



Urea Biosynthesis

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Abstract: High concentrations of ammonia are dangerous, especially for brain tissue (causing unconsciousness, coma and agitation). Ammonia can pass through membranes and enter brain cells, as well as mitochondria. The ornithine cycle takes place in the liver (cytosol and mitochondria). The formed urea is transported to the kidneys and excreted from the body through urine. The general formula is $2 \text{NH}_3 + \text{CO}_2 + 3\text{ATP} \rightarrow \text{urea} + \text{H}_2\text{O} + 3 \text{ADP}$. About 85% of ammonia is neutralized in the liver in the ornithine cycle.

Keywords: Serine, Glycoproteins, Proteoglycan, urine, sulfates, phosphates potassium, magnesium, ammonium carbonate, mucopolysaccharide

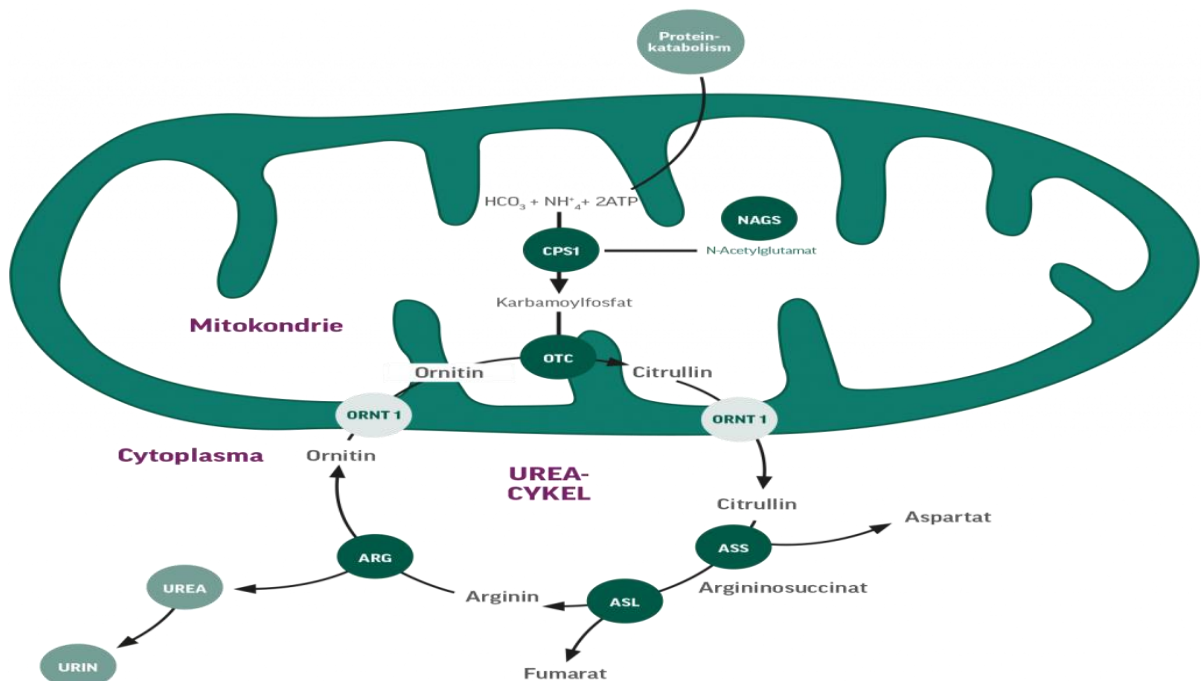
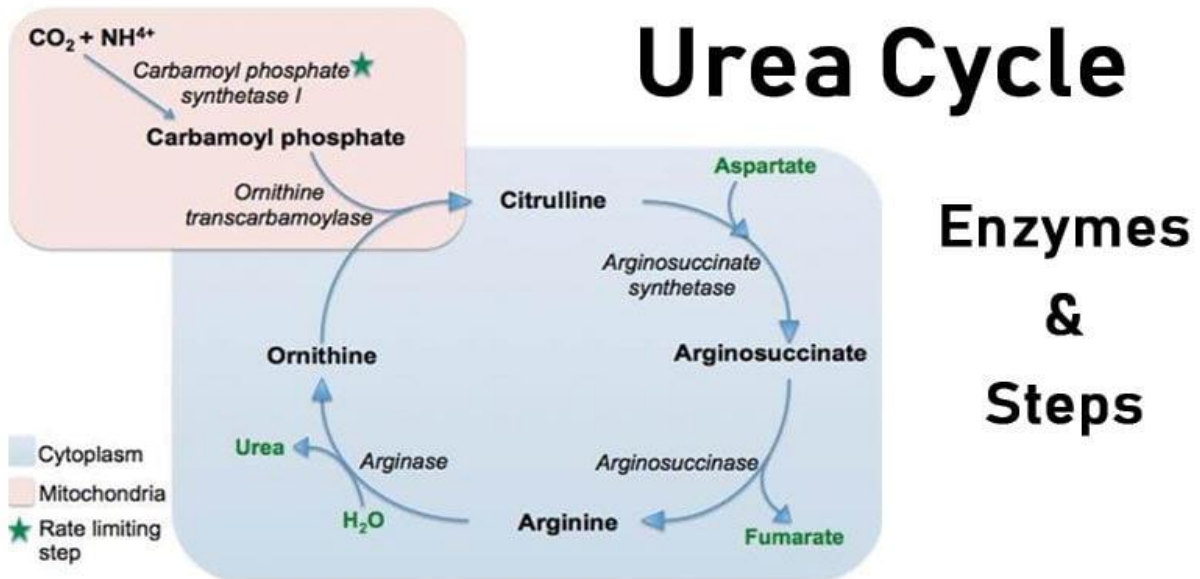
Many proteins also contain non-amino acid groups, and according to this criterion, proteins are divided into two large groups - simple and complex proteins (proteids). Simple proteids consist only of polypeptide chains, while complex proteids also contain non-amino acid or prosthetic groups. Depending on the chemical nature of the prosthetic group, the following groups are distinguished among complex proteins: Glycoproteins, which contain covalently bound carbohydrate residues as a prosthetic group; glycoproteins, which contain mucopolysaccharide residues, belong to the small group of proteoglycans. The linkage to the carbohydrate moieties usually involves the hydroxyl groups of serine or threonine. Most extracellular proteins, in particular immunoglobulins, are classified as glycoproteins. In proteoglycans, the carbohydrate moiety accounts for ~95% of the total mass of the protein molecule and is a major component of the extracellular matrix. Urea (urea) is a low molecular weight compound synthesized in the liver and freely passes through the cell membranes of parenchymal organs and erythrocytes. It is filtered in the renal glomerulus, but its significant passive absorption occurs in the renal tubules. The concentration of urea in plasma depends on the rate of its synthesis, the glomerular filtration rate (GFR), and the rate of renal perfusion.

Urea is considered a poison even in low concentrations. Urea is an osmotically active substance, so the accumulation of urea leads to edema in the tissues of parenchymal organs, myocardium, central nervous system, and subcutaneous tissue. Plasma urea concentration is often used as an indicator of renal glomerular filtration rate, but plasma creatinine measurement is more accurate. An increase in the concentration of urea, accompanied by a pronounced clinical syndrome of intoxication, is called uremia.

Urine is a waste product (excretion) of metabolism in humans and vertebrates; a liquid that is processed in the kidneys and excreted through the urinary tract. The body excretes water, salts and other waste products, as well as various toxic substances that have entered the body or formed in it. Normal urine in humans is clear, yellowish in color. Urine weight. 1.0101025 g/cm^3 ; $r-n=4.88.0$ (the urine reaction is acidic when eating protein-rich foods, slightly alkaline when eating plant foods). Urine contains 96% water, 1.5% salt, 2.5% organic compounds (urea, uric acid, etc.). Urine also contains salts, like those in blood plasma, mainly NaCl, as well as sulfates, phosphates, and potassium, magnesium, and ammonium carbonates. On average, a person excretes 1.2-1.6 liters of urine per day. Its amount and composition depend on the mode of fluid intake, type of food, external



temperature, functional stress, and other factors. Changes in the physicochemical properties of urine independent of the above factors indicate some changes in the body. **For example:** dark urine indicates impaired liver function, urine resembling "meat porridge" indicates serious diseases of the urinary organs. The appearance of protein in the urine indicates inflammation of the kidneys and bladder, and the presence of glucose indicates diabetes mellitus. Therefore, urine examination (analysis) is important in diagnosing many diseases. For analysis, 100-200 ml of urine is collected in a clean container and the mouth is tightly closed. Before this, the external genitalia should be washed (see Personal hygiene).





References:

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