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Abstract

Amyotrophic lateral sclerosis (ALS) is an adult-onset, progressive and fatal neurodegenerative disorder; there is no cure for ALS to date and the causes of this degeneration are still unknown.

In this study, I prose rehabilitation models to describe mechanisms, global preventions and treatments of ALS caused by toxic invasions, in a perspective of biomedical and biochemical infophysics, based on published clinical data and our previous models of meridian channel system.

Of the mechanisms, I think, toxic invasions to ALS patients, who are exposure to toxins (metals, such as aluminum and manganese or chemical materials, such as hazard of pesticides), are mostly launched from sweat (major) and sebaceous (minor) glands, wounds or esophagus; after the invasions, the toxins may progressively spread to the whole bodies via networks of the meridian, nervous and/or cardiovascular systems for most cases of metal or chemical causes based on published data; physical diffusions play roles in the invasions and spreads.

The principle of my global prevention model after the exposures is an elimination of all of possible invading or invaded toxicants on the complete skin and/or in the whole bodies via sweat (major) and sebaceous (minor) glands, and the meridian channels, using the running (tap) water (37 - 40 ^{o}C) and massages.

The principle of my global treatment model is the same as or similar to that of my global prevention model after the exposures, except periodic or repeated expelling and diffusing of the toxins with intervals of hours, until curing ALS caused by the toxic invasions.

In one sentence, my treatment principle is: how the toxicants can invade us, we can expel them, no matter what they are, where they launch the invasions from, and how they affect the (motor) neurons.

Because of no side effects, like sing, song or music therapies, my models in this paper can be applied directly and may be the first choice, in clinic trials. Additionally, the preventions and treatments can be accomplished in most medical centers and/or patient homes; and the clinic costs are affordable to most patients (families).

1 Introduction

Amyotrophic lateral sclerosis (ALS) is an adult-onset, progressive and fatal neurodegenerative disorder, characterized by degeneration of both upper motor neurons (UMN) in the primary motor cortex and lower motor neurons (LMN) in the brainstem and spinal cord; there is no cure for ALS to date [1, 2]. The cause of this degeneration is unknown and different causal hypotheses include genetic, viral, traumatic and environmental mechanisms [2, 3].

Â Â Â Â Â Â Roos PM and colleagues reported: metal analyses were performed with high-resolution inductively coupled plasma mass spectrometry; statistically significant higher concentrations of manganese, aluminum, cadmium, cobalt, copper, zinc, lead, vanadium and uranium were found in ALS cerebrospinal fluid (CSF) compared to control CSF; higher concentrations of these metals in ALS CSF than in ALS blood plasma, which indicate mechanisms of accumulation, e.g. inward directed transport; a pattern of multiple toxic metals is seen in ALS CSF; the results support the hypothesis that metals with neurotoxic effects are involved in the pathogenesis of ALS [3, 4].

Â Â Â Â Â Â An association between pesticide use and ALS has been explicÂitly evaluated and suggested in previous studies [1, 5 - 12].

Published data demonstrated increased risk of ALS among football or soccer players [13 - 16] other athletes [17] and individuals who engage in vigorous physical activity [18], but inconsistent results have also been reported [19 - 22]. Strenuous physical activity, repeated head injuries, use of illicit performance-enhancing drugs, or chemicals used to treat football fields have all been disÂcussed as potential explanations for such risk elevations [13, 23]. Chronic traumatic encephalopathy, a newly defined neuroÂdegenerative disease, often resulting from repeated head injuries, has been proposed as the underlying reason or the â€œcorrectâ€• diagnosis for

ALS cases observed among profesÂsional athletes [1, 13 - 23].

Â Â Â Â Â Â Kiernan MC commented in a review [24]: the main clinical feature in ALS is a combination of UMN and LMN damage involving brainstem and multiple spinal cord innervation regions. Limb-onset ALS is the predominant type with 70% of the cases among patients. Bulbar onset accounts for 25% of the cases, with the final 5% of the cases having initial trunk or respiratory involvement [8, 24, 25].

Â Â Â Â Â Â Bastos AF commented in another review [26]: ALS infection may have access through the hemato-cellular barrier. Once inside, it contiguously spreads. Horizontal propagation includes crossing the middle line of the encephalic trunk or the spinal marrow, due to the seeming proximity of the anterior horns and encephalic trunk nuclei. The disease affects LMNs in the medulla and anterior horn of the spinal cord as well as UMNs in the cerebral cortex [2].

Â Â Â Â In our previous study [27], based on physical chemistry, anatomy and histology, we modeled meridian channels as a physiological network system. We think, the meridian channel system is mostly constructed with interstices in or between systems of the integumentary, nervous, muscular, cardiovascular, skeletal, lymphatic, endocrine, respiratory, digestive, urinary and reproductive as well as between the systems and fatty tissues; the meridian channel system does not have its own envelope, it just uses other envelopes of the physiological systems as its envelope; major components in the meridians are loosen connective tissues that consist of electrolytes, cells and proteins; the electrolytes provide rich fluids and ions for processing, propagation or transportation of information, matter and energy in the meridians. Similar to systems of the nervous, cardiovascular, lymphatic, endocrine, respiratory, digestive and urinary, the meridian channel system should be unblocked according to the theory of Chinese medicine. If the systems are blocked, some diseases could occur.

Â Â Â Â In an extension and penetration of our previous study of meridian channel system, we modeled how information, matter and energy are processed, propagandized or transported in the meridian system in a perspective of biomedical and biochemical infophysics [28, 29].

Â Â Â Â In a recent study, I defined sweat and sebaceous glands as ports to exchange information, energy and matters between the meridian channel system and environments [30]; and proposed my local models to treat gout or gouty (acute) arthritis.

Â Â Â Â Â Â In this study, I prose rehabilitation models to describe mechanisms, global preventions and treatments of ALS caused by toxic invasions, in a perspective of biomedical and biochemical infophysics [29].

2 Methods

I use published clinic trial data [1 - 26], diffusion theories and our previous published models of meridian channels and biomedical and biochemical infophysics [27 - 30].

3 Models

3.1 Invading Mechanisms

Of the mechanisms, I think, toxic invasions to ALS patients, who are exposure to toxins (metal, such as aluminum and manganese or chemical materials, such as hazard of pesticides), are mostly launched from sweat (major) and sebaceous (minor) glands, wounds or esophagus; after the invasions, the toxins may progressively spread to the whole bodies via networks of the meridian channel, nervous and/or cardiovascular systems for most cases of metal or chemical causes based on published data [1 - 26]; physical diffusions play roles in the invasions and spreads.

Fig. 1 shows my model of the toxic invasions into a spinal cord via sweat (major) and sebaceous (minor) glands and meridian channels or wounds (not shown) [27 - 30] from the environments. The diffusion coefficients are different in different media (such as blood vessel walls, CSF, meninges, sweat glands, meridian channels), for different persons, inherently and environmentally. The greater the coefficient or concentration gradient is, the faster the diffusion flows.

All forces, convection, diffusion, growth, recombination, fragmentation should be considered [31]. Simplified modeling equations to describe the flows, pressure and forces were proposed in my previous investigation [30].

If the meninges, spinal cord or head are injured or have some defects inherently, the diffusion coefficients will be much higher than the normal. Big gaps or leaks may occur in the meninges or at the junctions between the meninges and blood vessels (or other tissues). The toxic fluids can quickly diffuse or flow into the nervous system (such as CSF, spinal horns), and make the motor neurons degeneration when the toxic concentration gradients are high. The cerebrospinal

fluid (CSF) plays a role to propaganda the poison to the whole cerebral and spinal tissues [26], and to degenerate the whole nervous and muscle systems.

Models of toxic invasion, from environments, into other parts of the patient bodies are the same as or similar to that in Fig. 1. Fig. 2 is a block diagram of the invasions.

Â Â Â Â Â Â The toxic invasions launched from esophagus will diffuse through digestive, cardiovascular [30], meridian [28] and/or nervous systems.

3.2 Global Preventions and Treatments

To prevent ALS caused by toxic invasions, I recommend people, who are exposure to toxins (such as metal or chemical materials), respectively use masks, goggles and covers to globally protect their mouths, noses, eyes, four limbs, necks and other body parts, before the exposures to the toxins; after the exposures, take showers or use running (tap) water (37 - 40 ºC) and massage global bodies for 15 - 30 minutes as soon as possible, just like to treat a local gout or gouty (acute arthritis) [30], especially, use towers with the water to massage the backs (skins of the spinal cord), brush teeth, rinse the mouths (with gargle) and eyes (with massages), clean the nostrils and outer ears with wet cotton balls.

Â Â Â Â The principle of my global prevention model after the exposures is an elimination of all of possible invading or invaded toxicants on the complete skin or in the whole bodies via sweat (major) and sebaceous (minor) glands, and the meridian channels, using the running (tap) water and massages. The prevention methods have not any side effects and are very economic.

ALS patients should get rid of the toxins when they are treated (detoxed). The principle of my global treatment model is the same as or similar to that of my global prevention model after the exposures, except periodic or repeated expelling and diffusing of the toxins with intervals of hours, multiple treatments per day, until curing ALS caused by the toxic invasions.

Â Â Â Â Â Â I believe drinking moderate more warm (37 â€“ 40 ºC) water or soup (with a normal eating) is very helpful to elimination of the toxicants via sweat glands and urinary system, just like curing virus induced flu [32]. This treatment is supported by a clinic trial based on an extracting principle with juice or water fasting [33].

Â Â Â Â In one sentence, my treatment principle is: how the toxicants can invade us, we can expel them, no matter what they are, where they launch the invasions from, and how they affect the (motor) neurons.

Â Â Â Â Fig. 3 depicts my model of global preventions and/or treatments. After the invasions, I suggest to globally expel the toxins from the meridian channels to the environments via sweat (major) and sebaceous (minor) glands, using the running (tap) water (37 - 40 ºC) and massages; then to periodically perform the above elimination after the invaded toxic fluids diffuse from the body tissues (such as nervous and/or muscle systems) into the meridian channels, until all of the systems have no toxins (Fig. 4).

Â Â Â Â Because of no side effects, like sing, song or music therapies, my models can be applied directly and may be the first choice, in clinic trials. Additionally, the preventions and treatments can be accomplished in most medical centers and/or patient homes; and the clinic costs are affordable to most patients (families).

4 Discussion

Via sweat and sebaceous glands and meridian channels or wounds [30], to draw out the poisons from the affected body parts with instruments is another way, with a little side effect, to treat ALS caused by toxic invasions. This method can be performed periodically and multiple times per day, the time interval between two adjacent treatments can be hours.

Other solutions, such as physiological saline, can be used to treat or prevent ALS caused by the toxic invasions too. However, I think the running (tap) water is the first choice.

Â Â Â Â Â Â I believe the principle in this paper can also be applied in clinic trials to cure other diseases with the same or similar toxic invasions, such as virus induced flu [32].

Â **Â Â Â Â** Subcutaneous fats or fatty tissues may decrease the diffusion coefficient of the toxic fluids. Therefore, the infection to a fitted people is easier than that to a fatty people. This maybe a cause why there is a strong clinical impression that ALS patients have a higher level of physical fitness and lower body mass index (BMI) than average [1, 34].

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Illustrations

Illustration 1

Fig. 1

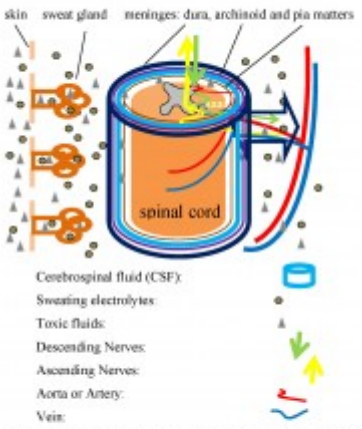

Fig. 1 My model of invading mechanisms of ALS: toxic fluids diffuse into a spinal cord via sweat (major) and sebaceous (minor) glands and meridian channels or wounds (not shown). The draw is not to the scale.

Illustration 2

Fig. 2

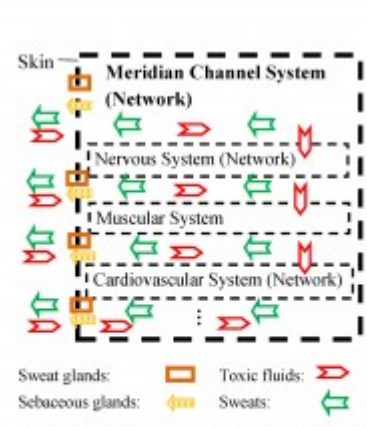

Fig. 2 Block diagram of my model of invading mechanisms of ALS: toxic fluids diffuse into nervous, muscular and other systems via sweat (major) and sebaceous (minor) glands and meridian channels or wounds.

Illustration 3

Fig. 3

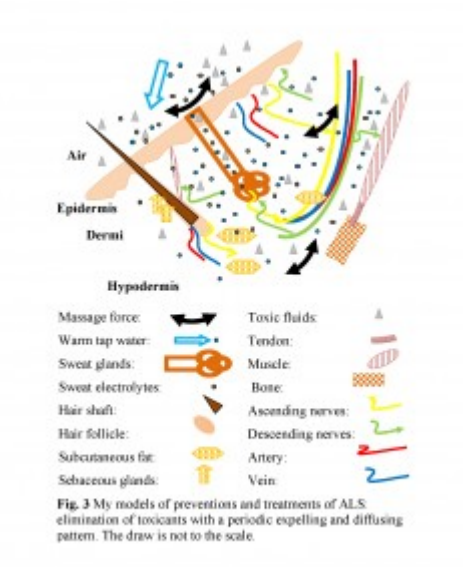

Fig. 3 My models of preventions and treatments of ALS: elimination of toxicants with a periodic expelling and diffusing pattern. The draw is not to the scale.

Illustration 4

Fig. 4

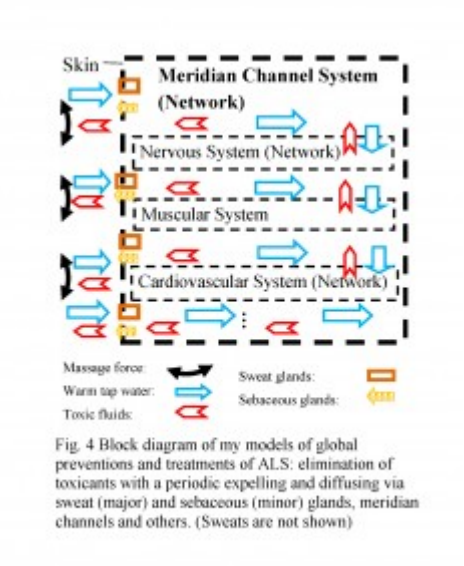

Fig. 4 Block diagram of my models of global preventions and treatments of ALS: elimination of toxicants with a periodic expelling and diffusing via sweat (major) and sebaceous (minor) glands, meridian channels and others. (Sweats are not shown)