

Who said the blood “circulates” in your body?

By Bruno Chikly, MD, DO

Every so often a new model comes into play that revolutionizes the concepts and perceptions of our body and obliges us to let go of old dogmas. Did you know that a few medical schools in the US welcome their new medical students by telling them that they know about 50% of what they are going to learn is not correct, but they just don't know which 50% it is.

Staying current on the latest updates is an education in progress. One of the foundations of our modern physiology is that the blood circulates within its 150,000 km of blood vessels (more than 90,000 miles). Western civilization has proudly held this as a fact since William Harvey discovered it in England in 1626. Incidentally his discoveries took place just a little bit after Aselli officially identified the presence of lymphatic vessels in animals (1622).

In LDT and the brain curriculum we work with numerous fluids, including blood, lymph, interstitial fluid, synovial fluid and other body fluids. We know lymphatic vessels “circulate” inside the body. To be correct these vessels don't transport lymph in a full circle like blood; so for the lymph system as well as for the cerebro-spinal fluid (CSF) we could more properly say they “fluctuate” rather than circulate.

We know the blood “circulates” water, minerals, more than 500 different proteins and especially oxygen and other gases to our tissues. The total volume of blood in our body is about 5 liters. It is sent with high pressure from the left ventricles to the rest of the body (120-140 mm Hg or mm of mercury). In fact, the heart contractions actually eject only 50 to 60 ml of blood at each contraction. This is barely a small glass of good wine!

We now know the heart is not simply a mechanical pump because its power cannot be strong enough to propel blood through approximately 300,000 meter square of blood vessels. More than a mechanical pump to help circulate blood, the heart is actually more of a “pressure pump” that maintains pressure inside the system so the blood vessels don't collapse. But this pressure also is what sustains the movement of water/fluid and small components, such as minerals, neuropeptides, hormones, oxygen, etc.

Every physiology book agrees that the speed of RC is not the same in every part of the blood vessels. Bernard Vial, MD helped us remember how Doppler identified the extremely slow speed of red blood cells or erythrocytes corpuscles (RBCs) in the terminal parts of the blood system. In the capillaries the speed of

the RBCs is about 700 microns per seconds. This is extremely slow moving, about 2.52 meters (8.2 feet) per hour inside the body. This is a minute distance compared to the length of the entire system, as we previously mentioned the 150,000 km of blood vessels.

For the manual therapist the blood capillaries should be one of the most important regions of the body. It is the location of very important exchange, between blood, interstitial fluid, lymph happening within a connective tissue matrix filled with glycoaminoglycans, fibers and many critical cells.

The red corpuscles are often larger than the diameter of capillaries. They will have to deform themselves in order to pass through these small blood vessels, which can provoke an important accumulation of RBCs in many areas of the body. Yes, the speed of blood is high in the initial large blood vessels but this speed slows down extremely in small blood vessels. This flow can even completely stop. It can also sometime reverse itself entirely in some blood anastomoses such as in some areas of the face and neck or cranium (i.e. the circle of Willis).

It is not a common conception to imagine the blood moving very slowly or stopping in many parts of the body. Yes, we can visualize the important movement of blood at the beginning of the system but we need to rather see a mechanism of pressure rather than movement at the end as the blood enters smaller arteries. If we cut a blood vessel in one extremity we will see the blood “gush” away from our body but this can also be explained by a high pressure system rather than a high circulatory system.

I hope you can now see this high pressure facilitating exchange of smaller particles, communicating pulses, rhythms, spreading information in our tissues connected with other rhythms in our bodies and with the whole environment.

Every time we gain new information and insights, we have the possibility to shift our awareness and help widen our understanding of the world. *Stay tuned to the next exciting Newsletter where I will present articles with **new SCIENTIFIC conceptions of cerebrospinal fluid.***

Fluid studied in the LDT curriculum

- Lymph and interstitial fluids are discovered within our beginning LDT classes
- Synovial fluids are discovered in LDT3, LDV1 and LAFR (Lymph Articulation Fluid Release) with all the articulations/joints techniques

- Indirectly we work with the aqueous and vitreous humor as well as endo/perilymphatic fluids in LDT3 working with the organs of senses

Fluid studied in the Brain curriculum

- Arteries and veins and their control by the Autonomic Nervous System are studies in Brain 3 and especially in the neurovascular classes (BNV).

- Some cerebro-spinal fluid (CSF) rhythms are reviewed in the initial brain classes

Composition of blood

Blood is made up of:

-55% plasma

Mainly water (90-92 %) that contains more than 500 dissolved proteins (i.e. albumins, globulins and fibrinogen). It also contains chemical substances such as neuropeptides, hormones, antibodies, enzymes, glucose, fat particles, salts, etc.

-45% formed elements. 99% of these elements are red blood cells (RBCs), the other 1% are mainly white blood cells and platelets.

RBCs, also called erythrocytes are round biconcave shaped cells that look like the wheel of a car with a depressed surface at the center. The RBCs constantly need to change their round shape in order to enter numerous blood capillaries. RBCs transport mainly oxygen and carbon dioxide molecules to the cells. This task is produced by hemoglobin an iron containing protein that gives blood its red color.