

The two-way feedback and passing-way of human body

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Abstract: Two-way feedback of human body was published in 1992. The sensation of two-way feedback of body is a special system of human reaction, which maintains and regulates symmetry and balance of human body. The human two-way feedback reacts to human health. For human overall health and delay decrepitude, it is necessary to pay attention to the stimulations (passive acceptance and initiative interventions) and relevant influences in human body and the stimulative effect. In this paper, the experimental research of stimulation and an example of two-way feedback in human body are given. And lay a foundation of prevention, medical treatment and hygiene of human overall health.

Key words: two-way feedback of human body; stimulation; meridian point; meridian; acupuncture; mechanical model of passing track of human body; human hygiene; overall health; comprehensive medicine

1 The two-way feedback of human body

The human body has features, which are both symmetric and asymmetric. The symmetric features contain asymmetrical elements and in the asymmetric features you can find symmetry. Both are coexisting in the human body. Similarly balance and imbalance co-exist and can mutual change in the human body to maintain life and vitality^[1, 2]. The appearance of two-way feedback is a special system of reaction, regulation and maintenance of symmetry and balance. The disease instinctive and direct reflection to the one or several relevant local positions (or points) is the positive feedback. Stimulation one or more relevant local correct positions (or points) at human body to relieve the patient's symptom are the negative feedback, which is the passive reflection^[3]. Of course, relevant local point includes the pain area of body. The appearance of two-way feedback was confirmed by studies on different age, sexual and race of people^[3-5]. The direct reflection to local position is a method of diagnostic reference, and the negative feedback is a method to alleviate the patient's symptom or pathogenesis.

2 Lower resistance points of subcutaneous

By measuring the electric resistance of human body in 1978, Zhang and Yang^[6] discovered lower resistance point under-skin of human body. Lower resistance points were connected into lines which reveal a diagram, and it was found that they had common char-

acteristics, symmetrical characteristics and uninfluenced by time and found the lower resistance point just in the acupuncture point area (Xuewei (穴位)) of traditional Chinese medicine. So, Ref. [6] proposed the meridian (Jingluo (经络)) of traditional Chinese medicine with physical character of lower resistance. Fig. 1 was lower resistance diagram of human shank^[6]. From experiments in Ref. [7], it is indicated that lower most resistance point of the acupuncture point area could use as a reliable auxiliary index to determine the meridian point at the acupuncture point area of traditional Chinese medicine under-skin of experimental men and animal. So the lower most resistance point which at the acupuncture point area is the physical parameter point of meridian. The lower most resistance point under-skin was called meridian point by Ref. [7]. If the meridian point in an acupuncture point area of traditional Chinese medicine, then we call the "acupuncture point area" meridian point.

Fig. 2 shows the resistance of acupuncture point area of Zusanli (足三里) in men, cat and dog, and acupuncture point area of Neiguan (内关) in rabbit^[7], the ordinate: 1—meridian point, 2~5—surrounding points in an acupuncture point area, the abscissa—impedance (k Ω).

3 The relation between meridian, cortex and viscera

Stimulation Zusanli meridian point alimentary conditional reflex in dog and stimulation Neiguan meridian

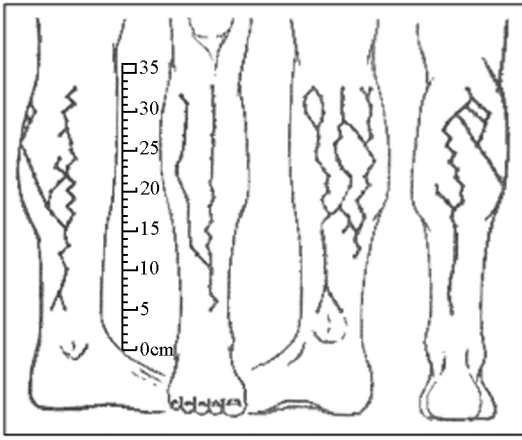
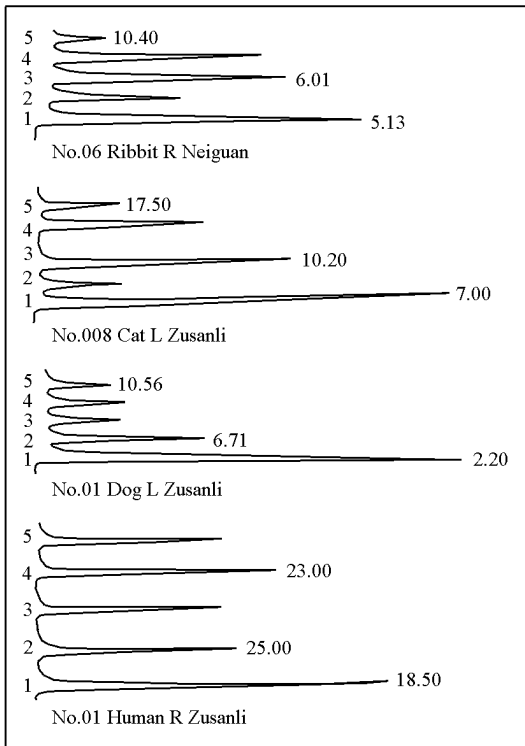


Fig. 1 Lower resistance diagram of human shank



Abscissa—impedance / $k\Omega$
1—Meridian point; 2 ~ 5—Surrounding points

Fig. 2 Lower most resistance points in acupuncture point area of men and animals

conditioned reflex in blood vessel of human Neiguan meridian point. There were strong systolic in blood vessel when stimulate the Neiguan meridian point. But there were weak or the level with the datum line reaction when stimulated the non-meridian point. When touch stimulation on Neiguan meridian point, there were weak or the level with the datum line reaction also.

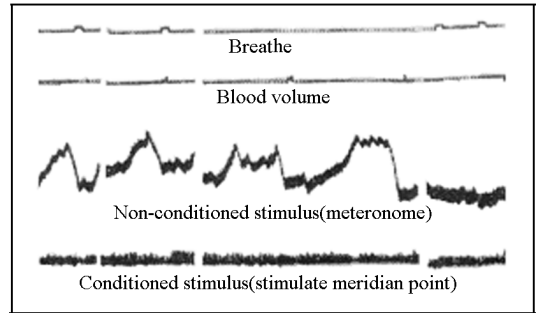


Fig. 3 Conditioned reflex in blood vessel of Neiguan meridian point

Fig. 4 was the influence of stimulation of the central end of vagus nerve and Zusanli meridian point on the discharges of the neurone in the medullary vagus centre. Fig. 5 was the evoked response of the neurons in the medullary vagus centre induced by stimulation of vagus nerve and Zusanli meridian point separately in cat.

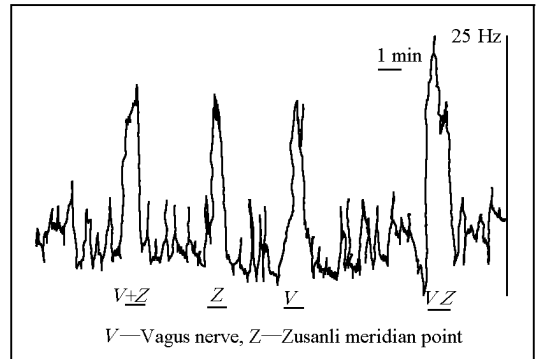


Fig. 4 Influence of stimulation of the central end of vagus nerve and Zusanli meridian point on the discharges of the neurone in the medullary vagus centre

Fig. 4 and Fig. 5 showed that the afferent impulse of Zusanli meridian point confluent with the afferent impulses of the vagus at the medulla being located at commissural nucleus of the vagus (in front and back of the obex) and medial lateral 2/3 of reticular formation. The impulse of the Zusanli meridian point ascended to vagal center at medulla via lateral funiculus of the spinal cord , especially the nonspecific path of same

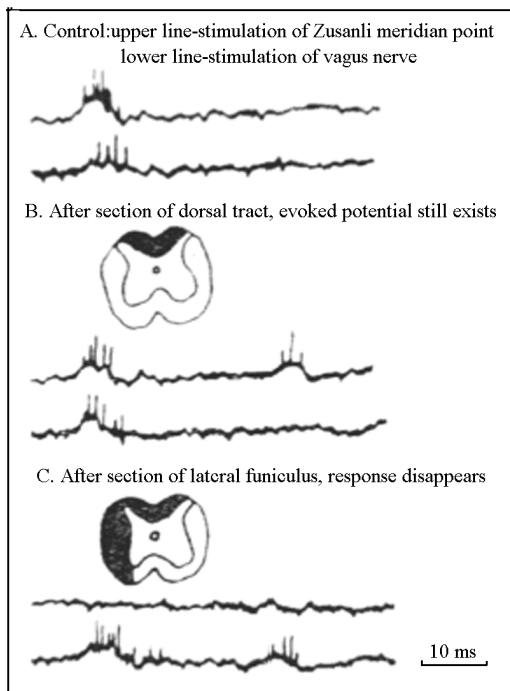


Fig. 5 Evoked response of the neurons in the medullary vagus centre induced by stimulation of vagus nerve and Zusanli meridian point separates in cat

lateral ventrolateral funiculus. From Ref. [7] experiments revealed that stimulation of meridian points, such as Zusanli meridian point, Weishu (胃俞) meridian point, etc., produced not only an excitation of vagal central neurons in medulla via indirect pathway, but also excited monoaminergic nuclei to modulate the activity of vagal central neuron. In general, noradrenergic nuclei showed an inhibitory effect, but serotonergic nuclei evoked an excitation. And showed that electropuncture of Zusanli meridian point and Neigun meridian point could induce the release of the peripheral monoamines, such as adrenaline, also noradrenaline, 5-HT. And the adrenaline was chiefly from the adrenal gland. Acupuncture of the blank points didn't produce any response^[7]. So, there are close relationship in connexion with the neurotransmitters, hormones and other chemical agents in the body. And those have relation to pain or anti-pain^[5].

The theory of meridian-cortex-viscera interrelationship was proposed on the ground of Zusanli meridian point alimentary conditioned reflex in dog and Neiguan meridian point circulatory conditioned reflex in man. In 1959, Chang^[4] proposed that meridian channel system was an independent system connected with the nerves to the cortex, it acted through the nerves, and the nervous action was realized by humoral agents, and the relationship among meridian, cerebral

cortex and viscera was meridian-cortex-viscera interrelationship. This theory of functional regulation was experimental supported by Ref. [5] and Ref. [7]. So, the meridian point (the lower most resistance at the acupuncture point area of traditional Chinese medicine) and the relation between meridian point and the body are defined meridian which is not the connective line between acupuncture point areas on the skin surface of human body.

4 The pathway of lower most resistance in cells of body

When stimulation special local position (or point), the response of meridian sensation of pathway was perceived by human brain. This phenomenon in Ref. [5] recommend that the neural biological phenomenon viewed as a bi-directional sensation which crossed body segments, in view of diversity of biology and identity of life, after definitude of the biological phenomenon was truthfulness, and an experimental model of neural biology and systematic study was given by Ref. [5]. In Ref. [8] showed that there were gap junctions between glial cells, neuron and glial cell in the central nervous system of Chinese leech, Fig. 6(1) was the leech's gap junction between glial processes that was showed by lanthanum tracer, the scale was $0.05 \mu\text{m}$, the larger arrow; trans-section, the smaller arrow; tangential section; Fig. 6(2) was the leech's gap junction between axon of neuron and glial process, that was showed by lanthanum tracer, the scale was $0.1 \mu\text{m}$ ^[8]. The extent of gap junction between neuron and glial cell was 2 nm , and the diameter of the central pole was 2 nm too^[5, 8].

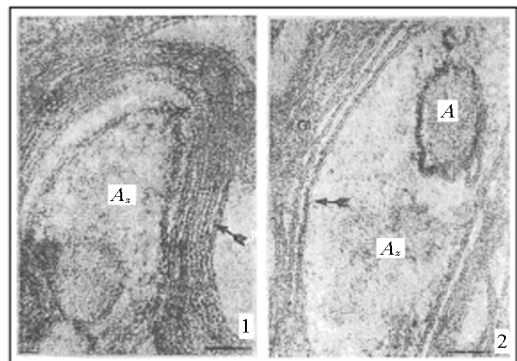


Fig. 6 Gap junctions between glial processes, and between neuron and glial process were revealed

After experiments of Anterior pagoda neuron of leech and other researches, a signal figure of lower most resistance pathway between cells of body was given by Ref. [5], see Fig. 7. It is obvious that the path-

way between the special local position (including meridian point) and the inner of body is realized at a nanometer level by lower most resistance pathway. The substance of meridian is the throughput system which is intercellular and intra-cell in progress exchange, transportation and integration of material, energy and information. The pathway of regularity circulation of the throughput system is called by meridian phenomenon^[1, 2], and the regular manifestation is the two-way feedback phenomenon also.

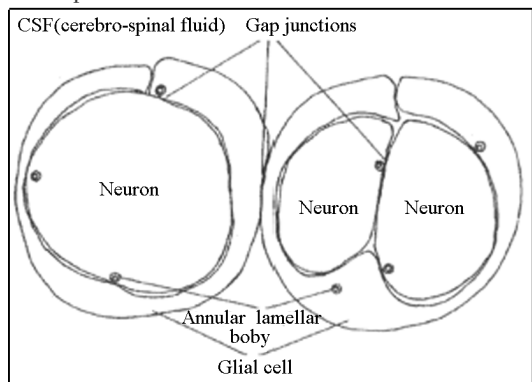


Fig. 7 Structural model of lower most resistance passing-way

5 The model of pathway and relationship among the two-way feedback in the body

On the basis of the sensation of two-way feedback of human body, lower most resistance point at the subcutaneous, the physiological action of meridian point, the theory of meridian-cortex-viscera interrelationship, there are gap junctions between neurons, glial cells, neuron and glial cell in the central nervous, the pass way of lower most resistance in cells and a network of lower most resistance pathway of body and structural model of lower most resistance passing-way and identity of life. For theoretical analysis according to the experiments and practice of stimulation and the effect of stimulation a passing track model of 14 main Jingmai (主要经脉) which were defined by straight lines was established. This model is an example of two-way feedback in human body. Consider the meridian changed in time, then a 4D meridian circulation model was showed by Ref. [2] and Ref. [5]. Fig. 8 was the passing track model in human body. Baihui (百会), Dashu (大抒), Tiantu (天突), Xuanji (璇玑), Laogong (劳宫), Yongquan (涌泉), Huiyin (会阴), Qugu (曲骨), Baihuanshu (白环俞) are meridian points of acupuncture point areas (Xuewei (穴位)); and Yangming (阳明), Taiyin (太阴), Jueyin (厥阴), Shaoyin (少阴), Taiyang (太阳),

Shaoyang (少阳) are jing (经) in Fig. 8.

For objective appraisal of health and recovery effect the throughput capacity of meridian circulation and the throughput efficiency of meridian circulation were given by Ref. [1] and Ref. [2].

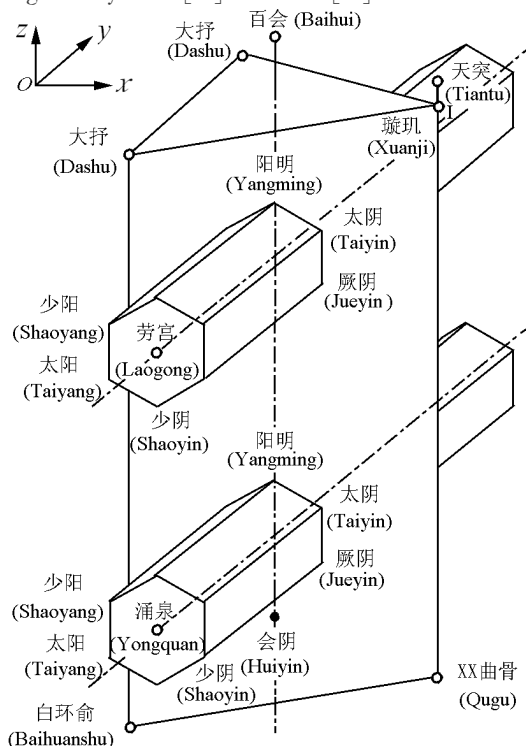


Fig. 8 Mechanical model of passing track of human body

The passing track in human body is influenced by health factors. Fig. 9 is a sketch of the two-way feedback. Stimulation can have direct act on the viscera (organ, bone, etc.) in going positive feedback or can realize negative feedback going in viscera. The influence of stimulation in human body is depending on the effect of direct stimulation, negative feedback and the mutual influence between the parts of human body.

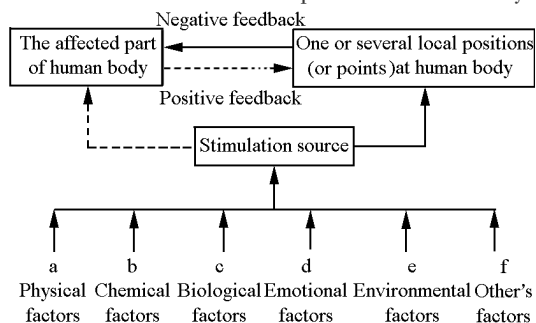


Fig. 9 Appearance of the two-way feedback of human body

Stimulation can have positive or negative influence

upon human health. Stimulation include six aspects: a. physical stimulation (mechanics, optics, acoustics, electricity, magnetism, rays, etc.); b. chemical stimulation (including medicine); c. biological stimulation (including virus, bacterium and germ encroach at human body); d. environmental influence (inside and outside of body); e. emotional influence (the seven emotional factors and the six desires i. e. psychological stimulation); f. the other stimulations (influence of food and drink; nature; action, sports, exercise and games (way, capacity, intensity, etc.); thinking; i-dea; language; way, habit and customs of daily life and others).

Appropriate control and selected stimulation on the base of two-way feedback can defend human health, to raise the ability of human disease-resistant and build up a powerful physique. But we must pay attention to select the correct stimulative position and the individual difference of human body, stimulative influence on many-sided in human body and the scientific effect of stimulation. We can apply one or several stimulations for human health and we may apply synthetic method for diagnosis and relieve symptom for human body also.

6 Conclusions

Chinese have a long tradition and interest in the pursuit of health and robust. In China, a new branch of health science "Healthology" was established in 1993^[9]. The human two-way feedback is the reflection of instinct and a system of regulation and balance. It is one of original systems of life, and reflects the human overall relation of internal cause and external cause. It is the theoretical foundation of human overall health and comprehensive medicine, and it has important theoretical and practical significance. We need to pay attention to the overall health and the enhancement living quality^[10, 11]. The overall health of personal and mankind related to everybody and there is no shirking

the responsibility for us. Further researches on the theories of stimulation and two-way feedback, and the effect of stimulation and select optimum method and position have deep significance. The stimulative function does not unilateral especially in the reaction of whole body and we must pay special attention to the harmful reaction after stimulation.

We dedicate this paper in commemoration of the 110th birthday of Guo Yuechuan and Chang Hsichun.

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