serious at a value greater than 0.7–1.
- Highest values of transferases - viral hepatitis (prodromal stage - 2x, after two weeks up to 50x increased, around the 8th week they normalize).
- Rapid rise (approx. 30x) – toxic liver damage.
- Drug and alcohol intoxication - a slight increase.

## Glutamate dehydrogenase (GMD)

- Relatively specific for the liver (about 10x more in the liver than elsewhere).
- GMD is a mitochondrial enzyme, also found in muscles, brain and leukocytes.
- Converts glutamate to oxoglutarate.

S-GMD = 0.123 cat/l (male); 0.088 cat/l (women).

- A massive increase in GMD is a manifestation of liver necrosis or neoplasia.
- With obstructions and cholestasis, the values increase up to 10x (induction of enzyme formation in cells).
- However, the sensitivity is below 50 %.

## Lactate dehydrogenase (LDH)

- Lactate dehydrogenase is of rather limited importance for the examination of the liver - it is a cytosolic enzyme that occurs in practically all cells.
- Half-life of isoenzymes with liver subunits (LDH<sub>5</sub> and LDH<sub>4</sub>) – short half-life (10 h).
- Cardiac subunits predominate - LDH<sub>1</sub> and LDH<sub>2</sub>, which circulate longer.

S-LDH = 2.5–7.7 µcat/l.

- Information on total LDH is non-specific.
- From liver disorders - the biggest rise in acute liver failure or toxic lesions, also in hepatitis, liver metastases; it tends to be low for obstructions.
- Examination of isoenzymes by electrophoresis – the most significant is the rise of LDH<sub>3</sub> – infectious mononucleosis (from disintegrated monocytes), or pulmonary embolism (from platelets).

## Glutathione-S-transferase (GST)

- Normally penetrates minimally;
- sensitive indicator;
- increases mainly with intoxication and drug damage, also with chronic hepatitis and hepatocellular carcinoma.

## Links

### Related Articles

- Biochemical tests of the liver
- Liver function tests

### References

- {{#switch: book

|book =

*Incomplete publication citation.* SCHNEIDERKA, Peter, et al. *Chapters in Clinical Biochemistry*. Prague : Karolinum, 2004. 978-80-7262-438-6.

|collection =

*Incomplete citation of contribution in proceedings.* SCHNEIDERKA, Peter, et al. *Chapters in Clinical Biochemistry*. Prague : Karolinum, 2004. {{#if: 80-246-0678-X |978-80-7262-438-6} }  
|article =  
*Incomplete article citation.* SCHNEIDERKA, Peter, et al. 2004, year 2004,

|web =

*Incomplete site citation.* SCHNEIDERKA, Peter, et al. Karolinum, ©2004.

|cd =

*Incomplete carrier citation.* SCHNEIDERKA, Peter, et al. Karolinum, ©2004.

|db =

*Incomplete database citation.* Karolinum, ©2004.

|corporate\_literature =

SCHNEIDERKA, Peter, et al. *Chapters in Clinical Biochemistry*. Prague : Karolinum, 2004. 978-80-7262-438-6} }