

The background features a dark blue gradient with several overlapping circular patterns. On the left side, there is a large circular scale with numerical markings from 140 to 260 in increments of 10. The scale is partially obscured by other circular elements. The overall aesthetic is technical and scientific.

# **LABORATORY DIAGNOSIS OF MYOCARDIAL INFARCTIONS IN WOMEN**

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# OBJECTIVES:

**Briefly describe cardiac function**

**List laboratory test that are used in the diagnosis of Myocardial infarction**

**Discuss the differences in myocardial infarctions between men and women**

# HEART DISEASE

- Blood vessel disease, such as coronary artery disease
- Irregular heartbeats (arrhythmias)
- Heart problems you're born with (congenital heart defects)
- Disease of the heart muscle
- Heart valve disease

# PREVENTION

- Many forms of heart disease can be prevented or treated with healthy lifestyle choices



# CARDIAC FUNCTION

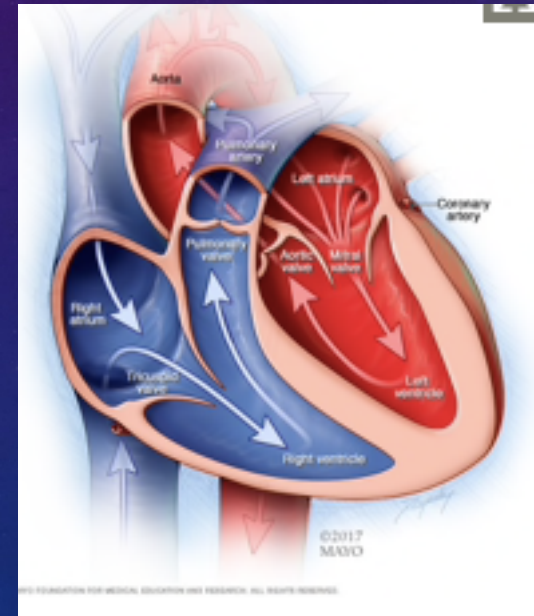
- Cardiac function is the ability of the heart to meet the metabolic demands of the body.



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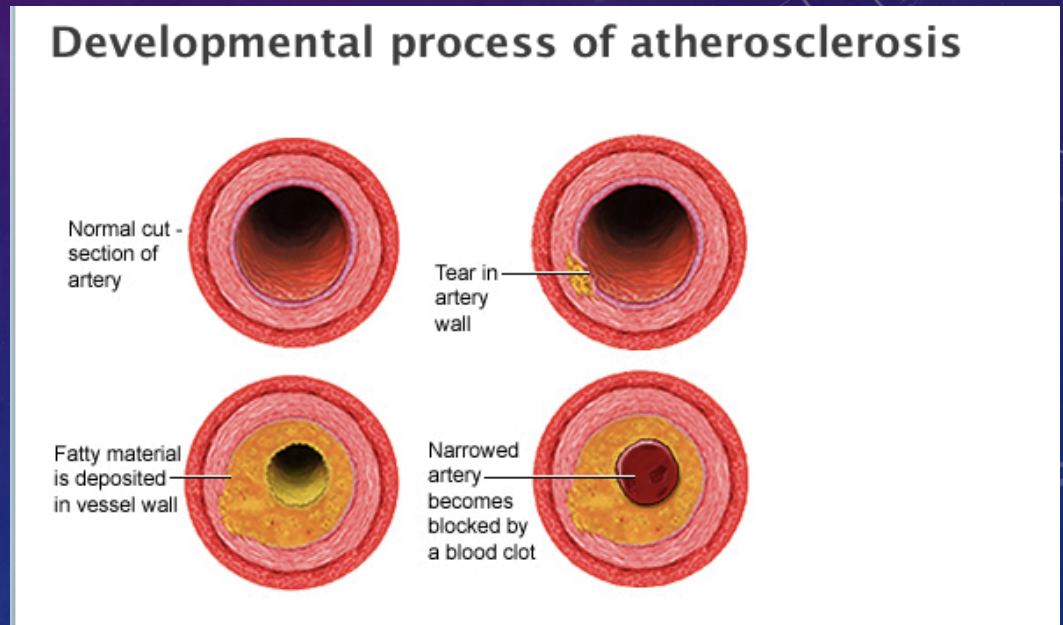
# HOW THE HEART WORKS:

- Two upper chambers (atria) and two lower chambers (ventricles).
- Pulmonary arteries
- Pulmonary veins.
- The left side of the heart then pumps the blood through the aorta and out to the rest of the body.



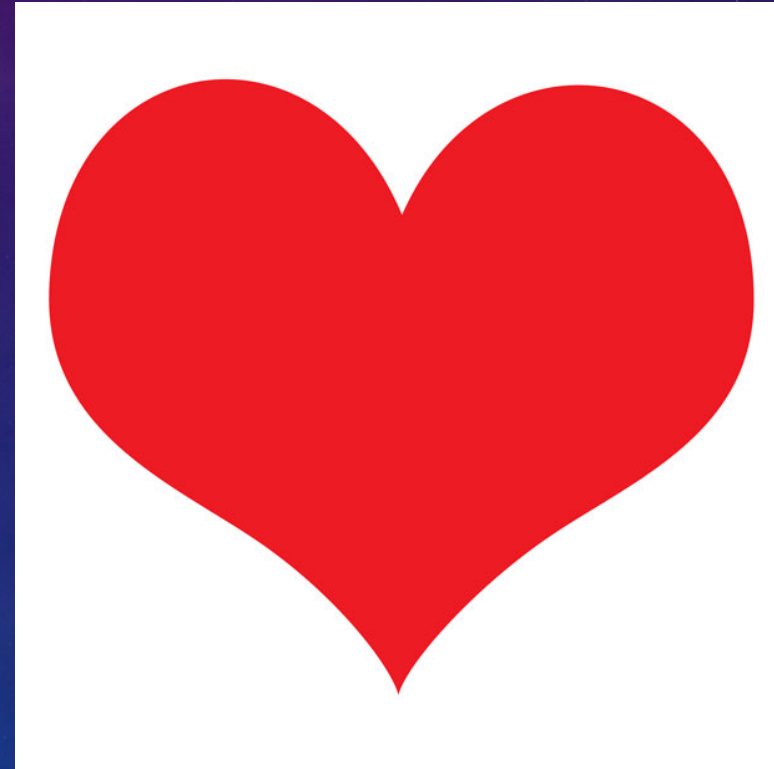
# CORONARY ARTERY DISEASE

- Build up of fatty plaques in the arteries



# CORONARY ARTERY DISEASE

- CAD is the #1 Killer of men and women
- 1 in every 4 women dies from heart disease
- CAD is the leading cause of heart attacks





# CORONARY ARTERY DISEASE

- Heart attacks are twice as likely to be fatal in women under the age of 50 compared to men
- 54% of women recognize that heart disease is their number one killer
- Almost 2/3 of women die suddenly of coronary heart disease with no previous symptoms



# MYOCARDIAL INFARCTION

- Flow of blood to the heart is severely reduced or blocked.



# SIGNS AND SYMPTOMS

- No symptoms
- Mild symptoms
- Severe symptoms

# SIGNS AND SYMPTOMS

- Chest pain that may feel like pressure, tightness, pain, squeezing or aching
- Pain or discomfort that spreads to the shoulder, arm, back, neck, jaw, teeth or sometimes the upper belly
- Cold sweat
- Fatigue

# SIGNS AND SYMPTOMS

- Heartburn or indigestion
- Lightheadedness or sudden dizziness
- Nausea
- Shortness of breath



**IT'S THE BIG ON**

MEN VS WOMEN





# MEN VS WOMEN

- Chest pain
- Told they are suffering from reflux or anxiety

# KEY DIFFERENCES WITH MEN AND WOMEN

- Women are more likely to have cardiac chest pain syndromes not directly associated with obstruction of the large epicardial coronary vessels
- Women almost a decade older
- Women less likely to be referred for coronary angiography
- Women less likely to receive fibrinolytic therapy, percutaneous coronary intervention or artery bypass surgery
- In hospital and long-term mortality higher in women



# WOMAN'S HEART ATTACK

- Symptoms when resting
- Stress
- Tend to show up to ER later

# AHA RECOMMENDATION FOR WOMEN CALLING 911

- Uncomfortable pressure, squeezing, fullness or pain in the center of their chest.
- Pain or discomfort in both arms
- Shortness of breath

# AHA RECOMMENDATION FOR WOMEN CALLING 911

- Cold sweat, nausea, or light headiness
- As with men most common chest pain~however, more likely to experience other symptoms!



# LABORATORY TEST

- Recommended collection:

1. At presentation
2. 6 – 9 hrs
3. 12 – 14 hrs

(Recommended by American College of Cardiology & European College of Cardiology)



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# CARDIAC MARKERS

- Old cardiac enzymes:
- CK, AST, LD
- Current cardiac markers:
- Myoglobin
- Troponin T or I
- CK
- CK-MB



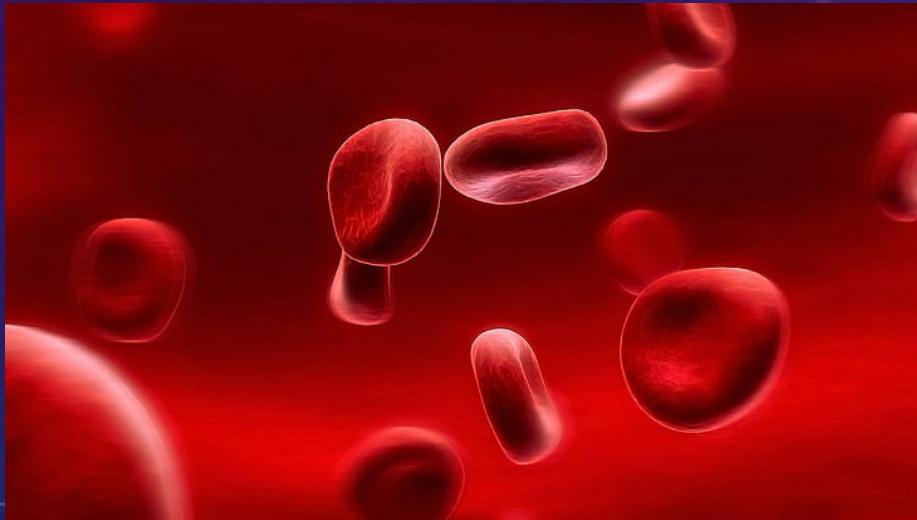
# TOTAL CK

- Not cardiac specific
- Important to calculate CK-MB/CK ratio
- Levels following MI:
  - Rise 4 – 8 hrs
  - Peaks at 12 – 24 hrs
  - Returns to normal in 2 – 3 days

## CK-MB

- MI High specificity for myocardial damage
- Usually <6% total CK
- Ratio CK-MB: total CK
- **MI □ Ratio of  $\geq 6\%$**

# MYOGLOBIN



- Heme protein in skeletal and cardiac muscle
- Oxygen carrier
- Released from damaged muscle very early after MI
- Levels rise early



## TROPONINS



- Proteins that bind to thin filament of cardiac and skeletal muscle
- Troponin T (TnT)
- Troponin I (TnI)
- Troponin C (TnC)
- 
- Functions:
- Bind calcium
- Regulate muscle contraction

## TROPONINS

- High sensitivity & specificity for myocardial damage
- 
- Rise 4 – 10 hrs
- Peak at 12 – 48 hrs
- Remain elevated 4 – 10 days

## TROPONINS

- **Troponin T (TnT)**
- Rises few hrs following onset of chest pain
- Peaks at 12-48 hours
- Elevated 7 – 10 days
- 
- **Troponin I (TnI)**
- **Cardiac specific**
- Release in circulation similar to TnT and CK-MB
- Levels return to normal in ~6 days

## HIGH-SENSITIVITY C- REACTIVE PROTEIN (HSCRP)

- Biomarker of inflammation
- Acute phase reactant
- Elevated baseline levels □ higher risk of cardiovascular disease

## HOMOCYSTEINE

NOTE: At this time the American Heart Association does not consider homocysteine a major risk factor for CVD

- Amino Acid present in very small quantities
- Vitamins B6, B12, and folate required for metabolism
- 
- **Increased homocysteine  $\square$  higher risk of heart disease, stroke, atherosclerosis, and peripheral vascular disease**
- Direct links not confirmed

# BNP AND NT-PROBNP

- B-type Natriuretic Peptide
- Hormone release by cardiac ventricles
- Regulation of cardiovascular homeostasis
- Increased in diseases characterized by expanded fluid volume
- **Aids in diagnosis of CHF**

# NEW TROPONIN ASSAYS

- High Sensitivity cardiac troponin
- I or T assays

# ADVANTAGES OF HIGH SENSITIVITY CARDIAC TROPONIN

- Rule out MI sooner
- Earlier Diagnosis of MI
- Improved patient care and outcome



conclusion

# QUESTIONS



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