Slide 1: Welcome back we… all these classes we have seen the importance of all nutrients like carbohydrates, proteins, fats, minerals and vitamins. Now the next important nutrient in the body is water. So it comprises 50 to 70% of the total body weight and muscles also contain a lot of water about 73%-and fat contains 20% in the body, not outside. And intracellular fluid is the fluid within the cells which comprises of two thirds of the total body water and extracellular fluid is outside the cells, that is like in blood and lymph, it is composed of one-third of the total body water.

Slide 2: And this water is an essential nutrient without which death occurs and therefore we cannot live without food, without vitamins and minerals and without water. All these are very important for life.

Slide 3: Now functions of water it is a universal solvent. The water dissolves all the nutrients in it and carries it to various cells through the blood and it dissolves the waste products and helps to eliminate them from the body through the feces, through perspiration, through urine and other waste. Then urea, if the urea remains in the body, there is a chance of becoming uremic, that means the blood is having urea and it becomes toxic. Therefore urea also is dissolved in water and it is eliminated from the body so that the body homeostasis is maintained. And carbon dioxide which is a waste product of the metabolism is… has to be eliminated therefore this carbon dioxide is dissolved in blood and eliminated through respiration. Therefore when the carbon dioxide remains in the body, the pH of the blood becomes more and more acidic and causes problem.

Slide 4: Then they remove the waste products like sodium, whenever there is excess of sodium, there is… the water removes them by getting the urination more number of times and the excess amount of urine is excreted. Then normally there is 1 to 1.5 liters per day of urine is excreted through which all the waste products are excreted from the body and the homeostasis is maintained. Then it avoids concentrated urine so the urine is always diluted and excreted. So when the urine is concentrated, then there is a chance of getting the kidney stones in the kidneys. Therefore whenever water is… dissolves all the waste material and excretes it, there is no chance of having kidney stones and the kidneys are healthy.

Slide 5: Now body temperature regulation also is carried out by water. So all the metabolism in the body generates a lot of heat. So the water that is present in the body it absorbs the excess heat and maintains the body temperature and it secrets fluid via perspiration, so that… and the skin is… because of the perspiration skin becomes cool and as the perspiration evaporates, the temperature is maintained. And it is a lubricant for joints and synovial fluid, the fluid that is present in the joints and it is a shock absorber. Say when the mother is pregnant, there is amniotic fluid in the placenta, so that… because of this amniotic fluid the baby is not directly hurt so it protects the baby against any injuries. Then cerebrospinal fluid also helps us to protect our brain and spinal cord.

Slide 6: Now there are… daily water losses is through urine, this is the excess, I mean the largest amount of water loss is through urine, then the second is the skin, and lungs is through

the water vapor, when we exhale, you feel the air that is warm with water vapor and some amount of water is lost through feces.

Slide 7: The sources of water, when we say water it is not pure water, which gives us fluid in the body. So all the fluids like water and other beverages are supplying water to the body. then the fresh fruits and vegetables, meat, and except all the dried grains and foods you have water in all the other foods. And you get water from metabolism. So whenever there is a metabolism of carbohydrates, fats and proteins, the end product is water and energy nutrients like carbon dioxide, energy and water.

Slide 8: Now factors affecting the water balance and its maintenance. The ability of the body to adjust fluids and electrolytes and acid-based balance, these are influenced by age. So as the age increases, the ability to adjust fluids will decrease and when it is an infant stage, where the body is very small and the amount of water is less so the excess urine is excreted the large amount of urine is excreted and the body has to maintain, that is why the infant has the milk as the main diet where 90% of it is water. Then gender and body size and environmental temperature and lifestyle.

Slide 9: So infants immature kidneys are less able to conserve water than. So they lose more fluids, whereas in adults because of higher metabolic rate, it increases the fluid loss and when it comes to elderly people, the aging increases the risk of dehydration. There is metabolism and loss of water is there, therefore dehydration occurs. And women have the proportionately more amount of body fat and less water compared to men.

Slide 10: Environmental temperature, there are fluid losses through sweating and the perspiration is increased in hot weather, and the body attempts to dissipate heat. Whenever there is lot of perspiration, the body temperature becomes cool. And lifestyle and other factors like diet, exercise, stress affect the fluid, electrolyte and acid balance.

Slide 11: Now dehydration, it is the deficit of total body water with, whenever there is disruption in the metabolic process, there is reduction in the body water, which is called as dehydration. So this is also a reason for hypernatremia. Hyponatremia is increased sodium content in the body. So whenever there is increased sodium content it attracts water and try to excrete from the body, therefore dehydration may occur. And the term dehydration must be distinguished between hypovolemia that is… hypovolemia is, there is loss of the blood volume, particularly the plasma. So when there is loss of blood volume, it does not refer to as dehydration, but when the total body water reduces, then we can call it as dehydration.

Slide 12: Then most of the people can tolerate 3 to 4% decrease in the total body water without any difficulty, so we can stay for a certain time, even though we are thirsty, we can wait for some time. Then some times when it increases to 5 to 8%, it causes fatigue and dizziness, and over 10% it can cause physical and mental deterioration and accompanied by severe thirst.

Slide 13: And dehydration occurs when free water loss exceeds free water, that is there is no balance intake and output. And usually it happens when there is heavy exercise, there is lot of dehydration and any diseased condition. When there is fever also, there is lot of excess of heat along with water, thereby there is dehydration. And a decrease of more than 15 to 25%-of water is fatal. At this stage, the person… the death is sure. Then mild dehydration is characterized by thirst. Whenever the body reduces the water content, the brain gives a signal to take water by creating thirst and general discomfort, so this results when you take normal water through the mouth.

Slide 14: Now excess of water also is dangerous. Some people keep on drinking water, more and more water so it can get intoxicated. So water intoxication is also known as water poisoning or dilutional hyponatremia. So this is potentially dangerous and death can occur, because the brain functions lose its normal balance and electrolytes are disturbed in the body and the… since it is a hyponatremia, the sodium quantity becomes very less in the body, compared to the water content, thereby it affects the brain and there is pushed outside safe limit of over hydration. So you can see how the edema occurs. This is a normal foot and when there is over hydration, when here… the person consumes more and more of fluids, there is so much of edema.

Slide 15: Although water is essential for life if a person drinks too much the blood becomes dangerously diluted by… and the salts that have to be present in normal levels are decreased too much. So according to the American scientists, it is… this condition is called as hyponatremia, which leads to water intoxication. So some of the symptoms are, you get headache, fatigue, nausea, vomiting, frequent urination, because the body has to lose the excess water so there is frequent urination and mental disorientation because the sodium level in the blood decreases. So when a person drink too much of water the kidneys are overloaded with work. So they cannot flush it out as well and cause excess water to enter into the cells. So this causes all the cells to swell and cause edema. So similar thing happens to the brain cells and the… when the brain cells start swelling and getting hydrated, this condition is fatal.

Slide 16: And water just like any other substance can be considered as a poison. Water is an essential nutrient and it can also become a poison when it is over consumed over a specific period of time. So more than 6 liters of water, if it is consumed for a long period, then the body starts getting water intoxicated. So whenever the body gets water intoxicated, the nutrients that are present in the blood and the other substances get diluted and the body gets disoriented. So even healthy people can get water intoxication.

Slide 17: So this is the importance of water and how it is important to take sufficient amount of water, what happens in dehydration and how important it is to maintain the fluid balance, acid-base balance and water balance, and what happens if we take excess amount of water so that we feel, if we take excess amount of water we are healthy, but it gets intoxicated. Thank you.