



الجمهورية الجزائرية الديمقراطية الشعبية
PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

وزارة التعليم العالي والبحث العلمي
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH



جامعة باجي مختار - عنابة
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كلية العلوم
FACULTY OF SCIENCES
قسم البيوكيمياء
DEPARTMENT OF BIOCHEMISTRY

Structural and Metabolic Biochemistry

TCSNV 2nd

Fondamental unit S3

METABOLISM OF AMINO ACIDS

Pr. KADI-BIREM

Metabolism of amino acids

An amino acid consists of two parts:

Carbon group
(C)

Use for energy
production

Can lead to the
formation of glucose
or fatty acids

Nitrogen group
(N)

Waste product that is
converted into urea
through the urea cycle in
the liver

Metabolism of amino acids

In the liver

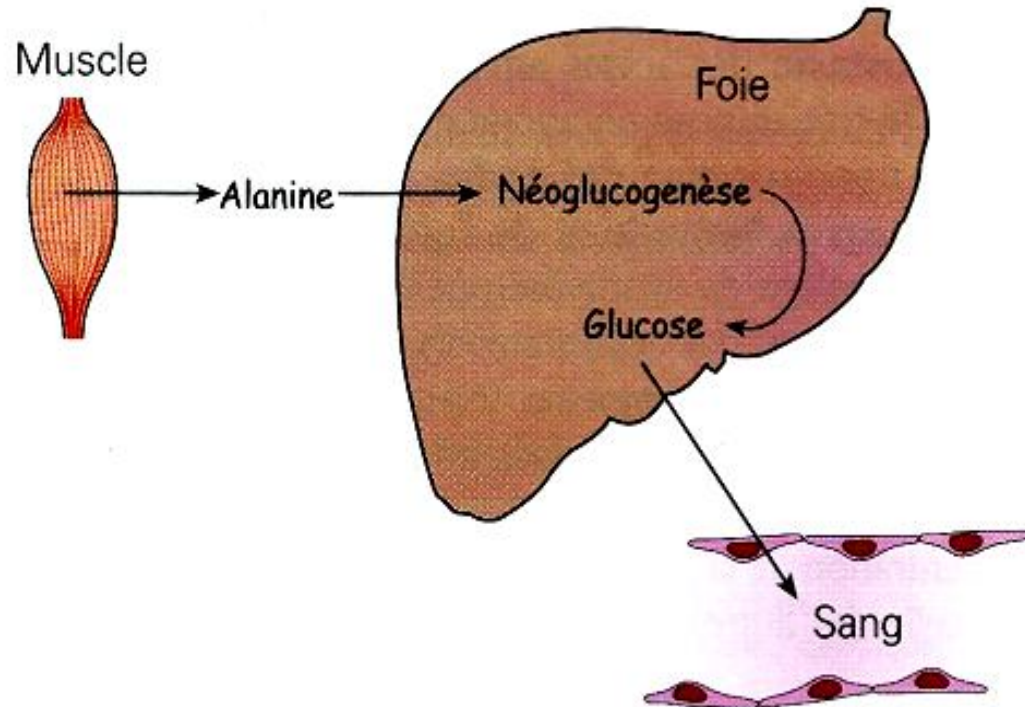
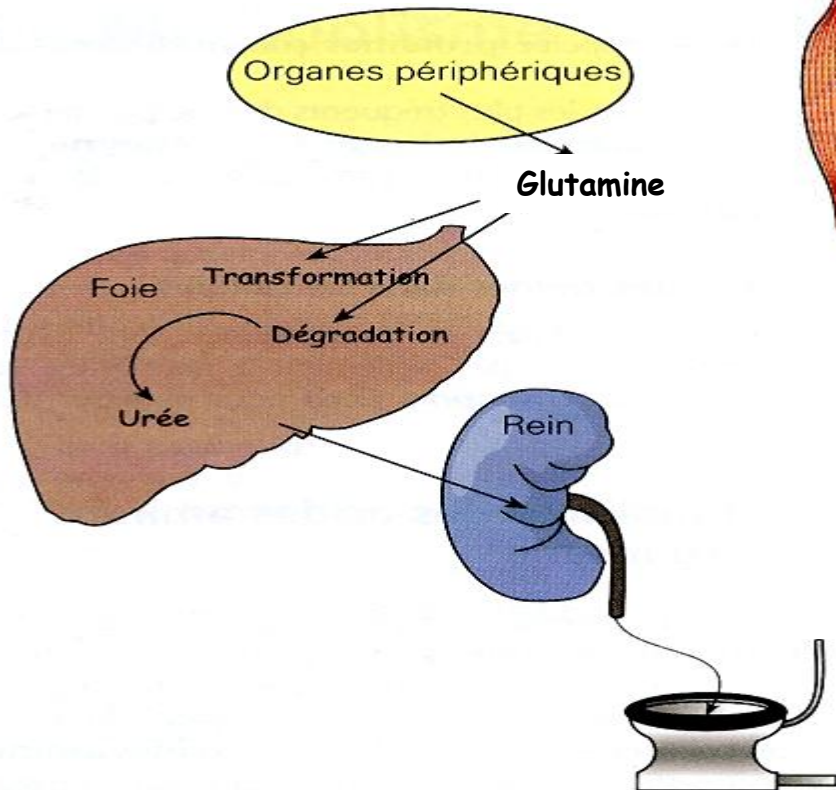
- 3/4 of circulating amino acids are captured.



- Urea synthesis

In the muscle

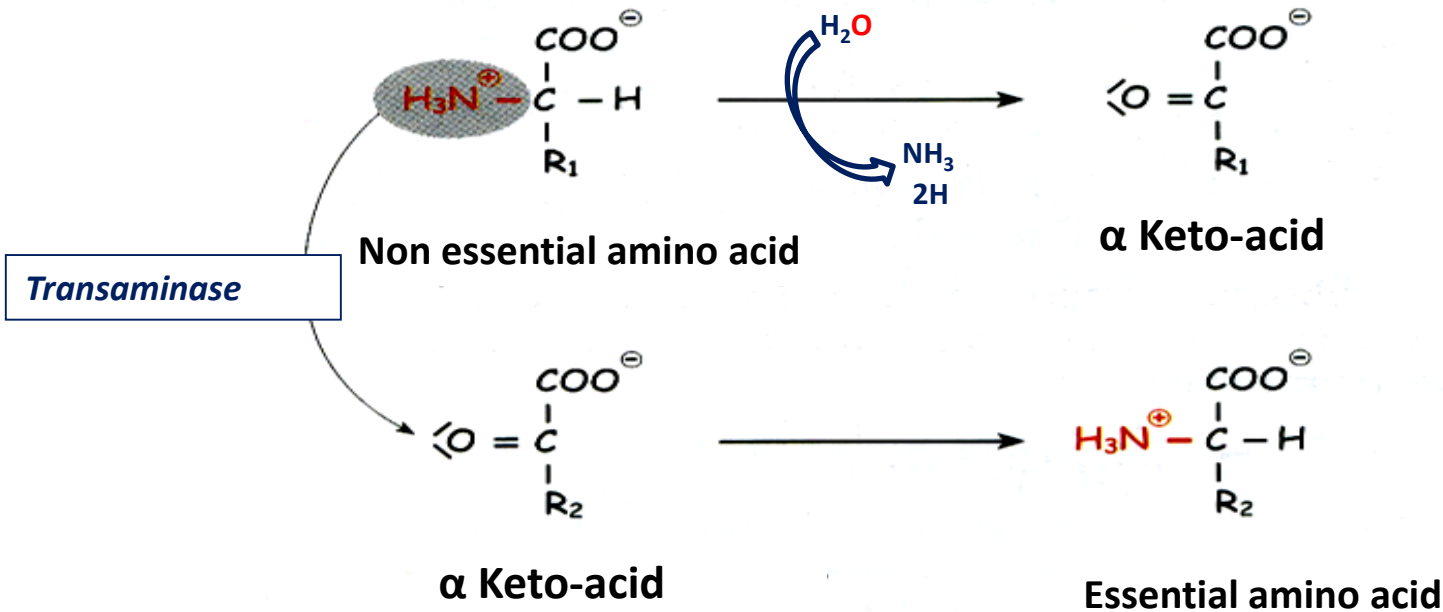
Export of amino acids during fasting



Reactions of transformation of amino acids

Transamination

- Most amino acids are desaminated through **transamination**, where the **amino group** is transferred to a **α -keto acid**.

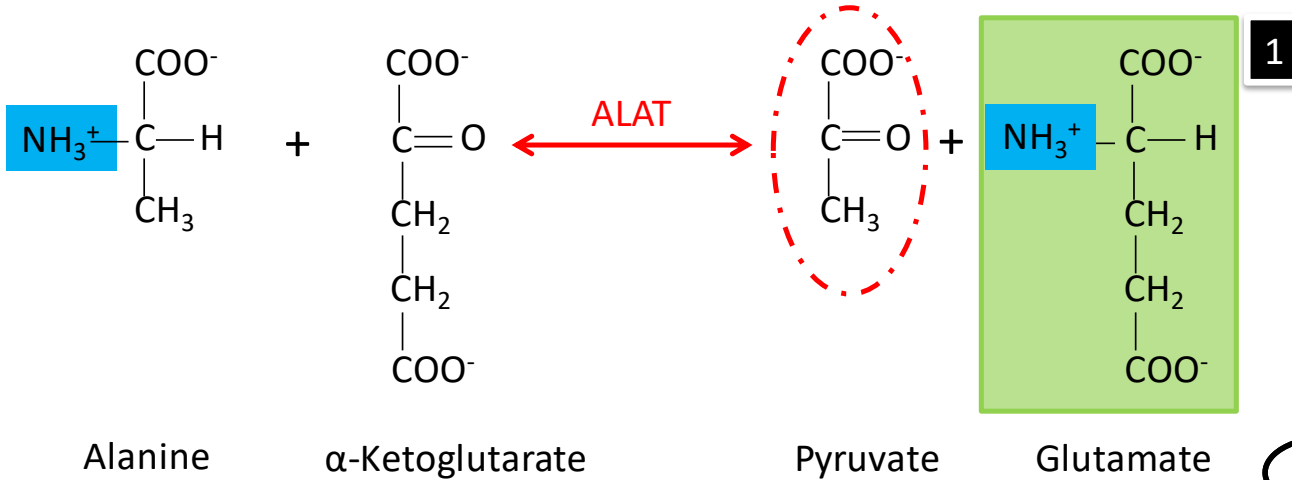


The most aminotransferases are:

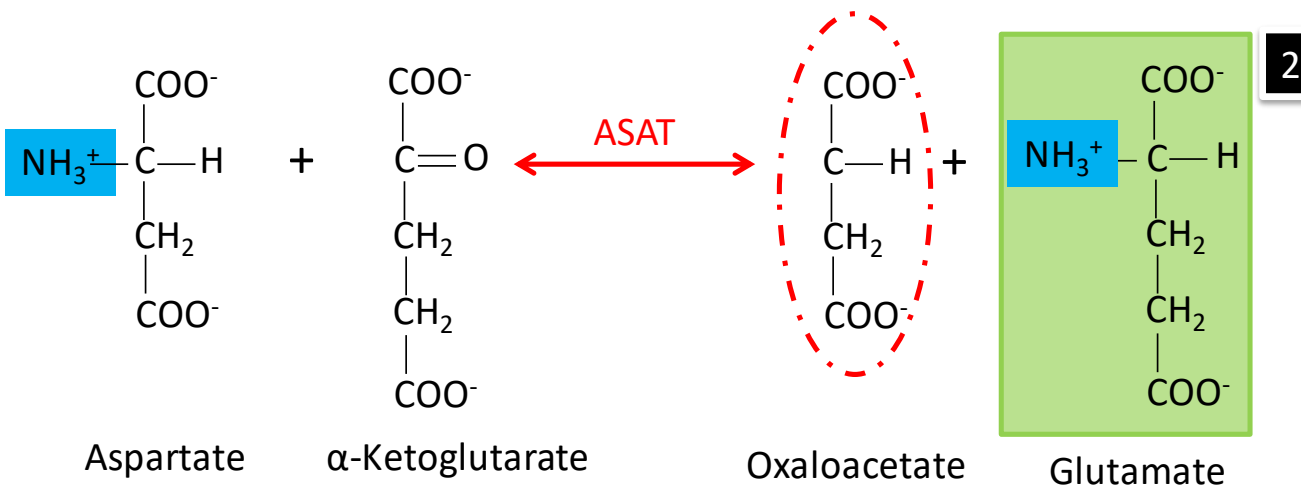
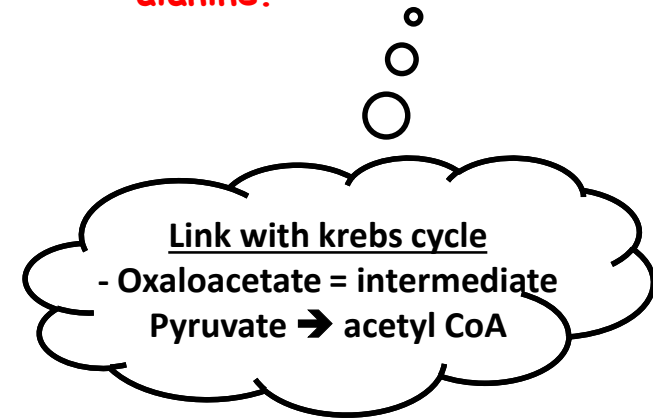
- ALAT (**alanine** aminotransferase)
- ASAT (**aspartate** aminotransferase)

Reactions of transformation of amino acids

Glutamine synthesis in peripheral tissues



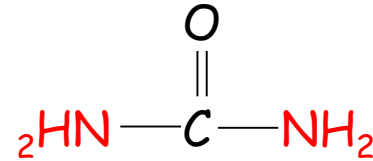
- Pyruvate is a keto-acid corresponding to the alanine.



- Oxaloacetate is the a keto-acid corresponding to the aspartate

Urea cycle

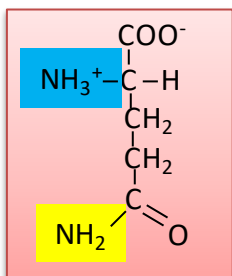
The purpose of its reactions is to convert ammonia (NH_3), resulting from the degradation of amino acids, into a less toxic degradation product, urea.



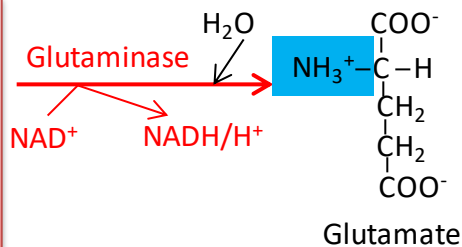
Synthesized in liver
by urea cycle
enzymes

Contains 5 enzymatic reactions:
✓ 2 mitochondrial
✓ 3 cytosolic

Urea cycle

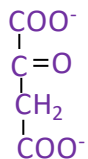


Glutamine

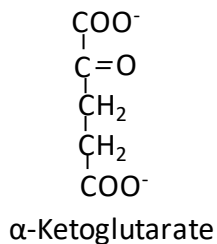
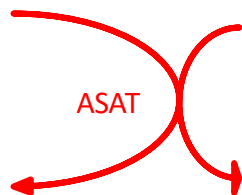


Glutamate

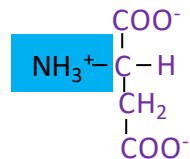
+



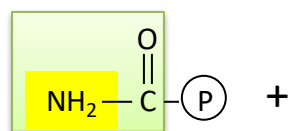
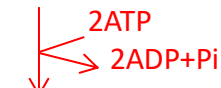
Oxaloacetate



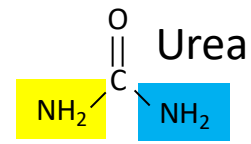
α -Ketoglutarate



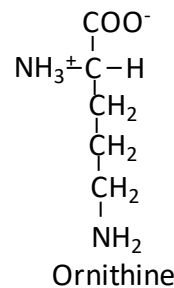
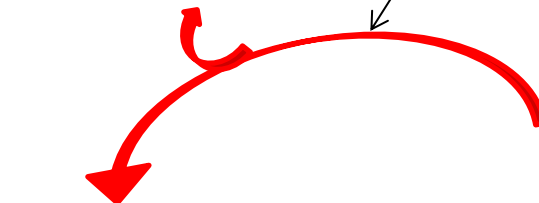
Aspartate



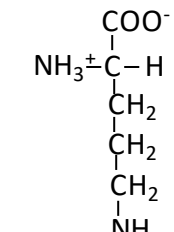
Carbamyl-phosphate



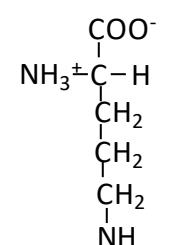
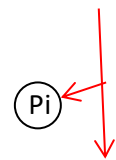
Urea



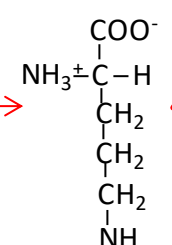
Ornithine



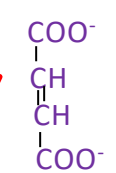
Arginine



Citrulline



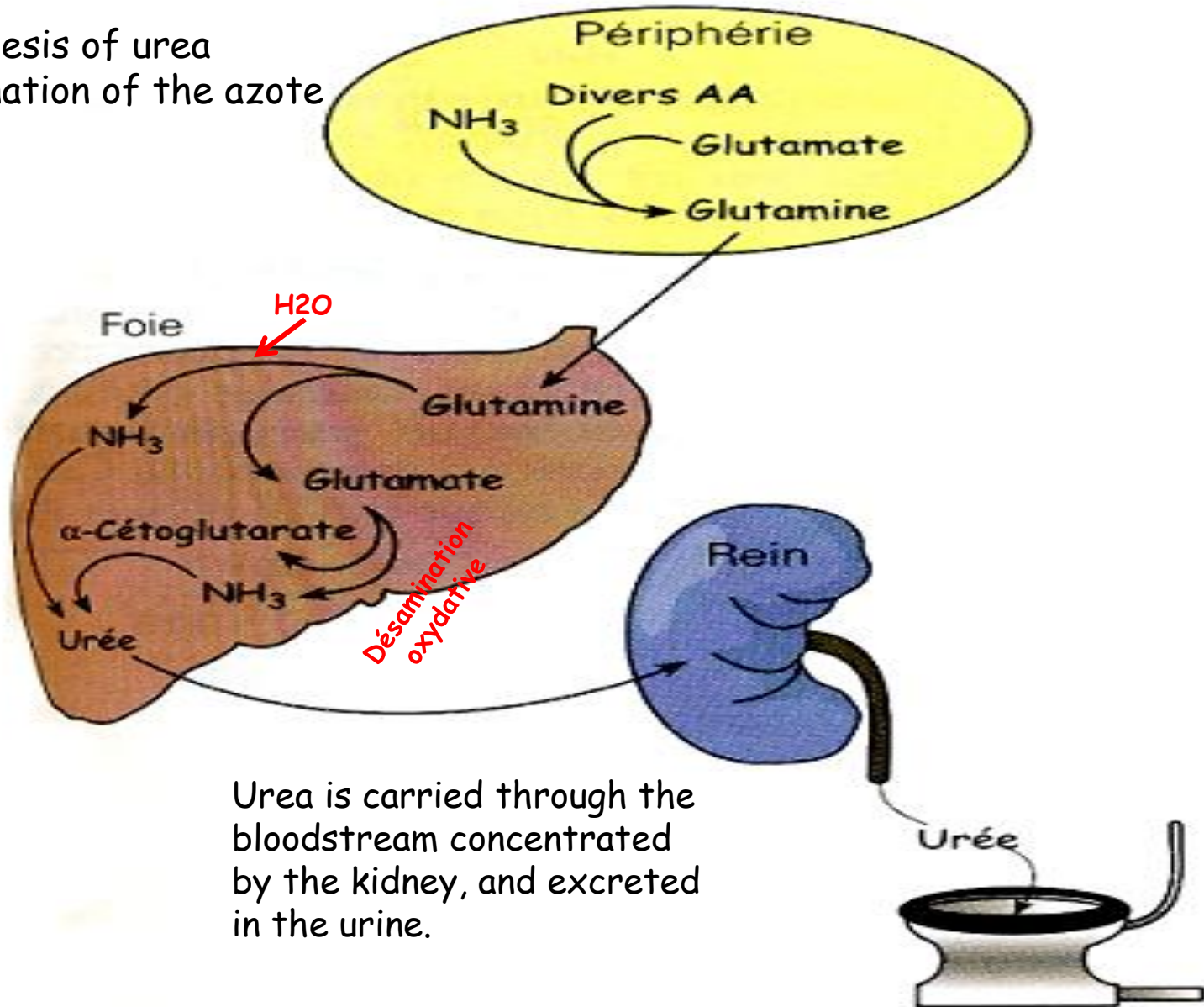
Argininosuccinate



Fumarate

Urea cycle

- Biosynthesis of urea
→ Elimination of the azote



Urea is carried through the bloodstream concentrated by the kidney, and excreted in the urine.

Balance of the biosynthesis of the urea

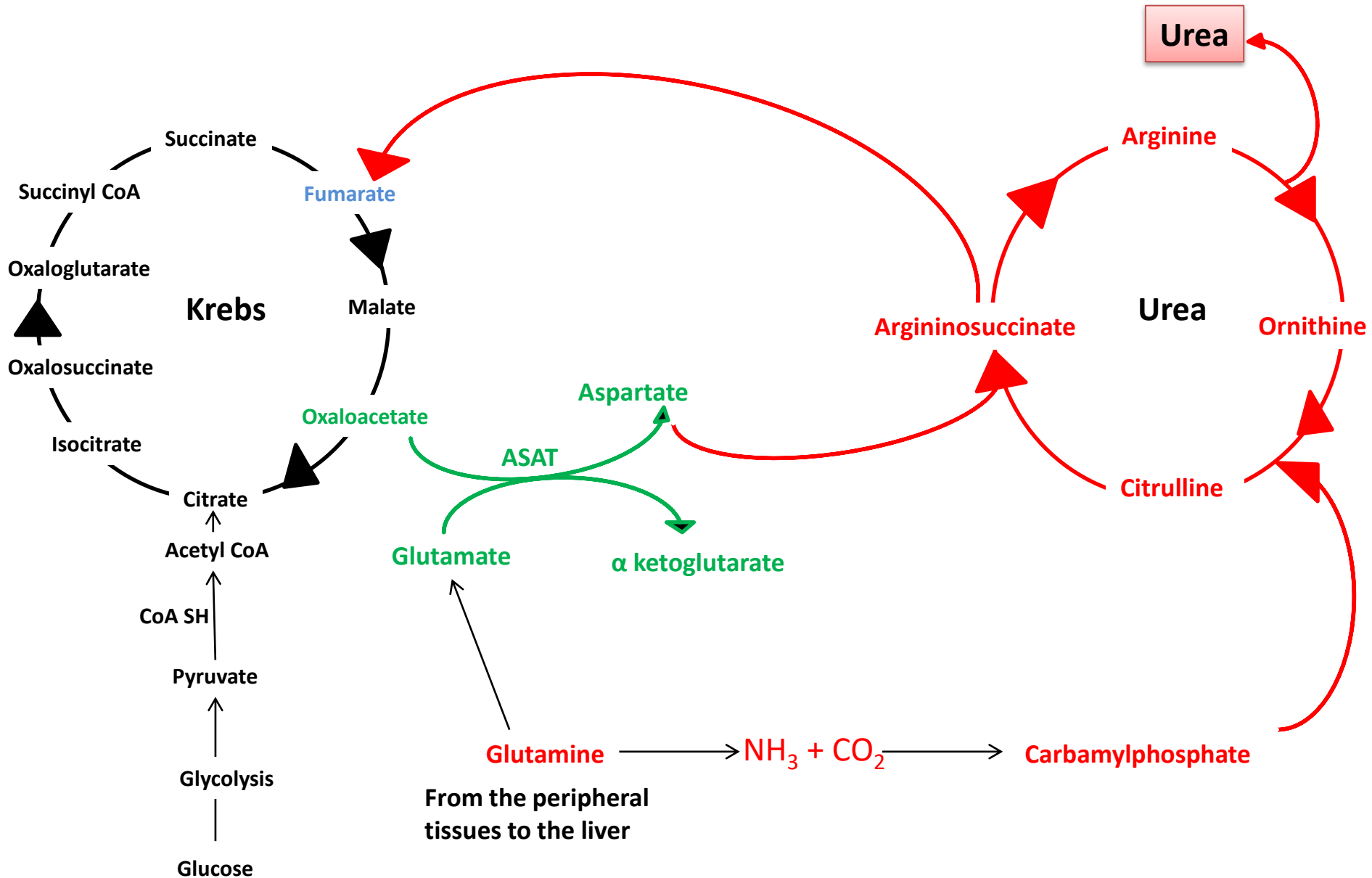
- **Balance**

- 4 ATP used

- Necessary energy for ammoniac detoxification

The urea cycle is energy intensive, consuming 4 ATP, while it is connected to the krebs cycle via fumarate, it can influence ATP production by altering the availability of intermediates in the krebs cycle.

Urea cycle/Krebs cycle



Urea cycle

Summary

