**Topic D.4: The Heart**

**Essential Idea: Internal and external factors influence heart function.**

**Statements & Objectives:**

**D.4.U1 Structure of cardiac muscle cells allows propagation of stimuli through the heart wall.**

Compare cardiac muscle tissue to skeletal muscle tissue.

(**Compare** Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.)

Contrast cardiac muscle tissue to skeletal muscle tissue.

(**Contras**t Give an account of the differences between two (or more) items or situations, referring to

both (all) of them throughout.)

Describe how the Y-shape, intercalated discs and gap junctions of cardiac muscle cells allow for propagation of the stimulus to contract.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

**D.4.U2 Signals from the sinoatrial node that cause contraction cannot pass directly from atria to ventricles.**

Explain the events of the cardiac cycle, including atrial and ventricular systole and diastole and the movement of the signal to contract through the heart.

(**Explain**: Give a detailed account including reasons or causes)

Outline the role of the atrioventricular node in the cardiac cycle.​

(**Outline** Give a brief account or summary.)

**D.4.U3 There is a delay between the arrival and passing on of a stimulus at the atrioventricular node.**

Outline the causes of the delayed initiation of contraction of ventricles.

(**Outline** Give a brief account or summary.)

**D.4.U4 This delay allows time for atrial systole before the atrioventricular valves close.**

State the function of a delayed contraction of the ventricle.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.4.U5 Conducting fibres ensure coordinated contraction of the entire ventricle wall.**

Describe the motion of the signal to contract from the AV node through the ventricles.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

List features of Purkinje fibers that facilitate rapid conduction of the contraction signal through the ventricle.

(**List** Give a sequence of brief answers with no explanation.)

State that the contraction of the ventricle begins at the heart apex.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.4.U6 Normal heart sounds are caused by the atrioventricular valves and semilunar valves closing causing changes in blood flow.**

State the cause of each of the two sounds of the heartbeat.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.4.A1 Use of artificial pacemakers to regulate the heart rate.**

State the purpose of an artificial pacemaker device.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.4.A2 Use of defibrillation to treat life-threatening cardiac conditions.**

State the cause and effect of ventricular fibrillation.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

State the purpose of a defibrillator.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.4.A3 Causes and consequences of hypertension and thrombosis.**

Describe the relationship between atherosclerosis and hypertension.

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

List consequences of hypertension.

(**List** Give a sequence of brief answers with no explanation.)

Outline factors that are correlated with a greater incidence of thrombosis and hypertension.

(**Outline** Give a brief account or summary.)

**D.4.S1 Measurement and interpretation of the heart rate under different conditions.**

List variables that can influence heart rate.

(**List** Give a sequence of brief answers with no explanation.)

Outline methods for detecting heart rate.

(**Outline** Give a brief account or summary.)

**D.4.S2 Interpretation of systolic and diastolic blood pressure measurements.**

State the cause of systolic and diastolic pressure.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Describe how sound is used to measure blood pressure.​

(**Describe** Give a detailed account or picture of a situation, event, pattern or process.)

**D.4.S3 Mapping of the cardiac cycle to a normal ECG trace.**

State the function of an electrocardiogram.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Label the P, Q, R, S and T waves on an ECG trace.

(**Label** Add title, labels or brief explanation(s) to a diagram or graph.)

State the cause of the P wave, the QRS wave and the T wave.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

State an application of the use of ECG technology.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**D.4.S4 Analysis of epidemiological data relating to the incidence of coronary heart disease.**

Define epidemiology.

**(Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

List epidemiological factors that can predispose ethnic groups to coronary heart disease.

(**List** Give a sequence of brief answers with no explanation.)

**D.4.NOS: Developments in scientific research followed improvements in apparatus or instrumentation—the invention of the stethoscope led to improved knowledge of the workings of the heart.**

List variables that lead to the development of the stethoscope.

(**List** Give a sequence of brief answers with no explanation.)

State the function of the stethoscope.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**Key Terms**

cardiac muscle tissue

Y-shape

Atria

​delayed initiation

atrioventricular valves

hypertension

​diastolic pressure

​stethoscope

​myofibrils

propagation​

​intercalated discs

​ventricle

​Purkinje fibers

​heart beat

​thrombosis

electrocardiogram

myosin

​sodium channels

stimulus

gap junctions

​systole

​heart apex

​defibrillation

​heart rate

​epidemiology

​actin

skeletal muscle tissue

​sinoatrial node

diastole

​atrioventricular node

​semilunar valves

ventricular fibrillation

P, Q, R, S, T waves

​sarcolemma

heart wall

​cardiac cycle

​atrial systole

artificial pacemakers

atherosclerosis

systolic pressure

​heart disease

​desosomes