**BTEC Diploma Health & Social Care**

**BTEC– Unit 5**

TASK 5: Part 1 & 2 **Submission date**………………………………..

**P5** Explain the concept of homeostasis

**M2** Discuss the probable homeostatic responses to changes in the internal environment

during exercise.

**D2** Evaluate the importance of homeostasis in maintaining the healthy functioning of the body

**P6** Follow guidelines to interpret collected data for heart rate, breathing rate and temperature before and after a standard period of exercise.

**M3** Present data collected before and after a standard period of exercise with reference to validity.

**TASK:** *In this section of your report you will need to explain homeostasis and using examples discuss the probable homeostatic responses within the heart rate, breathing rate, body temperature and blood glucose rates.*

**Remember for all of your BTEC Health & Social Care Coursework**

***Self-check: Tick the boxes when you have checked that have completed each task***

* **Font size**: 12
* **Font Style**: Comic Sans
* **Header**: Your name and Group.
* **Spacing:**1 ½ line
* **Bold and underline all titles and subtitles. Main titles should be in the centre of the page; subtitles left aligned.**
* **Proof read and spell check all of your work before submission for assessment.**
* **Save any work to the hard drive on your computer from USB. Email copies of your work to yourself as an attachment.**
* **You will need to save all previously assessed work and hand it back in with any re-drafts of your work.**

You must reference your work and include these in your unit 5 bibliography. ***Don’t just rely on the Stretch & Whitehouse Book for your information use a variety of resources for your information. Remember the power point includes references and sources of further information.***

Try to include images and diagrams to explain difficult points

**1**: Title: Homeostasis within the body.

2: Put a subtitle: Introduction

Write a brief introduction explaining that you are going to look at the body maintains its internal environment.

Write a definition of homeostasis

Explain what is meant by ‘the internal environment’

Describe negative feedback and its role as a regulatory as a regulatory mechanism.

**Example:**

Introduction

For the body cells to function correctly they need an stable internal environment in which to function the body does this by constant monitoring and reacting to the changing conditions to keep the environment stable. This process is known as homeostasis.

Biology-online (2013) defines homeostasis as “The ability of the body to seek and maintain a equilibrium or stability within its internal environment when dealing with external changes”.

As we saw when looking at the tissues the term internal environment refers to the matrix and the interstitial fluid in which cells exist; Oxygen and other substances required by the cells pass through this from the internal transport system to reach the cells and waste products move in the opposite direction to be carried away and excreted from the body. (Waugh & Grant 2001 pg 4)

Homeostasis of the functions we are going to examine uses negative feedback this means that as a change from the normal expected level is detected a change occurs to lessen this and return the level to normal this response that acts as the regulatory mechanism to keep the body functioning correctly. (Stretch & Whitehouse 2010, Waugh & Grant2001) To enable this each control system must have a receptor (sensor) which detects the change in the level of the factor being regulated (stimulus). This detectable change is called the input. This information is then received by a coordinator or control centre, usually located in the brain. This then triggers the action that will correct the change and an effector carries out the action that brings about the change.

3: Put a subtitle: Homeostatic mechanisms for the regulation of the heart rate.

Describe how the heart is regulated.

Include the following in your description –

* The sympathetic and parasympathetic nerve supply to the heart.
* The role of the Sino atrial node
* The role of the cardiac centre of the brain
* Internal baroreceptors and chemoreceptors
* The effect of raised body temperature on the heart rate
* The effect of adrenaline on the heart rate

Discuss the probable homeostatic response of the cardiovascular system to exercise

Example:

Homeostatic mechanisms for the regulation of the heart rate.

There are several mechanisms that assist in the regulation of the heartbeat. The heart is controlled by the autonomic nervous system which means this control is involuntary. The sympathetic nerves of the autonomic nervous system cause the heart to increase and the parasympathetic nerves cause it to decrease. These nerves supply a specialised cluster of cells in the upper part of the Right atrium, the Sino-atrial node (SAN), which is known as the pacemaker. This sends impulses across the atria and via the Bundle of His causing the cardiac muscle to contract.

The control centre for the regulation of the heart beat is the cardiac centre which is situated in the medulla oblongata of the brain and controls the response to the information received. The Vasomotor Centre controls the sympathetic nerve fibres which leave from here via the spinal cord to the SA Node. The Cardiac-inhibitory centre controls the parasympathetic fibres of the vagus nerve which travel to the SA Node.

The changes within the body are detected by Baroreceptors in the walls of the aorta and carotid bodies. The nerve endings are sensitive to pressure changes within these structures and detect the change in blood pressure due to stretch within the vessel. The baroreceptors are the principal regulating mechanism in controlling blood pressure and therefore heart rate. A drop in Blood Pressure results in an increase in the heart rate and a rise in Blood Pressure results in a decrease in Heart Rate. Chemoreceptors in the carotid and aortic bodies also play a part in the detection of change, although these are primarily involved in the control of respiration sensitive to increasing carbon dioxide levels & acidity in the blood. The chemoreceptors influence the cardiac centre only when there is a severe disruption of respiratory function or a rapid fall in Blood Pressure, such as in severe haemorrhage. (Waugh & Grant2001)

Heart rate is also affected by the secretion of hormones. The hormones Adrenaline and Noradrenaline have the effect of increasing the heart rate, these are secreted by the adrenal glands. Adrenaline has a greater effect on the heart than Noradrenaline which has more influence on the blood vessels. Adrenaline stimulates the SA Node to work faster boosting the effect of the sympathetic nerves. Another hormone Acetylcholine assists the parasympathetic

nerves in the reduction of impulses and a decrease in heart rate occurs.

Rising body temperature also affects the heart rate as Thermo receptors detect increasing body temperature, stimulating the hypothalamus in the brain which then activates the sympathetic nervous system and this speeds the heart rate.

The probable homeostatic response of the cardiovascular system to exercise

Before exercise begins the body predicts the change because the sympathetic nervous system is stimulated and adrenaline is released to increase the cardiac output & stroke volume. The Baroreceptors detect the small increase in blood pressure as the arterioles constrict, stimulating the Vasomotor Centre of the cardiac centre. This results in a message via the sympathetic nerve fibres to the SA Node of the Heart to increase the electrical impulses & stimulates the cardiac muscle to contract more frequently, increasing the heart rate and cardiac output.

4: Put a subtitle: Homeostatic mechanisms for the regulation of breathing rate

Describe how breathing is regulated

Include the following in your description –

* The sympathetic and parasympathetic nerve supply to the lungs.
* The role of the respiratory centre of the brain
* Internal chemoreceptors in the arteries
* The role of the diaphragm and intercostals muscles in changing the breathing rates.

Discuss the probable homeostatic response of the respiratory system to exercise

5: Put a subtitle: Homeostatic mechanism for the regulation of body temperature

Describe how body temperature is regulated

Include descriptions of the following –

* How heat is produced by the body
* How heat is lost from the body by – Radiation, Conduction, Convection, Evaporation
* The role of the hypothalamus
* The role of arterioles and sweat glands in the skin
* The effects of shivering
* The role of surface area to volume ratio in the care of babies
* The fever mechanism

Discuss the probable homeostatic response of the regulation of body temperature during exercise.

6: Put a subtitle: Homeostatic mechanisms for the regulation of blood glucose levels

Describe how blood glucose levels are regulated

Include descriptions of the following –

* The role of the pancreas
* The role of insulin
* The role glucagon
* The role of the liver

Discuss the probable homeostatic response of the regulation of blood glucose during exercise.

7. Now you need to summarise with a evaluate of the importance of homeostasis in maintaining the healthy functioning of the body

**P6 & M3**

P6 Follow guidelines to interpret collected data for heart rate, breathing rate and temperature before and after a standard period of exercise.

M3 Present data collected before and after a standard period of exercise with reference to validity.

**TASK: *In this section of your report you need to present data as both tables and graphs and examine the validity of the results.***

Using the chart of results on Connect choose 2 individual’s to present the results for.

*These results were collected during a period of exercise that involved a 20 minute brisk walk.*

*Participant’s temperature, pulse and respiratory rates were measured before the exercise started – baseline or resting.*

*The pulse and respiratory rates were then measured again half way through the walk.*

*At the end of the walk to temperature was recorded, this was recorded again 5 minutes later.*

*The pulse and respiratory rate were recorded 2 minutes after the exercise stopped and again 3 minutes later (5minutes after the exercise stopped).*

1. Design a chart to show your chosen collected results *(see example on page 232 Stretch & Whitehouse)*
2. Enter your results into the chart.
3. You now need to display your results on a series of graphs. *(See page 233 -234 Stretch & Whitehouse)* **Your graphs will be handdrawn**

Make sure your graph has a title

Both axis are labelled - vertical- this will be the scale for the measurement

* Horizontal – time

Ensure you have identified the scales being used

Plot the points

Use fine lines to connect the plotted points

1. Open a word document

Title: P6 M3 Explanation of the collection of the data and the findings

Subtitle: Method

Here you will describe the equipment used to record the information, how the activity has been carried out (procedure).

*P6 M3 Explanation of the collection of the data and the findings*

*Method*

*This activity involved the taking of physiological measurements during and immediately following a period of exercise.*

*Equipment :*

*Thermometer to measure body temperature*

*Stop watch to time the length of the activity, intervals between the recordings following exercise and for timing the measurement of pulse rate and breathing.*

*Procedure*

*Participants were asked to sit quietly before the exercise began.*

*The pulse, temperature and breathing rate were then measured to obtain a resting or baseline measurement.*

*The participant was then asked to walk briskly for 20 minutes.*

*10 minutes into the exercise the participants pulse rate was recorded*

*After 20 minutes the participant were asked to stop and their breathing rate and temperature were measured immediately.*

*Two minutes after stopping of the exercise the pulse rate was measured.*

*Five minutes after the stopping of the exercise the pulse rate and breathing rate were measured again.*

Sub title: Findings

You now need to discuss the results, explain what they are showing and why the changes have occurred.

Look at the baseline measurements do they fit in normal parameters? (identify what the normal parameters are)

Do you see anything with the recordings during exercise? What is the cause of this?

What happens following exercise with the recordings?

What might these results show in terms of fitness?

Comment of the validity and reliability of your results. What could improve these?

See my example using participant 4&5 -Obviously you will explain the findings in relation to the set of results you have chosen

*Both my chosen participants had baseline measurements for pulse temperature and breathing rate that are within the expected normal limit. It is expected that an adult would have a pulse rate of between … & …. Beats per minute at rest. A normal breathing rate for an adult is ……………. and a normal body temperature is …………….. depending …………………………………. and on the site at which it is measured. As we were measuring an axillary temperature you would expect it to be …………………. below the normal quoted body temperature.*

*During exercise there was a rise in both pulse rate and breathing rate, which can be seen on the graphs. This is because during exercise there is an increased demand for both oxygen and glucose. As more carbon dioxide is produced chemoreceptors stimulate the respiratory centre and baroreceptors stimulate the cardiac centre to increase the breathing and heart rate to meet the demands for oxygen and glucose to the cells.*

*The demand remains high soon after stopping the exercise this enable the body to remove excessive carbon dioxide and waste products from the blood before the breathing and heart rate begin to lower. The recovery time is the time taken from stopping exercise to the return to the normal resting rate. Both participants have not returned to their resting pulse rate which would suggest that further readings should have been taken to see the length of their recovery time. However from the data collected it would appear that participant 4 is less fit than participant 5 because …………………………………………………. Or it could be that participant 5 didn’t put as much effort into the activity so didn’t show the same increase in breathing and pulse rate as they seem to be recovering at a similar rate.*

*I would suggest the pulse and breathing results were reliable and could be replicated if the same activity was repeated but would suggest including more measurements in the recovery period until the pulse rate returns to normal and maybe using electronic measuring of pulse rate throughout the exercise would further improve the validity of the results.*

*Temperature recording didn’t really show any great variation during the exercise this could be because the exercise wasn’t long enough to affect body temperature or that axillary temperature wasn’t the most suitable way of achieving an accurate reading. As oral monitoring due to the likelihood of mouth breathing would also affect reliability and validity, maybe tympanic monitoring would be a more effective and increased the validity of this measurement.*

For submission ensure you have uploaded your report and the scanned images of the graphs that you have produced.