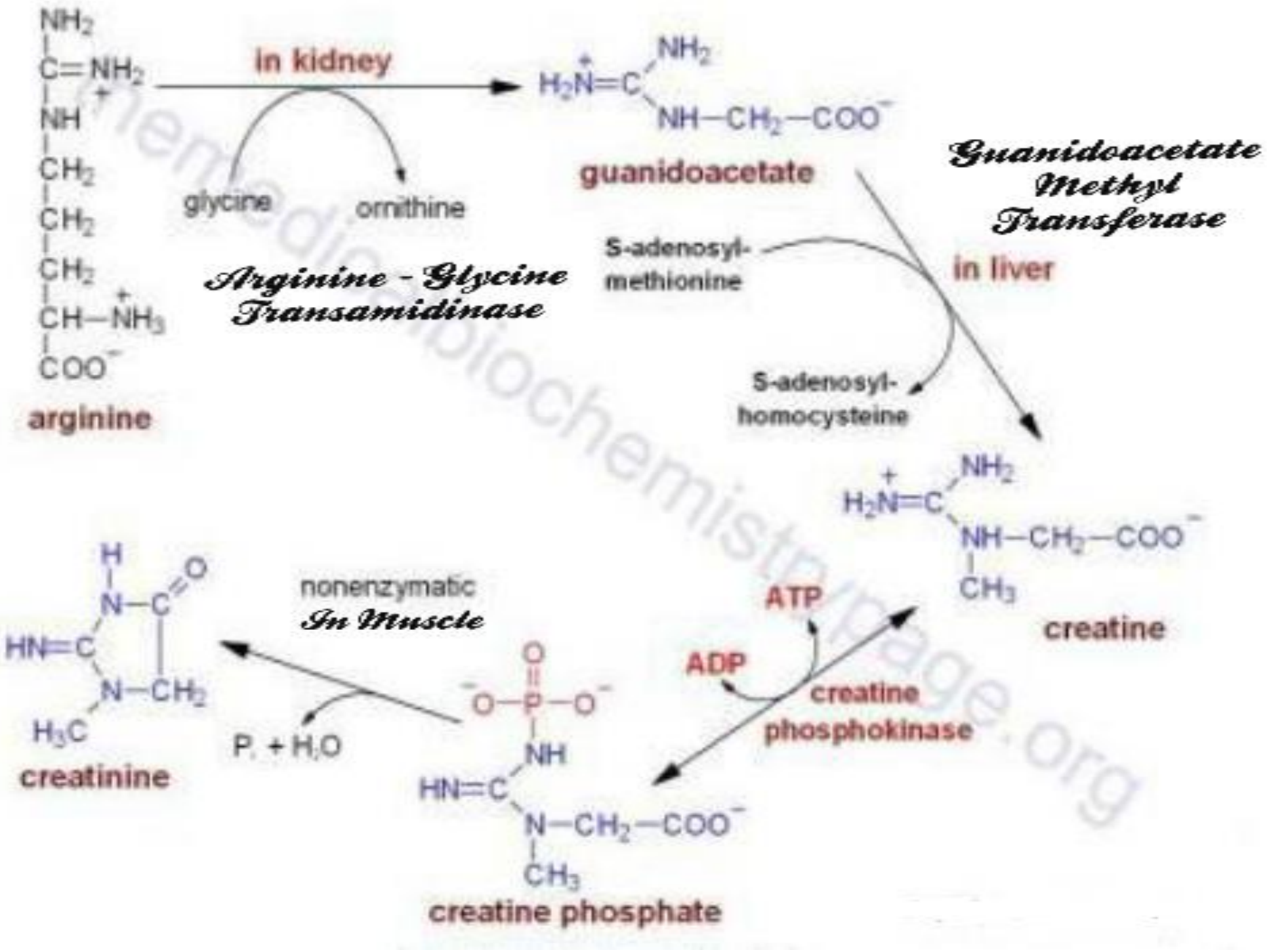
Creatine & Creatinine

-Creatinine , the anhydride form of creatine , is formed largely in muscle .

-Creatine and creatinine are present in muscle, brain and blood .In both, (brain and blood) presents as phosphate and free state .

- Trace amount of creatine are also present normally in urine . An increase in plasma creatinine is due to the fall in the glomerular filteration rate (GFR) :

1. Any disease lead to renal impairment and renal perfusion(hypotension and renal artery stenosis) .
2 . Most diseases that lead to loss of functioning nephron as acute and chronic glomerular nephritis.
3 . Diseases where pressure in increased on the tubular side of the nephron as urinary tract obstruction due to prostatic enlargment .
4 . Some endogenous substance (acetoactate) and exogenous substance (drugs) may affect the analytical method of identifying amount of plasma creatinine .


arginine
In kidney
glycine
ornithine
Arginine - Glycine Transamidinase
guanidoacetate
Guanidoacetate Methyl Transferase
S-adenosyl-methionine
in liver
S-adenosyl-homocysteine
creatine
ATP
ADP
creatine phosphokinase
creatine phosphate
nonenzymatic
In Muscle
creatinine

Notes :

1 . Values of creatinine are lower in children than adult , lower in women than in men because the bulk of muscle in male is greater than that in female plasma and lower during pregnancy .

2 . Meat containing meal raise plasma creatinine.

3.Creatine phosphate is an unstable compound .

4 .Creatinine drugs as salicylic acid (aspirin) and cimetidine increase plasma creatinine by inhibiting tubular secretion of creatinine .

5 . The kidneys has three major functions :

- Extraction of waste product .
- Maintain extracellular fluids volume and compositions.
- Hormones synthesis such as erythropoietin (the secretion of these hormone will be affected in the renal disease) .

6 . Biochemical test of renal functions :

- Measurment of GFR (measurment of creatinine) .
- Blood urea .
- General urine analysis (presence of albumin in urine and RBCs) .

7 . Creatinine excreted in urine $\rightarrow$ constant and $\propto$ muscle mass

Creatine Kinase isoenzyme

Creatine kinase is a dimer of BB , MB , **MM isoenzymes.**

CK-1 or BB is found in brain .

CK-2 or MB is found in heart only .

CK-3 or MM is found in skeletal and heart muscle .

The appearance of CK-2 in the blood is diagnostic of myocardial infraction because the heart is the only tissue containing CK-2 .