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The Case for Molybdenum in ALS Therapy

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ABSTRACT

Amyotrophic lateral sclerosis (ALS) is a devastating disease without a known cure or cause, herein 3 studies will be presented that all somehow contribute to the possibility of Molybdenum, a chemical element with the atomic number 42 is what's missing in ALS patients diet leading to their disease, that at least according to one study done mostly on animals. Both other studies mentioned Molybdenum only as an afterthought, on a list of many vitamins and minerals contributing to their interventions. Both studies who used Molybdenum showed decisive results with one study reporting the thorough healing of an ALS patient and the other, with much lower levels of Molybdenum per intervention resulted in much better mortality rates in the intervention group. Brought together these finding warrant further study of Molybdenum's possible therapeutic role in intervention for ALS.

Keywords: ALS, Amyotrophic lateral sclerosis, Molybdenum, Hypothesis, Theory

Molybdenum is a chemical element; it has symbol Mo (from Neo-Latin molybdaenum) and atomic number 42.

Molybdenum minerals have been known throughout history, but the element was discovered (in the sense of differentiating it as a new entity from the mineral salts of other metals) in 1778 by Carl Wilhelm Scheele. The metal was first isolated in 1781 by Peter Jacob Hjelm.

Amyotrophic lateral sclerosis (ALS) is a devastating disease leading to death within 3-5 years in most cases. The cause is uncertain and neither are possible therapy, herein I will bring a case for Molybdenum as a possible key player in ALS pathology.

This will be done by reviewing just 3 studies, all of them very interesting in their own way but in two of them Molybdenum is noted only as an after-thought but still the fact that it's part of both studies' therapies and the fantastic results shown in both of them make it interesting to at least reflect on the possible role of Molybdenum as a possible key to ALS therapy in a way only one study, the first I'll show, acknowledged fully, I'll start with the first result you'll get if you searched "ALS Molybdenum" on google.

"Molybdenum Deficiency Produces Motor Nervous Effects That Are Consistent with Amyotrophic Lateral Sclerosis"[1] By Christoper A. Bourke who's done his study on animals and found that (in his own words) "Amyotrophic lateral sclerosis (ALS)–motor neuron disease (MND) is divisible into 6 familial and 10 sporadic syndromes. Familial syndromes are also recognized in animals, namely, dogs, cattle, rats, and mice. This article is concerned with the most common form of ALS, sporadic Charcot ALS (SC-ALS). This form is of particular interest

because it does not occur in any animal as a complete disease; instead, each of its three parts can occur as separate syndromes in sheep, horses, and cats. It is possible that physiological differences between these animals and humans could explain this separation. In addition, an understanding of the etiology of each animal syndrome could reveal a common predisposing factor that is responsible for generating the complete disease" he proceeds to his findings: "Molybdenum (Mo) deficiency has recently been demonstrated as the predisposing factor for two of the animal syndromes and the third has a pathogenesis that is consistent with Mo deficiency. This raises the possibility that Mo deficiency is the predisposing factor for SC-ALS". [1]

So far interesting but I could understand people looking past this as his study centered mostly on animals and therefore it lacks sufficient proof. But what do you say about the next study who reports the successful healing of ALS in one patient? [2] "In a 49-year-old male patient suffering from muscle weakness and fasciculations, progressive muscular atrophy, a variant of ALS, was diagnosed after extensive examinations ruling out other diseases. Due to supposed mercury exposure from residual amalgam, the patient's teeth were restored. Then, the patient received sodium 2,3-dimercaptopropanesulfate (DMPS; overall 86 × 250 mg in 3 years) in combination with α-lipoic acid and followed by selenium. In addition, he took vitamins and micronutrients and kept a vegetarian diet", they proceed to their astonishing success story "The success of the therapy was followed by scoring muscle weakness and fasciculations and finally by electromyography (EMG) of the affected muscles. First improvements occurred after the dental restorations. Two months after starting therapy with DMPS, the mercury level in the urine was increased (248.4 μg/g creatinine). After 1.5 years, EMG confirmed the absence of typical signs of ALS. In the course of 3 years, the patient recovered completely." That's all very interesting you may tell yourselves but what does it got to do with Molybdenum? Well Molybdenum was part of the treatment protocol on the list of said "vitamins and micronutrients" in the dosage of 200 micrograms.] "https://karger.com/view-large/figure/15115192/000477397_T03.JPG][2]

Table: Daily dosages of orally applied vitamins, micronutrients, and other supplements

Vitamins			Micronutrients			Other	
A	retinol	10,000 IU	B	boron picolinate	2 mg	krill oil	1 g
B_1	thiamine	30 mg	Ca	calcium citrate	300 mg	gingko extract	800 mg
B_2	riboflavin-5-phosphate	20 mg	Cr	chromium chelidamate arginate	180 μg	melatonin	10 mg
B_3	niacinamide	640 mg	K	potassium iodide	200 μg	l-tyrosine	200 mg
B_5	Ca-panthothenate	380 mg	Mg	magnesium citrate	560 mg	ubiquinol	200 mg
B_6	pyridoxal-5-phosphate	20 mg	Mn	manganese picolinate	4 mg	lithium	100 mg
B_7	biotin	5 mg	Mo	molybdenum picolinate	200 μg	α-lipoic acid	600 mg
B_9	methyltetrahydrofolate, glucosamine salt	1,000 mg	Se	selenomethionine	180 μg	acetyl-l-carnitine	2 g
				sodium selenite	300 μg		
B_{12}	adenosylcobalamine	225 μg	Vn	vanadium picolinate	70 μg	acetylcysteine	1,000 mg
C	ascorbic acid	700 mg	Zn	zinc citrate, zinc picolinate	15 mg	astaxanthine	24 mg
D	cholecalciferol	10,000 IU				NADH	12 mg
E	α-tocopherol, all 8 isoforms	400 IU				taurine	1.5 g
K_2	menaquinone 7	300 μg					

Source: https://karger.com/view-large/figure/15115192/000477397_T03.JPG.

Another study wasn't as far fetched but also showed very interesting results: They tested for "Effect of complete high-caloric nutrition on the nutritional status and survival rate of amyotrophic lateral sclerosis patients after gastrostomy"[3] They begin their abstract saying that "Complete high-caloric nutrition is emerging as an instrument for dietary intervention in

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disease prevention. Our aim was to evaluate the beneficial effects of complete high-caloric nutrition on nutritional status and prognosis in ALS patients undergoing percutaneous gastrostomy." They proceed to their Methodology: "Forty patients with ALS following percutaneous gastrostomy were randomized to receive either routine diet alone (the control group) or complete high-caloric nutrition combined with routine diet (the Ensure group) for six months" This diet I would tell you right now, consists partially of 38 micrograms of Molybdenum. They proceed with their methodology " Body weight, body mass index (BMI), nutritional indicator proteins, lipid levels and total lymphocyte count were measured before intervention and after six months of intervention. At 12 months of follow-up, Kaplan-Meier survival was generated to evaluate the beneficial effects of complete high-caloric nutrition on prognosis.

Their results: " After adjustment for baseline, compared with routine diet, body weight, total lymphocyte count and nutritional indicator proteins including transferrin, albumin, hemoglobin, and prealbumin were significantly increased at six months of intervention (all $P<0.05$). However, we found no significant changes in total cholesterol, triglycerides, low- or high-density lipoprotein cholesterol or BMI during the intervention in either group (all $P>0.05$)."

But here comes the inteeresting part: "Interestingly, the cumulative survival rate of ALS patients in the Ensure group was significantly better than that of ALS patients in the control group ($P<0.05$)" To examine further: "The survival rates of the Ensure group were 100%, 100% and 80% at 3, 6 and 12 months after gastrostomy respectively, and the control group rates were 80%, 70% and 55%, respectively". Very interesting results indeed.[3]

To conclude: a study examining animals laid the hypothetical ground work to claim that ALS could be the result of Mo deficiency, while two other, separate studies used Molybdenum as part of their vitamin intervention with promising results, this could at least warrant further studying

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