

APPLICATION OF ACUPUNCTURE IN VETERINARY MEDICINE

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ABSTRACT

Acupuncture is mentioned for the first time more than two thousand years ago, and the interest in it is still prevailing. Thanks to this, it is no longer defined only as a theory of Traditional Chinese medicine, but is accepted as applicable and effective. In other words, *"if something has worked well for more than two millennia, then there is something useful in it"*.

Acupuncture is included in the curriculum of many of the prestigious veterinary universities and clinics around the world. Thousands of veterinary and humane specialists apply acupuncture every day in their practice as an additional or alternative therapy.

The aim of this publication is to summarize the main achievements, methods of application and effectiveness of acupuncture in veterinary medicine by providing independent clinical trials and the results thereof.

Key words: Acupuncture, veterinary medicine, physical methods.

Introduction

Acupuncture is a method of alternative medicine that introduces thin needles to specific body points for therapy. Acupuncture is also mentioned during the time of the ancient Chinese dynasties, III–II centuries BC. They used this method of treatment in humans, and later in animals, mainly horses (9).

Undoubtedly, since then, changes have been made to the core of this ancient art (10). Western perceptions of it differ radically from those of Traditional Chinese medicine. The first are based more on science, while the second are the empirical understanding of the spirit and body. Both sides have their own reasons and supporters. There is still no definite opinion on the mechanism of acupuncture. However, several theories are set in front of us.

Theories on the mechanisms of acupuncture action on the body

1. Theory of the trigger points

According to the first theory, trigger zones (points) that concentrate nerve endings, plexuses, blood vessels and lymphatic vessels are located in the muscles, fascia and skin of the body. Many of these areas coincide with the so-called acupuncture points. With a strong and concise stimulation of these points, whether by needle or electrostimulation, long-lasting analgesia is achieved. Acupuncture is believed to activate the body's defense mechanisms to restore and maintain homeostasis (1). The strong impulse that is generated and conducted to the spinal cord and brain is the reason for ignoring the weaker pain impulses – with other words they are not analyzed by the brain and there is no perception of pain. This is the so-called *"The gate theory"*, which will be discussed in more details in the following lines.

2. Theory of the role of opioid substances

Another theory points to the importance of opioid substances whose levels in cerebrospinal fluid and blood increase in acupuncture stimulation. High levels of dinorphine (primarily acting at the spinal cord level), endorphin (in the brain), enkephalin (active in the spinal cord and the brain) are observed (7, 10, 13). The latter two endogenous substances have strong modulating properties

for musculoskeletal pain. Dinorphine is a powerful pain regulator of predominantly visceral nature. The secretion of serotonin, epinephrine, cortisol, gamma aminobutyric acid (GABA) is also increased (2, 3, 14).

3. Theory of *Qi*

Eastern medicine supports the theory of vital energy *Qi* (Chi) (Fox, Ramey). This energy circulates in the body through certain channels called meridians. Disturbances in body homeostasis, including the development of pathological processes, disrupt the balanced flow of *Qi*. Acupuncture restores this balance and regains the physiological state of the body.

4. The Gate Theory of Wall and Melzack

According to this theory, there are specific, peripheral nerve endings called nociceptors that perceive mechanical, chemical and thermal irritations (2). They are located on the skin, internal organs, muscles, joints, meninges. Inflammatory mediators (bradykinin, serotonin, cytokines, prostaglandins) stimulate these receptors. The described nerve endings belong to three types of primary afferent fibers: $A\beta$, $A\delta$ and *C* fibers.

The $A\beta$ -Fibers have a large diameter and a thick myelin sheath. They carry the impulses quickly and have a low receptor threshold, making them sensitive even to slight irritation and touch. The $A\delta$ -fibers have a smaller diameter than the first and thinner shells. They carry the impulses more slowly and are sensitive to abrupt, sharp, painful irritation. *C*-fibers are the smallest, non-myelinated. They conduct the pulses most slowly and react to diffuse, dull pain.

When transmitting disease signals $A\beta$ and $A\delta$ -fibers are activated first, thanks to their low threshold of irritation and transmit a signal to the brain telling it exactly where the pain is localized. *C*-fibers are activated slowly and responsibly for physical perception of pain. They generate emotion – fear, irritability. In practice, the pain localization information is first accepted, a response to the elimination of the source of pain (withdrawal from the hot surface) is sent, and then a painful perception is perceived (1, 3).

Acupuncture stimulates $A\beta$ and $A\delta$ -fibers, which are rapidly and intensively communicated, thus giving signals of invasive interventions to trigger *C*-fiber disease diseases. This prevents the achievement of the last life-long centers in the brain.

Acupuncture points

There are four groups of acupuncture points. The first group is called motor. They are located in places where the nerves enter the muscles. They are 67% of all acupuncture points. The second group is located at sites of superficial nerves, along the dorsal and ventral midlines. The third group is in places with a high density of nerve plexuses. The last group of acupuncture points – the fourth group – are located at the sites of muscle-tendon connections. (8)

Typical dependence in the localization of acupuncture points is that they are located in places with low electrical resistance and high conductivity.

Local effects of acupuncture application

They are expressed in improving the blood circulation in the relevant site and the secretion of Hageman's factor (XII) of blood clotting. This results in activation of the platelet coagulation cascade with plasminogen and kinin release. The reaction of the complement is also stimulated. The mastocyte degranulation results in the release of histamine, heparin and proteases. There is a powerful vasodilatation induced by the released kinins and prostaglandins. The overall response is expressed in increased resistance, stimulation of local immune status, improved tissue perfusion, muscle and tissue relaxation, and last but not least analgesia (3, 8).

Methods for treatment

Acupuncture methods are applied through various instruments and apparatus (3, 13). Chinese needles with a length of 0.5-75mm and a diameter of 0.16–0.4mm corresponding to (28, 30, 32, 34, 36 G) are used. These needles have to enter into the defined acupuncture points by looking for the specific effects. Hydroacupuncture requires the injection of sterile solutions into the acupuncture points, the fluid exerting pressure on the point and stimulating it. Most often NaCl, vitamin B12 and lidocaine are injected.

Electroacupuncture is another method that uses a special high and low frequency operating apparatus. The low frequency (1–20 Hz) stimulates the $A\delta$ -fibers and the release of beta-endorphins in the brain while enkephalins and dinorphins are released into the spinal cord (8). The high frequency (80–100 Hz) activates the C-fibers and the secretion of serotonin and norepinephrine. Low-frequency therapy has been shown to provide more sustained analgesia (8). Laser acupuncture stimulation is suitable for patients who are intolerant to needles. It is performed with special therapeutic lasers.

At acupressure acupoints are manually pressed for a few minutes. Suitable for a home therapy.

Hemoacupuncture has two types of administration. The first is to withdraw blood from acupoint over *v. facialis transversalis*, used in febrile conditions. The second one is injecting one's own blood in the mouth and is shown in autoimmune conditions.

Moxibustion uses the healing effect of the *Artemisia vulgaris* herb. The so-called *wormwood cigar* is prepared, it is lit on the acupoint and burns without touching the skin. It has a warming effect and is suitable for chronic arthritis.

Pneumoacupuncture is a subcutaneous introduction of air, which exerts pressure on the acupoint to stimulate it. It is suitable for muscular atrophy. The air is subsequently absorbed (3).

Implantation is a method in which sterile gold with round or elongated shape or other sterile product is implanted in an acupoint. The gold provokes changes in the ionic balance of the tissue and stimulates the acupoint for a long time (3, 8).

Possible side effects

Practicing acupuncture requires pre-training and knowledge of matter. It is considered to be one of the safest medical interventions but, although rarely, undesirable effects such as sedation, earlier recurrence of the initial symptoms, skin irritation with erythema are not excluded. The use of electroacupuncture in patients with pacemaker, arrhythmia or epilepsy should be given caution.

Studies and application of acupuncture in animals

Since the creation of the International Society of Veterinary Acupuncture, many articles have been published in 1974 showing the effects of acupuncture in animals. The application of acupuncture is expressed in the influence of specific functional states.

Um et al. use acupuncture in the treatment of unilateral arthritis (12) caused by injection of a *M. tuberculosis* suspension into one of the knees of mixed breed dogs. They use infrared thermography to measure the temperature of the diseased and healthy knee of a treated and control group of dogs. After 4 weeks of acupuncture, the treated group showed a normalization of the local temperature of the diseased knee while in the control group the temperature remained elevated.

Kim and Nam describe the effect of sedation (6) when applying acupuncture to healthy dogs. The study uses acupuncture at the *Linteng* and *GV20* points, which have been shown to have a calming effect in humans. Acupuncture in these points causes sedation, which is evidenced by a decrease in the values measured with SEF 95 and an acceptable sedation level as measured by the Ramsey Sedation Scale.

A study by Kim et al. revealed that the motility of the proximal dog colon was not affected by acupuncture in acupoints of Meridian of the colon (5), whereas acupuncture at GV1 point reduced the frequency of colon contractions in healthy dogs.

Hwang et al. compares the effect of electroacupuncture and acupuncture (4) applied in points ST36 and GV20 in rats. The study shows that electroacupuncture compared to acupuncture greatly increases cellular proliferation and differentiation of neuroblasts in the subgranular zone of dentate gyrus in the brain.

In a new study involving humans and rats, Salazar et al. prove that electroacupuncture at GV-14 and GV-20 points in humans and Baihui in rats unlocks the peripheral blood release of mesenchymal stem cells as well as increases the functional linkage between the anterior part of the hypothalamus and the amygdala.

Conclusion

The ancient science of acupuncture today presents real scientific evidence supporting the effect of its action. Its application in clinical practice today is comparatively limited, but even as an alternative and complementary treatment method, it occupies an increasing share of additional therapies. Positive results are limited to the manifestation of a pronounced analgesic, anti-inflammatory, trophic, vasodilating and neuroendocrine effect.

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