كليه المستقبل الجامعة

قسم الفيزياء الطبية

مختبر الفيزياء الطبية

مرحلة رابعة

تجربة تخطيط القلب ((ECG))

د. نور الهدى طالب

م. ساره حامد دانة

Electrocardiography

The contraction of any muscle is accompanied by electrical currents called any depolarization and these currents can be recorded by electrodes and these electrodes are connected to the surface of the body, and for this we can record the contraction of the muscles of the whole body and therefore, the contraction of the heart muscles can only be recorded clearly, so the person must be relaxed and all The other muscles of his body are flat and although the heart contains 4 chambers, it appears in the imaging .The electrocardiogram is only two chambers because the atria contract together and the ventricles contract together.

Normal pulse

The regular rhythmic heartbeat stems from within the tissue of the heart muscle itself. It is self-propelled, as the natural pulse begins with an electrical signal emanating from a specialized neuromuscular electrical generator and regulator, very small in size located in the wall of the right atrium called the (sinoatrial node) or (intral node) at a rate of 60- 100 beats / electrical signal per minute .This electrical signal spreads very quickly to the atria, which makes them contract to push blood from the atria to the ventricles, then this electrical signal is transmitted to a receiver, and in the same case it is considered a very small backup generator located between the ventricles and the atria and is called the (atrioventricular node)

which allows the passage of the electrical signal through electrical connections that branch from the ventricular node to the ventricles in a fraction of a second, which causes them to contract to push blood from the ventricles out of the heart, and the right ventricle pushes non-oxygenated blood to the lungs to be oxidized, and the left ventricle pushes oxidized blood to all parts of the body to benefit from the blood The oxidizer that returns after extracting oxygen from it to the right part of the heart, thus completing one cycle of blood. Thus, in a normal person, electrical signals originate from the (sinus node) and at this time the system is called the (heart rhythm) or (sinus rhythm). This time by (nodal rhythm), or it can stem from any other source such as the muscles of the ventricle itself, and this

may be due to the failure of the sinoatrial node to issue impulses or the presence of an external source elsewhere in the heart that beats at a higher rate than the pacemaker.

Components of the ECG

ECG devices all share the same principle, but differ slightly In terms of ingredients.

The device generally consists of the following parts:

. Calibration:

This part works effectively to adjust and calibrate the device properly before starting the ECG process, so it generates a square wave (mv1) showing that the device is in a state of good.

. Sensitivity point:

This part is very important in maintaining the sensitivity of the device, as it emits (mv1) in its normal state, and by using the sensitivity point, the wave can be enlarged or reduced. According to the patient's condition.

. Location:

And the whole of his work to adjust the thermal index.

. Marker:

This wave is used when an abnormal wave in planning so that the doctor can know Disease can also be used to differentiate one conductor from another.

. thermal index:

The thermal indicator in the ECG machine plots the wave on paper and is quite accurate

A thermal resistance through which a limited current passes, which raises the temperature of the oscilloscope required drawing process.

. Speed setting:

The ECG device contains two speeds (25-50) mm/s. Each speed is used according to the existing condition and determined by the doctor, referring to the heart. If the patient is old, his pulse is somewhat weak, so we use the low speed (25) mm/s. And if it is young, it has a fast pulse, then high speed is used so that we can keep up with the planning of the patient's condition.

Screen:

The screen is a contract for the doctor to dispense with paper or not need it, to obtain a reading continuous to the heart.

. The breaker is one of the protection circuits in the device, as it uses a protection circuit from currents and high voltages It is truly a successful method in all devices.

Connection point:

Through it, we carry out the process of linking between the body and the device.

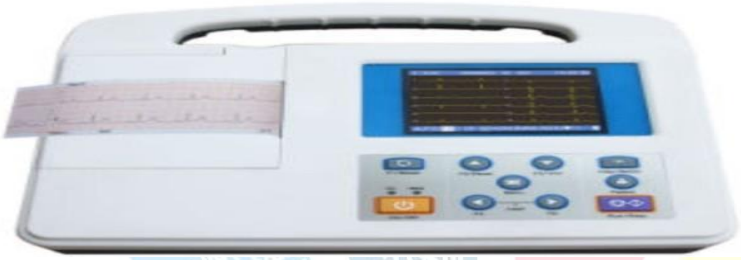
ground :

It is used as usual to leak excess charges, and protection from electric shocks.

poles:

The device consists of five electrodes that are placed in specific places on the body.

ECG heart monitor



-How to do an EKG

The wires from the EKG run to electrodes, which are strips of metal that conduct electricity. Electrodes are placed on each arm and leg and at six points on the chest, above the heart. The electrodes pick up the currents that the heart produces at each heartbeat, and transmit them to a loudspeaker inside the electrocardiogram. The amplifying currents then flow through a coil of very thin wire suspended within a magnetic field, and the wire moves because these currents interact with the magnetic field. And a sensitive lever records the movement of the wire on moving graph paper, which results in an electrocardiogram in the form of pictures called (leads). Each heartbeat produces a series of wave lines. The normal beating of the heart gives a specific waveform. Certain types of heart disease alter this known pattern in a recognizable way.

EKG pictures (leads):

Each electrode connected to the body is considered a camera, and we put 10 electrodes on the human body, one on each arm and each leg, and at six points on the chest, and thus we get 10 electrodes (cameras) from different directions, each camera produces a different image for us than the other camera because each one It captures the view of the heart from a different angle, but it is the same view, like a football match, so we find that there are more than one camera in the stadium and each one captures a specific view from a specific angle, but it is the same match....

And the EKG machine produces 12 pictures (leads), and they are:

1. The six-electrode cameras on the chest produce 6 different images (leads) and name them((V1 V2 V3 V4 V5, V6)).

The locations of the electrodes on the chest are as follows:

V1: in space number 4 between the ribs on the right (Rt. 4th intercostal space).

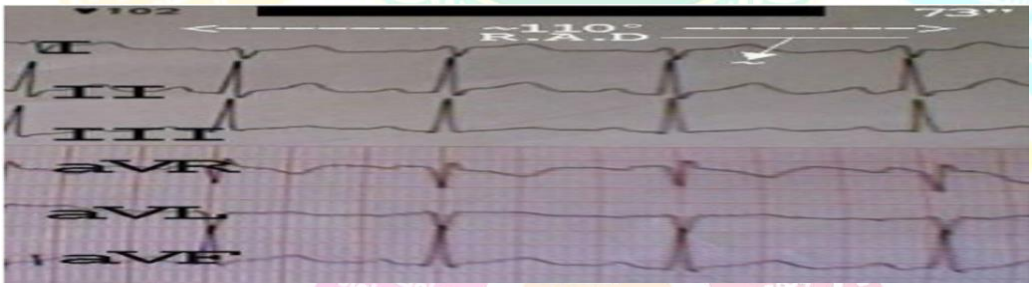
V2: in the space number 4 between the ribs on the left (Lt.4th intercostal space).

V3: at the point between 11 & v2

V4: At the top of the APEX heart

V5: At the same level as the apex of the heart at the anterioer axillary line
V6: At the same level as the apex of the heart at the mid-axillary line

2-As for the electrodes on the terminals, each one produces an image for us, except for the one at the left leg, which is only for the ground connection, and does not interfere with the drawing.



For example: at the right hand it is called: aVR, and at the left hand: aVL, which at Right foot: aVF

3- As for the remaining three images, they are a merger of each of the two images .Resulting from the electrodes located at the edges, for example: the merger of the image resulting from the camera (the electrode) located at the right hand with the other located at the left hand produces an image called: (lead 1)

Also, the image of the right hand with the foot is called: (lead II). Also, the picture of the left hand with the foot is called: (Lead III). And since these images are a merger of more than one image, they are therefore augmented. In order for the resulting images to be all equal, the device enlarges the other images issued by the parties.

(aVR, aVL, aVF).

Where the letter (V) means the word (Vector) i.e. the camera electrode is directed to it.

And the meaning of the word (a) is (augmented), i.e. augmented, as we have explained.

The meaning of the word (R) is Right (arm),

and the meaning of the word (L) is (Left arm).

And from me the word (F) is Foot).

And the pictures are arranged as follows (from left to right of course)

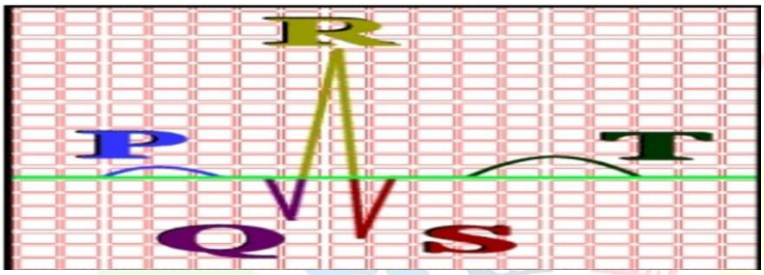
-((Lead I, lead II, lead III, aVR, aVL, aVF, V1, V2.V3,V4 V5 V6

3- The shape of the drawing of the heart:

It is known that the muscles of the atria are very small when compared to the muscles of the ventricles. Therefore, the electric current accompanying the contraction of the atria will be small and is symbolized in the electrocardiogram by the symbol (wave) (b) (wave), while the contraction of the ventricles is symbolized by the symbol (QRS group). complex), and then the diastole of the ventricles is symbolized by the (T) wave, as the cardiac cycle begins with the systole of the atria, then their diastole, then the systole

of the ventricles, then their diastole, and all of this is recorded as waves in a piece of paper.

in order of events:

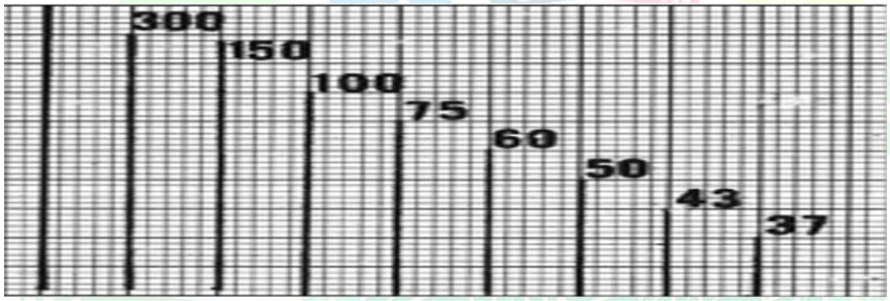


Systole of the atria (wave B) (wave) and then their diastole (-) - here the diastole of the atria is not recorded because it occurs at the same time as the systole of the ventricles and thus the systole of the ventricles impedes the recording of diastole of the atria. Then the ventricles contract (ORS complex). Then their expansion (T wave).

According to the QRS group, a downward curvature of a straight line is called (Q wave) and the curve that follows it upwards is called (R wave).which may be preceded by (Q wave) , then followed by a downward bend Another is called the (S wave), and it may also be preceded by a(Q wave) or not.. That is, it is not a requirement that the ventricular systole be represented by (QRS group), and any change in these images reveals a problem that may be in the brain. Heart rate or as a result of an artery blockage or something else, but the most widely used and clearer images are (II lead) and (avR), and one of them is used to follow up the patient's condition in intensive care units, although the most used is ((lead (II). If the direction of the electric current in the heart is in the same direction as the electrode (camera) to which it is directed, then the result will be a negative (downward) curvature on the electrocardiogram paper, and vice versa, if the direction of the current is opposite the direction of the camera, then the result will be a positive (upward) curvature on the electrocardiogram paper. The direction of the current has nothing to do with the direction of the camera, so the signal (bending) has any shape.Therefore, we find that most of the curves (lead II) are positive (upward) because the pole (camera) The

vector is visualized against the direction of the current, and the (avR) curves are downward because the camera Oriented perception in the direction of the current. After reading the electrocardiogram, it is necessary to write a report of the heart rate per minute, as well as the rhythm of the heart rate, whether it is regular or not. Also, a report must be written about the defect of the transducer of the heart, as well as the signs of anemia, with knowledge of the (B) wave, the QRS group, the T wave, and the ST segment.

Heart rate and rhythm:



The number of large squares	Accurate heart rate
1	300
2	150
3	100
4	75
5	60
6	50

It represents (Interval (RR), and some of them are considered (waves), and for this reason, measuring the distance between (waves) is the highest point in the drawing _ represents the heart rate, so the distance between (intervalR (R) represents the time Which took the conduction of electrical currents through the different parts of the heart.

AL-MUSTAQBAL UNIVERSITY COLLEGE
وقل رب زدني علما
كلية المستقبل الجامعة
اسست عام ٢٠١٠
١ القضاء على الفقر
٣ الصحة الجيدة والرفاه
٤ التعليم الجيد
٥ المساواة بين الجنسين
٦ المياه النظيفة والنظافة الصحية
٧ الطاقة النظيفة بأسعار معقولة
٨ العمل اللائق ونمو الاقتصاد
٩ الصناعة والابتكار والهياكل الأساسية
١٠ الحد من أوجه عدم المساواة
١١ المدن والمجتمعات المستدامة
١٢ الاستهلاك والإنتاج المسؤولين
١٣ العمل المناخي
١٤ الحياة تحت الماء
١٥ الحياة في
١٦ السلام والعدل والمؤسسات القوية
١٧ عقد الشراكات لتحقيق الاهداف