ECG BACK TO BASIC
ECG BACK TO BASIC

TENTATIVE
8 AM – 8.30 AM – Registration
8.30 AM – 8.45 AM – Pre Test
8.45 AM – 10.30 AM – Ice Breaking
   Know Your Heart
   Normal ECG (happy Heart)
10.00 AM – 11.00 AM – Tea Time
11 AM --- 12.45 AM – Abnormal ECG
   Arithmias
12.45 AM --- 2.00 PM --- Lunch
2.00 PM --- 4.00 PM – What to do When Emergency
4.00 PM --- 4.30 PM --- Post Test
5.00 PM - disperse

U can save people life

ECG
BACK TO BASIC
—-
LETS LEARN
—-
IT’S EASY
—-
EVERYONE CAN READ ECG
—-
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1. KNOW YOUR HEART

2. HAPPY HEART

ANATOMY & PHYSIOLOGY OF THE CARDIOVASCULAR SYSTEM

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LEARNING OUTCOME

- List down the anatomy of cardiovascular system.
- Explain the physiology of cardiovascular system.
- Describe the anatomy and physiology of cardiovascular system.
- Discuss the function of anatomy and physiology of cardiovascular system.
ANATOMY OF THE HEART
LOCATION OF THE HEART

- Fist-sized
- Rests on the diaphragm
- Near the midline of the thoracic cavity (Mediastinum)

Diaphragm
SURFACE ANATOMY OF THE HEART

External Heart Anatomy

- brachiocephalic trunk
- left common carotid artery
- left subclavian artery
- superior vena cava
- aorta
- right pulmonary arteries
- left pulmonary arteries
- pulmonary trunk
- left pulmonary veins
- left atrium
- left cardiac vein
- right pulmonary veins
- right atrium
- right coronary artery
- left ventricle
- right ventricle
- inferior vena cava
LAYERS OF THE HEART

Pericardium

- Confines heart to the mediastinum
- Allows sufficient freedom of movement.
- Consists of two parts: the *fibrous* and *serous*.
PERICARDIUM

- **Fibrous**: thin inelastic, dense irregular connective tissue and helps in **protection, anchors** heart to mediastinum.

- **Serous**: thinner, more delicate divided into **parietal and visceral**.
LAYERS OF THE HEART

• The wall of the heart is composed of three distinct layers. From superficial to deep they are:
  – The **epicardium**
  – The **myocardium**
  – The **endocardium**
Pericardium is a double-walled sac containing the heart and the roots of the great vessel. The pericardial sac has two layers, a serous layer and a fibrous layer. It encloses the pericardial cavity which contains pericardial fluid.
**EPICARDIUM**

- Epicardium (inner layer of a double walled sac that surrounds the heart).
- Composed of mesothelium and delicate connective tissue (imparts a **slippery texture** to the outer surface of the heart).
MYOCARDIUM

- Myocardium (thickest part of the heart; consists of cardiac muscle).

- Responsible for pumping

ENDOCARDIUM

- Thin layer of endothelium which is continuous with the lining of the large blood vessels attached to the heart chambers and valves.
**MYOCARDIAL THICKNESS AND FUNCTION**

- **Atria**: thin walled
- **Ventricles**: thick walled
- **Lt ventricle is thicker than the Rt ventricle.**
PHYSIOLOGY OF THE HEART
BLOOD FLOW THROUGH THE HEART

Superior vena cava

To the lungs

From the lungs

Pulmonary valve

Right Atrium

Tricuspid Valve

Inferior vena cava

Aorta

To the lungs

From the lungs

Left atrium

Mitral valve

Aortic valve

Left ventricle

Right ventricle

Descending aorta
CIRCULATION OF BLOOD AND HEART VALVES
CIRCULATION OF THE HEART

Superior vena cava → right atrium → tricuspid valve → right ventricle → pulmonary valve → pulmonary artery

Inferior vena cava → left ventricle

aorta

Circulation of Blood Through the Heart:

rest of body → left atrium → lungs → right atrium

Superior Vena Cava

Pulmonary Artery

Pulmonary Vein

Mitrail Valve

Pulmonary Valve

Tricuspid Valve

Right Atrium

Left Atrium

Left Ventricle

Right Ventricle

Aortic Valve

Inferior Vena Cava

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CORONARY ARTERIAL SYSTEM

Aorta

Right main coronary artery
Left main coronary artery
Circumflex coronary artery
Left anterior descending coronary artery
Peripheral branches
Posterior descending coronary artery
Right marginal coronary artery
ATRIOVENTRICULAR & SEMILUNAR VALVES
- **Left side** is a pump to the systemic circulation.
- **Right side** is a pump to the pulmonary circulation.
Inherent and rhythmical beat is due to **auto-rhythmic fibers** of the cardiac muscle.

- These fibers have 2 important function
  - Act as **pace maker**
  - Form the **conduction system**
PHYSIOLOGIC CHARACTERISTICS OF THE CONDUCTION CELLS

1. Automaticity
2. Excitability
3. Conductivity
4. Rhythmicity
5. Contractility
6. Tonicity
The Cardiac Cycle

Diastole
Ventricular Relaxation and Filling

Systole
Ventricular Contraction and Ejection

Aorta
Superior Vena Cava
Pulmonary Artery
Pulmonary Veins
Left Atrium
Right Atrium
Left Ventricle
Right Ventricle
Inferior Vena Cava
**ATRIAL SYSTOLE**

- **Atrial depolarization** causes atrial systole
- End of atrial systole is also end of **ventricular diastole**
VENTRICULAR SYSTOLE

- It is caused by ventricular depolarization
Both atria and ventricles are relaxed.

It lasts for 0.4 sec.

When heart beats faster, the relaxation time shortens.

Ventricular repolarization causes ventricular diastole.
HEART SOUNDS

- Produced from blood turbulence caused by closing of heart valves
- S1 – atrioventricular valve closure
- S2 – semilunar valve closure
- S3 – rapid ventricular filling
- S4 – atrial systole
AUSCULTATION

Auscultation position for aortic valve
Aortic valve
Tricuspid valve
Pulmonary valve
Mitral valve
Auscultation position for tricuspid valve
Auscultation position for mitral valve
**CARDIAC OUTPUT (CO)**

- **CO = SV X HR**
  - mL/min  mL/beat  (Beats/min)

- **FOR A RESTING ADULT**
  
  \[ \text{CO} = 70 \text{mL/beat} \times 75 \text{beats/min} \]
  
  \[= 5250 \text{ mL/min} \]
  
  \[= 5.25 \text{ L/min} \]
Three factors regulate stroke volume
- Preload
- Contractility
- Afterload
**Preload**

- Stretch of cardiac muscle prior to contraction.
- Frank-starling law
- Preload is proportional to end diastolic volume
- If heart rate is more than 160 beats/min, stroke volume declines due to short filling time.
CONTRACTILITY

- It is the strength of contraction at any given preload.
- Positive and negative inotropic.
- **Stimulation** of sympathetic division: leads to positive inotropic effect
- **Inhibition** of sympathetic division: leads to negative inotropic effect
The pressure that must be overcome before a semilunar valve can open is termed the afterload.

Increase in afterload cause decrease in stroke volume

Hypertension and atherosclerosis increases the afterload.
Preload and Afterload

Preload
Volume of blood in ventricles at end of diastole (end diastolic pressure)

Increased in:
- Hypervolemia
- Regurgitation of cardiac valves
- Heart Failure

Afterload
Resistance left ventricle must overcome to circulate blood

Increased in:
- Hypertension
- Vasoconstriction

↑ Afterload = ↑ Cardiac workload
REGULATION OF HEART RATE

- SA node initiates 100 beats/min.
- Tissue require different volume of blood flow under different conditions (ex: exercise)
- Hormones of adrenal medulla are important in regulating the heart rate.
Cardiac Physiology

Cardiac Physiology (remember this?)

- CO = SV x HR
- HR: parasympathetic and sympathetic tone
- SV: preload, afterload, contractility

Diagram:
- Stroke Volume
- Preload
- Contractility
- Afterload
- Heart Rate
- Cardiac Output
THANK YOU