

Amyotrophic Lateral Sclerosis

A Needling Approach



by Maria Shapoval, ND
<https://www.drmariashapovalnd.com/>

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative condition that affects the motor neurons of the cerebral cortex, brain stem, and spinal cord. It afflicts patients 55–75 years of age, and is slightly more common in men than women. The initial presenting symptoms include unilateral weakness, coordination problems, and difficulty with fine finger movements. As the condition progresses, patients develop muscle atrophy, paralysis, twitches, and cramping. As such, ALS has components of upper motor neuron disease—fasciculation and spasticity—as well as lower motor neuron disease—muscle weakness, atrophy, and loss of reflexes. There are two different types of onset for ALS, “limb onset” and “bulbar onset.” Limb onset, as the name suggests, begins within the arms and the legs. Bulbar onset, referring to the impact on the cortical bulbar neurons within the brain stem, presents with speech and swallowing difficulties. As the condition progresses, the patients become more dependent on personal-support workers for mobility, and will undergo gastrostomy as eating becomes dangerous due to choking, regardless of the type of onset. The weakening of the respiration muscles is a critical component of this disease, as it leads to respiratory insufficiency, hypoxemia, and respiratory acidosis, as well as other complications. Patients will require artificial ventilation, which can place the patient at risk for infections. Riluzole is the only treatment that has demonstrated improved prognosis and delay of respiratory complications; however, it does not stop the progression of the disease. As such, it is important to seek additional therapies to offer improvement in the respiratory function, as it is the primary cause of mortality in this condition.

Acupuncture Overview

There are several forms of acupuncture that have been explored in the research, including Japanese and Korean styles. According to the theory behind acupuncture, conditions like ALS result from the blockage or deficiency in the movement of “qi.” The insertion of the needles opens up the passage for the “qi” to flow, thus improving symptoms. “Tonification” is the strengthening of a particular organ by moving the energy or the “qi” into this organ. Thus, acupuncture protocols can focus on tonifying the lung function so as to improve the respiratory parameters like oxygen saturation and respiratory rate. Acupuncture can be used alone, in combination with herbs or

injectable substances, and in combination with electrical stimulation.^[1] This is done by running a current of specific frequency from one acupuncture needle to another. The intensity is increased to the maximum tolerance, but avoiding painful stimulation. The application of this electrical current can increase the effect of the acupuncture.

Summary of Research Literature on Acupuncture

While there is a substantial body of clinical trials demonstrating positive results with the use of acupuncture in movement disorders like Parkinson's disease, the research on ALS is largely limited to animal studies. There are two studies that explore this therapy in humans; however, both are of limited sample size. Below is an overview of these studies.

Electroacupuncture in Humans

This study examined the effect of electroacupuncture on the respiratory function in patients with ALS. Eighteen participants with ALS were treated for 15 minutes twice per day for 5 days, with respiratory parameters evaluated before and after each treatment.^[2] The treatment consisted of four acupuncture points: SP-3, LU-9, HT-8, and LU-10, selected for their role in lung tonification. Electrical current with a frequency of 100 Hz was applied to SP-3 and LU-9. There was no significant change in respiration rate or levels of carbon dioxide, but a statistically significant reduction in heart rate was noted, as well as an increase in percent oxygen saturation. However, the clinical significance of this increase is questionable as it is fairly small.

Case Report of Injection into Acupuncture Points

Two patients suffering with ALS were provided homeopathic injections of a product called Enercel into acupuncture points five days per week for four weeks.^[3] The Enercel product is composed of the following homeopathic remedies: *Cactus grandiflorus* 4x, *Aloe socotrina* 4x, *Abies nigra* 4x, *Arnica* 6x, *Lachesis* 11x, calcium carbonate 6x, and *Pulsatilla vulgaris* 6x. The points included GV-20, EX-21, GV-14, LI-11, SJ-5, GB-34, ST-36, ST-4, ST-6, ST-21, ST-25, ST-29, UB-17, LV-14, UB-20, UB-21, LI-4, SI-6, GB-30, ST-37, ST-41, and UB-60. The patients also received several products designed to promote detoxification. Both patients demonstrated improvement in grip strength, reduction in fasciculations, and improvement in speech. Given the combination of the therapies included, it is difficult to conclude whether it was the combination or one specific component that was responsible for the improvement.

Electroacupuncture in Animal Model

The animal model of ALS involves a genetically mutated mouse with the defect within the superoxide dismutase 1 enzyme (SOD1). This enzyme plays an important role

in removing the free radicals, and thus maintaining the health of the mitochondria and other cellular components. Deficiency or defects within this enzyme result in neuronal-cell loss and symptoms resembling ALS, which is why it is frequently used to model ALS in animals. In addition, the loss of motor neurons ALS involves an increase in marker of inflammation, such as tumor necrosis factor alpha (TNF- α), and an increase in microglial activation. Microglia can be thought of as the macrophages of the central nervous system. While their role in ALS is not fully clear, microglia are present in high numbers in the areas of neuronal loss in ALS, and may be responsible for the neuronal inflammation observed in this condition.

In this study, the electrical stimulation was applied to the ST-36 acupuncture point.^[4] The stimulation resulted in increased motor function, as demonstrated using the rotarod test. It also led to a reduction in neuronal cell death and a reduction in TNF- α . Interestingly, stimulation of this point has been associated with the regulation of the immune system in other studies.

Bee Venom Injection into Acupuncture Point in Animal Models

Bee venom has been used for quite some time in the treatment of inflammatory conditions like rheumatoid arthritis. The venom is composed of a compound called apitoxin, which is believed to be responsible for the anti-inflammatory effect seen with this therapy. This animal study employed the use of SOD1-mutant mouse model of ALS and included the injection of the venom into the ST-36 acupuncture point, compared to controls.^[5] The results include improvement in motor activity as well as 18% prolonged animal survival, and increased neuronal survival within the brain stem and spinal cord. Reductions in microglial activation and TNF- α were also observed.

Interestingly, injection of the bee venom intraperitoneally was just as effective, but it acts via a different mechanism.^[6] Another animal study compared the injection of bee venom into the peritoneum to injection into ST-36. Intraperitoneal injection did improve motor function (stride length) and motor neuron survival just as well as the ST-36 injection. However, the injection of venom into ST-36 significantly reduced TNF- α levels, which the intraperitoneal injection did not. Thus, bee venom may have different effects depending on its route of administration, but both are effective at improving motor function in this animal model.

Another possible mechanism responsible for the damage seen with ALS may be via reduced proteasome activity. Proteasomes are enzymes responsible for removing misfolded or damaged proteins from the cells. Without proper proteasome function, damage or mutated proteins—such as α -synuclein—can aggregate into clumps and interfere with cell function by promoting oxidative stress and impairing mitochondrial

function. This can contribute to or trigger cell death. Melittin is another component of bee venom, which has been demonstrated to have proteasome-protective functions.^[7] An animal study injected melittin into ST-36 acupuncture point and demonstrated improved motor performance and delayed disease onset. It did not improve lifespan, but did reduce TNF- α , inhibited α -synuclein malformation, and restored proteasome function by 40–50%. The reduction in TNF- α may be attributed to reduction in malformed proteins like α -synuclein, which are inflammatory in nature and may be responsible for the increase in microglial activation seen in ALS.

Thus the stimulation of ST-36, whether by injection of bee venom or electrical stimulation, may improve neuronal survival and provide anti-inflammatory effects. Whether these results will be comparable in human studies remains to be seen.

Conclusion

The research on the use of acupuncture in the treatment of ALS remains limited largely to animal studies. While the human studies demonstrate the safety of acupuncture, the animal studies demonstrate possible mechanisms behind the improvement in motor symptoms seen with several acupuncture protocols. The stimulation of acupuncture point ST-36 provides improvement in stride length and neuronal survival. This may be due to the immune-modulating properties of this acupuncture point. The injection of bee venom, whether intraperitoneally or into this point, also improves neuronal survival and motor function, with anti-inflammatory effects observed only with the acupuncture point application. It is unclear whether replicating the electrical stimulation of the various points discussed in this review will yield significant clinical improvements, as more studies are desperately needed.

References

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