

Anatomical Discovery of Meridians and Collaterals

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BACKGROUND Meridian theory is a fundamental of traditional Chinese medical science. The interpretation of the anatomical substance of meridian is a long-term aim of the scientific community. With further in-depth study of the meridian, the majority of scientists are aware that the fascia and connective tissue correlate with the meridian acupuncture points. However, the existing system of regional anatomy and systematic anatomy study cannot fully explain the anatomical issue of the meridian. Many researchers found that the distribution of acupuncture points and meridians of the body are closely related to the fascia connective tissue. During evolutionary process of organisms from simple to complex, from extracellular matrix of the single layer organisms, middle lamella of two germ layers organisms, mesenchyma of the three embryonic layer organisms to the higher animals, the body's connective tissue are all homologous structures. According to these biological patterns, organisms can be divided into both the functional system which consists of differentiated cells as well as the supporting and storing system which is composed of undifferentiated cells. Human body consists of supporting and storing system which is derived from the non-specific connective tissue and functional system which is composed of differentiated cells. This method of research which is based on these two systems and investigates the structure of human body is called fascial anatomy. The research field which is based on the relationship of the two systems is called fasciaology. It puts forward a new perspective of research and lays the biological foundation of the theoretical research of traditional Chinese medical science.

METHODS 1. The study of digital human being. The virtual meridians and points had been constructed through the mark, dissection, reconstruction and perspective processing on the fascia converging areas of the trunk and limbs based on the digital dataset of VCH-M1 (Virtual Chinese Human-Male1) and VCH-F1 (Virtual Chinese Human-Female1). 2. The creation of computerized auto-marks. We extracted the muscles and eliminated noise, detected the edges and found the convex hull of the muscles edge and marked the interstitial connective tissue points in the cross section images from the digital dataset of the left leg of VCH-M1. The auto-marked images were reconstructed by 3D-DOCTOR. 3. CT imaging. 4. MRI imaging.

RESULTS The result shows that marks at three-dimensional reconstruction between human limbs and muscle in the part of connective tissue areas show strong consistency with the meridian running in the structure of the image. This together with our anatomy observation on cadaver specimens of the meridian acupuncture points confirmed that the distribution of the human body meridians and points are in connective tissue where they can generate strong biological information at the site.

CONCLUSION In this study, we found that the anatomical basis of the meridians is the fascial network of human body. The histological composition of Meridian is the non-specific connective tissue (including loose connective tissue and fat tissue). Acupuncture points are the parts which produce strong biological reaction when stimulated. A new anatomical approach and academic research are put forward. In view of fascial anatomy, human body is constituted of a supporting and storing system which is composed of non-specific connective tissue network and a functional system which is composed of differentiated cells. The study on supporting and storing system as well as the mutual relationship between the supporting and storing system is called fasciaology.

DISCLOSURE The work described in this paper was supported by the following funding agencies: The National Basic Research Program (also called 973 Program) (Grant No.2007CB512705). National Natural Science Foundation of China (Grant No.30801464). National Hi-tech Development Program of China (863 Program) (Grant No.2001AA231031, 2002AA231021) and Key Sci-tech Research Project of Guangdong Province (Grant No.2002B30611).

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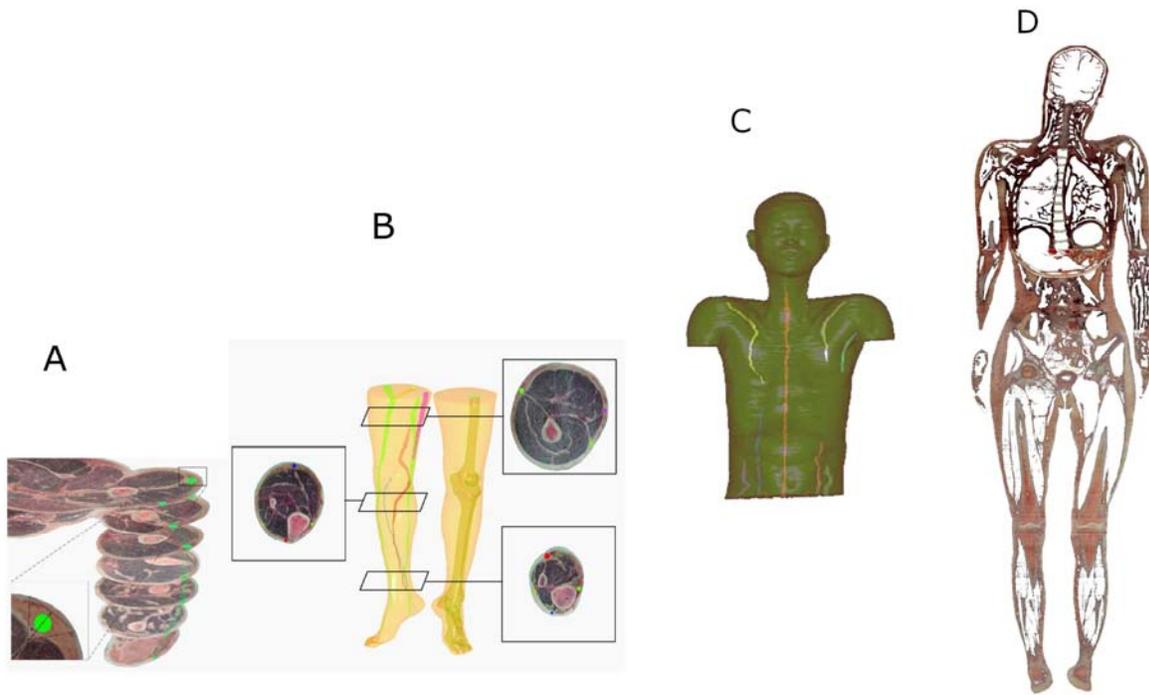


Fig. 1

The connective tissues in VCH images were marked and their 3-D structures were rendered (Fig. 1A to C). When fascia connective tissues of the whole body were marked and their 3-D structures were rebuilt, a complete fascia network was observed as in the Fig. 1D.

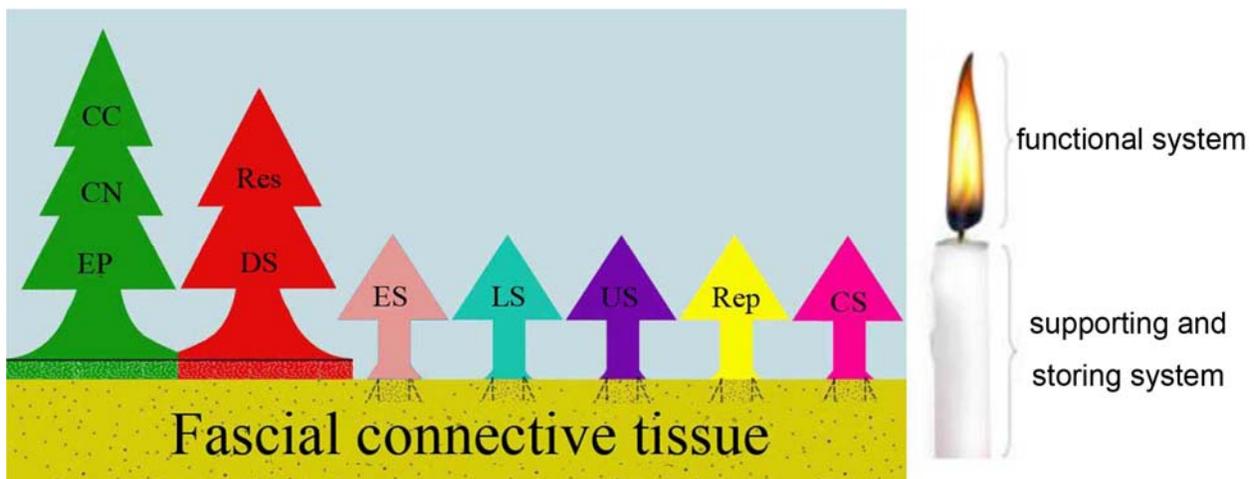


Fig. 2

CC: cerebral cortex; CN: central nerve; EP: epidermis; Res: respiratory system; DS: digestive system; ES: endocrine system; LS: locomotor system; US: urinary system; Rep: reproductive system, CS: cardiovascular system, FCT: Fascial connective tissue. We can see in this schematic diagram, the living condition of an organism is just like a lightening candle, the fascial system (unspecialized connective

tissue network) is equivalent to the stick of a candle and the functional system is equivalent to the flame of a candle.

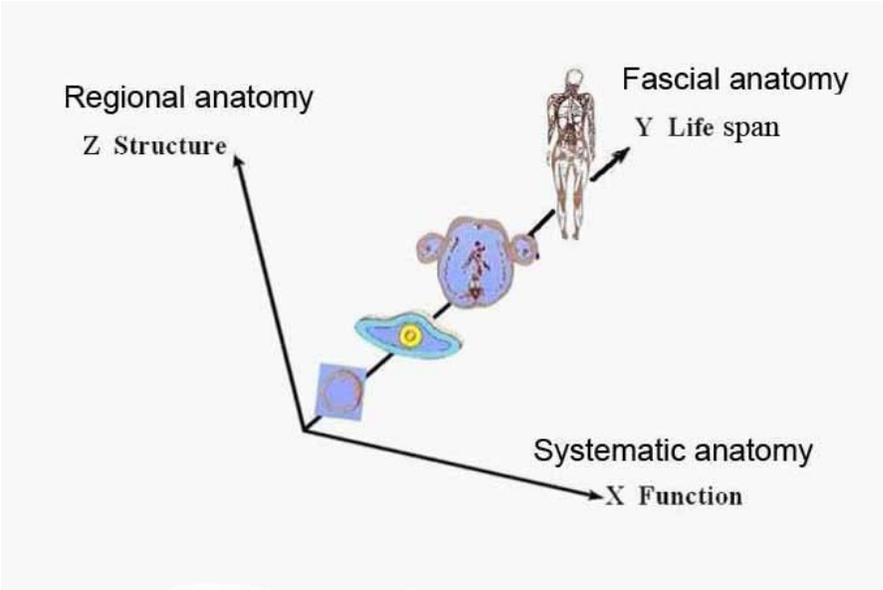


Fig. 3
The relationship between the fascial anatomy and systematic anatomy, regional anatomy.