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Use the following steps to make a water bath for 2 min to wash betacyanin from the injured cells on the surface. Be sure that all of the cylinders are the same size. Discard the colored rinse-water. 5. Place one of the seven beet sections into each of seven dry test tubes. Do not crush, stir, or otherwise damage the cylinders when moving them to the test tubes. 6. Label the tubes 1-7 as follows: 1. 100% sucrose 2. 75% sucrose 3. 50% sucrose 4. 25% sucrose 5. distilled water 6. 100% distilled water 7. 75% distilled water. 7. Add 10 mL of the appropriate sucrose solution to each of tubes 1-4. Add 10 mL of distilled water to tubes 5-7. 8. Keep the tubes in the water bath for 20 min. 9. Remove the tubes from the water bath and quickly blot the surface of the cylinders with a paper towel. 10. Measure the absorbance of the solutions at 460 nm and record your results and the class average results in table 10.2. Then graph Concentration of Organic Solvent versus Absorbance for the class averages. Question 4. a. Based on your results, are lipids soluble in both acetone and methanol? b. Based on your results, which damages membranes more: 50% methanol or 25% acetone? e. What other solvents might be interesting to test in this experiment? f. What was the purpose of tube 7? g. How accurate were your hypothesized rankings for the treatments involving organic solvents? INQUIRY-BASED LEARNING How sensitive are cellular membranes to their environment? Observation: Cellular membranes are the interface between cells and their environment. The integrity of cellular membranes, which is critical for the proper functioning of the membranes and cells, is affected by environmental stimuli. Question: How do solvents or temperature affect membrane permeability? a. Establish a working lab group and obtain Inquiry-Based Learning Worksheet 10 from your instructor. b. Read the procedure for this experiment. c. Discuss with your instructor the purpose of the experiment and your group's hypothesis. d. Discuss with your instructor the purpose of the experiment and your group's hypothesis. e. Conduct your procedures, record your data, answer your question, and make relevant comments. f. Discuss with your instructor any revisions to your questions, hypothesis, or procedures. Repeat your work as needed. 10-6 Questions for Further Study and Inquiry 1. Are your conclusions about membrane structure and stress valid only for beet cells? Why or why not? 2. What characteristics of beets make them useful as experimental models for studying cellular membranes? 3. Explain why phospholipids have a natural tendency to self-assemble into a bilayer. Why is this biologically important? 4. Freezing temperatures are often used to preserve food. Considering the results of this experiment, which qualities of food are preserved and which are not? 5. Movement of water through membranes has long puzzled scientists. Why would you not expect water to move easily through a membrane? 6. What suggestions would you make to improve the experimental designs in these procedures? Doing Biology Yourself How would you design an experiment to determine the relative lipid solubilities of various organic solvents? 10-7 WRITING TO LEARN BIOLOGY What role did the stability and tendency for self-assembly play in the early evolution of life? Cellular Membranes 111 112 EXERCISE 10 10-8 EXERCISE 11 Enzymes Factors Affecting the Rate of Activity Learning Objectives By the end of this exercise you should be able to: 1. Describe the relationship between structure and function of enzymes. 2. Relate structure and function to active sites, modes of inhibition, and optimal conditions for enzymatic activity. 3. Hypothesize and test how inhibitors and changes in temperature and pH affect enzymatic reaction rates. 4. Describe how some enzymatic reaction rates can be measured by color changes and gas liberation as products are formed. Please visit connect.mheducation.com to review online resources tailored to this lab. f. Unfortunately, not all chemical reactions within our cells are exothermic. For example, the reaction of glucose and oxygen to form carbon dioxide and water is exothermic, but the reaction of carbon dioxide and water to form glucose and oxygen is endothermic. How do you think the cell obtains the energy to drive this reaction? 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 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Of Chlamydomonas provided by your instructor. Note to each cluster on a microscope slide, being careful not to mix the two drops. Do not add a coverslip. (i) While you observe the drops through low power of the microscope, mix the two drops of heterokonts. (ii) Switch to high magnification and note the clumping gametes. (iii) Isolate cells and have

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How to produce a zygote; at the same time, another sperm fuses with the polar nucleus to produce the endosperm. The endosperm is unique to angiosperms, that nourishes the embryo and young plant. Procedure 31.2. Examine stages of microsporogenesis and megasporogenesis in Lillium 1. Examine fresh or preserved specimens of anthers (Fig. 31.8a) and ovules (Fig. 31.8b). Within the anther, examine a cross section of a lily anther showing microspores in early prophase I (Fig. 31.8a). 4. Examine a prepared slide showing stages of meiosis II (Fig. 31.8b). 5. Examine a prepared slide showing pollen tetrads of microspores produced by meiosis (Fig. 31.8c). 6. Examine a prepared slide showing mature pollen with two or more nuclei (Fig. 31.8d). 7. Examine living or prepared pollen from various plants if available. Note any differences among pollen grains and differences between pollen of monocots and eudicots. 31-4 In Anthers Tube cell nucleus Meiosis Microspores (2n) Microsporogenesis Microsporangia cells Tube cell Pollen coat and wall Generative (sperm-) producing cell (c) Mitosis Microspores (n) Tube nucleus Pollination Mature Pollen Grain on Anther (microgametophyte) Microgametogenesis Generative nucleus 189 µm (b) @Louisia Howard/Science Source Figure 31.6 Pollen grains. (a) A cut pollen grain with two nuclei. Sperm nucleus (1n) Tube nucleus (1n) (b) Scanning electron micrograph of pollen grains of different species (1200X). Question 4. a. How many pollen grains germinated? Germinating Pollen Grain on Stigma Figure 31.5 Microsporogenesis and megasporogenesis occur in the anthers of flowers. Mature pollen grains (see fig. 31.6) are microgametophytes. Micrographs of microsporogenesis and megasporogenesis are shown in figure 31.8. b. Can you see vegetative and generative nuclei in the pollen tubes? Procedure 31.3 Examine germinated pollen grains Examine a prepared slide of germinated pollen grains. Open, mature microsporangia Pollen grains @BiologyImaging.com Figure 31.7 Lillium anther (40X). Mature pollen grains are the product of microsporogenesis and megasporogenesis within the microsporangia of flower anthers. A higher-magnification view of developing pollen grains is shown in figure 31.8. 31-5 Survey of the Plant Kingdom 343 ©M. L. Walker/Science Source (a) (b) ©Biophoto Associates/Science Source ©Ed Reschke/Getty Images (c) (d) ©Noble Press/Science Source (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w) (x) (y) (z) (aa) (ab) (ac) (ad) (ae) (af) (ag) (ah) (ai) (aj) (ak) (al) (am) (an) (ao) (ap) (aq) (ar) (as) (at) (au) (av) (aw) (ax) (ay) (az) (ba) (bb) (bc) (bd) (be) (bf) (bg) (bh) (bi) (bj) (bk) (bl) (bm) (bn) (bo) (bp) (bq) (br) (bs) (bt) (bu) (bv) (bw) (bx) (by) (bz) (ca) (cb) (cc) (cd) (ce) (cf) (cg) (ch) (ci) (cj) (ck) (cl) (cm) (cn) (co) (cp) (cq) (cr) (cs) (ct) (cu) (cv) (cw) (cx) (cy) (cz) (da) (db) (dc) (dd) (de) (df) (dg) (dh) (di) (dj) (dk) (dl) (dm) (dn) (do) (dp) (dq) (dr) (ds) (dt) (du) (dv) (dw) (dx) (dy) (dz) (ea) (eb) (ec) (ed) (ee) (ef) (eg) (eh) (ei) (ej) (ek) (el) (em) (en) (eo) (ep) (eq) (er) (es) (et) (eu) (ev) (ew) (ex) (ey) (ez) (fa) (fb) (fc) (fd) (fe) (ff) (fg) (fh) (fi) (fj) (fk) (fl) (fm) (fn) (fo) (fp) (fq) (fr) (fs) (ft) (fu) (fv) (fw) (fx) (fy) (fz) (ga) 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Human Biology

muscles, whereas a dendrite transmits the nerve impulse to subsequent neurons (600x). Axon Cell Dendrites c. Of the three types of muscle, which contracts without voluntary thought? Science Photo Library/Alamy Stock Photo to rather continuous functional fibers similar to those of skeletal muscle. Thus, cardiac cells depolarize and contract in a coordinated fashion, and smooth muscle cells are found in organs such as blood vessels and internal organs. (d) Supporting cells called glia, including Schwann cells, which help propagate the nerve impulse and provide nutrients to neurons. b. Of the three types of muscle, which contracts most swiftly? Table 41.1 A Comparison and Organization of Vertebrate Animal Tissues Examined 41-13 Location in the Vertebrate Body Function Tissue Examined Location in the Vertebrate Body Function Tissue Examined 485 Cell body Dendrite Direction of conduction Myelin sheath Axon terminal Node of Ranvier Axon (a) Motor neuron (multipolar) Muscle fiber Axon Cell body Direction of conduction Axon Sensory neuron Examine a prepared slide of a smear of nervous tissue (figs. 41.21, 41.22). Neurons consist of (1) a cell body containing a nucleus and (2) cytoplasmic extensions that conduct nerve impulses. Dendrites are short extensions of a neuron that usually carry impulses toward the cell body from other cells or sensory systems. Axons are long extensions that usually carry impulses away from the cell body. An axon may carry an impulse to a muscle to make it contract or to the dendrites of another neuron. Because cell bodies occur only in the brain and spinal cord, some axons and dendrites must be a meter long to reach distant parts of the body. Axons and dendrites extending from neurons are often bundled as nerves that look like thin spaghetti among the muscles and organs of the vertebrate body (fig. 41.23). To review all of the available examples of animal tissues, briefly reexamine each prepared slide. As you view each type of tissue, record in table 41.1 the tissue's location and function. Question 13 What is the difference between a nerve, such as that found in an arm or leg, and a neuron? (b) Sensory neuron (unipolar) Myelin sheath Skin Axon Cell body Dendrite (c) Interneuron (multipolar) © Scott Maxam/Alamy Stock Photo. (c) Don W. Fawcett/Science Source Figure 41.22. Human anatomy. (a) Motor neuron. Note the branched dendrites and the single, long axon, which branches only near its tip. (b) Sensory neuron with dendritelike processes at one end and a single axon at the other. (c) Interneuron with multiple branching processes. Many myelinated neuron axons are visible, each looking somewhat like a severed hose (400x). 14-14 Where do stem cells come from? With the right stimulation, stem cells can produce a variety of tissues with great therapeutic value. Even a whole organism can be produced from properly treated stem cells! The fate of stem cells is determined early in their genetic program and an appropriate microenvironment stimulate their differentiation into specialized tissue. But not all stem cells are the same. Human embryonic stem cells are derived from the inner cells of the blastocyst, a developmental stage occurring several days after fertilization. Since these blastomeres will soon fertilized egg Blastocyst 5-6 days Gastrula 14-16 days begin to specialize, stem cells of therapeutic value must be harvested from early embryos. These embryonic stem cells are totipotent (i.e., can form all embryonic and adult tissues), but the bioethics of harvesting them from human embryos is controversial. Alternatively, adult stem cells found in areas of rapid cell division (such as bone marrow and reproductive organs) in mature organisms also have great utility, but they do not have the potential to develop into as many different cell types as do embryonic stem cells. Inner cell mass yields stem cells that have the ability to form any cell type in the body Develops into skin, neurons, eyes, ears Develops into bone marrow, muscle, blood vessels Develops into pancreas, liver, lung, bladder (e) Embryonic stem cells 41-15 Bone marrow Blood-forming stem cell (produces blood and immune system cells) Stromal stem cell (produces bone and fat cells) (f) Adult stem cells Vertebrate Animal Tissues 487 INQUIRY-BASED LEARNING Can the visibility of cellular structures be enhanced? Observations: Cells are so small and transparent that their structures are difficult to see, even at high magnifications. Stains with dissolved pigments will adhere to some organelles more than others and thereby increase contrast and visibility. Question: What stains best enhance the visibility of cellular structures? a. Prepare slides of the following tissues: epithelial, connective, muscle, and nervous tissue. b. Apply various stains to each slide. c. Observe the stained slides under a microscope. d. Record your observations. e. Compare your results with those of your classmates. f. Discuss with your instructor any revisions to your questions, hypotheses, or procedures. Repeat your work as needed. Questions for Further Study and Inquiry 1. Why are vertebrate animal tissues difficult to classify into a single consistent system? 2. If a compound microscope produces an image in only two dimensions (length and width), how could you determine the three-dimensional shape of a cell? 3. How many animal tissues and cell types might be in a typical hamburger? 4. All living cells maintain a polarized membrane, meaning that positive and negative ions are separated on either side of the membrane. What role does this polarization play in the function of neurons? 5. How does the structure of bone tissue resemble woodcuts in form and function? 6. What aspects of a neuron's structure enhance its function? 7. What structural components of cartilage promote its function as a pliable, yet tough, material? WRITING TO LEARN BIOLOGY Does the presence of nuclei in frog blood cells indicate that the lack of nuclei in mammalian blood cells is an "advanced" characteristic? Why or why not? 488 EXERCISE 41 41-16 E XER CISE 42 Human Biology The Human Skeletal System Learning Objectives By the end of this exercise you should be able to: 1. Identify the major bones of the human skeleton and the different types of joints. 2. Understand how bones are held together. 3. Understand what bones form structures such as the elbow and knuckles. 4. Understand human morphology and how age influences bone structure. Please visit connect.mheducation.com to review online resources tailored to this lab. 7 The human body consists of 206 bones that make up about 15% of our body weight. Most bones are parts of larger structures and systems; for example, the skull has 22 bones, the vertebral column 26 bones, and the ribcage 24 bones. Bones are attached to muscles by tendons. In this exercise, you will study bones of the human body. Before you begin this exercise, review the structure of bone tissue in Exercise 41. Procedure 42.1 What bones compose the human body? 1. Examine the articulated skeleton in the lab. The human skeleton consists of the axial skeleton (skull, vertebrae, sternum, arms, and ribs) and appendicular skeleton (shoulder, arm, hip, and legs). 2. Use your textbook or other books in lab to identify the bones of these parts of the skeleton. Note the geometry of the skeleton, paying particular attention to the shapes of the bones, the textures of the bones, and the planes in which the joints can move (figs. 42.1, 42.2). 3. Identify and label the bones in figure 42.3. For each bone, list whether it is part of the axial or appendicular skeleton. Also identify these bones in your body. 42-1 The Skeletal System by the Numbers At birth, our bodies have more than 270 bones. During development, however, several of these bones fuse; that's why adults have only 206 bones. In adults, the skeleton accounts for 15% of our body weight. The smallest bone in humans is the stapes, which is a stirrup-shaped bone in our ears that is critical for hearing. The stapes is approximately 3 mm x 2.5 mm. Unlike other bones, the stapes is full size at birth. We have 12 pairs of ribs. Approximately 4% of people have an extra pair. Ribs are attached to the sternum (or breastbone), which is a long, flat bone shaped like a cockle in the center of the chest. Bones in our bodies are approximately 48% water. For comparison, our heart and liver are both 72% water, our lungs are 84% water, and our adipose (i.e., fat) tissue is 14% water. THE APPENDICULAR SKELETON (126 Bones) The appendicular skeleton consists of the shoulders, the upper limbs (in humans, nonchimpanzee called arms, forearms, and hands), and the pelvic girdle (pelvis), and lower limbs (in humans, commonly called legs, ankles, and feet). The appendicular skeleton enables movement and protects the major organs of digestion, reproduction, and excretion. HUMAN ANATOMY AND PHYSIOLOGY 490 EXERCISE 42 42-2 The Appendicular Skeleton 1. Examine the articulated skeleton in the lab. The human skeleton consists of the axial skeleton (skull, vertebrae, sternum, arms, and ribs) and appendicular skeleton (shoulder, arm, hip, and legs). 2. 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Stethoscope Pressure cuff 5. Elbow Arm Air valve Squeezeable bulb Figure 45.5 Measurement of blood pressure with a sphygmomanometer. Blood pressure is recorded as two numbers separated by a slash; the first number is the systolic pressure, and the second number is the diastolic pressure. For a healthy 20-year-old college student at rest, a typical blood pressure is 120/80. 45-7 6. 7. through the artery. You'll feel no pulse in your partner's wrist when pressure in the cuff is 200 mm Hg. Place the bell of the stethoscope under the cuff and over the brachial artery just above the elbow. Again inflate the cuff to a pressure of about 200 mm Hg. Slowly release pressure in the cuff. When the pressure falls below the systolic pressure, blood spurts through the artery. This flow of blood occurs quickly and produces vibrations and turbulence that can be heard with a stethoscope as loud, tapping sounds. The pressure at which you hear these so-called Korotkoff sounds is the systolic pressure. Continue to slowly release pressure from the cuff. As the pressure drops, the sounds become louder and more distinct as more blood flows through the artery. At this point, the flow of blood is continuous but still turbulent. When the cuff pressure reaches the diastolic pressure, blood flow is normal (i.e., nonturbulent) and the sounds disappear. The pressure at which the sound disappears is the diastolic pressure. Repeat this pressure until you obtain consistent measurements. However, do not keep the cuff inflated around your partner's arm for more than a minute or so at a time. Record the average blood pressure: mm Hg When you stand up, gravity causes arterial pressure to decrease in the upper parts of your body and increase in the lower parts of your body. Indeed, standing up from a prone position has an effect on brachial artery blood pressure equivalent to losing about 500 mL of Human Biology 521 Table 45.1 The Effect of Posture on Blood Pressure Posture Blood Pressure (mm Hg) (systolic pressure/diastolic pressure) Pulse Rate (beats/sec) Prone Standing (10 sec after rising) Standing (5 min after rising) Standing (7 min after rising) Standing (9 min after rising) Question 12 How did your partner's blood pressure change? Why? 240 220 Systolic blood pressure (mm Hg) blood. Measure your partner's pulse and blood pressure while he or she is reclined. 8. Have your partner stand up. Measure his or her pulse rate and blood pressure immediately and 5, 7, and 9 min after rising. Record your results in table 45.1. 200 180 160 140 120 100 80 0 9. Have your partner do bench-step exercises for 3 min at a rate of 60 steps per min. Have your partner lie down again and continue to measure your partner's blood pressure at 2-min intervals until it returns to normal. Plot these blood pressures on figure 45.6. 1 2 3 4 5 6 7 8 9 10 Time (minutes) Figure 45.6 Graph of systolic blood pressure on the y-axis and time on the x-axis. The data you plot on this graph will describe the recovery of systolic blood pressure after exercise. Question 13 a. How does exercise affect blood pressure? d. What was your partner's recovery time? That is, how long did it take for your partner's blood pressure to return to normal? b. Which is affected more, systolic pressure or diastolic pressure? e. What other physiological changes occurred as your partner recovered? c. How do you explain this? 10. Temperature also affects blood pressure. To show this, have your partner put his or her hand in cold (5°C) water for 1-2 minutes. Then remeasure the blood pressure. 522 EXERCISE 45 45-8 Question 14 a. How does cold affect blood pressure? b. Why would you expect such a difference? b. Are systolic and diastolic pressures affected similarly? Procedure 45.4 Locate valves in veins c. Compare your data with those of your classmates. What is the average blood pressure for your class? Venous Blood Pressure Blood moves slowly and at low pressure through capillaries. After exiting the capillaries, there is no mechanism (e.g., heart) to pump and increase the blood pressure so it remains low, and blood continues to move slowly through the veins. One-way valves prevent the blood under such low pressure from flowing backward. 1. Compress the vessels near your right elbow until the veins stand out. 2. Lay the index finger of your left hand on a vein near your wrist. 3. Move your thumb along and on top of the vein toward your elbow (i.e., toward your heart). 4. Lift your thumb and note what happens to blood in the vein. If blood refills all of the vein, repeat the experiment by placing your finger where the thumb reached. Continue until you reach a point at which the blood does not return toward the finger when the thumb is lifted. Question 17 What blocks the backflow of blood in veins? Procedure 45.3 Blood flow in veins 1. Hang your hands down at your side. Note the veins on the back sides of your hands. 2. Raise your hands above your head. Question 15 What happens to the veins? Why? 3. Have your partner hold his or her hand out to heart level and next to a meterstick taped to the wall. Slowly raise your partner's hand; the height where the veins disappear is the venous pressure measured in centimeters (cm) of water. Convert this measurement to mm Hg using the following formula: mm Hg = cm water × 0.73 = Question 16 a. How does blood pressure in veins compare with that in the brachial artery? 45-9 Blood Pressure and Your Health Your blood pressure is relatively constant when you are sitting down and resting. Optimal blood pressure occurs when systolic pressures are less than 120 mm Hg and diastolic pressures are less than 80 mm Hg. 118/75 is an example of an optimal blood pressure. Prehypertension occurs when systolic pressures are between 120 and 129 mm Hg, and/ or when diastolic pressures are between 80 and 89 mm Hg. People with prehypertension will probably develop hypertension if they do nothing to lower their blood pressure. Hypertension, or high blood pressure, occurs when systolic pressures exceed 129 mm Hg and/or when diastolic pressures exceed 90 mm Hg. A blood pressure of 145/96 is an example of hypertension. The American Heart Association estimates that approximately 50 million Americans have hypertension, and at least 30% of them do not know it. If left untreated, hypertension increases the risk of health problems such as stroke, heart attack, kidney damage, and heart failure. Smoking, obesity, stress, and a poor diet can contribute to hypertension, and regular exercise can help lower blood pressure (fig. 45.7). Although hypertension has no symptoms, it kills more than 50,000 people per year in the United States. Human Biology 523 The Unhealthy Circulatory System ANEMIA ARRHYTHMIA Anemia is a decrease in the oxygen-carrying capacity of blood. Anemia can result from red blood cells that are too small, contain too little hemoglobin, are manufactured too slowly, or die too quickly. Iron deficiency is the most common cause of anemia; sickle cell disease (see fig. 17.4) is a type of inherited anemia. An arrhythmia is an abnormal heartbeat. Some arrhythmias originate in the atria, causing transient flutters or racing that lasts only a few seconds. An electronic pacemaker implanted under the skin is a common treatment. In ventricular fibrillation, the ventricles contract wildly, causing sudden cardiac arrest. Death may occur within minutes. ATHEROSCLEROSIS ANEURYSM Fatty deposits inside coronary arteries reduce flow to the heart muscle. This "hardening of the arteries" is called atherosclerosis (athero is from the Greek word for "paste," and sclerosis meaning "hardness"). A cross section of a partially clogged artery is shown in the upper right corner. Atherosclerosis can so weaken the wall of an artery that a region of the vessel forms a pulsating, enlarging sac called an aneurysm. If it bursts, blood loss may be great. HEART ATTACK Smoking is the most common preventable cause of death. Cigarette smoke damages the lungs, impairing their ability to deliver O2 to the heart (and increasing the chance of lung cancer). Nicotine stimulates the secretion of epinephrine and norepinephrine, increasing both heart rate and blood pressure. Nicotine also damages blood vessels and stimulates the formation of blood clots, increasing the risk of stroke. Blocked blood flow in a coronary artery kills part of the myocardium, the heart muscle. This is a heart attack (myocardial infarction), and it may come on suddenly. A common treatment for a blocked coronary artery is a bypass operation. A surgeon creates a bridge around the blockage by sewing pieces of blood vessel taken from the patient's chest or leg onto the blocked artery. THE EFFECTS OF SMOKING ON CARDIOVASCULAR HEALTH Fat deposit Wall of artery ©BSIP/Getty Images Cholesterol and fat deposits Endothelium 524 EXERCISE 45 45-10 Organizations such as the American Heart Association provide much useful information about health and blood pressure. If your blood pressure is high, or if you'd like to learn more about how blood pressure affects your health and well-being, study their websites (e.g., .americanheart.org) and visit your physician. AN ANALYSIS OF YOUR RISK OF CARDIOVASCULAR DISEASE A number of factors are suspected or proven to influence your risk of developing heart disease. Factors such as exercise, diet, persistent emotional stress, race, salt intake, obesity, age, family history, and smoking are clearly associated with the probability of suffering from cardiovascular disease later in life, even though no single factor is a guaranteed predictor. To assess your risk, complete the following questionnaire provided by the The University of Arizona's Sarver Heart Center. To complete the questionnaire, simply record the number of points assigned to each level of each risk factor. Compare your total points with the ranges associated with different levels of risk. Although this is not a definitive test, it will heighten your self-awareness of the consequences of your lifestyle. The University of Arizona's Sarver Heart Center's Heart Disease Risk Assessment1 DIRECTIONS: Note your score for the various risk factors. Total your points at the end and find your risk of having a heart attack or stroke during the next 10 years. BP = blood pressure ©McGraw-Hill Education/Gary He, photographer Figure 45.7 Regular exercise can help you lower your blood pressure. Question 18 a. Hypertension is the most important modifiable risk factor for stroke, the #3 killer, and a leading cause of severe, long-term disability in the United States. How could hypertension affect someone's health? b. Why is hypertension called a "silent killer"? RISK FACTOR AGE Male 45-55 Male 56-65 Male 66-75 Male > 75 Female 55-65 Female 66-75 Female > 75 HYPERTENSION (High BP) Never hypertensive; BP below 130/80 Treated hypertension; BP average below 130/80 Treated hypertension; BP average above 130/80 Untreated hypertension; BP usually above 130/80 YOUR SCORE SCORE 2 3 4 5 2 3 5 0 1 2 3 ©The University of Arizona Sarver Heart Center. Reprinted by permission. 45-11 Human Biology 525 RISK FACTOR SMOKING Never smoked or nonsmoker for 5 or more years Nonsmoker for less than 5 years Current smoker for

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