**Cardio Function Questions**

**Cardiac cycle and values**

* Briefly explain the terms ‘cardiac output’ and ‘stroke volume’, **and** the relationship between them. *(3 marks)*
* Explain how it is possible for a trained performer and an untrained performer to have the same cardiac output for a given workload. *(2 marks)*
* What are the effects of training on resting ‘cardiac output’ and stroke volume’?

*(2 marks)*

**Role of CO2/ control of heart rate**

***During a game of football, a player’s heart rate will vary.***

* Explain how changes in the acidity of the blood cause the heart rate to increase during a game of football. *(4 marks)*
* Explain how the heart controls the rate at which it beats. *(4 marks)*
* During a game, a player’s work rate will vary. Describe how the ‘parasympathetic’ **and** the ‘sympathetic’ nerve pathways control heart rate

during a game. *(4 marks)*

* Explain how rising levels of carbon dioxide cause an increase in cardiac

output. *(4 marks)*

**Effects of exercise on the heart**

* How does a lower resting heart rate affect oxygen delivery to muscles?

*(2 marks)*

* Explain why aerobic training improves the performer’s ability to transport

oxygen. *(2 marks)*

**Starlings Law**

* Use Starlings Law of the heart to explain how stroke volume increases during activity (3 marks)
* Use ‘Starling’s law of the heart’ to explain how stroke volume increases when

running. *(3 marks)*

**CV Drift**

* Use **Figure 3 (graph on website)** to explain the term cardio-vascular drift. *(3 marks)*

**Cardio Function Answers**

**Cardiac cycle and values**

**Briefly explain the terms ‘cardiac output’ and ‘stroke volume’, and the relationship**

**between them. *(3 marks)***

*A. Cardiac output – ‘the volume/amount of blood pumped from heart/ventricle*

*in one minute;*

*B. Stroke volume – ‘the volume/amount of blood pumped from the heart/ ventricle in one beat;*

*C. Cardiac output = stroke volume x heart rate/Q = SV x HR.*

**Explain how it is possible for a trained performer and an untrained performer to**

**have the same cardiac output for a given workload. *(2 marks)***

*A. Different sized hearts/hypertrophy –trained bigger;*

*B. Different stroke volumes – trained bigger;*

*C. Different heart rates – untrained higher;*

*D. Can only occur at sub maximal workloads;*

*E. At higher workloads untrained will not be able to increase their heart rate sufficiently;*

*F. Different physiques/size/mass – untrained bigger.*

**What are the effects of training on resting ‘cardiac output’ and stroke volume’?**

***(2 marks)***

A. Cardiac output stays the same/no effect/no change

B. Stroke volume increases/equiv

**Role of CO2/ Control of heart rate**

**During a game of football, a player’s heart rate will vary.**

**Explain how changes in the acidity of the blood cause the heart rate to increase during a game of football. *(4 marks)***

A. Blood’s acidity increases/pH lowers;

B. Caused by more carbon dioxide being produced;

C. This is detected by chemoreceptors;

D. Nerve messages are sent to the medulla (oblongata)/cardiac (control) centre;

E. Sympathetic nervous impulses are sent;

F. To the Sino-Atrio node/SAN/SA node;

G. Decrease in parasympathetic/vagus nerve impulses;

**Explain how the heart controls the rate at which it beats. *(4 marks)***

A. Heart generates own electrical/nerve

impulses/intrinsic/myogenic;

B. Sino-atrial node/SAN/pacemaker;

C. Causes systole/contraction (of atria);

D. Atrio-ventricular node/AVN;

E. Bundle of His/AV bundle;

F. Purkinje fibres;

G. To ventricle/ventricle contracts;

**During a game, a player’s work rate will vary. Describe how the**

**‘parasympathetic’ and the ‘sympathetic’ nerve pathways control heart rate**

**during a game. *(4 marks)***

A. Controlled by medulla/cardiac centre

B. Sympathetic pathway increases heart rate

C. By release of adrenaline/noradrenaline

D. Increase stroke volume/ejection fraction

E. Parasympathetic decreases HR

F. By vagus nerve

G. Production of Acetylcholine

H. (Both) act on sino atrial node/SAN

**Explain how rising levels of carbon dioxide cause an increase in cardiac**

**output. *(4 marks)***

A. Increases acidity/ hydrogen ion concentration/ lowers pH/(in blood);

B. Detected by chemoreceptors;

C. Impulses/information to cardiac centre/ medulla (oblongata);

D. Increased stimulation of sympathetic nerve/decreased stimulation of parasympathetic/vagus nerve;

E. Adrenaline/nor-adrenaline;

F. To S.A.N./S.A node/sino-atrial node;

G. Increase in heart rate;

H. Increase in venous return;

I. Increase in stroke volume/ejection fraction;

J. Starlings Law of the heart

**Effects of Exercise on the heart**

**How does a lower resting heart rate affect oxygen delivery to muscles?**

***(2 marks)***

A. Less oxygen needed for contractions of heart;

B. More oxygen available for muscle contractions;

C. Increased heart rate range

**Explain why aerobic training improves the performer’s ability to transport**

**oxygen. *(2 marks)***

A. More blood volume/haemoglobin/Hb/red blood cells;

B. Increased a-VO2 diff/more oxygen extracted by muscles;

C. Increased capilliarisation/more capillaries.

**Starlings Law**

**Use Starlings Law of the heart to explain how stroke volume increases during activity (3 marks)**

* Increased venous return
* Greater diastolic filling
* Cardiac muscle stretched/elastic
* Greater/stronger /more powerful contraction
* Increased ejection fraction

**Use ‘Starling’s law of the heart’ to explain how stroke volume increases when**

**running. *(3 marks)***

A. Increased venous return;

B. Greater diastolic filling/heart fills with more blood;

C. Cardiac muscle stretched/elastic;

D. Greater/stronger/more powerful force of contraction/contractility;

E. Increased ejection fraction/greater percentage of blood ejected;

**Cv drift**

**Use Figure 3 to explain the term cardio-vascular drift. *(3 marks)***

*A. Cardio-vascular drift starts after 10*

*mins;*

*B. Heart/pulse rate increases/beats more and decrease stroke volume/ejection fraction*

*C. Fluid lost as sweat;*

*D. Reduced plasma/blood volume/ increase viscosity;*

*E. Reduced venous return;*

*F. Starling’s Law;*

*G. Cardiac Output also increases due to more energy needed to cool body/sweat.*