



PHYSICAL CHARACTERISTICS OF PULSE OXIMETRY

Urmanova Gulbahor Urunbaevna

Assistant professor of the Tashkent Pediatric Medical Institute (scientific consultant)

Yoldosheva Dilorom Kholboba's daughter

Student of the Tashkent Pediatric Medical Institute

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A pulse oximetry method proposed in the 1970s is based on the principles of photoplethysmography, a method based on the property of light absorption to determine the oxygen saturation level of arterial blood.

The method of recording the amplitude of blood volume fluctuations in the vessels by transillumination (illumination with light rays) of a part of the tissue is called photoplethysmography (from the Greek "photo" - light, "plethysmos" - filling, "grapho" - writing, imaging). The research device is called a photoplethysmograph.

Photoplethysmograph is a device that detects changes in human organs and tissues using light-sensitive elements. It can be used to measure pulse. In this case, a change in the intensity of light from an artificial source is recorded due to the oscillation of the pulse wave. This method allows the use of spectrophotometry. According to the photoplethysmography technique, the surface of the tissue where the blood flow is studied is placed in the path of the light rays between the radiation source and the sensor photodetector.

The image recorded by the sensor in the pulse oximetry method is called a photoplethysmogram. The narrowing and expansion of the vessel under the influence of arterial blood flow pulsation leads to a corresponding change in the signal amplitude from the photodetector. A photoplethysmogram obtained after amplification and processing of the photodetector signal describes the functional state of blood flow. A photoplethysmogram obtained after amplification and processing of the photodetector signal describes the functional state of blood flow. When pressure decreases or vasoconstriction occurs, the amplitude decreases. A photoplethysmogram can also show the development of hemodynamic disorders of the studied vascular system. Therefore, the photoplethysmogram is displayed on the graphic display of the monitor in clinical diagnostics. A photoplethysmogram records the changes that occur when the small vessels are filled with blood, depending on the phase of the cardiac cycle; controls the activity of the cardiovascular system; serves to analyze the functions of the cardiovascular system in medical research.





The pulse oximeter consists of a red and infrared diode lamp, a photodetector, a processor, connectors for connecting to a computer and other equipment, an internal memory device and a display. A photodetector or photosensor is a light or other electromagnetic energy sensor. The electrical signal produced by the photodetector depends on the light incident on the device. That is, when it is exposed to more or less electromagnetic radiation, it produces one or another signal that can be interpreted and the amount of this radiation is measured. A pulse oximeter is a small device designed to measure a person's heart rate (heart rate) under various conditions. Pulse oximeters are lightweight devices that come in a variety of shapes and sizes and are placed on a finger capillary.

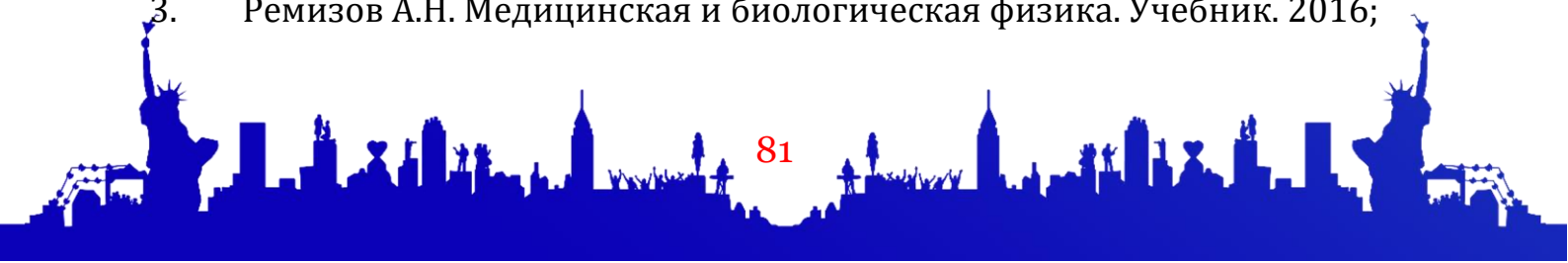
Professional three-sensor Mindray PM-60 Pulse oximeter is a unique modern device with the functions of continuous or selective monitoring of heart rate and SpO₂ concentration. This model is unique because it can be used with adults, children and newborns. The pulse oximeter is equipped with a 2.4-inch LCD display and is widely used in the clinic to obtain convenient and high-quality information.

So, based on the above, it can be said that the pulse wave is the rhythmic oscillation of the blood vessels as a result of the contraction of the heart, i.e., expansion and contraction. In a broader sense, pulse refers to any changes in the vascular system associated with heart activity. Therefore, the pulses of the aorta, artery, arterioles, capillaries and veins are distinguished in the clinic, and it is important to study their physical properties.

Arterial pulse is a rhythmic oscillation associated with changes in the blood supply of the walls of the arteries. Generally, the wrist artery pulse is of greatest practical importance; Venous pulse - the pulsation of the neck veins, as well as the vibration of a number of other large veins located near the heart; Capillary pulse - the appearance of a capillary pulse is associated with an increase in the difference between systolic and diastolic pressure, that is, an increase in pulse pressure.

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