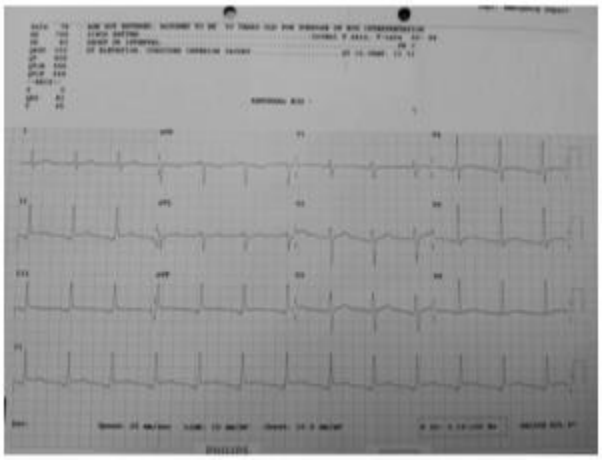
Body Fluids and Circulation

Case Study Based Questions

Read the following passages and answer the questions that follow:

1. This ECG shows atrial to ventricular conduction via an accessory pathway (note the inverted P waves and very short PR interval with 'delta' waves). This ECG finding is highly suggestive of Wolf Parkinson White Syndrome (WPW), a relatively common condition affecting about 1 in 500 people. In WPW an accessory bundle ("bundle of kent") can allow for conduction from atria to ventricle bypassing the normal AV node pathway. The resting ECG shows a short PR interval (<0.12 seconds), delta wave (i.e. slurred upstroke into the QRS complex) as well as broadening of the QRS complex. There are two main subtypes of WPW: Type A (+ve delta wave in V1) and Type B -(ve delta wave in V1).



(A) Which of the following correctly explains a phase/event in cardiac cycle in a standard electrocardiogram?

(a) QRS complex indicates atrial contraction.

(b) QRS complex indicates ventricular contraction.

(c) Time between S and T represents atrial systole.

(d) P-wave indicates beginning of ventricular contraction.

(B) The end of T-wave marks the end of.

(a) Systole

(b) Diastole

(c) Joint diastole

(d) None of these

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(C) P-wave in standard ECG indicates:

(a) Excitation of atria

(b) Excitation of ventricle

(c) Depolarisation of atria

(d) Both (a) and (c)

(D) How can one determine the heartbeat rate of an individual?

(a) By counting the number of T-wave.

(b) By counting the number of P-wave.

(c) By counting the number of QRS complexes.

(d) By counting the number of S-waves.

(E) Position of electrical leads to obtain a standard ECG is:

(a) One to each wrist and one to the left ankle.

(b) One to each ankle and one to the left wrist.

(c) One to each wrist and one to the right ankle.

(d) One to each ankle and one to the right wrist.

Ans. (A) (b) QRS complex indicates ventricular contraction.

Explanation: QRS complex is also known as ventricular complex in which Q is the first negative wave of ECG. R is the tallest positive wave of ECG and S is the deepest negative wave of ECG. Events occurring during QRS complex are spreading of impulse over ventricles, ventricular depolarisation/ventricular contraction/ ventricular systole. First heart sound is produced during this wave.

(B) (a) Systole

Explanation: There is an end of systole when marking of T-wave ends.

(C) (d) Both (a) and (c)

Explanation: Electrical excitation of atria causes contraction of atria which leads to depolarisation of atria, all these electrical activities take place at P-wave in standard ECG.

(D) (c) By counting the number of QRS complexes.

Explanation: The interval between two successive QRS complexes can be used to measure the heart rate when the cardiac rhythm is regular.

(E) (a) One to each wrist and one to the left ankle.

Explanation: To obtain an ECG, the machine is connected to the patient with three electrical leads (one on each wrist and one on the left ankle) that continually monitor the

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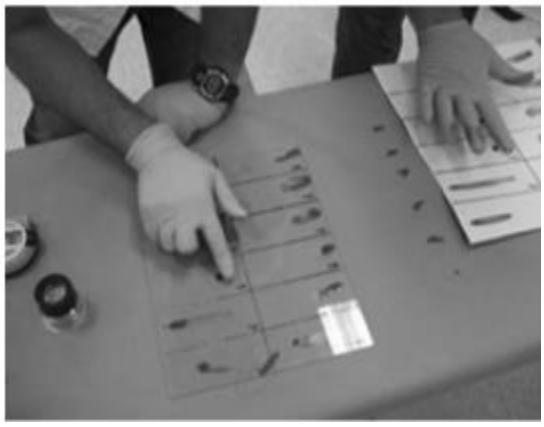
cardiac activity. Multiple leads are placed in the chest area for a detailed study of the heart's function.

2. The use of blood in forensic analysis is a method for identifying individuals suspected of committing some kind of crime. Paul Uhlenhuth and Karl Landsteiner, two scientists working separately in Germany in the early twentieth century, showed that there are differences in blood between individuals. Uhlenhuth developed a technique to identify the existence of antibodies, and Landsteiner and his students showed that humans had distinctly different blood types called A, B, AB, and O. Once doctors differentiated blood into distinct types, they could use that information to safely perform blood transfusions. Furthermore, forensic scientists can use that information to exculpate people suspected of some types of crimes, and they can use it to help determine the paternity of children. When scientists identify blood types, they rely on slight differences in the antigens or protein markers on the surfaces of red blood cells in a blood sample. In a body, those antigens are recognized and attached to by antibodies.



(A) Name the four blood groups found in humans.
(B) Name the blood groups that act as a universal donors.
(C) Which blood group is a universal acceptor? Where are antigens present?

Ans. (A) A, B, AB and O are the four blood groups found in humans.
(B) O negative blood group act as universal donor, this blood group has no antigens, but both antibodies A and B are present in the plasma.
(C) AB positive is a universal acceptor, it can accept blood from any other blood groups as it has both antigens A and B but no antibodies are present in the plasma. Antigens are present on the surface of erythrocytes (red blood corpuscles).

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