Commentary

Exploration of a Combined Treatment Plan for Alleviating and Controlling the Progression of Amyotrophic Lateral Sclerosis (ALS)

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Purpose: This article aims to discuss five medical intervention strategies required for patients with amyotrophic lateral sclerosis (ALS) and provide a reference for intervening in this challenging disease.

Methods: A retrospective analysis was conducted to identify existing issues in the treatment of ALS patients. A comparative analysis was performed to examine the nature, characteristics, and methods of previous intervention approaches.

Results: Early identification and intervention, the application of rational combined treatment approaches, the improvement of comprehensive physical and mental rehabilitation systems, and the exploration of new treatment strategies provide a guarantee for effective intervention treatment of ALS patients.

Conclusion: This article proposes the newly added combined treatment approach involving the elimination of excessive glutamate from the body, which is theoretically reasonable, safe, and simple to implement. This approach has the potential to enhance the therapeutic effects and improve the individual prognosis of ALS patients. Given the lack of specific therapeutic drugs, further research on an effective combined intervention approach remains necessary.

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Amyotrophic Lateral Sclerosis (ALS), also known as Motor Neuron Disease, is a progressive neurological disease. It mainly affects upper motor neurons and lower motor neurons, severely damaging the nervous

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system[1]. Therefore, the earlier to intervene, the better. The exact cause of ALS is still unclear. Possibly, it occurs from the coaction of genetic and environmental factors. About 10% of patients have hereditary ALS[2], and the remaining 90% are sporadic (nonhereditary). Practitioners in the medical field are working hard to find out the cause of ALS and its treatment. Finding an effective treatment to improve the prognosis of ALS patients is urgently needed.

1. Basic characteristics of ALS

The diagnosis of ALS is a clinical diagnosis that normally requires filtering out the possibilities of other diseases. The diagnosis is based on clinical manifestation, neuroelectrophysiological examination (e.g., electromyography), and the elimination of other possible diseases. ALS is characterized by progressive muscle weakness, atrophy, and dysfunction. The possible symptoms of ALS patients include: muscle loss; difficulty in movement; spasticity and spasmodic pain; speaking and swallowing difficulty. ALS affects patients in a progressive way. It causes a continuous decline in muscle strength and eventually affects the functions of respiration and swallowing. It severely affects patients' prognosis and quality of life. At present, there is no treatment that could completely cure ALS[3]. Most medical programs aim to relieve symptoms, delay the development of the disease, and improve patients' quality of life.

1.1. Medicine

At present, four medicines, including Riluzole[4] and Edaravone[5], are approved to be used as the treatment of ALS. Riluzole is able to delay the development of the disease. Edaravone is able to reduce the cellular damage from oxidative stress. It is able to relieve and delay but not to reverse or cease the development of the disease. In September 2022, the FDA approved Relyvrio (AMX0035), which is the medical product from Amylyx Pharmaceuticals. Relyvrio came to the market with the support of the phase II clinical trial, which had results showing that the median survival of patients in the Relyvrio group was 6.5 months longer than that of the placebo group. In 2023, the first treatment for hereditary ALS came to market; the drug only works in 1-2% of ALS patients. The conclusion is that the prospects for treatment are not promising.

1.2. Spasticity management

Muscle spasms are common in ALS patients[6], and muscle relaxants and antispasmodic drugs are used to relieve symptoms. When these drugs are used, they should be adjusted and monitored according to the

specific situation of the patient.

1.3. Respiratory management

As the disease progresses, patients with ALS are more likely to have respiratory disorders[7], and patients may need ventilator assistance or other respiratory treatments, such as non-invasive ventilation (NIV) or tracheotomy, which can help patients maintain good respiratory function.

1.4. Nutrition management

Since ALS patients may experience difficulty swallowing and weight loss in the later stages of the disease, patients need appropriate nutritional support and need to work with a dietitian to develop an appropriate diet plan. In more severe cases, additional nutritional support through nasal feeding or gastric tubes is required[8].

1.5. Sports care

In the later stages of the disease, ALS patients would suffer from muscle atrophy. Rehabilitation can help them maintain muscle function, reduce pain, and improve quality of life. Physical therapists can make an individualized rehabilitation plan[9]. In addition, psychological support, social support, and family care are equally important in providing emotional support and practical help.

2. What are the shortcomings of medical intervention methods for ALS

2.1. Diagnosing is difficult

The disease that induces ALS is not clear. Some scholars believe that it is caused by DNA defects[10], while others believe that it is induced by poisoning. It may also be related to environmental factors. Without clear causes, those factors are difficult to prevent and treat accurately. At the same time, ALS is difficult to diagnose. The diagnosis requires ruling out other possible causes, and early symptoms are similar to those of other neurological diseases. These factors increase the difficulty of a clear diagnosis.

2.2. Rapid progress and large individual differences

After the onset of ALS, it usually progresses rapidly in a short period of time, resulting in muscle atrophy, weakness, and dysfunction. Therefore, the treatment time window is narrow, and immediate treatment is urgently needed. There are huge individual differences among different ALS patients, including the rate of disease progression and lesion site, so it is difficult to formulate a unified and effective intervention plan. Personalized treatment strategies are needed.

2.3. A comprehensive treatment is in need

There is no complete cure for ALS. There are treatments that can ease symptoms and slow its progression, but they are not effective. In the later stages of the disease, ALS patients would suffer from difficulty breathing, swallowing, and impaired digestive function. Each patient's condition is different; thus, assisted breathing, nutrition management, and exercise care need to be personalized to the individual. Studies have confirmed the effectiveness of regenerative medicine, that is, umbilical cord mesenchymal stem cell transplantation can improve the motor function of ALS patients. Therefore, ALS patients need to be supported by a multidisciplinary comprehensive team, including neurology, rehabilitation medicine, respiratory medicine, regenerative medicine, dietitians, sports rehabilitation therapists, psychology, social support, and other collaborative efforts.

2.4. New treatment option

This paper suggests a new method to eliminate excess glutamate from the body. Clinical studies suggest that excessive glutamate content in the human body will cause a series of nervous system damage problems[11]:

① Neurotoxicity: glutamate is an excitatory neurotransmitter, which plays an important physiological and biochemical role under normal circumstances. However, when the abnormal content of glutamate metabolism increases, it will overstimulate nerve cells, resulting in neurotoxic effects, the injury, and death of nerve cells.

② Neurologic abnormality: excessive glutamate can lead to overexcitation of nerve cells and excessive electrical signals, which can lead to nervous system disorders, such as convulsions, tremors, restlessness, and anxiety[12], and even in severe cases may induce seizures.

③ Neurodegenerative diseases: Studies have shown that excessive glutamate may be associated with the development of some neurodegenerative diseases. Damage and death of nerve cells are caused by excessive glutamate; thus, it is associated with the development of diseases such as ALS, Alzheimer's disease[13] and Parkinson's disease[14].

④ Abnormal amino acid metabolism: The balance and normal metabolism of various amino acids in the body are necessary to maintain good health. Excessive glutamate will interfere with the metabolic balance of other amino acids, resulting in the lack or excess of some amino acids, which will further affect protein synthesis and tissue repair[15], and negatively affect important human physiological and biochemical processes.

3. Result

When the disease occurs, firstly, the patient needs to have an active awareness of detection and prevention in the early stage; secondly, the multidisciplinary treatment team should propose a personalized comprehensive intervention plan; finally, in the case of poor existing treatment methods, it is suggested to actively introduce a new plan that is theoretically reasonable, feasible, safe, and simple in operation.

3.1. Active early detection and prevention

Early signs of ALS include muscle loss, muscle wasting, and difficulty with the tongue and chewing. If these symptoms occur, especially in people with a family genetic risk, they should pay great attention to them. Other possible causes can be ruled out through nerve conduction velocity examination, electromyography, blood, and imaging examinations. Early detection enables early treatment and early intervention.

3.2. New combination treatment

In addition to drug therapy, spasticity management, respiratory management, nutrition management, sports care, and other comprehensive management, a glutamate elimination program was introduced.

① Control the source of glutamate: customize a diet. First of all, reduce glutamate intake, especially sodium glutamate in food and food additives. Initiate a 6-month fasting for 10 kinds of high-glutamate foods, such as MSG, chicken essence, soy sauce, abalone, mushrooms, and a balanced nutritious diet, and a prohibition of alcohol.

② Increase glutamic acid excretion: the glutamic acid scavenger program[16], which mainly regulates the intestinal flora, excretes heavy metals and other toxic substances as a supplement to strengthen the health of intestinal flora, and excretes the accumulated glutamic acid in the body while metabolizing detoxification.

	Fasting program	Regular drinking water	Vegetarian oriented	Remove heavy metals	Daily Yogurt	Unique probiotics
1 day	√	√	√	√	√	√
2 day						
...						
15 day						

Table 1.

Develop habits and mark daily (√), lasting for 15 days

③ Repairing glutamate damage: customized regenerative medicine plan. Since the body is composed of cells, the essence of disease lies in cell damage. Regenerative medicine can activate the activity of cells in the body through stem cells, repair damaged cells and tissues, regulate immune functions through NK cells, and enhance the body's healthy metabolism and self-repair ability.

3.4. Social education and psychological intervention

Social education and psychological intervention play an important role in ALS management[17]. They can help patients and their families acquire necessary knowledge, skills, and support, improve their quality of life, and facilitate their coping with the psychological and social challenges brought about by the disease. Social departments can provide disease knowledge education and nursing skills training for patients and their families. This helps them understand the symptoms and prognosis of ALS, as well as the use and maintenance methods of assistive devices such as wheelchairs, respirators, and hearing aids. It also includes exercise rehabilitation and nutrition management, helping them better care for the patients.

Psychological counseling and support are crucial to help patients and their families cope with emotional distress, anxiety, depression, and other psychological issues. This reduces the patients' feelings of despair and suicide rates. Encouraging patients and their families to participate in the ALS community and providing marriage and family counseling[18] helps family members deal with the changes and challenges brought about by ALS, maintaining intimate relationships and family stability.

4. Discussion and conclusions

In summary, ALS can be considered one of the most difficult-to-treat diseases in modern human history. This is because the triggering mechanisms of ALS are not fully understood, and clinical treatment mainly focuses on symptomatic treatment and supportive health management, with poor effectiveness. Considering the large number of patients and the high number of new cases each year, along with the high levels of suffering and despair experienced by patients, the use of this safe, effective, and convenient combination treatment plan described in this article holds promising prospects.

Early detection and prevention are the first steps in controlling ALS. Active awareness of testing and accurate diagnostic methods are crucial for improving treatment outcomes and individual prognosis. In the practice of treating and controlling the progression of the disease, it is important to have shared decision-making between patients and doctors, personalized treatment plans, and multidisciplinary interventions. Over the past century, ALS treatment has made significant progress, but it remains challenging. Therefore, it is still necessary to research new effective intervention strategies. In the context of the Boao Lecheng international medical tourism pilot zone in Hainan, China, where medical treatment, research, operation, and international exchanges are authorized by law, we believe that with the advancement of cutting-edge medical technologies such as gene therapy and cell therapy, the treatment of ALS will further develop.

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