

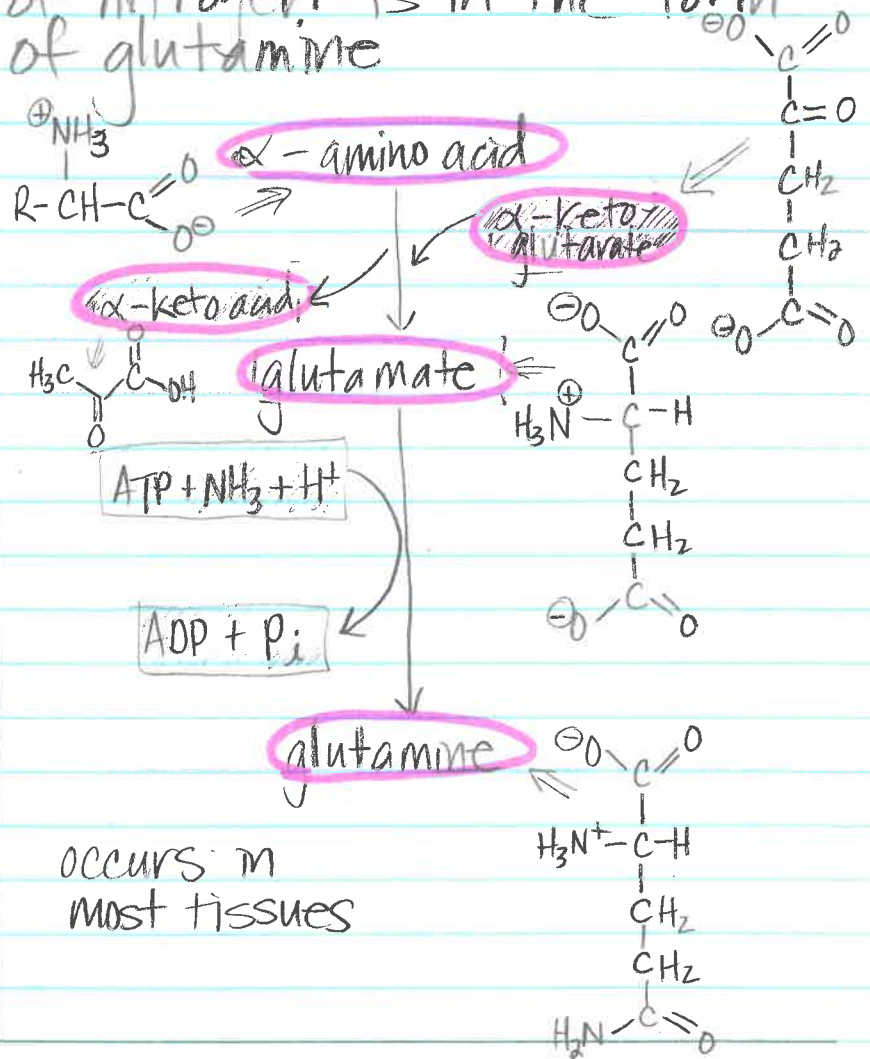
Ch 27 Protein Metabolism

TODAY'S DATE

27.3

Is excess protein stored for later use?

excess protein is not stored to any appreciable extent in living organisms — the only significant way the body has to store small amounts of nitrogen is in the form of glutamine



so what happens to nitrogen that is not needed for biosynthesis?

nitrogen that is not needed for biosynthesis is converted to ammonia (or ammonium ion) + must be eliminated from the body - organisms must have a mechanism for removing this ammonia from the cell b/c even low concentrations are poisonous + they have diff ways of doing so.

- most vertebrates + adult amphibia excrete nitrogenous waste as urea in urine
- birds, reptiles, + insects convert nitrogenous waste to uric acid
- all marine organisms excrete free ammonia (it is very soluble in water + is rapidly diluted)

what is urine?

urine is the fluid formed in the kidneys + excreted through the urinary tract

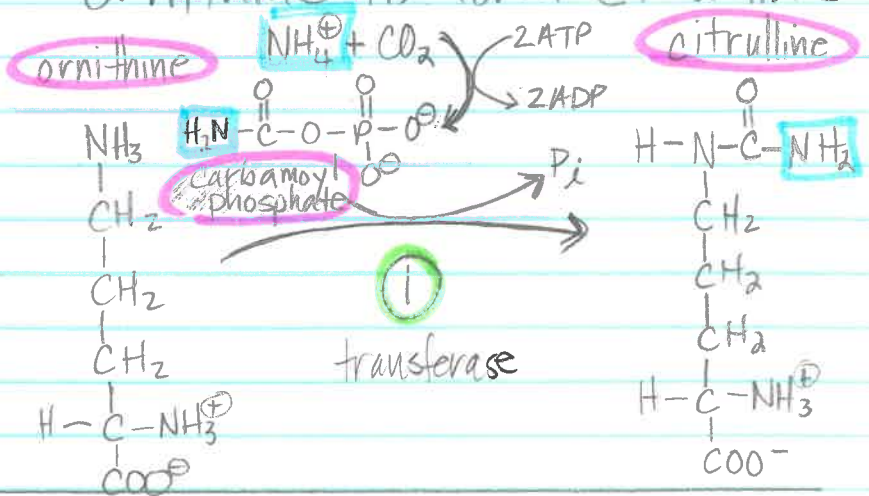
What is the urea cycle?

The urea cycle is the metabolic pathway by which excess nitrogen is converted to urea.

What happens in Step 1?

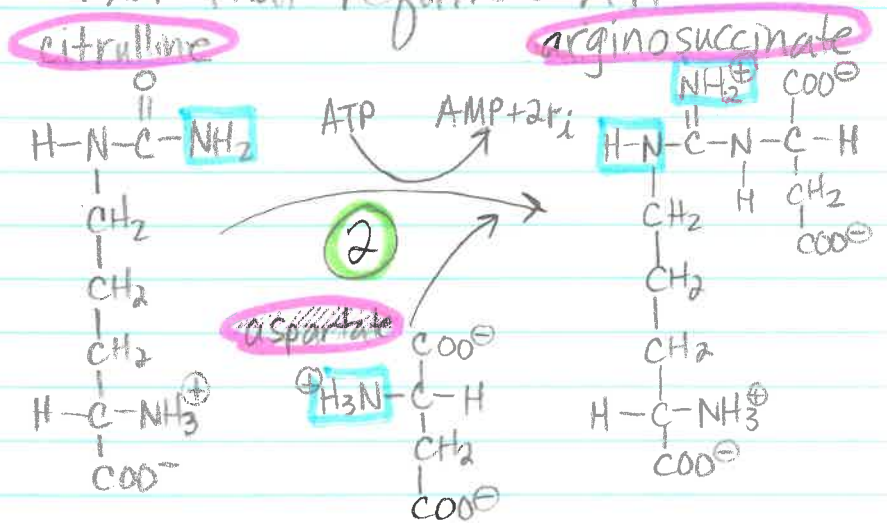
Step 1

- ammonium ion, NH_4^+ , (released from the oxidative deamination of glutamate) enters the urea cycle as carbamoyl phosphate, formed by rxn w/ bicarbonate ion, HCO_3^-
- the carbamoyl group ($-\text{CONH}_2$) is transferred from carbamoyl phosphate onto ornithine to form citrulline



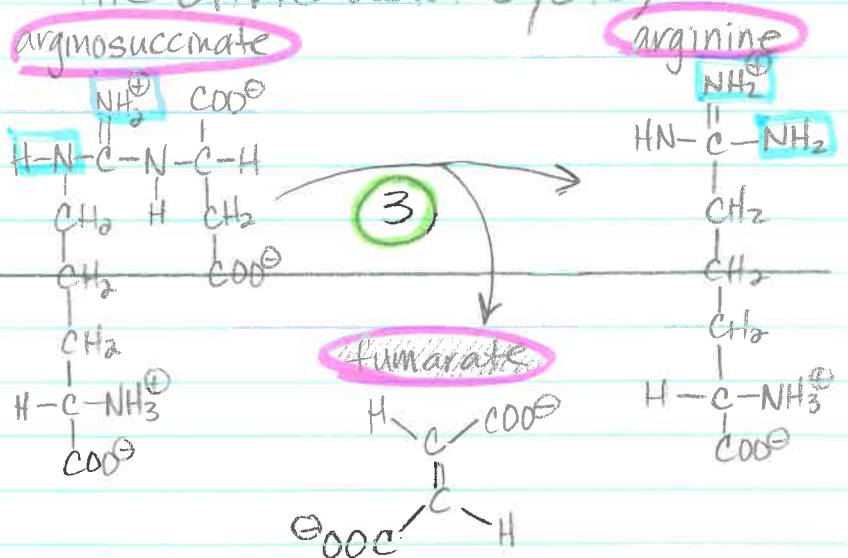
What happens in step 2?

Step 2
 - citrulline combines w/ a molecule of aspartate to form arginosuccinate in a rxn that requires ATP



What happens in step 3?

Step 3
 - arginosuccinate is cleaved to form arginine and fumarate (a by-product of the urea cycle, but intermediate of the citric acid cycle)



what happens
in step 4?

Step 4

- arginine is split into 2 compounds, urea + ornithine
- ornithine is used to begin another round of the urea cycle
- urea is transported by the bloodstream to the kidneys + eliminated in the urine. (avg individual excretes ~1.5 L of water, containing ~30 g of urea per day)

