Creatine

Creatine is synthesized primarily in the liver. It is then transported through the blood and taken up by tissues with high energy demands, such as the brain and skeletal muscle, where it is phosphorylated to ***phosphocreatine***, a high-energy compound.
During times of increased energy demands, ATP is rapidly resynthesizes from ADP with the use of ***phosphocreatine*** through a reversible reaction catalysed by the enzyme **creatine kinase** (**CK**).

Creatinine

Creatinine is formed irreversibly in the muscles from the breakdown of creatine and phosphocreatine. This process is non-enzymatic and occurs at a relatively constant rate depending on muscle mass. Therefore, creatinine concentrations in blood and urine may be used to calculate the **creatinine clearance** (**CrCl**), which correlates approximately with GFR.

Creatinine is removed from the blood primarily by glomerular filtration, but also by ***proximal tubular secretion***. **Little or no tubular reabsorption of creatinine occurs.** If filtration in the kidney is deficient, blood creatinine concentrations rise.

In cases of severe kidney dysfunction the CrCl rate will overestimate the GFR, because ***hypersecretion of creatinine by the proximal tubules*** will account for a larger fraction of the total creatinine cleared.

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