Clinical Chemistry Laboratory

3rd Stage

LEC. 5

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Determination of Serum Creatinine

Creatinine is the catabolic end product of creatine produced by loss of water (or phosphoric acid) from creatine in an irreversible reaction.

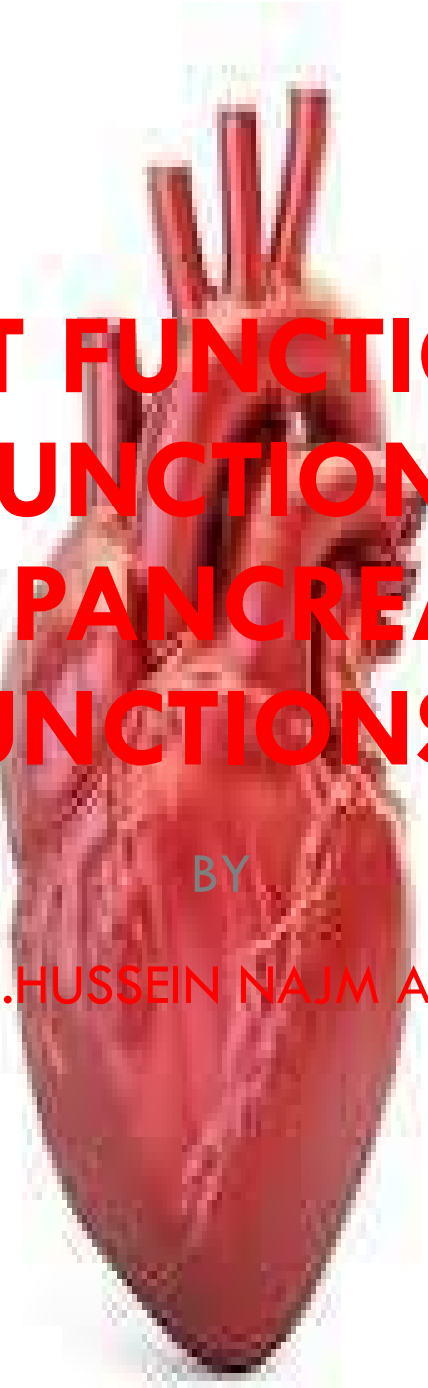
The normal value of S.creatinine is 0.2 – 1.4 mg/dl depending on age, gender and muscle mass :

Adults male 0.8 – 1.4 mg/dl
Adults female 0.6 – 1.1 mg/dl
Children 0.2 – 1 mg/dl

Clinical significance :

Creatinine is regarded as the most useful substance to the diagnosis and follow up of kidney diseases. A single random measurment of S.Creatinine can be used as a qualitative and semi quantitative indicator of impaired extent of kidney damage.

HEART FUNCTIONS , HEART FUNCTIONS TESTS AND PANCREATIC FUNCTIONS



BY

DR.HUSSEIN NAJM ABED

- **HEART DISEASES include :**

Myocardial Infarction (MI)

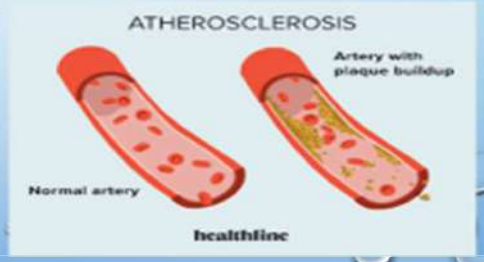
- also known as "heart attack," is caused by decreased or complete cessation of blood flow to a portion of the myocardium. Myocardial infarction may be "silent" and go undetected, or it could be a catastrophic event leading to hemodynamic deterioration and sudden death. most myocardial infarctions are due to underlying coronary artery disease.

Cardiac Arrest

- the sudden cessation of cardiac activity so that the victim becomes unresponsive, with no normal breathing and no signs of circulation.
- If corrective measures are not taken rapidly, this condition progresses to sudden death.

ATHEROSCLEROSIS

- is a chronic inflammatory disease in which there is a buildup of plaques inside arteries.
- atherosclerosis mainly develops through the continuous process of arterial wall lesions due to lipid retention by trapping in the intima by a matrix such as proteoglycans resulting in a modification that, in turn, aggravates chronic inflammation at vulnerable sites in the arteries plays an important role at all phases of atherogenic progression.



ANGINA

- is chest pain or discomfort caused when the heart muscle doesn't get enough oxygen-rich blood.
- it may feel like pressure or squeezing in the chest.

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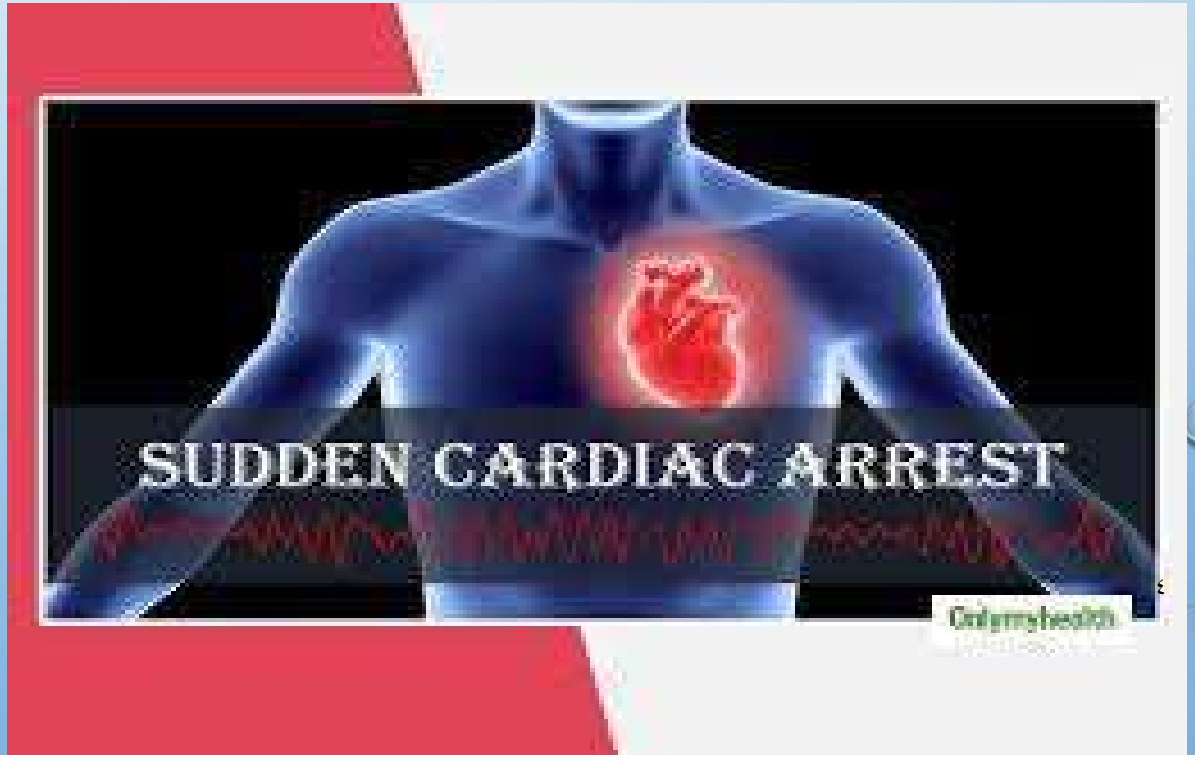

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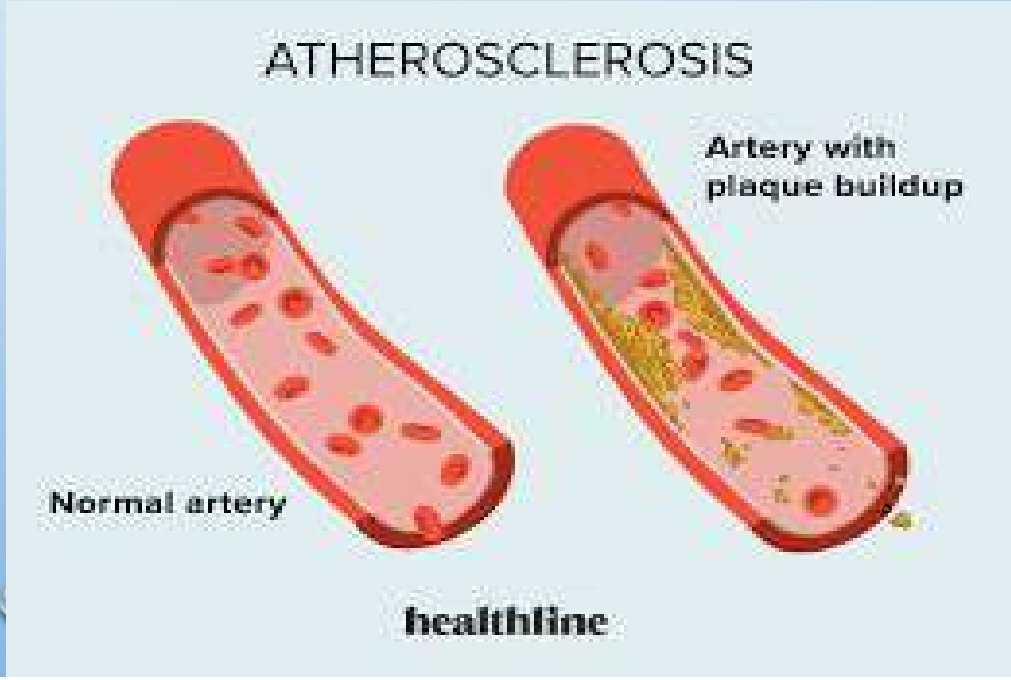

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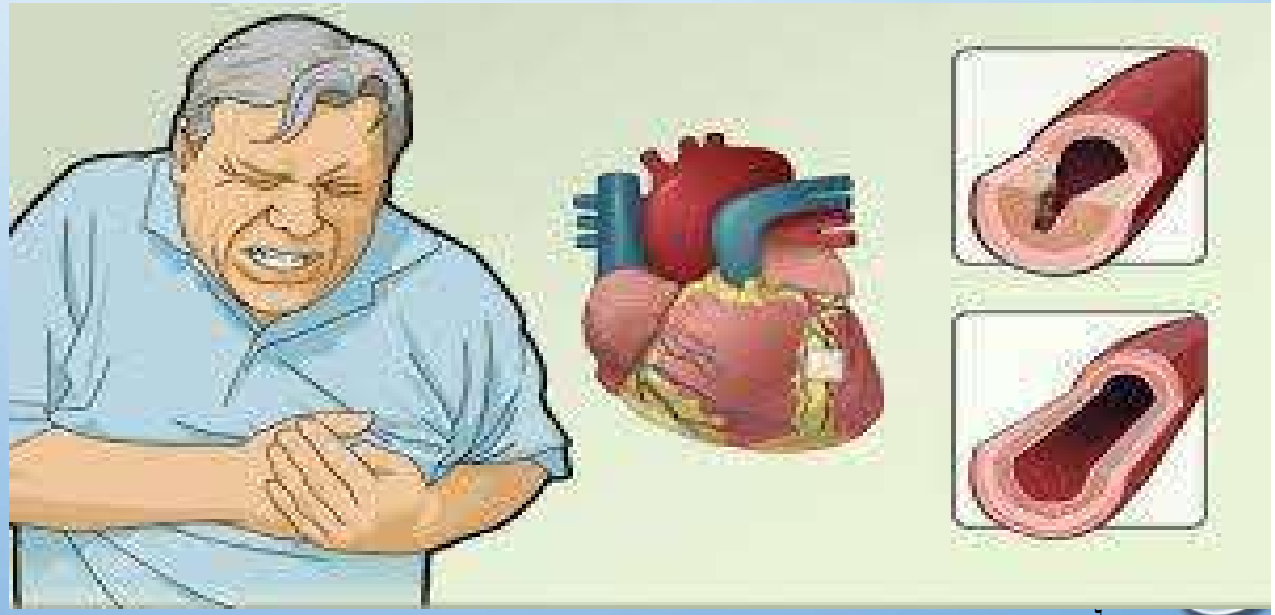


CARDIAC BIOMARKERS

- Cardiac Biomarkers are substances that are released into the blood when the heart is damaged or stressed. measurements of these biomarkers are used to help diagnose acute coronary syndrome (ACS) and cardiac ischemia, conditions associated with insufficient blood flow to the heart.
- Tests for cardiac biomarkers can also be used to help determine a person's risk of having these conditions or to help monitor and manage someone with suspected ACS and cardiac the root causes of both acute coronary syndrome (ACS) and cardiac ischemia are **usually** the buildup of plaque in artery walls and hardening of the arteries (ATHEROSCLEROSIS).
- This Can Result In Severe Narrowing Of The Arteries Leading To The Heart Or A Sudden Blockage Of Blood Flow Through Coronary Arteries Ischemia.
- Cardiac Ischemia Is Caused When The Supply Of Blood Reaching the Heart Tissue Is Not Enough To Meet The Heart's Needs.
- When Blood Flow To The Heart Is Blocked Or Significantly Reduced For A Longer Period Of Time (Usually For More than 30-60 Minutes), It Can Cause Heart Cells To Die And Is Called An Acute Myocardial Infarction (AMI Or Heart Attack).

- **CARDIAC BIOMARKERS** : This Test Measures The Levels Of Cardiac Biomarkers In The Blood. These Markers Include Enzymes, Hormones, And Proteins (LDH, GOT, CK, Cardiac Troponin, Myoglobin, Other Markers) .

LACTATE DEHYDROGENASE ISOENZYMES

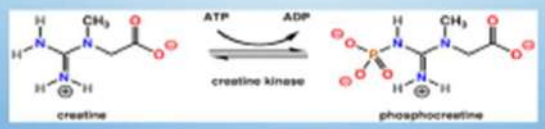
- Were Used Widely In The Past For Diagnosis Of Myocardial Infarction, But More
- Recently, Due To (LDH)-1 Availability Of Troponin Immunoassays, Lactate Dehydrogenase Isoenzyme Assay Has Been Mostly Discontinued In The Clinical Setting For Diagnosis Of Myocardial Infarction.
- Briefly, LDH Exists In Five Isoenzymes Forms (LDH1 , LDH2, LDH3, LDH4, And LDH5) Usually LDH Isoenzymes Levels Increase 24–72 Hours Following Myocardial Infarction And Reach A Peak Concentration In 3–4 Days.
- The Levels Remain Elevated For 8 To 14 Days, Making It A Late Marker For Myocardial Infarction. Concentration Can Be Elevated In Hemolytic Anemia, Stroke, Pancreatitis, Ischemic Cardiomyopathy, And A Variety Of Other Diseases.

GOT (GLUTAMATE OXALOACETATE TRANSAMINASE)

- The First Biomarker Used To Aid In The Diagnosis Of Acute MI Was GOT, Also Called Aspartate Aminotransferase (AST).
- The GOT released from cardiomyocytes undergoing necrosis would be useful in diagnosing acute MI .

CREATINE KINASE

- is an enzyme found primarily in heart muscle cells.
- There are three isoforms are called isoenzymes:
  - A-CK-MM (found in skeletal muscles and the heart)
  - B-CK-MB (found mostly in the heart, but small amounts are found in skeletal muscles).
  - C-CK-BB (found mostly in the brain and smooth muscle).



MYOGLOBIN

- The small heme protein that assists in oxygen transport in all muscle tissues, is released within 1 -4 hour and rises more rapidly than troponin or CKMB. peaks in nearly 8 to 10 hours, and returns to normal within 24 hours.

TROPONINS

- The troponins are a complex of 3 protein subunits, namely TROPONIN C, TROPONIN T, AND TROPONIN I, located on the thin filaments of the skeletal and cardiac muscle fibers.
- TROPONIN C IS the calcium-binding component, troponin t is the tropomyosin-binding component, and Troponin I is the inhibitory component.
- as the isoforms of troponin C is identical in the skeletal and cardiac muscle, troponin C is not extremely specific for myocardial injury.
- TROPONIN I is extremely specific for the cardiac muscle and has not been isolated from the skeletal muscle. this absolute specificity makes it an ideal marker of myocardial injury.

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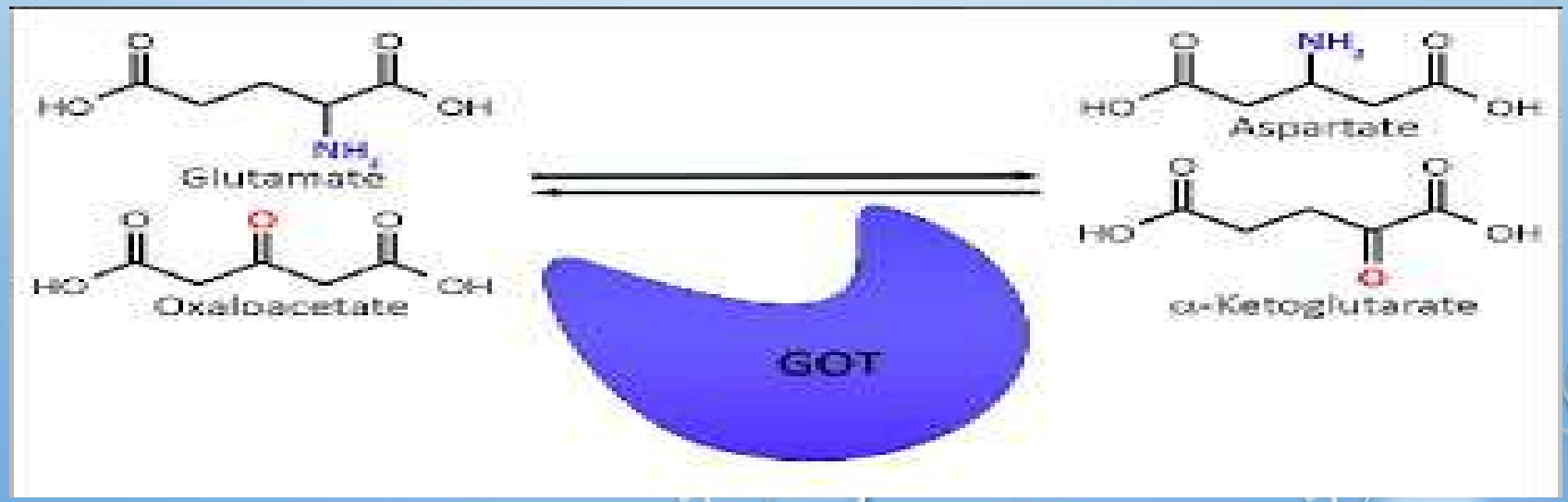

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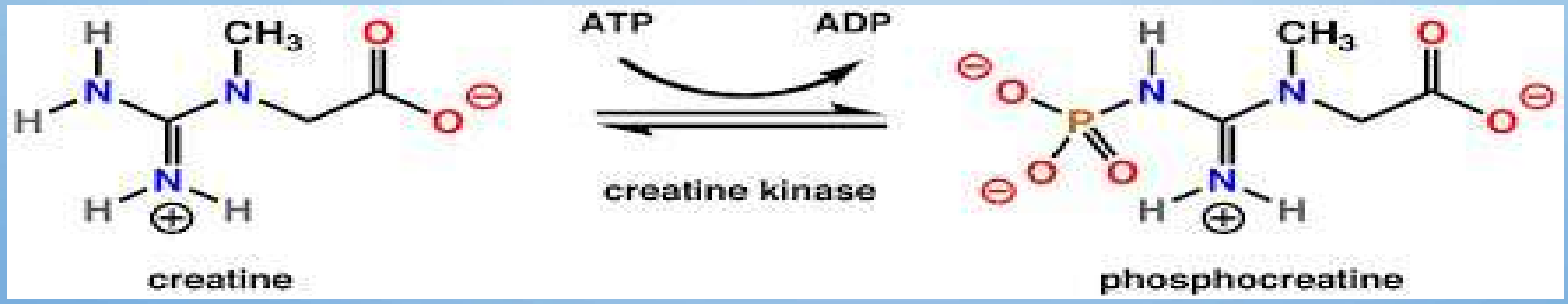

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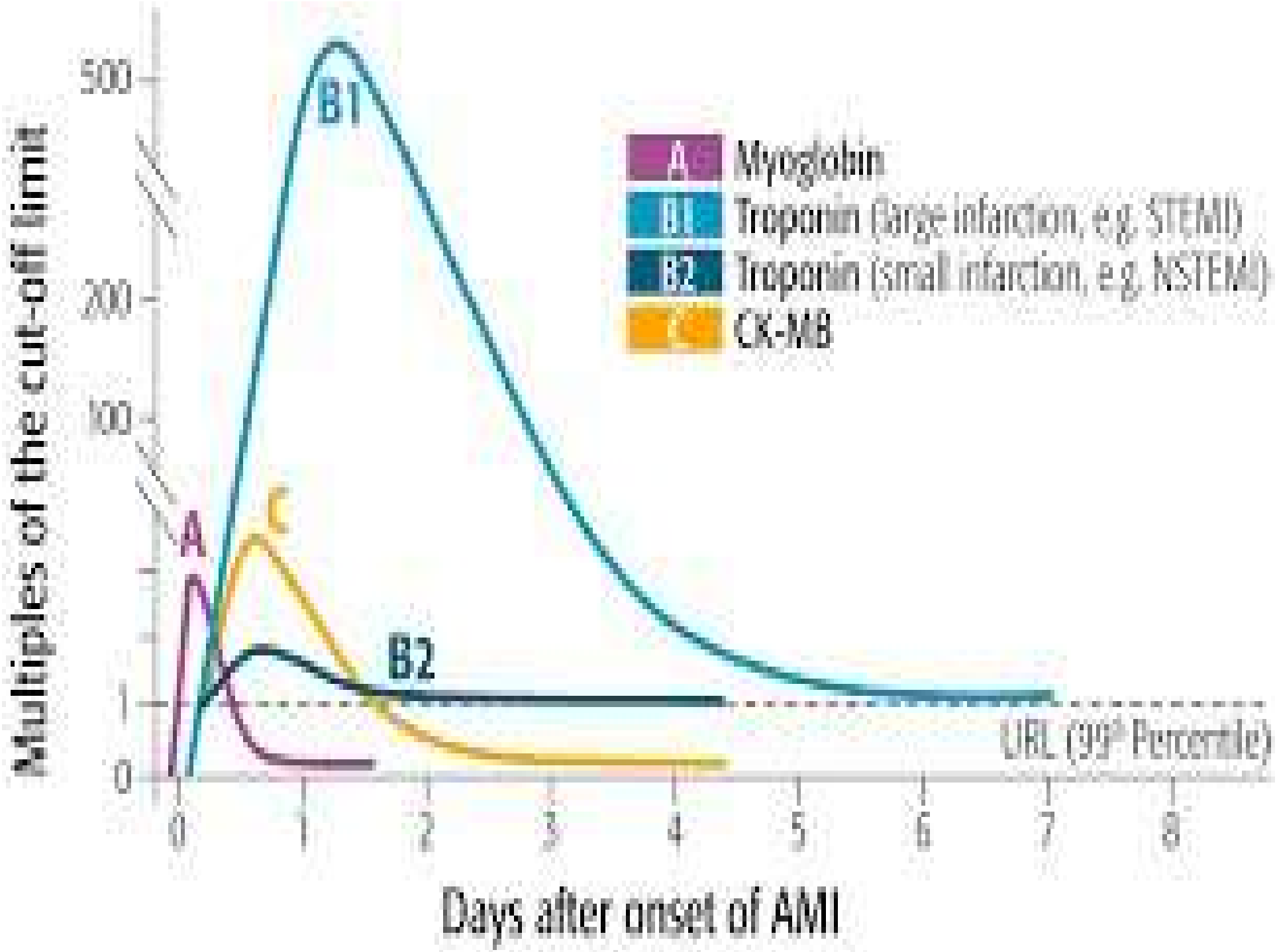
Multiples of the cut-off limit
500
200
100
1
0
B1
A
C
B2
A Myoglobin
B1 Troponin (large infarction, e.g. STEMI)
B2 Troponin (small infarction, e.g. NSTEMI)
C CK-MB
URL (99th Percentile)
0
1
2
3
4
5
6
7
8
Days after onset of AMI

THANK YOU