

Meridian and Evolution of Circulation System

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Abstract

Larger body size is a major trend in animal evolution. To achieve further 3dimensional increases in size, it is necessary to employ internal transport and exchange systems (i.e. circulatory systems) to provide bulk flow delivery of substances. Previously, we discuss the meridian and water transportation in living organism and emphasis the meridian provides important function for fluid circulation. Meridian increases the efficiency also solves the circulation problem. The most important evolution of transportation in living organism is the circulation system, as known as from open system for insects and to close for mammal, one internal circulatory systems for aquatic animal and to two for land animals, irregular contraction of myoepithelial cells to periodic pulsatile heartbeat, vessel spaces are lined only by matrix to a secondary cell lining, termed endothelium in Vertebrates, without lymphatic system to with, simple diffusion through the skin to metal ioncontaining respiratory pigments, etc.. However, these concepts could not explain the difference of mammal from rat to human and the division between closed and open system is not always clearcut. Conversely, the closed system of vertebrates contains vascular beds, such as the sinusoids of the liver, spleen, and bone marrow, where there is direct contact between blood and the interstitial space. In hemochorial placentation (Ex: In primates), the maternal spiral arteries become openended, and blood is released into a placental labyrinth where it bathes the chorionic villi and is drained by the spiral veins. Such an arrangement is highly reminiscent of an open system. Meanwhile, the gap between plant and animal is even huge beyond these concepts.

Keywords: Animal evolution; Lymphatic system; Blood; Circulatory system; Chinese medicine

Introduction

The circulation system in Chinese Medicine is not only cardiovascular system, but also including the fluid recycle system [1-3]. Meridian concept provides us an ideal and economic guide role to diagnosis illness of human and animal moreover discover new drugs from herbs and compounds in the neighbourhood region. Through the harmonics of blood pressure pulse, we could quantitatively measure the meridian for physiological, pathological and pharmacological condition [4]. Meridian concept reflexes the efficient design of radial resonance in Hemodynamic [5]. Water, is the essential element of life. From aquatic to land animals, the keratinized epidermis developed for water preservation. The change also occurred in the circulation system, the oxygen no longer could be obtained directly from water pushes pulmonary circulation development. Right heart and pulmonary vascular system build the environment for gas exchanging and solve the problem of evolution from environment change. The circulation system leads and cooperates with the molecular components to achieve the physiological function. This dramatic shifts repeat in the birthday of every newborn land animal. If the circulation system defects happened, such as Tetralogy of Fallot or Transposition of Great Arteries, the molecular components could not compensate, the cyanosis occurred. It means the molecular components unable to meet the broken physical boundary condition, just like the fish suffers hypoxia on land. The vertebrates have close circulatory system, more complicated for more effective water usage. However, the exchange and recycle of intracellular and extracellular fluid is not independent from

cardiovascular system. If viewing them as a whole which all are fluid transportation system, just like Chinese Medicine, we could well realize the steps of revolution and the reasons for herbs treating disease of animal.

The interstitium contains three fourth extracellular fluids all over the body out of the vessels. Recent studies [6] remind us the importance and true histology of the interstitium, the structure that beneath the skin, mucosa, fascia, is not just a dense structure of collagen fibers, fibroblasts, but abundant extracellular fluid used to loss during tissue excision and fixation. The spongy, fluid-filled structure also corresponds to immune system and cancer spread.

How to make the water move more efficiently "In mammal body"? The arterial pressure waves propagate in radial direction in the aorta; the aorta and the closely attached organ can produce coupled oscillation to form resonance circuit [7-9], then the blood flow into organs or distal tissue, microcirculation, interstitium, and then draining by veins, lymph system. Zhang et al. found there are low hydraulic resistance channel along meridians, similar to the character of the interstitial space [10]. The structure of the interstitium full of fluid is beneficial to harmonic arterial pulse wave propagation. When mammal revolution, the circulation system change little in structure and molecule design, it must increase the harmonic numbers to raise the efficiency, so we can find 6 harmonics in rat blood pressure wave and 12 in human.

The mathematic and physic meaning of harmonics generating is equal to increase dimension of engineering possibilities. The more harmonics generate, the more meridians conduct and the efficiency raise. These engineering designs of meridian are also found in plant.

Even watermelon can detect meridian line on the surface with neural crest [11], no wonder we can treat disease by eating herbs [12,13]. The meridian generation process is also well developing from simple plants to complicated species with similar structure and molecular designs in animals. The meridian design is universal from plant to animal, from astral to atom because the physical basis behind meridian design is resonance the way this world utilizes energy. Meridian, being the fluid transportation system or water channel, is the most important energy consumption source which revolution should focus on.

For example, derived BMX from *Osthoe* exists in many plants belong to *Apiaceae* Lindl, such as *Ligusticum sinense*, *Angelica pubescens*, *Notopterygium incisum* Ting, etc. These similar herbs are all recorded the function on neural system and entering brain in the classic literature of Chinese Medicine. This compound can pass the blood brain barrier to the neurons in central nervous system, own specific chemical structure to penetrate the barrier and physic property transmitting efficiently in the extracellular fluid of the interstitial space or meridian. The efficiency of the exchange of molecules and drugs in this space is higher and more selective than diffusion. The fundamental harmonic or the first meridian dominates the blood perfusion of the most important brainstem which should always keep stable within 10% until dying process [14,15]. No doubt that BMX is also specific HDAC8 inhibitor which effect on histone for gene expression. During evolution process, the structure and molecular design face the similar problem, no matter plant or animal. The pharmacology behind the herbs about specific distribution [16] is the physiologic design of resonance in the whole circulatory system including the cardiovascular system and interstitium, called meridian in Chinese Medicine.

Conclusion

In conclusion, the meridian is the fluid transportation system for the original circulation system act as the foundation of other system, such as immune system, metabolism system, endocrine system, etc. During the evolution process, cardiovascular system, lymph system and endothelium step by step specializes from interstitium. This process combine structure and molecule design both in plant and animal to solve the problem of exist. These problems could emerge to man or animal as disease or illness when environment change, so we can obtain rescue from herbs rich in specific compounds for the problem solving, even find the compounds from similar tissue which own the same structure. New drugs development from herbs should pay attention to meridian. Because meridian is the primary fluid

transportation system providing basis for other system to build, during this process the evolution develops efficiently on the usage of water and energy for transportation, both in animal and plant.

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