

# Difference Between Perfusion and Diffusion

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## Key Difference - Perfusion vs Diffusion

Perfusion is the phenomena where a fluid flows through the [circulatory system or the lymphatic system](#) to an organ or a tissue. Normally it is described as, the flow of blood to the capillary bed of a tissue. Perfusion is extremely important after a cardiothoracic surgery to maintain a healthy [blood](#) flow to [tissues](#) which is normally managed by health professionals. August Krogh won the Nobel Prize in 1920 for describing blood perfusion in skeletal muscle cells.

[Diffusion](#) is a general term which could be applied in different occasions. Generally it is termed as the movement of particles or waves from a region of higher concentration to a region of lower concentration. Diffusion is also described as the passive movement of particles along a concentration gradient. But in medical terms, diffusion usually refers to the diffusion of gases between alveolar capillaries. While in the [alveoli](#) capillaries [oxygen](#) is diffused from alveoli to blood, similarly, carbon dioxide from blood into the alveoli. The **key difference** between perfusion and diffusion is, **perfusion is the blood flow through a certain mass of the tissue in a unit time whereas, diffusion refers to the passive movement of particles along a concentration gradient (gas exchange in alveoli).**

## What is Perfusion?

The word perfusion was coined from a French word “perfuse”, which means “to pour over or through”. Perfusion is generally termed as the flow of fluid through circulatory system or lymphatic system to a tissue or an organ. This is usually referred to the blood flow to the capillary bed of the tissues. All animal tissues need sufficient blood supply for a healthy life. Mal perfusion of it causes conditions like ischemia, coronary artery disease and deep vein thrombosis. The tests that are normally performed by a perfusionist (medical or emergency personnel), to verify the adequate perfusion, is an integral part of the patient assessment. The tests include measuring body’s skin color, temperature, other conditions such as, appearance and the capillary refill. Clinical perfusionists are sometimes clinical scientists or medical doctors who use cardiopulmonary bypass machine during major [heart surgeries](#). They play a pivotal role in the [heart](#), [liver](#) and [lung](#) transplantations by helping the patient’s recovery.

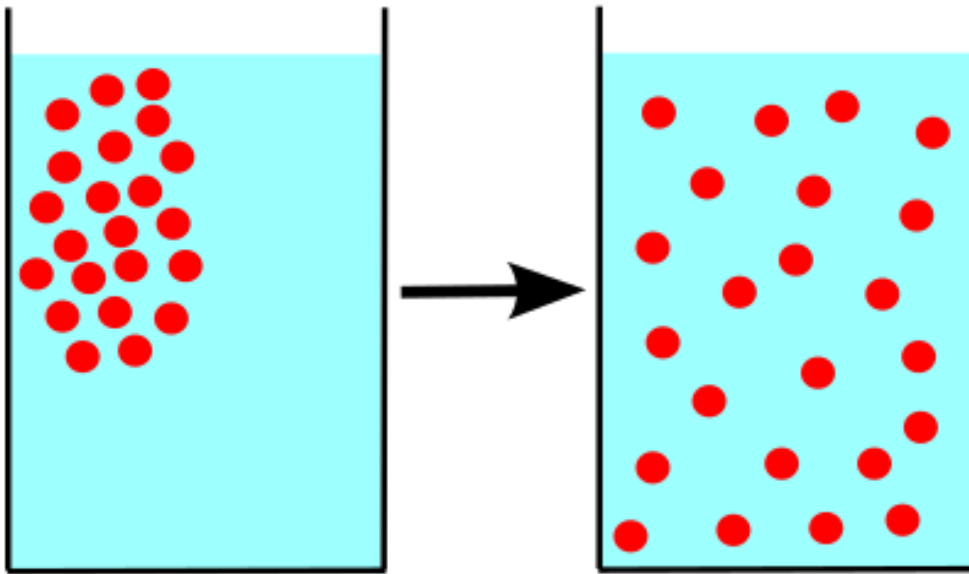


**Figure 01: Perfusion**

In 1920, August Krogh was the first to explain the adaptation of blood perfusion in [skeletal muscles](#) and other organs according to the demand, through the opening and closing of [arterioles](#) and [capillaries](#). The terms, 'over perfusion' and 'under perfusion' refer to the average perfusion that exists across all tissues in an individual body. For example, the heart is always in over perfusion because of its activity. Many [tumors](#) are also in the over perfusion state. Hypoperfusion can be caused when an artery is blocked by an embolus where little or no blood reaches the tissue. However, hyperperfusion can also be due the conditions like [inflammation](#). Perfusion is generally measured by microspheres that are labeled with radioactive [isotopes](#) which have been using since 1960S'. It measures the radiation of the tissue of interest.

## What is Diffusion?

Diffusion is described as the tendency of molecules to spread into an available space in order to occupy the particular space. Gases and molecules in a liquid can be diffused from a higher concentration environment to a lower concentration environment. The cellular energy is not expended for diffusion thus, it is known as a passive process. Moreover, it is spontaneous.



**Figure 02: Diffusion**

A number of naturally occurring process relies on diffusion. Respiration involves the diffusion of gases. In the lung the carbon dioxide diffuses form the blood into the air of the lung alveoli. The oxygen is diffused from the air into the blood that joins [red blood cells](#). Diffusion also occurs in the plants when [photosynthesis](#) process takes place. This usually occurs in the plant leaves by gaseous exchange.

## What are the Similarities Between Perfusion and Diffusion?

- Both processes are involved in the particle flow.
- Both processes are vital for human survival.
- In animals, in both cases the circulatory system is involved and it is vital for these processes to take place correctly.

## What is the Difference Between Perfusion and Diffusion?

Perfusion vs Diffusion	
Perfusion is the blood flow through a certain mass of the tissue in a unit time.	Diffusion is the passive movement of particles along a concentration gradient.
Occurrence	
Perfusion takes place in animals.	Diffusion takes place in both animals as well as plants.
Involvement of the Concentration Gradient	
Perfusion does not take place along a concentration gradient.	Diffusion takes place along a concentration gradient.
Distance	
Perfusion is an efficient transport system of molecules over long distance.	Diffusion is an efficient transport system of molecules over short distance.
Active or Passive Process	
Perfusion is an active process that needs metabolic energy.	Diffusion is a passive process.

## Summary - Perfusion vs Diffusion

Perfusion is the flow of a fluid through the circulatory system or a lymphatic system to an organ or a tissue. Normally it is described as the flow of blood to the capillary bed of a tissue (from heart to lung). Diffusion is described as the passive movement of particles along a concentration gradient. It is also termed as the movement of particles or waves from a region of higher concentration to a region of lower concentration. The difference between perfusion and diffusion is, perfusion is the blood flow through a certain mass of the tissue in a unit time, and on the contrary, hand diffusion refers to passive movement of particles along a concentration gradient

### Reference:

- 1.“What is PERFUSION? What does PERFUSION mean? PERFUSION meaning, definition & explanation.” YouTube, YouTube, 10 Mar. 2017. [Available here](#)
- 2.“Perfusion.” Wikipedia, Wikimedia Foundation, 17 Oct. 2017. [Available here](#)

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- 1.'Lindbergh perfusion pump in Putnam Gallery, 2009-11-24'By Sage Ross - Own work, [\(CC BY-SA 3.0\)](#) via [Commons Wikimedia](#)
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