

~ Cardiovascular system ~

نوعية الدموية القلب [جهاز القلب والوعاء].

Also, called 'circulatory system' is a series of tubes and a muscular pump that provides a one-way traffic for blood, oxygen, and nutrients through blood vessels (arteries, veins, and capillaries).

Terminology related to the heart [cardium] is often presented as [cardi] or [cardio].

علم دراسة القلب - Cardiology - Electrocardiogram. ^{record} تسجيل القلب / رسم

rate تسارع - Tachycardia - Pericardium.

Increase rate تسارع ضربات القلب.

Functions of CV System

توزيع
Maintain distribution of blood throughout body.

يوصل
Delivery of oxygen and nutrients like glucose and amino acids to cells.

التخلص من الفضلات
Disposal of wastes from body (carbon dioxide and other waste products) through lungs, liver, and kidneys.

~ "CV" System Components ~

• HEART

• BLOOD VESSELS

شرايين [مضغير او عينا] شرايين
arteries - arterioles - Capillaries -

Vanules - Veins) أوردة

كـ أوردة كبيرة.

~ CV Divided in ~

- راجع الصورة في السلايد

A. Systemic circulation

[between heart and body cells]

- Carries oxygenated blood away from left side of heart to body and deoxygenated blood from body to right side of heart.

B. Pulmonary circulation

[between heart and lungs].

- Carries deoxygenated blood away from right side of heart to lungs and oxygenated blood from lungs to left side of heart.

~ HEART ~

- ① Muscular pump made up of cardiac muscle fibers [called a muscle instead of an organ].
- ② It beats 60-80 beats / minute.
- ③ Located in the mediastinum, more to left side of chest.
- ④ About size of a fist
- ⑤ Tip of heart at lower edge [called the apex].

- Three distinct layers of heart wall -

Endocardium

(deepest layer), thin layer lines the heart chambers and covers its valves.

Mycardium

(the heart thick muscle), (middle layer).

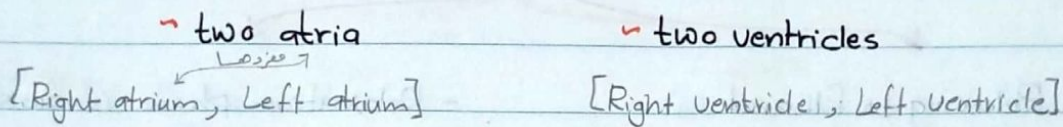
Epicardium

(outermost layer, it is the visceral layer of the Pericardium).

غشاء منفصل يُغلف القلب بالداخل [الغشاء]

- راجع الصورة

• Heart chambers divided into four chambers



• Heart is divided into right and left sides by a wall called the [septum].

Atria

- Left and right Upper chambers
[receiving chambers].

- Blood returns to atria in veins
[superior, inferior vena cava and pulmonary veins].

Ventricles

- Left and right Lower chambers
[pumping chambers].

- Thick myocardium.
- Blood exits ventricles into arteries [aorta and pulmonary artery].

• Heart values four values in heart

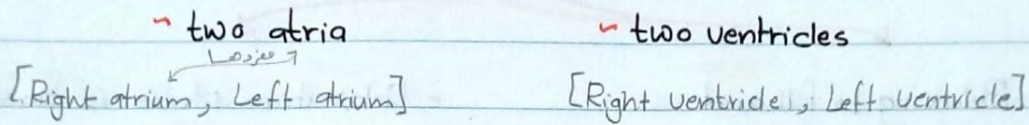
- tricuspid - Pulmonary - mitral - aortic

• Found at entrance and exit to ventricles.

• Allow blood to flow only in forward direction by blocking it from returning back.

Tricuspid value	Pulmonary value	Mitral value	Aortic value
- An atrioventricular value which has <u>3</u> leaflets or cusps.	- A semilunar valve between right ventricle and pulmonary artery	- An atrioventricular value between left atrium and ventricle	- A semilunar valve between left ventricle and aorta
- Between right atrium and right ventricle to prevent blood in ventricle from flowing back into atrium.	- to prevent blood in artery from flowing back into ventricle.	- to prevent blood in ventricle from flowing back into atrium.	- to prevent blood in aorta from flowing back into ventricle.

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• Heart valves four valves in heart

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* راجع الصورة في الملاحق

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- Between right atrium and right ventricle to prevent blood in ventricle from flowing back into atrium.	- to prevent blood in artery from flowing back into ventricle.	- to prevent blood in ventricle from flowing back into atrium.	- to prevent blood in aorta from flowing back into ventricle.

Systole and diastole

- Heart chambers alternate between -

- Relaxing to fill

Relaxation phase is diastole.

- Contracting to push blood forward.

Contraction phase is Systole.

The Pacemaker and the conduction system of the heart

Autonomic nervous system controls heart rate [no voluntary control over heart].

Special heart tissue conducts electrical impulses to stimulate different chambers to contract in correct order.

The conduction system pathway ~

1- SA node (sinoatrial node) or (pacemaker), where electrical impulse begins where a wave of electricity travels through atria causing them to contract [go into systole].

2- AV node (atrioventricular node) is stimulated to transfer stimulation wave to [bundle of His].

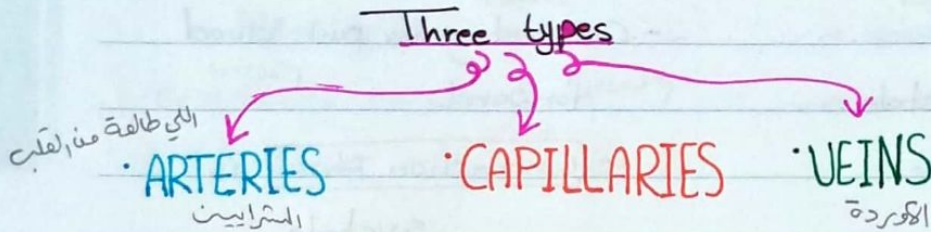
3- Electrical wave travels down right and left bundle branches within interventricular septum.

4- Finally, Purkinje fibers in ventricular myocardium are stimulated resulting in ventricular systole.

[Blood vessels] ^{الأوعية الدموية}

- متوترة بإبريق داخلة على إقلب و طلاقة منو

- Pipes that circulate blood through body.
- Lumen is the channel within blood vessels.



.ARTERIES.

- Large ^{سماك} thick-walled vessels. [pressure ↑ higher] ^{لصيرك} thick-walled.
- Wall contains smooth muscle and can dilate or constrict.
- As arteries travel through body they branch into progressively smaller vessels called arterioles. ^{عبارة عن شرايين أصغر سوية}
- Carry blood away from heart towards either lungs or cells of the body.
- Pulmonary artery carries deoxygenated blood to lungs.
- Aorta carries oxygenated blood to body. [oxygenated blood] ^{الشرايين}
- Coronary arteries supply myocardium. [Pulmonary artery] deoxygenated blood

.CAPILLARIES.

- Network of tiny, thin-walled blood vessels.
- Connecting unit between arteries and veins.
- Arterial blood flows into capillary bed and venous blood flows out of capillary bed

- Location for :-

- 1- Oxygen and nutrients to diffuse out.
- 2- Carbon dioxide and wastes to diffuse in.

مراجع الصورة

• VEINS.

- Much thinner walls than arteries.
- Much lower pressure system than in arteries.
- Have valves to insure blood flows only towards heart. (جارية فقط لقلب فقط)
- Squeezing by skeletal muscles also assists blood return to heart. (الضيق تدفق الدم عوداً)
- **Smallest veins** → **Venules**
- Carry blood towards the heart from either ^① the lungs or ^② the cells and tissues of body.
- Pulmonary veins carry oxygenated blood from lungs.
- Superior and inferior vena cava carry deoxygenated blood from body.

~ Blood Pressure ~

- Measurement of force exerted by blood against walls of vessel.
- During ventricular systole, blood is under great pressure to give highest pressure: systolic (top number of blood pressure reading). (القاسم الأعلى)
- During ventricular diastole, blood isn't being pushed from heart at all, so, blood pressure drops to lowest point - diastolic (bottom number of blood pressure reading). (القاسم الأسفل)
- **Pulse pressure** = difference between systolic and diastolic blood pressure. (الفرق)
- Measurement of blood pressure;
 - 1- Sphygmomanometer [an instrument]. (جهاز الضغط)
 - 2- Stethoscope

- Korotkoff's sounds - they are five sounds can be heard during measurement of blood pressure, the first sound is the snapping sound first heard at the systolic pressure, while the fifth sound is silence is considered diastolic blood pressure.

- The blood's path -

↳ Superior, inferior vena cava
and coronary sinus ~



↳ Rt. atrium ~



↳ Rt. ventricle ~



↳ Pulmonary artery ~



↳ Pulmonary veins ~



↳ Lt. atrium ~



↳ Lt. ventricle ~



↳ aorta ~

- راجع الصورة في السلايد

~ Cardiovascular combining forms ~

angi/o	vessel
aort/o	aorta
arteri/o	artery
ather/o	fatty substance
atri/o	atrium
cardi/o	heart
coron/o	heart
vascul/o	blood vessel
vas/o	vessel / duct
-ole	small
manometer	instrument ^{أداة} to measure ^{قياس} pressure.
hemangi/o	blood vessel
phleb/o	vein
sphygm/o	pulse
steth/o	chest
thromb/o	clot ^{أجل}
valv/o	valve
valvul/o	valve
ven/o	vein
ventricul/o	ventricle
-ule	small
-tension	pressure

~ Word building with angi/o ~

-gram	angiogram	record of vessel.
-itis	angitis	inflammation of vessel. التضيق
-plasty ^{تجميل/تصلاح}	angioplasty	surgical repair of vessel.
-Spasm	angiospasm	Involuntary muscle contraction in vessel. تقلص غير إرادي
-Stenosis	angiostenosis	narrowing of vessel. تضييق

~ Word building with aort/o & arteri/o ~

-al	arterial	Pertaining to an artery يتعلق
-ole	arteriole	small artery
-ic	aortic	pertaining to the aorta. يتعلق

~ Word building with ather/o & atri/o ~

[استئصال] removal -ectomy	atherectomy	surgical removal of fatty substance.
-oma	atheroma	fatty substance tumor/growth
-al	atrial	pertaining to the atrium
Inter- -al	<u>interatrial</u>	Pertaining to between the atrium.

~ Word building with cardi/o ~

-ac	cardiac	Pertaining to the heart.
brady- -ia ^{بطيء/سبأط}	brady cardia	state of slow heart.
electr/o -gram	electrocardiogram	record of heart's electricity.
-megaly ^{تكبير}	cardiomegaly	enlarged heart.
Mg/o -al	myo cardial	Pertaining to heart muscle.
-ologist ^{فحص}	cardiologist	heart specialist.
-rrhexis ^{تمزق أو انفجار}	cardiorrhexis	ruptured heart

Tachy- تسارع -ia | tachycardia | state of fast heart

~ Word building with coron/o, phleb/o, and vascul/o ~

-ary	Coronary	Pertaining to the heart
-itis	Phlebitis	Inflammation of a vein
-ar	Vascular	Pertaining to a blood vessel.

~ Word building with valu/o & valvul/o ~

-plasty	valvoplasty	surgical repair of valve
-itis	valvulitis	inflammation of a valve.
-ar	valvular	pertaining to a valve.

~ Word building with ven/o & ventricular/o ~

-ous	venous	Pertaining to veins.
-ule	venule	small vein
-gram	venogram	record of a vein.
-ar	ventricular	Pertaining to ventricles.
Inter- -ar	interventricular	Pertaining to between ventricles

Cardiovascular Vocabulary

- auscultation السماعة الطبية listening to sounds within body using stethoscope.
- cardiology branch of medicine for diagnosis and treatment of Cardiovascular disease; physician is a cardiologist.
- catheter flexible tube inserted in body to move fluids into or out of body; may be used to place dye into a vein to view blood vessels.
- infarct جزء من خلية القلب مات area of necrotic tissue due to loss of blood supply.
- ischemia نقص/عشوائى مؤقت local and temporary deficiency of blood supply due to a circulatory obstruction.
- murmur abnormal heart sound such as soft blowing sound or a harsh dick, also called a bruit.
- orthostatic hypotension اختلاف ضغط sudden drop in blood pressure when standing up suddenly.
- palpitation ضفقتان pounding, racing heart beats. احساس الإنسان بصرارة قلبه
- plaque yellow, fatty deposit of lipids in an artery; hallmark of atherosclerosis.
- regurgitation ارتجاع To flow backwards; in CV system refers to backflow of blood through a valve. رجوع
- sphygmomanometer blood pressure cuff; measures blood pressure.
- stent stainless steel tube placed within blood vessel to widen the lumen.
- stethoscope instrument for listening to body sounds.
- cyanosis bluish discoloration.
- pallor paleness or absence of color in the skin.
- diaphoresis profused perspiration; as with fever, physical exertion, and mental or emotional stress.

[Heart Pathology]

- ^{الذئبة الصدرية} angina pectoris severe pain and sensation of constriction around heart; caused by myocardial ischemia.
- Arrhythmia irregularity in heartbeat; some are mild and others are life threatening.
- (BBB) Bundle branch block electrical impulse is blocked from traveling down bundle branches; results in ventricles beating at different rate than atria; also called heart block.
- (CABG) Coronary artery bypass graft using a portion of vein to bypass an occluded coronary artery.
- Cardiac transplantation ^{زرارة القلب} the replacement of the diseased heart with the healthy heart of a brain-dead donor.

[Cardiovascular pharmacology]

- Antianginal for the cases of angina pectoris.
- ACE inhibitors for treatment of hypertension.
- Adrenergic for cases of hypotension.
- Statins ^{تقليل تصنيع الـ cholesterol} used to ↓ cholesterol production in the liver.
- Thrombolytic therapy used to dissolve clots ^{تفتت الجلطات}
- Nitrates for treating angina and given sublingually ^{تحت اللسان}

24 [Blood components] 24