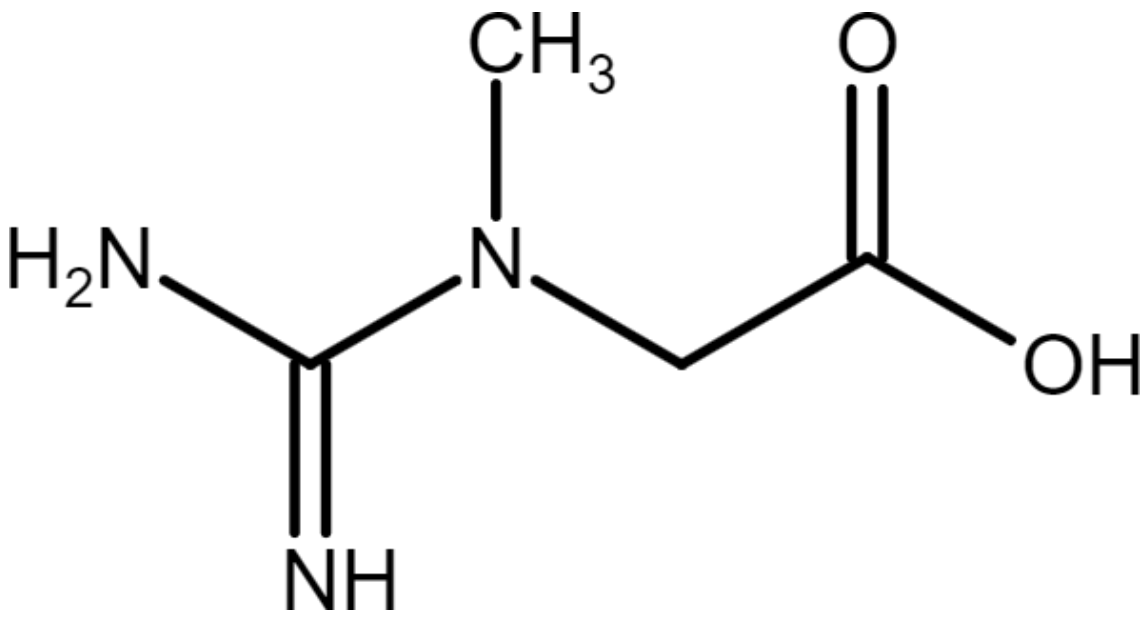
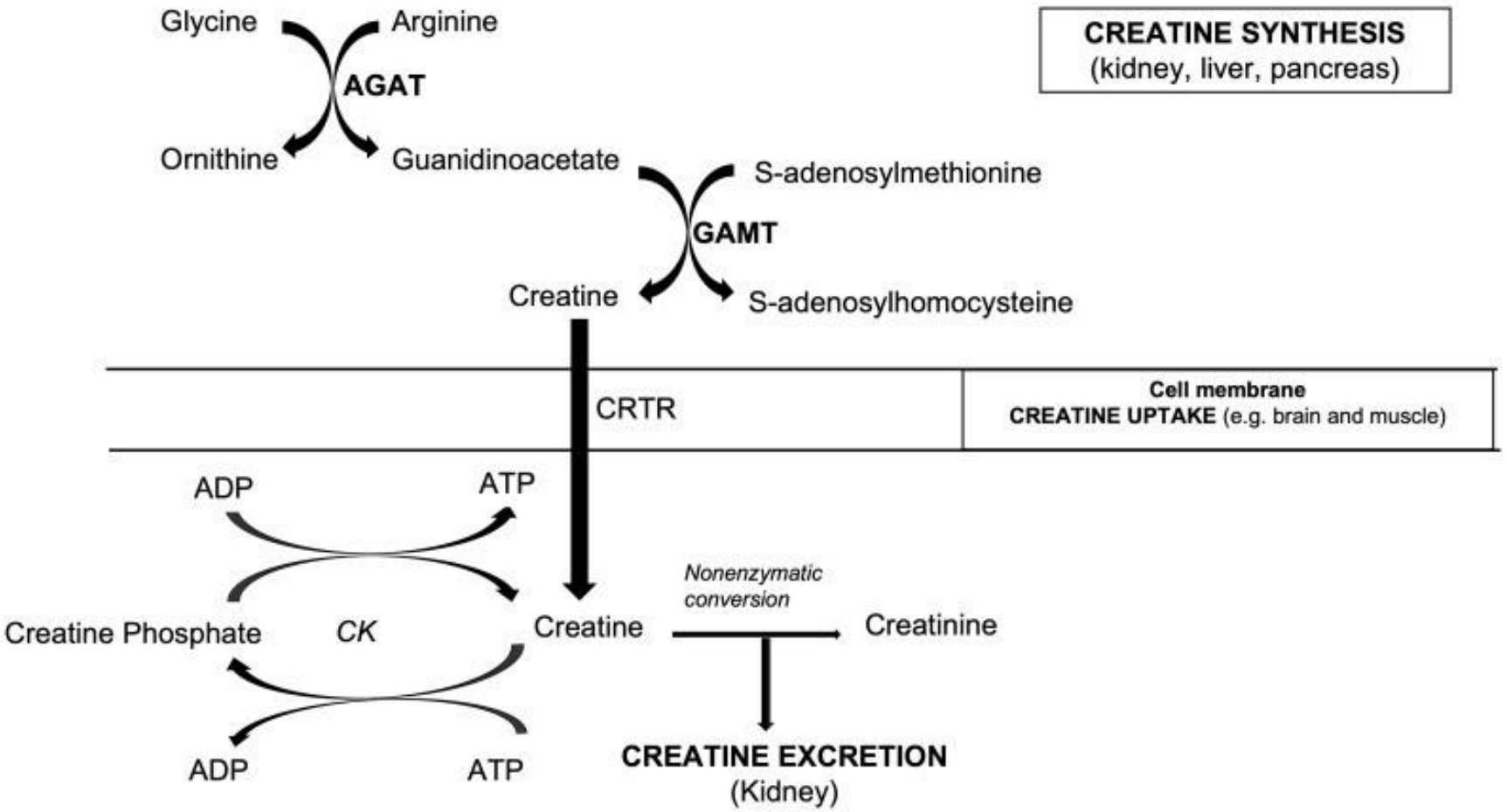
Kidney Function Tests
PART II

Asst. Lect. Aliaa Ahmed


CH3
O
H2N
N
OH
NH

Creatine and Creatinine

Creatine is synthesized in the liver, pancreas, and kidneys from the amino acids arginine, glycine, and methionine. Creatine is transported through the circulatory system to muscle where it is converted to phosphocreatine and acts as an energy reservoir much like ATP. Creatinine is a waste product produced in your muscles from the breakdown of creatine (Creatinine is formed by the hydrolysis of creatine). Almost all creatinine is excreted by the kidneys, so blood levels are a good measure of how well your kidneys are working.


CREATINE SYNTHESIS
(kidney, liver, pancreas)
Glycine
Arginine
AGAT
Ornithine
Guanidinoacetate
S-adenosylmethionine
GAMT
S-adenosylhomocysteine
Creatine
CRTR
Cell membrane
CREATINE UPTAKE (e.g. brain and muscle)
ADP
ATP
Creatine Phosphate
CK
Creatine
Nonenzymatic conversion
Creatinine
ADP
ATP
CREATINE EXCRETION
(Kidney)

Abbreviations

AGAT: Arginine : Glycine Amidinotransferase
GAMT: Guanidinoacetate Methyltransferase
CRTR: Creatinine Transporter
CK: Creatine Kinase

Role of Creatinine in the body

1. Indicator of Kidney Function

High creatinine levels suggest impaired kidney function, as the kidneys are responsible for removing creatinine from the blood.

2. Muscle Health Marker

Creatinine levels can provide insights into muscle mass and overall muscle health, making it especially relevant for athletes.

3. Stability of Metabolic Processes

Stable creatinine levels indicate a healthy balance of muscle metabolism and waste elimination.

Causes of High Creatinine Levels

Kidney Disease
Conditions like chronic kidney disease or acute kidney injury can lead to impaired kidney function and elevated creatinine levels.

Dehydration
Inadequate fluid intake can result in concentrated blood, leading to higher creatinine levels.

Medications
Certain medications, such as nonsteroidal anti- inflammatory drugs (NSAIDs), can cause temporary elevation in creatinine levels.

Causes of low creatinine Levels

Low levels of creatinine are not common and are not usually a cause for concern.

Low blood creatinine levels can indicate:

1 A diet very low in protein.
2 A decrease in muscle mass caused by a disease, such as muscular dystrophy.
3 Pregnancy can also cause low blood creatinine levels.

Measuring Creatinine Levels

Blood Test
A simple blood test is performed to measure the amount of creatinine present in the bloodstream.

Urine Test
Creatinine clearance can be measured by collecting a 24-hour urine sample and comparing it with blood creatinine levels.

Principle

Creatinine reacts with picric acid in alkaline conditions to form a yellow-orange color complex. The rate of formation of color is proportional to the creatinine quantity in the sample

Procedure

Reagent preparation

Mix reagents (R2) and (R3) in the ratio 1+1 Working reagent is stable 2 days at room temperature.

Wavelength: 492(490-500) Optical path: 1 cm
Light path Temperature: 25 C
Reading: Against distilled water

Pipetting in cuvette

	Sample	Standard
Working Reagent	1000 µL	1000 µL
Sample	100 µL	
Standard		100 µL

Mix, and after 30 sec read the absorbance A1 of the standard or sample. Exactly 2 min later, read absorbance A2 of standard or sample.

Calculation

A2-A1= A standard or A sample

SERUM: Creatinine mg/dl = A (sample) / A (standard) x 2

URINE: Creatinine mg/dl = A (sample) / A (standard) x 2 x50

Expected values

Men	**0.7 – 1.4 mg/dl**
Women	0.5 – 1.2 mg/dl
Children >2 years old	0.3 – 0.6 mg/dl

Thank you for listening