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ANATOMICAL PROPERTIES OF THE HEART AND PHYSIOLOGICAL BASIS OF THE HEART

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Annotation: Heart rate, the number of times the ventricles of the heart contract and relax (that is, beat) per minute or other unit of time. In human beings, the normal resting heart rate among adults ranges from 60 to 100 beats per minute (BPM), whereas the normal resting heart rate for children is higher and varies with age. The body moderates heart rate with the sympathetic nervous system, which releases epinephrine and norepinephrine to speed up the heart rate, and the parasympathetic nervous system, which releases acetylcholine to reduce it.

Key words: Heart, blodd, rate, lung, digestion system, rhythmic dilation.

A person’s heart rate changes throughout the day as they engage in activities with varying levels of strenuousness. Exercise, exposure to higher air temperatures and humidity, smoking, changing one’s body position, ingesting certain foods and medications, along with stress, anxiety, and other strong emotions, can temporarily increase heart rate. In contrast, slowing one’s breathing rate, relaxation, and ingesting certain other medications can temporarily decrease heart rate.

A heart rate that is either consistently too high or too low may be an indication of a medical problem. A condition called tachycardia occurs in persons with a heart rate of more than 100 BPM, whereas a condition called bradycardia occurs in persons with a heart rate of less than 60 BPM. Symptoms of both conditions include dizziness, fatigue, and fainting.

A person can measure their heart rate using a heart rate monitor (that is, a device that detects electrical activity in the chest or tracks the expansion and contraction of blood vessels in the wrist or finger). However, they can also measure their heart rate by tracking their pulse (the rhythmic dilation of an artery) at either the neck, wrist, elbow, or foot using their fingers and a timepiece. To check one’s pulse at the neck, one should lay their index and third fingers on the side of the neck, on either side of the trachea. The thumb should not be used, as a pulse can also be felt in that digit, and it may cause a miscount. Alternately, one can place their index and third fingers on the inside of the wrist, on the side closest to the thumb. A pulse can also be felt at the inside of the elbow and on the top of the foot. To calculate one’s heart rate, one should look at a watch or clock and count the number of beats that occur in 60 seconds; alternatively, one can count the number of beats that occur in 15 seconds and multiply that number by 4 (*see also* pulse).

PICTURE 1. HEART RATE MONITOR OUTPUT

Every time the heart beats, it pushes blood through the circulatory system; the blood picks up oxygen from the respiratory system and nutrients from the digestive system and carries them through the arteries to every cell in the body. While exercising or under stress, a person's heart rate is higher and more variable than at rest. While resting, a person's heart rate is lower, because the cells do not require as much oxygen. Adults whose resting heart rates that approach 60 BPM, such as those that occur in professional athletes and those who exercise regularly, have stronger hearts that work more efficiently. Those whose resting heart rates approach 100 BPM, in contrast, have hearts that are less efficient.

In general, a child's resting heart rate slows as they age until, as a teenager, their heart rate approximates the rate occurring in that of an adult. According to the American Academy of Pediatrics, the normal resting heart rate (taking into account both sleeping and waking heart rates) among children ranges from 90 to 205 BPM in newborns, 90 to 180 BPM in infants, 80 to 140 BPM in children ages 1–2, 58 to 120 BPM in children ages 3–7, and 50 to 100 BPM in adolescents.

Target heart rate is the range of heart rates that is healthy for a person to have while engaging in moderate-intensity exercise, which improves a person's cardiovascular health while not putting too much of a strain on the heart. There is varying guidance on how to calculate target heart rate. Generally speaking, healthy adults can calculate their maximum safe heart rate by subtracting their age from 220; for example, the maximum heart rate for a 40-year-old is 180 BPM. The U.S. Centers for Disease Control and Prevention recommends that adults keep their heart rates within a range of 64–76 percent of their maximum heart rate for moderate-intensity exercise and 77–93 percent for vigorous-intensity exercise. In contrast, the American Heart Association recommends

that adults keep their heart rates within a range of 50–70 percent of maximum for moderate-intensity exercise and 70–85 percent for vigorous-intensity exercise. Because children have higher resting heart rates, the recommended target heart rates for adults are generally too high for children.

Heart, organ that serves as a pump to circulate the blood. It may be a straight tube, as in spiders and annelid worms, or a somewhat more elaborate structure with one or more receiving chambers (atria) and a main pumping chamber (ventricle), as in mollusks. In fishes the heart is a folded tube, with three or four enlarged areas that correspond to the chambers in the mammalian heart. In animals with lungs—amphibians, reptiles, birds, and mammals—the heart shows various stages of evolution from a single to a double pump that circulates blood (1) to the lungs and (2) to the body as a whole.

In humans and other mammals and in birds, the heart is a four-chambered double pump that is the centre of the circulatory system. In humans it is situated between the two lungs and slightly to the left of centre, behind the breastbone; it rests on the diaphragm, the muscular partition between the chest and the abdominal cavity.

The heart consists of several layers of a tough muscular wall, the myocardium. A thin layer of tissue, the pericardium, covers the outside, and another layer, the endocardium, lines the inside. The heart cavity is divided down the middle into a right and a left heart, which in turn are subdivided into two chambers. The upper chamber is called an atrium (or auricle), and the lower chamber is called a ventricle. The two atria act as receiving chambers for blood entering the heart; the more muscular ventricles pump the blood out of the heart. The heart, although a single organ, can be considered as two pumps that propel blood through two different circuits. The right atrium receives venous blood from the head, chest, and arms via the large vein called the superior vena cava and receives blood from the abdomen, pelvic region, and legs via the inferior vena cava. Blood then passes through the tricuspid valve to the right ventricle, which propels it through the pulmonary artery to the lungs. In the lungs venous blood comes in contact with inhaled air, picks up oxygen, and loses carbon dioxide. Oxygenated blood is returned to the left atrium through the pulmonary veins. Valves in the heart allow blood to flow in one direction only and help maintain the pressure required to pump the blood.

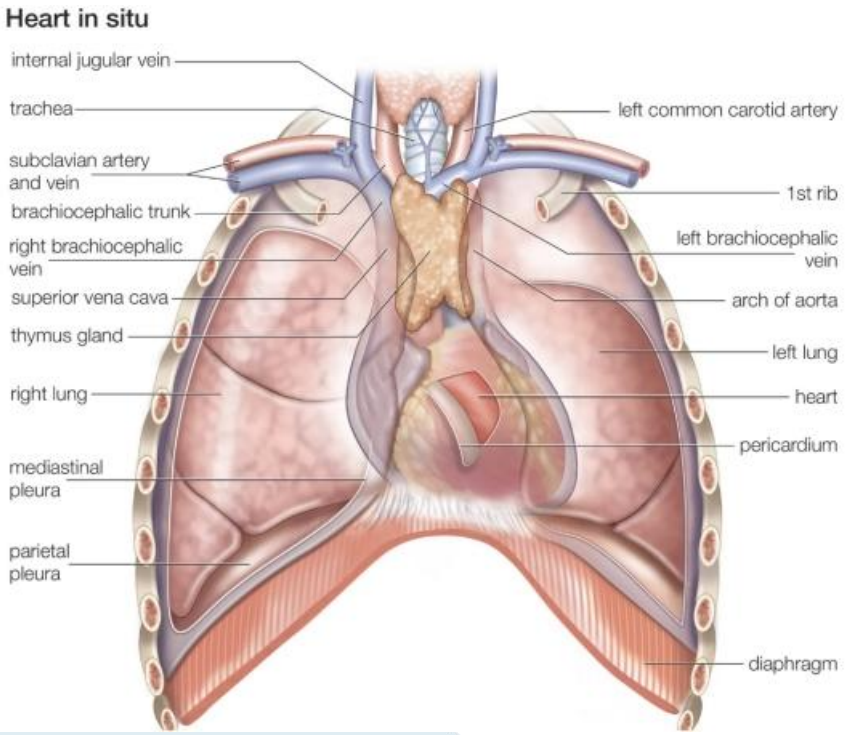
The low-pressure circuit from the heart (right atrium and right ventricle), through the lungs, and back to the heart (left atrium) constitutes the pulmonary circulation. Passage of blood through the left atrium, bicuspid valve, left ventricle, aorta, tissues of the body, and back to the right atrium constitutes the systemic circulation. Blood pressure is greatest in the left ventricle and in the aorta and its arterial branches. Pressure is reduced in the capillaries (vessels of minute diameter) and is reduced further in the veins returning blood to the right atrium.

The pumping of the heart, or the heartbeat, is caused by alternating contractions and relaxations of the myocardium. These contractions are stimulated by electrical impulses from a natural pacemaker, the sinoatrial, or S-A, node located in the muscle of the right atrium. An impulse from the S-A node causes the two atria to contract, forcing blood into the ventricles. Contraction of the ventricles is controlled by impulses from the atrioventricular, or A-V, node located at the junction of the two atria. Following contraction, the ventricles relax, and pressure within them falls. Blood again flows into the atria, and an impulse from the S-A starts the cycle over again. This process is called the cardiac cycle. The period of relaxation is called diastole. The period of

contraction is called systole. Diastole is the longer of the two phases so that the heart can rest between contractions. In general, the rate of heartbeat varies inversely with the size of the animal. In elephants it averages 25 beats per minute, in canaries about 1,000. In humans the rate diminishes progressively from birth (when it averages 130) to adolescence but increases slightly in old age; the average adult rate is 70 beats at rest. The rate increases temporarily during exercise, emotional excitement, and fever and decreases during sleep. Rhythmic pulsation felt on the chest, coinciding with heartbeat, is called the apex beat. It is caused by pressure exerted on the chest wall at the outset of systole by the rounded and hardened ventricular wall.

The rhythmic noises accompanying heartbeat are called heart sounds. Normally, two distinct sounds are heard through the stethoscope: a low, slightly prolonged “lub” (first sound) occurring at the beginning of ventricular contraction, or systole, and produced by closure of the mitral and tricuspid valves, and a sharper, higher-pitched “dup” (second sound), caused by closure of aortic and pulmonary valves at the end of systole. Occasionally audible in normal hearts is a third soft, low-pitched sound coinciding with early diastole and thought to be produced by vibrations of the ventricular wall. A fourth sound, also occurring during diastole, is revealed by graphic methods but is usually inaudible in normal subjects; it is believed to be the result of atrial contraction and the impact of blood, expelled from the atria, against the ventricular wall.

Heart “murmurs” may be readily heard by a physician as soft swishing or hissing sounds that follow the normal sounds of heart action. Murmurs may indicate that blood is leaking through an imperfectly closed valve and may signal the presence of a serious heart problem. Coronary heart disease, in which an inadequate supply of oxygen-rich blood is delivered to the myocardium owing to the narrowing or blockage of a coronary artery by fatty plaques, is a leading cause of death worldwide.



PICTURE 2 , HEART ANATOMY

Tachycardia, a heart rate of more than 100 beats per minute. Tachycardia occurs normally during and after exercise or during emotional stress and represents no danger to healthy individuals. In some cases, however, tachycardia occurs without apparent cause or as a complication of a myocardial infarction (heart attack) or heart disease and is an arrhythmia—i.e., a pathological deviation from the normal heartbeat rhythm. Most arrhythmias are caused by irregularities in the electrical stimuli that cause the heart to beat. Normally these pacemaking stimuli originate in the sinoatrial node. The chief symptoms of tachycardia are fatigue, faintness, dizziness, shortness of breath, and a sensation of thumping or palpitation in the chest. Tachycardia can be terminated by administering an electrical shock to the heart to restore regular heart rhythm or by the administration of such antiarrhythmic drugs as lidocaine, procainamide,orquinidine.

References:

1. Dalimova, M. (2023). ORIGIN AND PATHOGENESIS OF THE CURRENTLY COMMON ALBINISM DISEASE. *Ethiopian International Journal of Multidisciplinary Research*, *10*(09), 378-383.
2. Dalimova, M. (2023). The Importance of The Process of Metabolism on The Body. *Central Asian Journal of Medical and Natural Science*, *4*(6), 373-377.
3. Mukhtorovna, D. M. (2022). Digestive system activity in people of different ages. *Texas Journal of Medical Science*, *12*, 68-71.
4. Mukhtarovna, D. M. (2022). THE ORIGIN OF MIASTHENIA DISEASE AND METHODS USED IN TREATMENT. *American Journal of Interdisciplinary Research and Development*, *10*, 258-261.
5. Nozimjon o'g'li, S. S. (2022). Emergency medical care in case of drowning and measures to restore the patient's health. *Academia open*, *7*, 10-21070.
6. Nozimjon o'g'li, S. S., & Xasanboy o'g'li, A. A. (2021). Quantitative Indicators of Villi Cells in the Intraepithelial Part of the Small Intestine. *EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION*, *1*(2), 19-21.
7. Sayfiyev, H., & Saidova, M. (2023). EFFECTS OF GYMNASTICS ON FUNDAMENTAL MOTOR SKILLS (FMS), POSTURAL (BALANCE) CONTROL, AND SELF-PERCEPTION DURING GYMNASTICS TRAINING. *Modern Science and Research*, *2*(9), 204-210.
8. Khairullayevich, S. H. Development of gymnastics in Uzbekistan and attention to gymnastics. *International scientific-educational electronic magazine" OBRAZOVANIE I NAUKA*, *21*(12), 204-210.
9. Xayrullayevich, S. H. (2023). Use of Acrobatic Exercises and Their Terms In The Process of Teaching Gymnastics. *Intersections of Faith and Culture: American Journal of Religious and Cultural Studies (2993-2599)*, *1*(9), 80-86.
10. Sayfiyev, H. X. (2023). SPORT GIMNASTIKASI ORQALI YOSH BOLALARNING HARAKAT KO 'NIKMASI RIVOJLANTIRISH PEDAGOGIK MUAMMO SIFATIDA. *Educational Research in Universal Sciences*, *2*(11), 300-306.
11. Saidova, M., & Sayfiyev, H. (2023). CONTENT-IMPORTANCE AND PRINCIPLES OF PHYSICAL EDUCATION CLASSES. *Modern Science and Research*, *2*(9), 192-199.
12. Ayubovna, S. M., & Komiljonova, K. I. (2022). Features of Application of Sports Games in Preschool Children. *International Journal of Culture and Modernity*, *16*, 17-23.
13. Saidova, M. (2023). THE CONCEPT OF PHYSICAL QUALITIES. *Modern Science and Research*, *2*(10), 251-254.

14. Sayfiyev, H., & Saidova, M. (2023). EFFECTS OF GYMNASTICS ON FUNDAMENTAL MOTOR SKILLS (FMS). *POSTURAL (BALANCE) CONTROL, AND SELF-PERCEPTION DURING gymnastics. International scientificeducational electronic magazine" OBRAZOVANIE I NAUKA*, *21*.
15. Ayubovna, S. M. (2023). Physiological Basics of Forming Movement Skills and Teaching Sports Techniques. *Intersections of Faith and Culture: American Journal of Religious and Cultural Studies (2993-2599)*, *1*(9), 87-94.
16. CHULIEVA, V. E. (2021). THE PRINCIPLES OF COMMONALITY AND SPECIFICITY IN THE PHILOSOPHICAL TEACHINGS OF BAHA UD-DIN WALAD AND JALAL AD-DIN RUMI. *THEORETICAL & APPLIED SCIENCE Учредители: Теоретическая и прикладная наука*, (9), 566-573.
17. Erkinovna, C. V. (2023). The Philosophical and Mystical Views of Jaloliddin Rumi. *EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION*, *3*(1), 121-124.
18. Chuliyeva, V. E. (2020). THE PROBLEM OF PERSONALITY IN PHILOSOPHICAL AND ANTHROPOLOGICAL VIEWS OF BAHA AL-DIN WALAD AND JALAL AD-DIN RUMI. *Theoretical & Applied Science*, (11), 186-191.
19. Ayubovna, S. M. (2023). Physical Education And Sports Training Are An Integral Part Of A Healthy Lifestyle. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(9), 338-343.
20. Ayubovna, S. M. (2023). Psychological Research Of Coaching Activities In Sports. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(9), 344-352.
21. Ayubovna, S. M. (2023). Physiological Basics of Forming Movement Skills and Teaching Sports Techniques. *Intersections of Faith and Culture: American Journal of Religious and Cultural Studies (2993-2599)*, *1*(9), 87-94.
22. Xayrullayevich, H. (2023). The Initial Exercise of Teaching Methodology to Gymnastics. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(9), 329-337.