Cardio activity

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1.

When one stands upright quickly from a prone position, there is a sudden drop in blood pressure due to gravity pulling blood towards the feet, where it then pools. This drop in pressure then triggers the baroreceptor reflex. Baroreceptors are sensors in the walls of arteries that detect high blood pressure. When they detect high pressure, they will increase the number of pulses they send in order to inhibit heart rate and stroke volume. When low blood pressure is detected, the pulses occur less often, reducing inhibition, thus allowing the heart to pumps faster, and with more volume. This second case occurs when there is the drop in pressure due to standing upright. There is a sudden decrease in pressure followed by a jump in heart rate, which slowly tapers off to normal as the increased heart rate causes higher blood pressure, which stimulates the baroreceptors, decreasing heart rate and volume until a dynamic equilibrium is reached.

2.

Excessively high blood pressure (also known as hypertension) can be extremely dangerous. The higher pressure forces the heart to work harder, which may over time decrease the strength of the heart, leading to cardiac failure. This strain in particularly evident in the left ventricle, which may stiffen and work less effectively due to high blood pressure. High blood pressure may also damage the walls of the arteries, known as arteriosclerosis, which then leads atherosclerosis, potentially causing a heart attack or stroke.

High blood pressure can be caused by numerous different variables. High levels of sodium or fats (saturated and trans in particular) in one’s diet, excessive consumption of alcohol and frequent exposure to cigarette smoke, first or second hand. The reasons for their effects are myriad (high sodium levels causes kidneys to remove less water from the blood stream, alcohol causes strain on liver, etc.), but all have a high chance to significantly raise blood pressure.

The methods of avoiding these risks are relatively simple. Monitoring one’s diet to lower consumption of sodium and lipids contributes a fair bit to lowering one’s blood pressure. At least 30 minutes of exercise daily as well as limiting one’s alcohol consumption to one glass a day for women and two for men also helps significantly. Ideally one’s exposure to cigarette smoke should be as little as is feasible due to other related health risks alongside of blood pressure.

4.

The subject used for this experiment consumes a healthy diet comprised largely of foods low in fat, sodium and sugar and very little processed or genetically modified foods. Subject eats restaurant food approximately once every two weeks. Subject’s exercise habits consist of one hour sessions three or four days a week, mostly cardio and strength activities with very little endurance training.

Subject’s diet is well balanced and should be maintained with little variation. The exercise habits should include more well-rounded training (including endurance work) in order to adapt his body to more situations. Frequency of exercise should also be improved, splitting the subjects current amount of activity over more days of the week will likely be better than isolated workouts, followed by a few days of inactivity.

5. This statement is true. Heart rate is controlled by the pacemaker (sinoatrial and atrioventricular nodes), which is comprised of nervous tissue, not muscle tissue. Thus the health of one’s heart (cardiac muscle) has no effect on their maximum heart rate.

6.

Sometimes one’s internal pacemaker does not function properly, and so the heart does not beat fast enough to supply the oxygen the body needs. Artificial pacemakers have existed for several decades now, but have typically been large, visible, constrict movement and can malfunction causing the patient severe and expensive complications. Recently, St. Jude medical improved on the basic design with the Nanostim device. The Nanostim device controls the beat of the heart like any normal pacemaker, except that it does not have any external electrodes that can slip out of place; only one small cylinder (4 cm in length, 0.5 cm diameter). The device is inserted into the femoral vein in the leg and then pushed into the right ventricle by a catheter. The pacemaker controls the beat of the heart via electrical pulses from an electrode built into the main device.

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