

Editorial

Multiple Sclerosis: Multiple Etiologies

From its first description over one hundred years ago multiple sclerosis has remained mysterious and treatment has been mostly palliative. Neurologists have little difficulty diagnosing MS, but many physicians find only emotional problems until it is well developed. The pathological lesions are well known from autopsy specimens but not why they are there. Orthomolecular and ecological physicians have implicated nutritional, ecological and toxic factors, but too often nothing halts the progress of this disease. Fortunately, recent epidemiological surveys have found that patients who come through the first few years without major impairment remain relatively stable thereafter. This is very encouraging, for treatment helps the patient achieve stability until newer findings appear which will be curative.

Multiple sclerosis is a syndrome where a number of factors are involved. But the end result is the same — a specific deterioration of parts of the nervous system controlling movement and sensation. The events which trigger the sequence of changes which become MS may be transient, like a severe virus infection, or chronic, like lead poisoning.

The factors which relate to MS can be divided into two major classes: (1) those which have a major impact in its occurrence, (2) those which play a role but are difficult to relate to these first order factors.

First Order Factors

It was shown thirty years ago by Dr. L. Kurland that MS was much more common in North America in the north than in the south. It was much more common in Winnipeg, for example, than in New Orleans. The 37th parallel is the dividing line. This observation has been expanded, see Ingalls (1983). Of all the ecological factors studied the inverse correlation between the incidence of MS and hours of sunlight is the highest. We can therefore assume that daylight or hours of sunlight is a first order factor but that it may require second order factors to initiate the disease.

Daylight most obviously effects the secretion of melatonin by the pineal gland and affects the formation of vitamin D-3 from its precursors in the skin. Vitamin D-3 is one of the factors controlling calcium and phosphorous metabolism. Melatonin secretion has been linked to mood swings and vitamins A and D-3 with calcium and phosphorous have been used to treat allergies and arthritis

by Carl Reich. The following factors need to be studied:

1. The connection between melatonin and MS.
2. The possible deleterious effect of artificial light compared to daylight.
3. The relation between calcium/magnesium/phosphorous metabolism and MS.

Second Order Causes

Ingalls is impressed with the striking relationship between mercury poisoning from amalgams in teeth and the incidence of MS. The idea that mercury can cause MS is not new and has been described by Huggins (1982). In private conversation he told me about an MS patient who recovered two weeks after the last mercury filling was removed. Craelius in 1972 concluded that death rates from MS were "linearly related to the number of decayed, missing and filled teeth in six Australian and forty-eight American states, and in forty-five Asian and European countries." Ingalls suggests that absorption of mercury from silver amalgams (over 50 percent mercury) is a factor which is related primarily to MS characterized by unilateral symptoms. Ingalls has "spastic paresis of the right thigh, foot drop of the right leg and carries a cane in the left hand." Huggins (1983) has reported cases of MS who recovered following removal of all their mercury amalgams. Is unilateral MS a clue?

All the second order factors can be listed as follows:

A. *Nutritional*

1. **Substrate Pellagra** — Rudin (1981, 1982) summarized evidence from which he concluded that a deficiency of Omega-3 essential fatty acids causes substrate pellagra. He suggests that pellagra is due to a deficiency of certain prostaglandins. These are made in the body from their substrates, the Omega-3 and Omega-6 essential fatty acids. The conversion requires vitamins such as B-3 and B-6 and minerals such as zinc. Thus, a deficiency in either substrate or the enzymes will cause a similar end disease. MS may be one of the pellagriform syndromes. Evening primrose oil has been beneficial to a proportion of MS patients. It contains these essential fatty acids.

Omega-3 essential fatty acids are found in plants and animals indigenous to colder climates. Thus, grains grown in Canada are richer in these essential fatty acids than southern crops, and fish from northern waters have more than fish caught in the Gulf of Mexico. These essential fatty acids provide flexibility and cold resistance.

If we postulate that northern people require more Omega-3 essential fatty acids than southern people we have a possible relationship to the north/south distribution. It would require both cold weather and a deficiency of essential fatty acids to trigger MS.

2. **Large Doses of Vitamins** — Klenner (1971, 1973) first reported the successful treatment of MS using a large number of vitamins in very large dosages. I have seen a few patients who had been considered hopelessly ill recover and remain well on his program. Perhaps these cases represent the vitamin dependency group in contrast to the substrate deficiency group.

B. *Food Allergies and Toxicity*

The MS Belt is also North America's fruit, wheat and dairy belt. Fruit may be contaminated by insecticides. This may be a minor factor. Fruit in North America moves freely across the continent. One would have to assume northern people use more fruit than those in the south. But insecticides are choline esterase poisons and should not be ruled out.

Wheat may be another minor factor. One would have to compare bread consumption in both north and south. A few MS patients have become much better after eliminating wheat from their diet. Dairy products probably are consumed to a greater degree in the north. Milk allergy is very common and could be a factor.

C. *Calcium, Magnesium and Phosphate Metabolism*

Vitamin D-3 may be one of the most important factors. Certainly people living below the 37th parallel have more vitamin D-3 than do northerners. Fish oils which are rich in vitamins A and D-3 and in essential fatty acids might be therapeutic for MS.

D. *Toxic Elements*

The role metals play in causing disease is becoming more evident. For many years the manufacturers of leaded gasoline and

aluminum cooking ware resisted the idea that their products were in any way responsible for any pathology. The evidence for lead is overwhelming and soon no leaded gas will be available in the USA or Canada. It is rare to suffer just one metal toxicity in the same way that it is rare to suffer a single vitamin deficiency. A number of metals are used and released into our air, land and water, and in our food, drugs and cosmetics. It is likely multiple toxicity is much more prevalent than any single metal poisoning. Thus, Marlowe, Errera, Stellern and Beck (1983) found that disturbed children were high in both lead and mercury.

A study by Warren and Horsky (1983) does not reveal any significant difference in concentrations of zinc, copper, lead, bismuth, mercury and arsenic in frontal lobe, cerebellum, spinal cord, liver and muscle between a series of fifteen patients with MS and thirteen non-MS control cases. However, an examination of the molybdenum levels of spinal cord shows MS tissue averaged 4.4 p.p.b. compared to 9.5 p.p.b. for the controls. None of the other tissues showed a significant difference. MS primarily affects the spinal cord. Is there a lead here?

The ratio of copper over molybdenum (Mo) was 1.38 for the MS series and only 0.52 for the controls. Pfeiffer has been very active in examining the relationship between Mo and disease. Papaioannou and Pfeiffer (1984) suggest Mo deficiency may be a cause of sulfite sensitivity. They report that Mo deficiency is widespread. Many of their patients had no Mo in their blood. Normal is 10-100 p.p.b.

Traces of Mo are present in all living tissues. It is a component of a flavin-containing enzyme. Xanthine oxidase appears to contain two molecules of riboflavin (FAD), two atoms of Mo and eight atoms of iron per molecule.

Mo prevents dental caries. Navy recruits in the last war from Ohio were remarkably free of caries and the soil in Ohio is rich in Mo. High copper and low Mo is associated with caries.

If MS cases are really so low in Mo in spinal cord, they may be lacking a protein carrier. But low Mo will also increase potential for cavities in teeth which are filled with mercury amalgams which further increase their vulnerability to toxic changes.

Huggins (1982, 1984) tested 300 patients using hair analysis. Eighty-five percent had periodontal disease. Mineral imbalances were common involving Mn, K, Fe, Cu, Mg and Zn in decreasing order. The same profile was observed with degenerative diseases such as MS. His series of MS cases averaged six mercury fillings each.

Ingalls believes lead toxicity is a factor and could add to the North/South distribution of MS. Emission of lead depends upon the amount of gas burned in cars. Twelve of the fifteen largest U.S. cities and all the Canadian cities are north of the dividing line. In this area there is a heavy concentration of East-West traffic. However, MS is very prevalent in Saskatchewan where car traffic is not very heavy.

Soils north of the 37th parallel were covered by glaciers which left behind soils rich in minerals and is the area of our major mines from which we produce copper, lead, aluminum, silver, gold, mercury and other metals. Warren (1980, 1982) suggested that MS was more prevalent in populations living on glaciated soil which are generally higher in toxic metals. Children growing up on glaciated soil are more apt to pick up a metal burden than are children raised in non-glaciated areas.

Mercury is another metal. According to Ingalls, amalgams are the major source. Since dentists are most likely to be poisoned by mercury it would be interesting to determine whether dentists are more prone to MS than medical doctors working in the same areas. Mercury is also more prevalent in northern lakes and rivers, arising from industrial effluent and from mine run-off. A new source of pollution is discarded batteries.

Perhaps MS is a triple intoxication from copper, mercury and lead. I suggest every patient with MS be examined for the presence of all toxic metals using hair, blood and urine analysis. The toxic elements are mercury, lead, copper, aluminum and cadmium.

E. Xenobiotic Chemicals

Xenobiotics are chemicals not found in the body unless introduced into the body. There has been no time for us to adapt to and learn how to detoxify them safely. Levine and Reinhardt (1983) and Levine and Kidd (1984)

summarized evidence these chemicals injure the body because they generate highly reactive free radicals such as lipid peroxides. They are involved in a number of inflammatory and degenerative diseases. I would not be surprised if MS were initiated or made much worse by exposure to these chemicals. I have seen MS patients become worse when exposed to tobacco smoke.

F. Infection

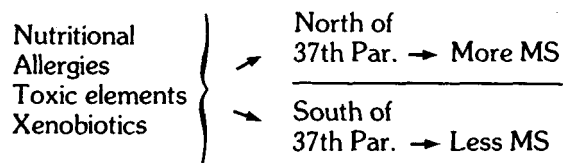
Ingalls rules out a slow virus etiology as does Reading (1979). Viruses do not respect borders and should be easily able to move everywhere in the USA, but a virus could be a second order cause. Virus infections deplete the body of vitamins, e.g. ascorbic acid, and minerals, e.g. zinc, and this could decrease one's resistance, thus allowing the first order cause to operate.

Reading (1979) presented a multifactorial hypothesis suggesting a transplacental etiology. Epidemiological evidence points to exposure to some agent under age 15, i.e. some metabolic disturbance in utero affects the vulnerable central nervous system tissue at a critical period in fetal development. This predisposes the offspring to MS. Metabolic disturbances combine during childhood and at puberty as the CNS matures. The metabolic disturbances involve B vitamins and minerals which are deficient.

It is clear giving pregnant women vitamin supplements almost eliminates the birth of spina bifida and other congenital lesions of the back. Reading's suggestion thus receives some support.

Hypothesis

MS is a syndrome caused by a combination of first and second order factors. It can be summarized in the following way:



Conclusion

A number of factors are related to MS. The presence of these factors should be studied and treatment tailored to those which

Second Order Factors First Order Factors

are most relevant. One should use a diet free of sugar and other additives, free of allergic foods, free of xenobiotics unless they are essential to treatment, and supplemented by vitamins, minerals and the Omega-3 and -6 essential fatty acids. Such a program will help many achieve stability.

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A. Hoffer, M.D., Ph.D.