## Definition of the phenomenon, its meaning, physiology, and pathology

This study examines ventilation-perfusion relationships, determinants of respiratory physiology, which directly show the concentration of oxygen and carbon dioxide in human blood (Ref-s928444). The main indicators are V and Q:

So, the indicator of the ratio of the two indicators determines the ratio of volumetric flows. Volumetric flows are the amount of air reaching the alveoli per minute to the amount of blood reaching the alveoli in minutes (Ref-f490818). Measured by ventilation/perfusion. Inconsistency of indicators can lead to respiratory failure type 1 (Ref-f490818). The ideal indicators for the human body in dry air are 0.95, with humidified air, the ideal indicators are 1.0 - the correspondence of ventilation and perfusion. A typical value is 0.8 (Ref-f490818).

### Pathology

With abnormalities in the ventilation-perfusion relationship, a shunt or dead space may occur. Shunt - area with perfusion, but no ventilation (V/Q = 0); Dead space is an area with ventilation but no perfusion (V/Q not defined). With impaired pulmonary gas exchange, which causes a low arterial oxygen partial pressure, there is a lower V/Q ratio. It is observed in asthma, chronic bronchitis, acute pulmonary edema, and hepatopulmonary syndrome (Ref-f872844). With an incrеased V/Q ratio, arterial oxygen partial pressure, tachypnea, and dyspnea are observed. As a rule, it is observed with pulmonary embolism or with emphysema. Thus, these indicators play an extremely important role in respiratory care.

## Description of the application of this phenomenon to respiratory care and medicine

In respiratory care and medicine, the ratio of the ventilation-perfusion ratio plays an important role in determining the oxygen levels in the blood for the timely provision of care to the patient with insufficient oxygen in the blood. In pathologies such as asthma, chronic bronchitis, acute pulmonary edema, and hepatopulmonary syndrome, which means a low V/Q index, pulse oximetry is performed to clarify the condition, and, then, oxygen therapy and an endotracheal tube is installed to supply a sufficient level of oxygen to the blood (Ref-f570479). In other pathologies, with an increased V/Q index, oxygen is prescribed as needed to maintain PaO2 within 60–80 mm Hg (up to 100% saturation) and direct efforts to eliminate the cause (Ref-f570479).

It plays an important role in the ambulance of patients, saving lives and alleviating symptoms for improved treatment and more effective medical intervention when needed. It is manifested in cases with Covid-19.

The benefits of technology and how advances in medicine and technology have changed the uses and consequences of using this process in medicine

Respiratory medicine is one of the most dynamically developing areas of global health care (Ref-u918289). The increase in the prevalence of respiratory diseases is due to many factors: smoking, both active and passive; general gas pollution and dustiness of atmospheric air; the so-called indoor factors - indoor air pollution during heating and cooking with bioorganic raw materials, continued gas pollution from automobile exhaust; as well as frequent infectious conditions. The technological process and development of respiratory medicine made it possible to improve the level of diagnostics and most accurately use the ventilation-perfusion ratio indicators to determine the level of oxygen in the blood and further help the patient.