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Course::exercise physiology

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## Question no 1

Describe preload and afterload in simple words

### Preload and afterload

#### Preload introduction

Volume of the blood in ventricle at the end of diastole

Increase in hypervolemia regurgitating of cardiac valves heart failure

In cardiac physiology preload is the amount of sarcomere stretch experienced by cardiac muscle cell's called cardio myocytes at the end of ventricular filling during diastole.

#### Afterload introduction

Resistance left ventricle must overcome to circulate blood

Increase in hypertension vasoconstriction .

Preload is directly related to ventricular filling as the relaxed ventricle fills during diastole the walls are stretched and the length of sacromere increase .sacromere length can be approximated by the volume of the ventricle because each shape has a conserved surface area to volume ratio .this is useful clinically because measuring the sacromere length is destructive to the heart tissue.

It requires cutting out a piece of cardiac muscle to look at the sacromere under a .microscope. it is currently not possible to directly measures preload in the beating heart of a living animal. Preload is estimated from end diastole ventricular pressure and is measured in millimetre of mercury.

## Question no 2

Enlist basic principles of the training

Answer

### Basic principles of the training

In order to get the maximum out of your training you need to apply the four key principles of training

1. Specificity
2. Progression
3. Overtraining

#### 4. Individualisation

### Specificity

#### Introduction

The stresses that are applied to the body in training must be the same as those experienced in chosen sport or adventures

#### Example

If you are planning to really get into walk or cycling and only have a limited amount of time trian.then u must spend time on those disciplines and not on other sports like squash or tennis .if you are focus on walking or cycling only then it's something you should be very aware of.

### Individualisation

#### Definition

This is a crucial principle the fundamental fact that everyone is different way if you are walking or cycling with a friend and doing exactly the same amount of training don't be concerned if one them gets fitter faster than the other this is what individualisation is all about

### Overtraining

Overtraining is very common problem problems and comes about when you don't get enough rest during your schedule. Without the correct amount of rest you will suffer from overtraning. With the correct amount of increase training and right rest you get overload .overload is essential if your performances is to improve. You do not want get the reverse effects.  
Overtraining

### Progression

#### Definition

This is all about the need to gradually increase the workload that you put your body through. It is essential to combine training and rest whilst at the same time increasing the stress that the body is through this so called stress is a combination of the frequency duration and intensity of the workout.

### Question no 3

What are the factor increasing stroke volume

### Stroke volume

#### **DEFINITION**

Stroke volume is the volume of blood pumped from the lift ventricle per beat .stroke volume is calculated using measuring of ventricle volumes from an echocardiogram and subtracting the volume of

the blood in the ventricle at the end of a beat (called end systolic volume) from the volume of the blood just prior to the beat (called end diastolic volume). The term stroke volume can apply to each of the two ventricles of the heart although it usually refers to the left ventricle. The stroke volumes for each are generally equal both being approximately 70 mL in a healthy 70 kg man.

Stroke volume is an important determinant of cardiac output which is produced of stroke volume and heart rate and is used to calculate ejection fraction which is stroke volume divided by end diastolic volume. Because stroke volume decreases in certain conditions and disease states, stroke volume itself correlates with cardiac function.

## Following factors that increase the stroke volume

1. *End diastolic volume*
2. Contractility

## End diastolic volume

Stroke volume is the volume of the blood in millilitres ejected from each ventricle due to the contraction of the heart muscle which compresses these ventricles...changes in HR alone inversely affect SV.

Decreased end systolic volume increases stroke volume

## Contractility

- Sympathetic stimulation
- Epinephrine and norepinephrine
- High blood pressure
- Thyroid hormones
- Glycogen

## Total peripheral resistance

**Increased vascular resistance**

**Semilunar valve damage**

**Increase end systolic volume decreases stroke volume**

**Elevated afterload commonly measured as the aortic pressure systole**

**Stroke volume**

**Though not usually affecting stroke volume in a healthy individual, increased afterload will**

**hinder the ventricle's ejection of blood, causing reduced stroke volume.** Increased afterload may be found in aortic stenosis and arterial hypertension.

## Question no 4

**Differentiate between isometric, isotonic and isokinetic exercise.**

## Answer

### Difference between isometric isotonic and isokinetic exercise

#### Isometric exercise

It's a type of low impact exercise that involves straining your muscle without moving or bending your joint. A prime example is holding your body in a plank position. You stay at the top of a push without bending your elbows.

Isometric exercises are good for maintaining your strength and stability. For instance, if you train by doing a plank position for an extended period of time, it won't necessarily help you do more push-ups. Isometric exercise is often recommended for people who are recovering from an injury or who suffer from joint pain like arthritis. Evidence is growing that isometric exercise may help lower blood pressure.

#### Isotonic

Isotonic exercise is involved putting a constant amount of weight or tension on the muscle while moving your joints through a full range of motion.

An example is bench pressing, as the amount of weight stays the same and straight all the way. Squats are another form of isotonic exercise using the body weight to tense the muscle and moving the knees through their range of motion.

Isotonic exercise can help strengthen and build muscle so that you can move through all types of motion with greater ease.

#### Isokinetic exercise

Isokinetic exercise is a type of workout that involves specialized machines and is not often used by the average person. It is mostly used to train athletes to improve their running or throwing by improving the speed at which they can move their limb, body, or a weight, smart says.

#### Difference

Isometric means same length so that your muscles do not get longer or shorter by bending a joint.

Isotonic means same tension so that the weight in your muscles stays the same.

Isokinetic

Isokinetic means same speed so that your muscles are contracting at the same speed through the workout.

## Question no 5

Answer

Given data

$$M= 10\text{kg}$$

$$S=2\text{m}$$

Required

$$W=?$$

Formula

$$W=PE$$

$$pE=mgs$$

$$W=mgs$$

Putting the value in formula

$$W= 10(10)(2)$$

$$W= 200\text{j kgm/s=j}$$

Result

$$W=200\text{j}$$