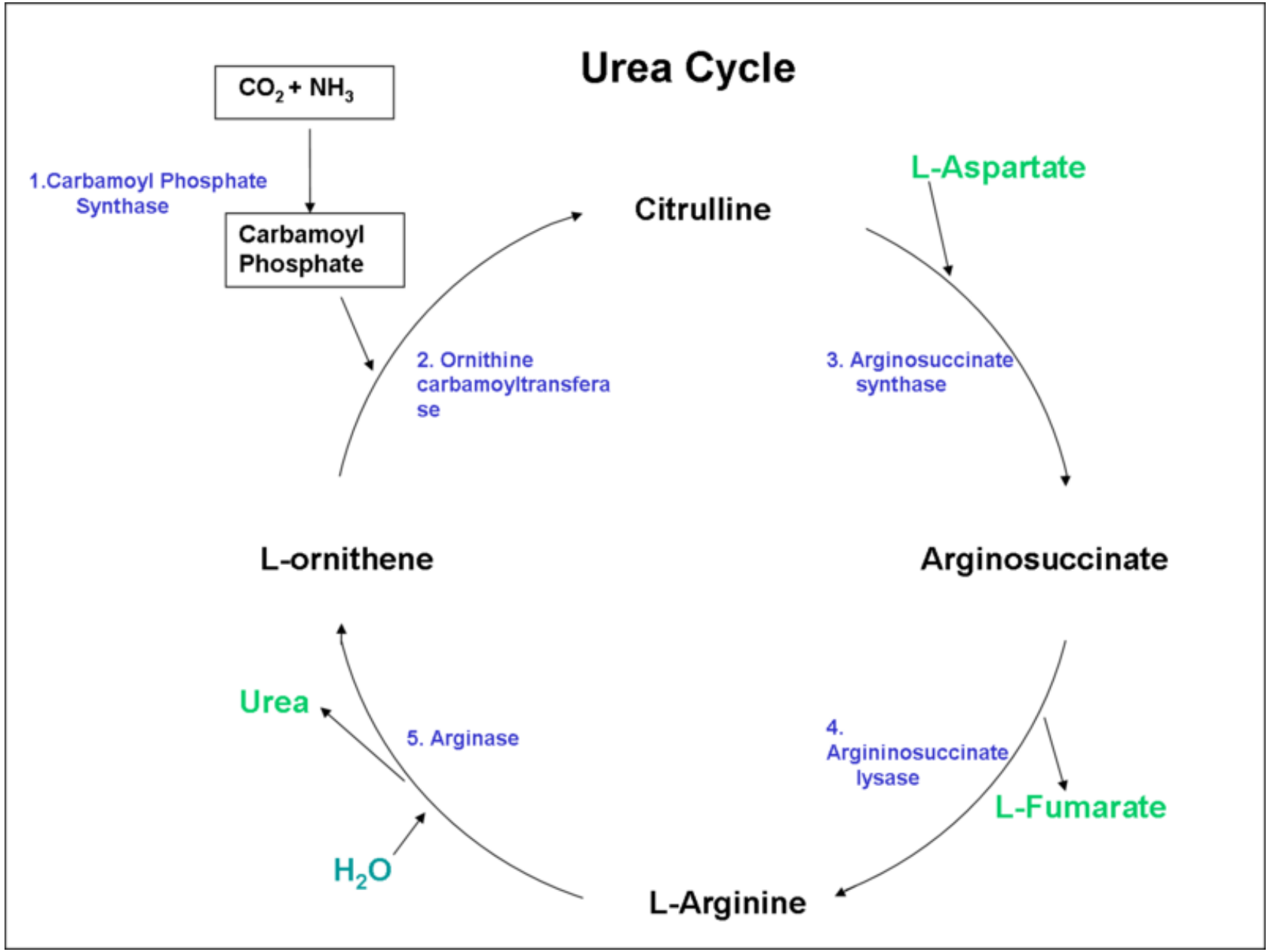
Estimation Of Arginase Activity In Liver Extract

- Introduction:

- Ammonia product of oxidative deamination of amino acids.
- It is toxic in even small amount and it must be removed from the body.
- Arginase is one of the important enzymes in urea cycle which is the major disposal form of amino groups derived from amino acids.
- Urea cycle catalyzed by a set of enzymes (Five enzymes) present in the liver ,and then is transported in the blood to the kidneys for excretion.


Urea Cycle
$CO_2 + NH_3$
1.Carbamoyl Phosphate Synthase
Carbamoyl Phosphate
2. Ornithine carbamoyltransfera se
Citrulline
L-Aspartate
3. Arginosuccinate synthase
Arginosuccinate
4. Argininosuccinate lysase
L-Fumarate
L-Arginine
5. Arginase
Urea
H_2O
L-ornithene

- Principle:

- The arginase enzyme catalyzes **the fifth reaction** in the urea cycle, the enzyme is present **exclusively in the liver.**

- Arginase catalyzes the hydrolytic cleavage of the guanidine group of Arginine to regenerate ornithine and urea.

Arginine ↔ Urea + Ornithine

- Arginase is present exclusively in liver (Cytoplasm).

- Two isozymes of this Enzyme exist , First ; Arginase I **(In cytoplasm)** for functions of urea cycle, Second; Arginase II to regulate the arginine/ornithine concentration in the cell **(In mitochondria).**

- Arginase requires a two-molecules metal of **Co^{2+} and Mn^{2+}** for it's activation while **ornithine and lysine** are potent inhibitors.

- The activity of the enzyme is determined by measuring the amount of urea produced, urea is reacted with the reagent isonitrosopropiophenone and heated in boiling water, leading to the production of a red color compound which is measured by spectrophotometry at 520nm.

- Question:

- What are the causes of high blood ammonia level?