Approximately

Science, Chemistry

Chapter 9 1)Approximately how much water do you need each day to stay healthy? Water constitutes 50% to 70% of the human body. Its unique chemical properties enable it to dissolve substances as well as serve as medium for chemical reactions, temperature regulation and lubrication (found in the knees and other joints of the body); it also aids in regulating the acid base balance in the body. It helps remove waste from the body and is the basis for saliva, bile and amniotic fluid. It is clear that obtaining the proper daily intake of water is extremely important.

For adults daily water needs are estimated at 2. 7 liters (11 cups) for adult women to 3. 7 liters (15 cups) for adult men, total water is a combination of fluids andfood. For fluid alone this corresponds to at 2. 2 liters of water (9 cups) for women to 3 liters water (13 cups) for men per day. (Fluid intake does not have to be derived from water alone). Identify at least two situations that increase the need for water. ? Dehydration: Dehydration is triggered after the loss of water due to illness and drinking alcohol.

The following are signs of the early stages of dehydration: dry mouth and lips, difficulty concentrating, dizziness, headache, elevated heart rate and fatigue. ? Thirst: If you do not drink enough water your brain lets you know by signaling thirst. Your brain communicates the need to drink. Thirst mechanism can lag behind actual water loss after a prolonged exercise and illness, as well as in older people. Children that are ill especially those with fever, diarrhea, vomiting and increased perspiration should be encouraged to take in adequate fluids.

Then list three sources of water in the average person’s diet. ? Liquids: Beverages that we consume, such as water, milk, coffee, tea, soda and fruit

juices. Beer and wine are also considered forms of water however – these should be consumed within healthy daily guidelines (2 for men and 1 for women). Plain water is considered by many experts to be the best source as it provides water intake without adding any calories – even though it doesn't provide any other nutrients. ? Foods: Much of the food we consume has water.

Many fruits and vegetables are more than 80% water. ? Metabolic Water: Water as a byproduct of metabolism. 2)What is the relationship with sodium and water balance, and how is that relationship monitored as well as maintained in the body? Sodium is the major positive ion found outside cells and is essential to fluid balance and nerve impulse balance. The North American diet provides abundant sodium through processed foods and table salt. Table salt is chemically known as sodium chloride, it is 40% sodium and 60% chloride.

The human body absorbs almost all sodium consumed. Once absorbed it becomes the major positive ion found outside of cells in extracellular fluid and is a key factor in retaining body water. Fluid balance throughout the body depends partly on the variation of sodium and other ion concentrations among the water containing components in the body. Sodium ions also function in nerve impulse conduction and absorption of nutrients like glucose. Both deficiency and toxicity can occur with sodium; the greater concern lies with toxicity.

Sodium deficiency is less common than excess sodium since it is so readily available in the diet; manyhealthproblems can occur when either happens. Kidneys are essential for regulating the volume and composition of bodily

fluids. Water balance is achieved by ensuring that the amount of water consumed and generated by metabolism equals the amount of water excreted by the body. Consumption side is regulated by behavioral mechanisms which include thirst and salt cravings. Urine is produced not only to eliminate cellular waste products, but also to control the amount and composition of extracellular fluid.

Controlling the amount of water and sodium as well as other chemicals is essential to life – our body controls this by producing various amounts of urine so that we can conserve water and chemicals when short in supply. Too much or too little water and/or salt in our bodies is dangerous. Therefore the amount of water and salt excreted in urine and the amount of urine excreted is adjusted to meet the needs of the body. 3)Identify four factors that influence the bioavailability of minerals from food. Food supplies us with many minerals, but the way in which our bodies are able to absorb them varies.

The degree to which ingested nutrient is absorbed from food sources and is available to our body is called bioavailability. The bioavailability of minerals depends on many factors. The mineral content listed in food composition table for amount of a mineral in a food is just a starting point for estimating the actual contribution the food will make to our mineral needs. For example spinach contains much calcium but only 5% can be absorbed because of the vegetables high concentration of oxalic acid, a calcium binder. Usually 25% of calcium is absorbed by adults.

Minerals from animal products are absorbed better as binders such as fiber in plant foods are not present to hinder absorption. The mineral content of

plants greatly depends on mineral concentrations of the soil in which they are grown. Refined plant food has a lower content of minerals. Four factors that influence bioavailability of minerals from food are outlined below: ? Fiber -Mineral Interactions: Components of fiber, particularly phytic acid in grain fiber can limit absorption of some minerals by binding to them. Oxalic acid is another substance in plants that binds minerals and makes them less bioavailable.

High-fiber diets can decrease the absorption of iron, zinc and possibly other minerals. ? Mineral-Mineral Interaction: Many mineral, such as magnesium, calcium, iron and copper are of similar sizes and the same electrical charge causes these minerals to compete with each other for absorption, and therefore they affect each other’s bioavailability. An excess of one mineral decrease the absorption and metabolism of other minerals. ? Vitamin-Mineral Interaction: Many beneficial vitamin-mineral interactions occur during nutrient absorption and metabolism.

When consumed in conjunction with Vitamin C, absorption of certain forms of iron such as that in plant products improves. The active Vitamin D hormone improves calcium absorption. Many vitamins require specific minerals to act as components in their structure and functions. ? Mineral Toxicities: An excessive mineral intake, particularly of trace minerals (such as iron and copper) can have toxic results. For many trace minerals the gap between just enough and too much is quite small. Using mineral supplements should be closely monitored and should not exceed any upper level set on a term basis.

The potential for toxicity is not the only reason to carefully consider the use of mineral supplements – there can also be harmful interactions with other nutrients, as well as the possibility of the supplements being contaminated. 5) In terms of total amounts in the body, calcium and phosphorous are the first and second most abundant minerals, respectively. What functions do these minerals have in common? Approximately 99% of calcium is found in the bones. In addition to its critical role in bones, it also functions in blood clotting muscle contraction, nerve-impulse transmission and cell metabolism.

Calcium requires a slightly acid PH and the Vitamin D hormone for efficient absorption. Calcium deficiency is a major factor in osteoporosis. Approximately 85% of the body's phosphorus is found in the bones – the remainder is found in the bloodstream and functions inside cells. Phosphorus is a component of enzymes, other key compounds, DNA, cell membrane and bone. The body efficiently absorbs phosphorus at about 70% of dietary intake. The high absorption rate and the availability of phosphorus in foods makes this mineral less important than calcium in dietary planning.

The active Vitamin D enhances absorption. Although there is currently no specific disease associated with inadequate phosphorus intake, a deficiency may contribute to bone loss in older women. The functions that these two minerals have in common are that they are both critical to good bone health, have a cell function of sorts, the majority of each is found in the bones, and Vitamin D enhances the absorption of both. ? Chapter 10 1)How does greater physical fitness contribute to better overall health? Explain the process. Physical fitness has many health benefits.

Physical fitness refers to the ability to perform moderate to vigorous activity without undue fatigue. The benefits of regular physical activity include, less injury, better sleep habits, reduced blood pressure, increased cardiovascular function and improved blood lipid profiles, aids in weight control/loss, increases muscle mass and strength, improves GI tract peristalsis, slows aging process, reduces risk of certain cancers, improves immune function, increases flexibility and balance, reducesstressand improves self-image, improves blood glucose, and strengthens bones and joints.

Physical Activity Guidelines for Americans recommends that all adults should be active to some extent – some activity is better than none. The Physical Activity Guidelines set specific timegoalsfor adults – they are outlined below: ? For substantial health benefits, adults should do at least 150 minutes a week or moderate-intensity activity or 75 minutes of a week of vigorous-intensity aerobic physical activity or an equivalent combination of moderate and vigorous intensity aerobic activity. For additional health benefits, adults should increase aerobic activity to 300 minutes a week or moderate-intensity activity or 150 minutes of a week of vigorous-intensity aerobic physical activity or an equivalent combination of moderate and vigorous intensity aerobic activity. ? Adults should also include muscle strengthening activities that involve all major muscle groups at least two days a week. ? In order to stay with an exercise program the following are recommended: oStart slow oVary activities, make it fun oInclude friends andfamilySet specific and attainable goals and monitor progress oSet aside a specific time each day for exercise oReward yourself for keeping up with your goals oDon’t worry about occasional setbacks; keep focus on long-term

health goals. 2)You have set a goal to increase muscle mass and decrease body fat. Plan a weekly fitness regime, specifying activity types, frequency, intensity, duration, and progression. Commitment is an important step in participating in a physical fitness program and is the first step in putting together a weekly fitness regimen.

There are three main components to a good plan that will decrease body fat and increase muscle mass; aerobic, stretching/flexibility, and strength training. ? Aerobic: Aerobic exercise focuses on improving cardiorespiratory and cardiovascular health. oActivities: Walking, running, hiking, cycling, basketball, tennis, soccer, elliptical trainer, etc. o Duration: 20 to 60 minutes. oIntensity: 55% to 90% maximum heart rate or RPE of 4 or above. oFrequency: 5 days a week oProgression: Initiation Phase 3 to 6 weeks/Improvement Phase 5 to 6 months/Maintenance Phase plateau in gains in fitness. Stretching/Flexibility: Focuses on stretching muscles in an effort to maintain and increase mobility. oActivities: Yoga and stretching o Duration: 4 repetitions of 10 to 30 seconds per muscle group oFrequency: 2 to 3 days a week and during warm-up and cool down oIntensity: 5 to 10 minutes during warm-up and cool down oProgression: Start with smaller muscle groups (arms) and work toward large muscle groups (legs) ? Strength: Focuses on increasing or maintaining muscle mass through resistance exercise. oActivities: Weight lifting, Pilates, push-ups and ull-ups o Duration: 8 to 12 repetitions of 8 to 10 to different exercises oFrequency: 2 to 3 days a week oIntensity: Enough to condition major muscle groups of the upper and lower body. 3)How are carbohydrates, fat and protein used to supply energy during a 100-meter sprint, during a weight lifting session,

during a 3-mile walk? Nutrients are converted to adenosine triphosphate (ATP) base on intensity and duration of any activity. Carbohydrates are the main nutrient for fueling exercise of moderate to high intensity, and fat providing energy during low intensity exercises.

For example, fat is a great fuel for endurance events, but would not be good for 100-meter sprint. If exercising at a low intensity (50% of the max heart rate) you would have enough stored fat to fuel activity for hours or days as long as their sufficient oxygen to allow fat metabolism to occur. As the intensity of exercise increases, carbohydrate metabolism takes over. While it is more efficient than fat metabolism it has limited energy stores. This stored carbohydrate can fuel about two hours of moderate to high level exercise.

One could continue with moderate to high intensity for longer by replenishing carbohydrate stores during exercise. If carbohydrates are not restored you will have to reduce your intensity and draw energy from fat. As exercise intensity continues to increase, carbohydrate metabolism efficiency drops and anaerobic metabolism kicks in – because the body can’t take in and distribute oxygen quickly enough to metabolism carbs or fat easily. Low amounts of protein are metabolized during all levels of exercise – slightly more in endurance exercise especially when carbohydrate fuel has been depleted.