**Cardiovascular System Notes Part 2**

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| **V. Blood**   * The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the human body * 5x thicker than water * Color range   + Oxygen-\_\_\_\_\_\_\_ blood is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ red   + Oxygen-\_\_\_\_\_\_\_ blood is \_\_\_\_\_\_\_\_\_\_ red * pH must remain between 7.35–7.45 * 5-6 Liters or about 6 quarts/body   **A. Composition**  **1. Blood Plasma**   * Makes up \_\_\_\_\_\_\_ of blood * Composed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Contains nutrients, salts (metal ions), respiratory gases, hormones, proteins, waste products   **2. Erythrocytes – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   * The main function is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Biconcave disks * Anucleate (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) * Outnumber white blood cells 1000:1 * Each erythrocyte has 250 million **hemoglobin** molecules   + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   + Binds strongly to oxygen   3. **Leukocytes –** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   * Crucial in the body’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **4. Platelets**   * Produced from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (megakaryocytes) * Needed for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ process       **B. Blood Disorders**  **1. Anemia –** caused by low \_\_\_\_\_\_\_\_\_ or hemoglobin   * Symptoms: fatigue, dizziness, headaches, shortness of breath   **2. Sickle-cell Anemia** – recessive \_\_\_\_\_\_\_\_\_\_\_ disorder   * Symptoms: fatigue, bone pain, ulcers, delayed growth, shortness of breath       **3. Hemophilia** – recessive sex-linked bleeding disorder   * Blood lacks \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors * Minor injuries can cause uncontrolled bleeding   **C. Blood Types**  **1. ABO Blood Types**   * There are 4 blood types, A, B, AB, and O, which are determined by antigens on our red blood cells.   + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are substances that trigger an immune response. * People with Type A blood have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on their cells, Type B have B antigens, Type AB have both A and B antigens, and Type O has neither A nor B antigens. * We inherit our blood type from our parents. * Type O is most common in the United States (45% of the population). * Type AB is most rare (4%) * Macintosh HD:Users:kellydeshler:Desktop:sci_ls_bloodtypes.gifBlood transfusions can be done using the same blood type or another type that will not trigger an immune response (see chart).   + O is the universal \_\_\_\_\_\_\_\_\_\_\_   + AB is the universal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **2. Rh Blood Types**   * A person will also have + or – for their Rh factor (ex. O- or A+) * The Rh factor usually does not affect transfusions, but can cause problems for a pregnant woman and the fetus if they have a different Rh phenotype   **VI. Physiology of the Heart**  **A. Conduction System of the Heart**   * \_\_\_\_\_\_\_\_\_\_\_\_, stimulates, and \_\_\_\_\_\_\_\_\_\_\_\_\_ the contraction of the atria and ventricles   + Makes the heart an effective pump * 2 types of Nodal tissue controls the heartbeat   + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – found in right atrium * Initiates the heartbeat every 0.85 seconds * Serves as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – bottom of right atrium   The **SA node** sends out an impulse causing the atria to contract.  The impulse reaches the **AV node** and travels along the **AV bundle**.  The impulses travels throughout the ventricles to the **Purkinje fibers**.  Ventricles  contract.  Macintosh HD:Users:kellydeshler:Desktop:blood-types-chart.png    **B. Cardiac Cycle & Heart Sounds**   * Cardiac cycle includes all the events that occur in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   + Heart beats on average 72 beats per minute but can range from 60-100 bpm. * L & R atria contract simultaneously * Atria relaxes then L & R ventricles contract simultaneously * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – contraction * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - relaxation   **Steps of the Cardiac Cycle**    **1.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – 0.15 sec   * Atria is systole (contracted) pumping blood into ventricles (diastole-relaxed)   **2.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - 0.30 sec   * Ventricle fills with blood and contracts pumping blood to the aorta and pulmonary arteries   **3.** Atrial & Ventricle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – 0.40 sec   * Both atria & ventricles are diastole (relaxed) as blood from the body fills the atria * What is that sound?   + - \_\_\_\_\_\_\_\_\_\_\_: closing of the bicuspid and tricuspid valve     - \_\_\_\_\_\_\_\_\_\_\_Dup: closing of aortic and pulmonary valve     - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: any one of the heart valves may not close properly   **Macintosh HD:Users:kellydeshler:Desktop:ekg.jpg**  **C. Measuring the Cardiac Cycle**   * Electrocardiograms (\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_) are used to measure the electrical rhythm of the heart’s contraction   **D. Disorders of Conduction**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = irregular heart beat   * 1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = more than 100 bpm   + Irregular contractions of the atria and/or ventricles due to chaotic electrical signals   + Result is lack of blood flow to the heart   + Heart rate may be 100-175 beats per minute at rest * 2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = less than 60 beats/min   + Heart does not pump enough oxygen-rich blood * Pacemaker – used to maintain a consistent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when the body’s natural pacemaker (\_\_\_\_\_\_\_\_\_\_\_\_\_) is not properly functioning     **VII. Vital Signs**  1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   * The stretching and recoiling of the \_\_\_\_\_\_\_\_\_\_\_\_ walls * Monitored at “pressure points” where pulse is easily palpated   2. Blood Pressure (BP)   * A device called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or an automatic BP cuff measures the pressure in large arteries   + Systolic: pressure at the peak of ventricular contraction   + Diastolic: pressure when ventricles relax * Pressure in blood vessels decreases as the distance away from the heart increases * Variations in blood pressure   a. Normal   * + 140–110 mm Hg systolic   + 80–75 mm Hg diastolic   b. Hypotension (\_\_\_\_\_\_\_\_\_\_ BP)   * + Low systolic (below 110 mm HG)   + Often associated with illness   c. Hypertension (\_\_\_\_\_\_\_\_\_\_ BP)   * + High systolic (above 140 mm HG)   + Can be dangerous if it is chronic   + Warning sign for risk of heart attack and stroke |

**Learning Goals**

1. List the four components of the blood and the four ABO blood types.
2. Describe the conduction system of the heart, including the role of the SA node and AV node in sending signals to cause the heart to contract.
3. Summarize the steps of the cardiac cycle, including what systole and diastole are.
4. Describe blood pressure, including what the systolic and diastolic numbers mean and what is normal, high and low.