

# The Body as an Electronic Scheme

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There is no clear evidence that acupuncture points and meridians are separate organs or specific tissues. However, in traditional Chinese medicine, the mechanism of acupuncture action is associated with the vital energy concept. To identify the body's energy source and the material basis of its transmission, transformation, and use, it is necessary to consider it as an energy-generating object, with all its components. By abstracting from the body's usual structural view, we found that it is an autonomous energy-generating object. The human body generates energy through the lungs and digestive tract, which are electrochemical generator organs. Because the generated energy must be transferred to the consumer, the body has wire and transformer analogs. It bears an obvious resemblance with an electronic circuit, where cellular structures, tissues, and their combinations act as electrical and radioelements. The heart, brain, and muscles, which have well-known electrical parameters, as well as acupuncture points, offer information about the state of these electronic circuits. This article describes an extra-organ approach for systematizing body structures. It also attempts to represent the meridians and acupuncture points system as integral electro-radioelements, as well as the local circuit components of the whole body's electronic scheme.

**Keywords:** Acupuncture points, Acupuncture meridians, Energy system of the organism

Acupuncture has been known as a treatment method for thousands of years. Since it is still practiced today, it can be concluded that acupuncture achieves the desired results. However, evidence-based medicine requires justification and confirmation. First, for the method's statistical effectiveness, evidence of the human body's morphological structures that are distinct from other organs, tissues, and body systems, which could be defined as a separate system of meridians and acupuncture points, should be provided.

However, such stable characteristic structures have not been cytologically identified.

Human skin acupuncture point studies, which were conducted in several countries in the twentieth century's second half using medical devices that could determine the skin's electrical characteristics, gave similar results. It is reported that acupuncture points and their associations (meridians) have the following characteristic biophysical properties [1]:

- 1) The acupuncture zones described in ancient Chinese medicine always have a point of least electrical resistance.
- 2) In all people, acupuncture points occur in the same locations, regardless of the characteristics of the person being examined, and they are paired, occurring on the right and

left on symmetrical parts of the body within an accuracy of 1 mm.

- 3) Between two points on the same meridian, electric current resistance is less than between one meridian and any other point on the skin's surface.

Because low-resistance areas have been identified in the same areas (within an accuracy of 1 mm) on the skin surfaces of all examined people and yet nothing in the body that can be characterized as a separate organ with a specific tissue has been identified, there is no reason to continue looking for points and meridians using histology and cytology.

Research into body structures that can be characterized as points and meridians should involve the study of the electrical characteristics of the skin as an external organ, as well as internal organs.

First, this requires a change of the researcher's point-of-view about the human body so that it is perceived not as a structure (strictly defined set of organs and tissues), but as an electrical system with electrical and electronic elements that ensures continuous body function and that have real, well-known electrical characteristics.

A different level and method of systematizing body structures, which considers their electrical parameters

and characteristics, such as electro-radioelements, rather than organ-specific tissues, is needed. Such a method of considering the body is overdue because of various developments, such as methods of creating new drug types and delivering them to target tissues [2,3].

Notably, organ and system electrical parameters have been studied in humans and animals for over 100 years, including statistically proven information from electrocardiography, electroencephalography, and electromyography.

Here, we try to describe the organism as something whole whose composition can be determined by measurable input and output characteristics. As input, substances that the body absorbs to maintain its vital functions are included, with attention to the purpose of absorption.

Because human bodies are autonomous, they must produce their energy, which requires that the body has one or more energy generators that may be similar or different. The respiratory and digestive systems generate various types of fuel from gas, solids, and liquids obtained from the outside. Through biochemical processes involving absorbed substances, they generate energy in the form of electric current, which is necessary for various metabolic processes. Since energy is generated through various types of chemical reactions, these systems can be represented as electrochemical generators. Therefore, considering the body as an electrical and electronic system requires a technical analogy.

In technology, electrochemical generators are devices that are supplied with external substances for electrochemical reactions, and from which reaction products are removed, allowing for continuous generator function if reagent supply is ensured.

In technology, wires are used to transfer energy from the source to the consumer, whereas, in the body, electrical signals are generally transported by nerve fibers.

Electrical circuits use transformers for signal transmission, which can also be seen in the body.

In technology, transformers are electromagnetic devices with two or more inductively coupled windings on a magnetic circuit, and they are designed to convert one or more alternating current systems into one via electromagnetic induction. Vessel-approaching nerve branches form diffuse perivascular plexuses on their surface. Nerve fibers separate from these plexuses into the perimuscular plexus, which lies in the adventitia's deep layers. Fibers branch off from the perimuscular plexus into the intramuscular plexus, which is embedded in the tunica media and entwined with muscle fibers.

Thus, from an electrical engineering point-of-view, blood vessels braided with one or more nerve fiber layers are specific inductors (vessels with one nerve layer on the surface) and transformers (vessels with two or more nerve layers on

the surface). The ferromagnetic core of such a transformer is a solution containing iron (blood) in the vessels beyond the nerve endings, which flow in one direction. The human body has also been considered as an antenna or radiator [4], i.e., a complex that includes an energy source, feeders, and inductors. Opposite effects are also known, e.g., the effect of acupuncture on heart rate variability, i.e., the characteristics of the electrical activity of various heart muscle parts [5].

Electronic devices also offer analogies when considering the role of cells in the formation of the body's electrical parameters.

The cell membrane is analogous to a capacitor's dielectric layer. The charge on the surfaces of both sides of the membrane is generated by the ions of substances on both sides of the membrane and is similar to capacitor plates. Membrane ion channels are like diodes, whereas the membrane fragment where one-way ion exchange occurs is similar to a PNP junction. Tissues made up of many cells form microelectronic structures with the specific function of signal conversion and processing and have a high packing density for electrically, electrochemically, and biochemically connected elements. Membrane surfaces also represent emitter circuits, which create triode operation conditions. Because of the various molecules and ions on the membrane's surface, it is analogous to a microcircuit on the dielectric substrate of the cell membrane. However, since the substrate of such a microcircuit is not isolated from the external environment's influence (it is in an electrolyte solution, e.g., blood, lymph, or interstitial fluid), such a chip would not be stable because its electro-radioelements change dynamically. Factors like metabolism, food, inhaled air quality, stress, and joy alter the solution's characteristics through the movement of its contents, sedimentation, the adhesion of various molecules, and their departure from the membrane surface, which change this "integrated circuit's" electrical structure [6].

Based on the body's functioning tissue and cell characteristics, it is not just an electrical circuit but an electronic one, where the roles of electro-radioelements and their components are performed by various components, such as blood, the cells of various tissues, and chemical compounds.

Considering that capacitors, inductors with a ferromagnetic core, diodes, triodes, and transformers are present in this circuit, the system consumes a pulsed current since these components do not operate on direct current.

Because tissues, and not individual cells, function in the body, they can be considered as integrated circuits that produce a common signal with complete information about an organ's or organism's state [7].

Using this body systematization approach, it can be understood that acupuncture points are related to electrical

and electronic systems, but not to the body's organ system and that they are a kind of reference point to such an electronic circuit. Diseases can cause electronic the circuit to be imbalanced, and acupuncture can restore the balance through action on acupuncture points and meridians. Considering the human body as an electronic circuit can clearly explain the meaning of meridians, which are highways (branches of the energy system) that power some parts of the body. In this case, it is clear why it is not simple needle insertion (randomly or at appropriate meridians) that provides therapeutic benefits to patients, but rather the combination of the points selected for stimulation or sedation. This is the organization of energy flow from one meridian to another, in places with excess energy or a lack of energy. Classical acupuncture theory highlights the importance of correctly determining the emptiness or fullness of the meridian during diagnosis to accurately select a set of acupuncture points for patient treatment. Regarding acupuncture points as components of an independent extra-organ electronic system explains which sets of points are suitable for energy flow from or to other meridians and points, and why various point combinations may be effective against the same disease or symptoms.

Because it seems to be the energy source for the organ system, and it works beyond organ/tissue boundaries using cellular (and not organ) structures at the ion and molecular levels (and not tissues) via their electrochemical interactions, the electrical system can be considered earlier than the organ system. This can explain some ideas from classical acupuncture theory, specifically those about system-to-system energy transfer during acupuncture.

That is, meridians, the system of acupuncture points and their associations, which have the same location in all people and can be found at any time through electrodermal resistance measurement, is an extra-organ structure. Their unambiguous location in the body is determined by the biological electronic circuit's stability, which, collectively, is represented by all organs during the vital processes that occur within them.

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## CONFLICT OF INTEREST

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