

Meridian and Interstitium

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Abstract

Meridian concept provides us an ideal and economic guide role to discover new drugs from herb and compounds. Through the harmonics of blood pressure pulse, we could quantitatively measure the meridian for physiological, pathological and pharmacological condition. Meridian concept reflexes the efficient design of radial resonance in Hemodynamic. However, the circulatory theory in Chinese Medicine is not only cardiovascular system, but also including the fluid recycle system.

Keywords: Blood pressure; Chinese medicine; Cardiovascular system; Circulatory system

Introduction

Water is the essential element of life. No living whether plants, animals or human can survive without water for a short time [1-3]. In the theory of biological evolution, one of the important differences from land animals and aquatic animals is the keratinized epidermis for water preservation. Unicellular organism, arthropods have open circulatory system, and as growing larger, the vertebrates have close circulatory system, more complicated for more effective water usage. The average adult human body is 65% water. The percentage of water in infants is much higher, typically around 75% water. The function of the water, of course, brings the oxygen, mineral materials, nutrient and even drugs to the every single cell. The exchange and recycle of intracellular and extracellular fluid is not independent from cardiovascular system.

The interstitium contains three fourth extracellular fluids all over the body out of the vessels. Recent studies 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 [4].

How to make the water move? The mighty water of the ocean was moved by the forces of lunar gravity, winds, earthquakes, all of the forces are transmitted by the form of wave. The same question, how to make the water move "in human body"? The traditional theory says heart pumping and blood pressure driven the blood flow, but in fact, pressure pulse can also generates pulse waves. The arterial pressure waves propagate in radial direction in the aorta [5]. The aorta and the closely attached organ can produce coupled oscillation to form resonance circuit [6,7], then the blood flow into organs or distal tissue, microcirculation, interstitium, and then draining by veins, lymph system. Zhang et al. [8] found there are low hydraulic resistance channel along meridians, similar to the character of the interstitial space [9]. The structure of the interstitium full of fluid is beneficial to

harmonic arterial pulse wave propagation. The intracellular fluid, extracellular fluid in the interstitium resonances with arterial pressure pulse waves and moves periodically to exchange oxygen, nutrient efficiently. Wang et al. found that resonant arterial pressure pulse waves can be strengthen and transmitted in those meridians [10]. This mechanism explains why the low-energy heart can nourish the high pressure-resistance tissue, muscle, bones, and the 180-degree turned aortic arch which cannot attenuate the force. The hypothesis pointed out that resonance pulse wave should actually be the force driven water moves and fluid recycles. This is the basic rule of the distribution for the molecules and drugs to specific tissue or organ because the different group of tissue owns different resonant frequency or harmonic of blood pressure [11,12]. For example, the compounds can pass the blood brain barrier to the neurons in central nervous system, own specific 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 brainstem keeps stable within 10% during dying process until hours near dead [13,14]. The pharmacology behind the herbs of Chinese Medicine about specific distribution is the physiologic design of resonance in the whole circulatory system including not only the cardiovascular system but also interstitium [15,16].

Conclusion

In conclusion, the interstitium is part of the circulatory system, where rich fluid component and low hydraulic resistance channel of meridian locates. The fluid of humans, animals, and other organisms circulates periodically not only driven by pressure but also pressure pulse waves, as the wave in the ocean without exception. New drugs development about tissue selectivity and pharmacokinetics should pay attention to the whole circulation system including cardiovascular organs and interstitium. It is the reason why meridians are so important in pharmacology and physiology.

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