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REVIEW ARTICLE

THE CHEMISTRY OF BLOOD PRESSURE (REVIEW)

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ABSTRACT

Heart is a pumping organ, it pumps blood in the arteries which is circulated throughout the various parts of body. The blood pressure is the force with which blood moves through arteries (the vessels which carry blood from heart to the rest of body). When heart muscle pumps, the force of the blood against artery walls it is called the systolic blood pressure. When heart relaxes between beats, the force of the blood decreases and blood pressure drops, this is called the diastolic blood pressure. When blood pressure is higher than normal value, it is called hypertension (High blood pressure). The high blood pressure has many damaging effects on vital parts of body. There are many reasons for the hypertension and in most of cases the exact diagnosis remains challenge. With the invention of new techniques, it would be possible to diagnose specific cause of blood pressure and it would be possible to develop selective therapies with fewer adverse effects, resulting in effective blood pressure reduction.

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INTRODUCTION

The blood circulates through blood vessels (60,000 miles). With each heartbeat, 2 or 3 ounces of freshly oxygenated blood are forced out of the heart's main pumping chamber, the left ventricle, into the aorta, the body's largest artery. The aorta is main vessel, it branches into smaller arteries, which in turn divide into even smaller vessels called arterioles, which carry blood to the capillaries. These capillaries are the microscopic vessels that supply oxygen and other nutrients, to each cell in the body. After the oxygen is used up, the blood returns to the heart via a branching system of veins. The heart is pumping organ, while pumping it exerts force on the arteries walls, this is referred as blood pressure. The main pressure comes from the heart, but arteries, arterioles, determine how much pressure is registered in the blood vessels. To raise blood pressure, the arterioles narrow or constrict, to lower it they open up or dilate. Pressure varies according to the body's activities. In relaxed mode heart does not need to beat fast, while doing physical activities it beats faster because more blood is needed to carry oxygen to the muscles, so blood pressure rises to meet increased demand.

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In some situations, such as when someone stands up suddenly after lying down, the body makes instantaneous adjustment in blood pressure in order to ensure a steady supply of blood to the brain. Blood vessels in the abdomen and legs constrict and the heart speeds up. Sometimes there may be a slight delay in this adjustment, and as a result, one may feel dizzy for a few seconds. In older people blood vessel reflexes are impaired so they may face more such type of problems. such(faintness)type of situation can arise after standing for long periods, during which time blood may get collected in the legs, thereby reducing the amount that is available to carry oxygen to the brain. Hormonal and nerve sensors regulate the blood pressure and it varies considerably during the course of a day. In relaxed mode blood pressure is low and it increases (rather shoots up) under stress. On receiving signal of stress the adrenal glands pump out epinephrine and norepinephrine (stress hormones) that are commonly referred to as adrenaline. These hormones signal the heart to beat faster and harder, resulting in increased blood pressure and flow to the muscles. During the different hours of the day, blood pressure keeps on changing because nature of our activities change, it is lowest between 1:00A.M and 4:00A.M (sleep time), rise rapidly during "arousal" from sleep between 6:00A.M and 8:00 A. M., remain at approximately the same levels during the afternoon and evening, and decrease from approximately 11.00 P.M

Factors responsible for Hypertension

There is significant linkage of blood pressure and hyperlipidemia (Hsueh *et al.,* 2000, Levy *et al.,* 2000, Kristjansson *et al.,* 2002, Hunt *et al.,* 2002), approximately 40% of persons suffering with hypertension also have hypercholesterolemia, genetic studies have have established a clear association between hypertension and dyslipidemia (Selby *et al.,* 1991).

- Increased sympathetic nervous system activity increases blood pressure due to increased cardiac output, increased vascular resistance, and fluid retention (Mark, 1996).
- Hyperuricemia is clearly associated with hypertension (Messerli *et al.,* 1980).
- With the age, Systolic blood pressure and pulse pressure increase, because the arteries become stiff, due to the Arteriosclerosis (O'Rourke *et al.,* 2000).
- Nitric oxide is released by normal endothelial cells in response to various stimuli, shear stress plays an important role in blood pressure regulation, thrombosis, and atherosclerosis (Cai and Harrison. 2000).
- The genetic factors (Biron, Mongeau and Bertrand, 1976) can be the cause of high blood pressure.
- Although several factors are responsible for the blood pressure elevation, renal mechanisms probably play a primary role (Guyton, 1991).

Role of potassium in lowering blood pressure; Potassium helps to lower blood pressure by balancing out the negative effects of sodium. More the fluid, the higher is blood pressure. Kidneys filters blood and sucks out any extra fluid, which is then stores in bladder as urine. This process uses a delicate balance of sodium and potassium to pull the water across a wall of cells from the bloodstream into a collecting channel that leads to the bladder. Consumption of sodium (sodium chloride) raises the amount of sodium in bloodstream and wrecks the delicate balance, reducing the ability of kidneys to remove the water. Consumption of fruit and vegetables increase potassium levels and help to restore the delicate balance. This helps kidney to lower blood pressure to a healthy level.

Conclusion

The complex pathophysiologic mechanisms lead to blood pressure elevation. Hypertension is highly prevalent among middle-aged and elderly, and the success rate in controlling blood pressure in these individuals is poor (Hyman, Pavlik and Vallbona, 2000). With the invention of new techniques, it would be possible to diagnose specific cause of elevation blood pressure and it would be possible to develop selective therapies with fewer adverse effects, resulting in effective blood pressure reduction.

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