



MULTIPLE SCLEROSIS The Alberta Disadvantage



DIRECT-MS – The Proactive MS Charity

The information in this booklet was prepared by the Board of the registered charity DIRECT-MS. This booklet is provided as general medical/scientific information and is not intended as a substitute for the medical advice of physicians.

DIRECT-MS was formed in 1998 by families affected by MS and is committed to two main goals:

- To provide reliable, science-based information on the role that nutritional factors play in MS so as to allow those affected by MS to make an informed decision on whether or not to use dietary strategies for managing the disease and for preventing it in close relatives.
- To fund scientific research which properly tests the effectiveness of dietary strategies for slowing or halting MS progression and for preventing it in the first place.

As a grass-roots charity, Direct-MS is completely volunteer-driven with very low overhead costs and no paid staff. 98% of the funds raised through donations goes directly to funding scientific research. Funds raised through special events are used for producing information booklets such as this one.

Much of the information prepared and distributed by the charity is not available from other MS charities that concentrate mainly on drug therapies. Such therapies, while of some value, do not address the causal factors of MS. DIRECT-MS believes that understanding the causal factors and using therapies that counter such factors hold the key to effectively treating MS and for preventing it in the first place.

For more information on nutrition and MS and the role of vitamin D in MS, visit the DIRECT-MS website at <http://www.direct-ms.org>

Alberta and Multiple Sclerosis

Multiple sclerosis (MS) is an autoimmune, degenerative, neurological disease. It often affects a person's abilities to walk and also may result in many other less obvious, problematic disabilities. It is a chronic disease that is most commonly diagnosed in young adults in their late 20s and early 30s. As the disease progresses, disabilities can accumulate and some persons with MS become very seriously debilitated by age 50.

MS strikes many Albertans and most people in this province know at least one person with the disease. What most people in Alberta do not know is that this is a very anomalous situation and that in most parts of the world MS is a rare, unheard of disease. The currently available data indicate that Alberta has the highest rate of MS in the world and the obvious questions are "Why?" and "What can be done to change this?".

Alberta is a rich province and its citizens enjoy a high standard of living. It has the lowest tax rates in Canada and the provincial government often talks of the "Alberta Advantage". There is no doubt that Alberta has many advantages compared with other parts of Canada and the World but it has one rather obvious disadvantage. This is a greatly increased risk for MS for all those who live in Alberta.

The purpose of this booklet is to explain why MS is so common in Alberta and to describe how Albertans can greatly lower their risk of MS. It also challenges the provincial government to become proactive and to take the necessary actions needed to eliminate this major Alberta Disadvantage.

Multiple Sclerosis – The Polio of Our Age

The distinguished MS researcher, Dr Howard Weiner of Harvard University, recently characterized multiple sclerosis as “The Polio of Our Age”. Polio, a viral disease, left many people (including former US president Franklin Roosevelt) badly crippled in the first part of the 20th century when polio epidemics swept across Canada and the United States. The introduction of a polio vaccine in 1953 put an end to the scourge of polio. Now it is just a distant memory for those over the age of 50 and is basically unknown to younger generations.

TO UNDERSTAND WHY MS IS SO COMMON IN ALBERTA IT IS NECESSARY TO UNDERSTAND THE MS DISEASE PROCESS AND THE ENVIRONMENTAL FACTORS THAT DRIVE IT.

As Dr Weiner emphasized, multiple sclerosis has replaced polio as the disease that now leaves many people seriously disabled. MS is not an infectious disease like polio but is an autoimmune disease like rheumatoid arthritis and type 1 diabetes. The basic process of an autoimmune disease is very different from an infectious disease in which a virus or bacteria infects the body. In an autoimmune disease a person’s own immune system attacks one or more specific parts of the body.

In MS, the immune system attacks tissue in a person’s central nervous system (CNS) and, as damage to the CNS increases, more and more disabilities accumulate. To understand why MS is so common in Alberta it is necessary to understand the MS disease process and the environmental factors that drive it.

The MS Disease Process

Over the past 30 years a great deal of scientific research has uncovered the basic disease process of multiple sclerosis. This knowledge is critical for understanding the probable causal agents of MS and for developing strategies to lower the risk of contracting MS.

As mentioned previously, in MS, the immune system attacks tissue in a person’s central nervous system. The specific tissue that is the target of the immune attack is myelin, a fatty substance that wraps around and insulates the nerve axons of the central nervous system. With the loss of myelin, the nerve axons themselves eventually are damaged and destroyed. The axons deliver instructions from the brain to all the parts of the body and their loss causes such messages to be delayed and blocked. This translates into the multiple disabilities that characterize MS.

STUDIES SUGGEST THAT THE MS DISEASE PROCESS BEGINS IN CHILDHOOD AND THAT IT IS OFTEN 20-30 YEARS BEFORE IT BECOMES CLINICALLY APPARENT IN YOUNG ADULTHOOD.

Studies suggest that the MS disease process begins in childhood and that it is often 20-30 years before it becomes clinically apparent in young adulthood. Such a long lag time between the start of the disease process and its recognition characterizes many chronic diseases including cancer and heart disease.





MS Rates in the World

To appreciate the anomalous rates of MS in Alberta, it is necessary to understand the great variations in MS rates throughout the world. The rate of MS is usually expressed as the prevalence of MS, which is the number of cases of MS per 100,000 population in a given area. In areas below latitude 35 degrees the prevalence of MS is always less than 50 and is most commonly less than 25/100,000. In contrast, in the areas above 35 degrees latitude the rate of MS is almost always above 50 and, in general, the prevalence increases with increasing latitude. In areas such as northern Europe, northern USA and Canada, MS prevalence is most often greater than 100 per 100,000 population as shown on the above map.

In England, Scandinavia and Germany the prevalence of MS is between 100 and 150. Similar rates are found in the northern USA and a number of provinces of Canada including Ontario, British Columbia and Manitoba. One area of anomalously high rates that was identified over 20 years ago is Scotland where rates over 200 were found in some areas.

Notably, the Alberta value at 311 stands out as by far the highest recorded MS prevalence in the world.

MS in Alberta

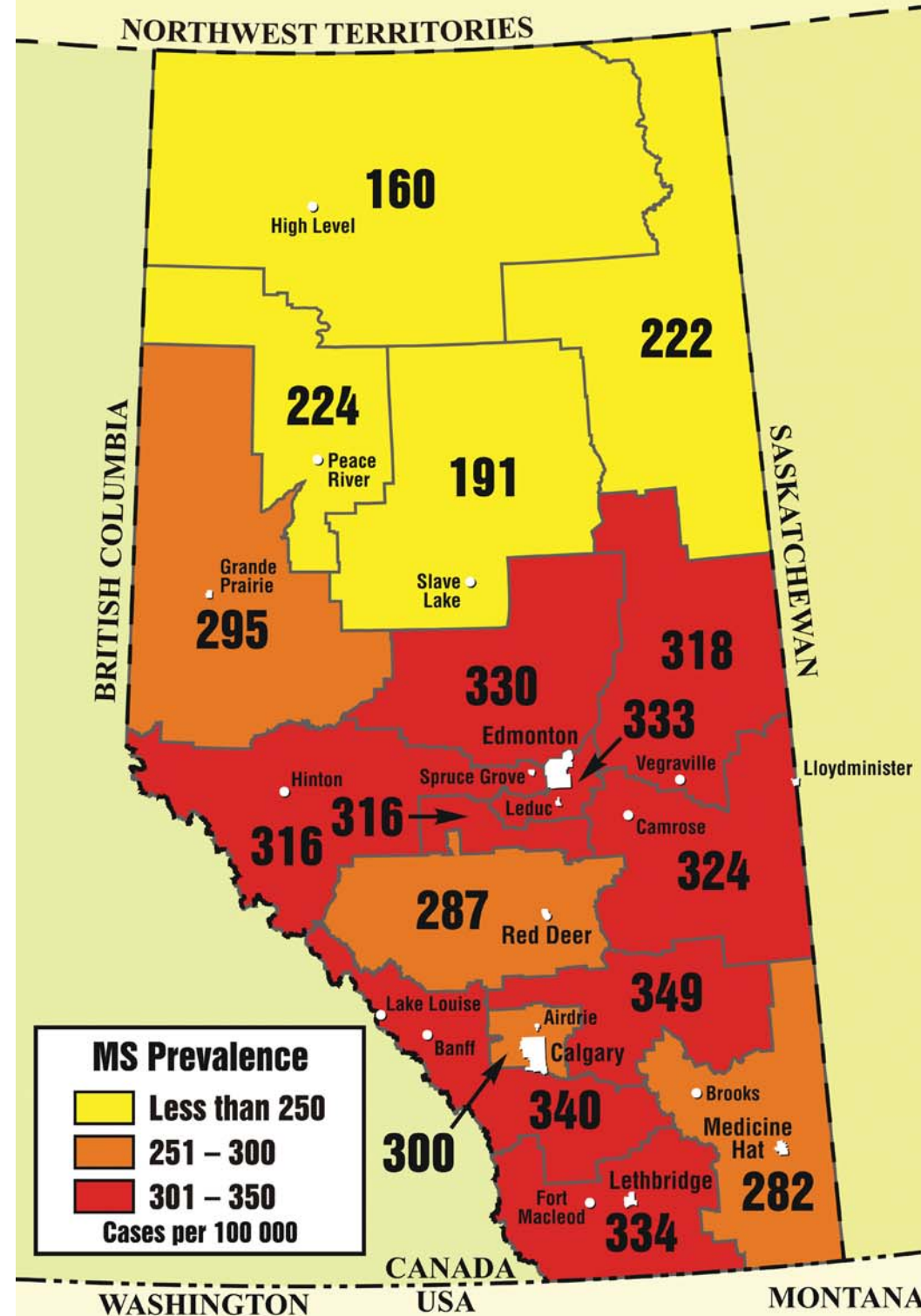
The statistics for MS in Alberta are well established thanks to detailed studies of the Health Surveillance Branch of Alberta Health and Wellness.

In 2001 there were 9386 cases of MS in Alberta and this represents a prevalence of 311 per 100,000 population. This is two to three times the prevalence of MS in most other parts of Canada, the northern USA and northern Europe and is six to eight times the prevalence of MS in the southern USA. Strangely this incredibly high rate of MS in Alberta has not been a cause for concern in the provincial government and has been ignored by the media.

As shown on the map on the opposing page, the prevalence of MS is relatively consistent over most of the 17 regional health authorities of the province. Only the 4 health authorities in the north have somewhat reduced rates mainly due to the relocation of more severe cases to better health care facilities in the central and southern parts of the province. The remaining 13 RHAs each have prevalence between 250 and 350 and no “hotspot” is evident. Notably the prevalence of MS in Alberta has increased from 200 to over 300 from 1990 to 2001, a staggering 50% increase.

Another measure of MS rate is the incidence of MS which is defined as the number of new cases in a year for every 100,000 population. In places like Britain and Scandinavia, where the MS is relatively common, the incidence of MS is between 5 and 10 per 100,000. In 2001 the number of new cases of MS in Alberta was recorded as almost 24 per 100,000, a shockingly high number unequalled anywhere else in the world.

The bottom line is that Alberta is the MS capital of the world and the federal and provincial governments, as well as the media, are ignoring this very disturbing and alarming fact.



What Causes MS?

Genes and Environmental Factors

It is now firmly established that genes play a significant role in the onset of MS and that only people who carry specific genes are susceptible to contracting MS. Studies have shown that numerous genes are involved in MS susceptibility with one or more genes related to the immune system being very important. It appears that perhaps only .5 - 1% of people of European heritage is susceptible to MS. Importantly, less than half of those who are genetically susceptible to MS actually fall victim to the disease and this demonstrates that one or more environmental factors also plays major role in MS onset.

To understand why MS is in near epidemic proportions in Alberta and what can be done about this major problem, it is necessary to understand the MS disease process and to identify the environmental factors that cause MS and drive its progression.

There are two main disease processes that result in myelin being attacked through autoimmune reactions. These are:

- 1) The activation myelin-sensitive immune cells by cross-reactions involving foreign proteins. It has been found that parts of proteins from infectious agents and foods closely resemble parts of one or more proteins in myelin. When the immune system defends the body against such foreign proteins, it also attacks the very similar looking proteins in myelin, a very unfortunate case of "mistaken identity".

- 2) The failure of the suppressor side of the immune system that usually shuts down any harmful autoimmune reactions such as an immune attack on myelin. An important part of the MS disease process is this failure to contain the autoimmune reactions caused by the cross-reactions involving foreign proteins.

It is clear that the main environmental factors involved in MS are those that promote and precipitate cross-reactions that lead to an immune attack on myelin and those which negatively affect the suppressor side of the immune system.

Five Causal Factors of MS

Five probable causal factors of MS have been identified, two factors that cause autoimmune cross-reactions and three nutritional deficiencies that result in a significantly reduced capacity for immune suppression.

The two causal factors involved in the activation of myelin-attack immune cells through cross-reactions are:

- 1) Infectious agents such as viruses and bacteria
- 2) Food types such as dairy, gluten grains and legumes

The three nutritional deficiencies that negatively affect the suppressor side of the immune system are:

- 1) Vitamin D deficiency
- 2) Omega 3 essential fatty acid (fish oil) deficiency
- 3) Anti-oxidant deficiency

We shall individually examine these causal factors in the following pages.

Infectious Agents

Numerous common viruses and bacteria have been found to yield fragments of proteins that closely resemble parts of proteins in myelin and thus have the potential to precipitate cross-reactions that drive MS. Thus, as Dr Weiner of Harvard says, “MS is in part due to common viruses and how the immune system reacts to them.” Some examples of infectious agents that can drive myelin-destructive cross-reactions are:



- Epstein-Barr virus that is responsible for infectious mononucleosis.
- Human herpes – 6 virus that causes the childhood disease roseolla

There is a large, robust scientific database which links various infectious agents to MS and it is widely accepted that common infectious agents are very important factors in the onset and progression of MS.

Food Types

Three specific food types have been implicated in MS and closely related autoimmune diseases such as rheumatoid arthritis and type 1 diabetes. These are:



- Dairy (milk, cheese)
- Grains that contain gluten (wheat, rye, barley)
- Legumes (beans, peas)

Like the infectious agents, these food types yield protein fragments that can potentially activate myelin-attacking, immune cells through cross-reactions.

Specific scientific evidence that links these food types to MS includes:

- Fragments of dairy proteins closely resemble parts of myelin proteins.
- Specific immune cells that attack dairy proteins also attack myelin proteins.
- There is a close correlation between the amount of milk consumed in a country and the prevalence of MS in that country.
- Areas of high MS prevalence coincide with areas of high gluten consumption.
- Dairy proteins can cause an MS-like disease in laboratory animals.
- Milk, wheat (gluten) and soy (legume) cause autoimmune diabetes in laboratory animals.
- Milk causes other autoimmune diseases such as rheumatoid arthritis and uveitis in laboratory animals
- Small clinical trials for rheumatoid arthritis and Crohn’s disease, autoimmune diseases similar to MS, have shown that avoidance of dairy, gluten and legumes results in major symptom improvement.

Nutritional Deficiencies and Lack of Immune Suppression

Although common infectious agents and various foods such as dairy can activate myelin-attacking immune cells, their actions can potentially be offset by the suppressor side of the immune system.

The activation of autoimmune cells that can damage tissue is a relatively common phenomenon in most people especially after an infection. In fact, well-controlled autoimmune reactions in the body can be beneficial and help to heal areas of the body that have been damaged.

The big difference between such beneficial autoimmune reactions and harmful ones, which drive autoimmune disease, is one of control. This control is supplied by the so-called suppressor or regulatory side of the immune system that effectively shuts down potentially harmful autoimmune reactions before they cause a problem.

There are three nutrients which support the suppressor side of the immune system to ensure it functions well and keeps any autoimmune reactions well controlled. These nutrients are:

- Omega 3 polyunsaturated fat which is found in fish, game animals and a few plants such as flax
- Anti-oxidants which include a range of vitamins, minerals and special substances found in plants
- Vitamin D which comes mainly from the action of sunlight on skin and from some fish

There is a large amount of scientific information that demonstrates these nutrients are very important for maintaining well-functioning immune suppression. More importantly, there is also abundant information that links deficiencies of these nutrients to multiple sclerosis. Some of this scientific information is summarized in the following pages.

Deficiencies in Omega 3 EFA and Anti-Oxidants



Omega 3 essential fatty acids that are found in fish oil are known to be effective immune regulators. A deficiency in omega 3 EFA is linked to MS by the following data:

- There is a close correlation of MS occurrence with the amounts of saturated fat and omega 3 EFA consumed. The more saturated fat and less omega 3 polyunsaturated fat consumed, the more common is MS.
- Feeding of omega 3 polyunsaturated fat to laboratory animals protects them against an MS-like disease.
- A recent, small clinical trial showed that fish oil supplements significantly reduced MS attacks over a two-year study.
- Increased intake of fish oil is very beneficial for rheumatoid arthritis and Crohn's; autoimmune diseases similar to MS.

Other nutrients that contribute to immune regulation and a control of autoimmune reactions are anti-oxidants. Anti-oxidants are nutrients that neutralize harmful oxidative reactions that are part of the autoimmune inflammatory reactions. Common anti-oxidants are vitamins A, C and E, selenium, various phytochemicals in plants such as flavonoids and specific substances such as alpha lipoic acid and ginkgo biloba.

It has been demonstrated that persons with MS have low levels of anti-oxidants and increased oxidative stress, especially during MS attacks. It has also been found that flavonoids can protect myelin from damage and that alpha lipoic acid can prevent an MS-like disease in laboratory animals.

In summary, deficiencies of both omega 3 polyunsaturated fat and anti-oxidants contribute to the MS disease process by hindering immune suppression.

Vitamin D Deficiency and MS

Vitamin D is known as the sunshine vitamin because, by far, the main source of the vitamin for most people is sunshine. When skin is exposed to sunshine, the ultraviolet B (UVB) radiation portion of the sun's rays reacts with cholesterol in the skin to produce vitamin D. A critical function of vitamin D, through the action of the produced vitamin D hormone, is the regulation of the immune system. Various types of immune cells have a vitamin D hormone receptor on them and the hormone influences the actions of the immune cells. It is this function that ties vitamin D to multiple sclerosis.



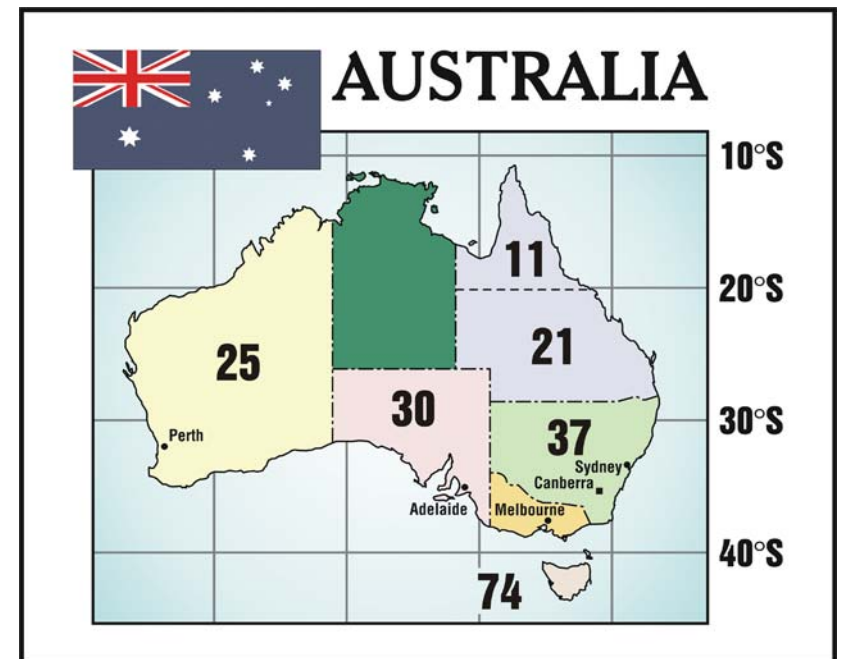
There is a great deal of diverse scientific evidence that demonstrates that a deficiency in vitamin D is involved in the multiple sclerosis disease process. One of the most convincing lines of evidence is the observation that MS in genetically similar populations systematically becomes more common as vitamin D supply systematically decreases with increasing latitude. As shown on the map on the opposing page, MS in Australia becomes more common with increasing latitude and the MS prevalence

CHILDREN WHO HAVE MORE SUN EXPOSURE AND A GREATER SUPPLY OF VITAMIN D DURING CHILDHOOD ARE MUCH LESS LIKELY TO CONTRACT MS AS ADULTS.

increases from 11/100,000 in tropical Queensland to 74/100,000 in temperate Tasmania. The increasing rates of MS correlate almost perfectly with decreasing amounts of ultraviolet radiation from the sun and consequent vitamin D supply. Australia is genetically homogeneous (mainly British and Irish descent) and other risk factors for MS such as infectious agents and diet are also nearly constant.

Thus the very large reduction (85%) of MS prevalence in the low latitude areas of Australia as compared with that in temperate Tasmania can only be explained by the increased ultraviolet radiation and consequent higher vitamin D supply in these low latitude areas of the continent. In support of this, a very recent study in Tasmania, which has the highest rate of MS in Australia, showed that increased sun exposure during childhood was associated with a greatly decreased risk of MS. Thus those children in this high-risk area of Australia who had more sun exposure and a greater supply of vitamin D during childhood were much less likely to contract MS as adults.

The Australian data leave little doubt that vitamin D supply plays a major role in MS.



The numbers on the map represent the number of MS cases for each 100,000 population. The MS rate increases as vitamin D supply decreases with increasing latitude.

Sunshine, Vitamin D and MS

One obvious question is how can we be sure it is the vitamin D component of sunshine that is the main factor in multiple sclerosis.

The answer to this comes from data collected in areas where a part of the population has a large consumption of fish which is the only other major source of vitamin D. Both Norway and Newfoundland, Canada are areas of potentially high rates of MS due to their low sunlight supply which is a function of their high latitude and to their

THE VARYING RATES OF MS IN NEWFOUNDLAND CAN BE EXPLAINED BY VARYING FISH CONSUMPTION AND CORRESPONDING VITAMIN D SUPPLY.

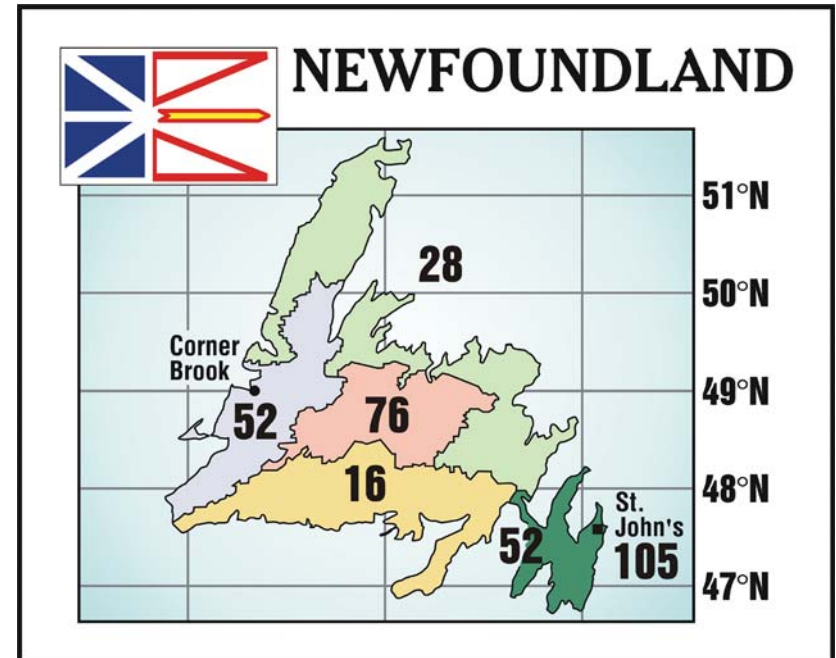
genetically susceptible population. Studies have shown that, in both Norway and Newfoundland, MS rates are much lower in areas of high fish consumption than in adjacent areas of lower fish consumption.

In the outports of Newfoundland where fish consumption is very high there is up to an 85% reduction in the prevalence of MS compared to the prevalence of the capital city of St John's. The varying rates of MS in Newfoundland that can be explained by varying fish consumption and correspondent vitamin D supply are shown on the map.

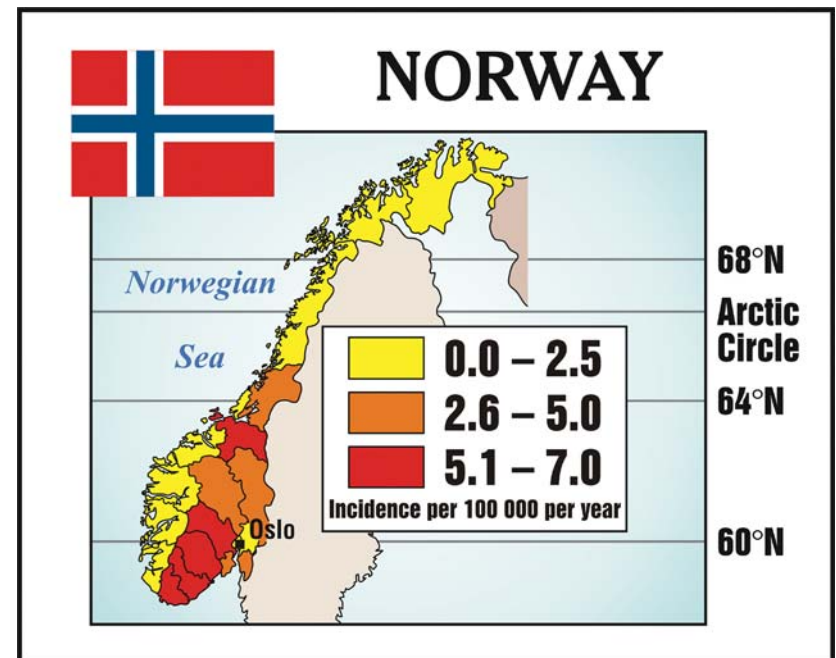
In Norway a similar relationship was documented where the incidence of MS was up to 75% lower in the coastal fishing towns compared with farming communities of interior Norway. These varying MS rates in

THE INCIDENCE OF MS WAS UP TO 75% LOWER IN THE COASTAL FISHING TOWNS COMPARED WITH FARMING COMMUNITIES OF INTERIOR NORWAY

Norway, which are mainly controlled by varying supply of vitamin D from fish consumption, are shown the accompanying map.



In both Norway and Newfoundland very low rates of MS are found in coastal communities which have a high supply of vitamin D through frequent fish consumption.



Vitamin D Deficiency and MS

There is a great deal of other diverse scientific evidence which links vitamin D deficiency to multiple sclerosis.

- People in occupations that involve plentiful sun exposure have a lower incidence of MS.
- MS rates are very low in local populations that eat a lot of fish, the only dietary source of abundant vitamin D.
- Vitamin D injections or exposure to ultraviolet light prevent and arrest an MS-like disease in laboratory animals.
- Immunological studies show that vitamin D can suppress autoimmune reactions.
- There is a close correlation between seasonal changes in MS disease activity and seasonal changes in vitamin D supply.
- Nurses who used a vitamin D supplement had a 40% reduction in the risk of MS.

MS – A Long Latency Vitamin D Deficiency Disease

There is no doubt that MS is a multifactorial disease and that both genetic susceptibility and a variety of environmental factors all play important roles in the onset and progression of the disease. Some of these factors activate immune cells that attack myelin and some reduce the capacity of the suppressor side of the immune system to stop such autoimmune attacks on myelin.

Despite the fact that a number of very different factors each plays a significant part in MS, the current data allow MS to be best characterized as a Long Latency Vitamin D Deficiency Disease. This statement can be made because it is apparent that adequate vitamin D throughout childhood and later life prevents MS from occurring in genetically susceptible persons despite infections by pathogens and the consumption of food proteins that are all implicated in MS.

Such protection against MS by adequate vitamin D is well illustrated by MS rates in Australia and Newfoundland that have been discussed and illustrated earlier. The vast majority of persons who are genetically susceptible to MS in the tropical

IT IS APPARENT THAT ADEQUATE VITAMIN D THROUGHOUT CHILDHOOD AND LATER LIFE PREVENTS MS FROM OCCURRING.

part of Australia do not contract it. Exactly the same protection against MS is seen in the outports of Newfoundland where the inhabitants ingest a large amount of vitamin D through the consumption of fish. MS prevalence is very low in those areas compared with the rest of Canada. The large supply of vitamin D supply from fish rather than from sun exposure in these areas is the only rational explanation for this protection against MS.

It seems that the maintenance of an optimal amount of circulating vitamin D prevents the childhood onset and expansion of autoimmune reactions that result in MS. Vitamin D accomplishes this prevention of MS by ensuring the suppressor side of the immune system does the job it was designed for. Thus the avoidance of vitamin D deficiency, especially in childhood, seems to be the key for preventing MS. That is why MS is best regarded as a long latency vitamin D deficiency disease.

The MS Causal Factors in Alberta

Alberta is populated mainly by persons of northern European descent and thus the population has a relatively high genetic susceptibility to MS. First Nations people and those of Asian descent have a markedly lower genetic susceptibility to MS but, despite an increasing proportion of people with lower susceptibility in the population, MS prevalence continues to increase.

The various environmental factors that contribute to MS onset and progression are all well represented in Alberta. Notably, the contraction of childhood infections implicated in MS, such as Epstein-Barr, tends to be slightly delayed in Alberta. This results in more virulent infections that have a greater chance of causing autoimmunity. Dairy and gluten products, both of which have the potential to drive autoimmune activity through cross-reactions, dominate the diet of Albertans. Thus both causal factors that activate myelin-attacking immune cells are very common throughout Alberta.



The causal factors that are tied to a malfunction of immune suppression are also very well represented in Alberta. Because of the relatively high latitude of the province, vitamin D supply is very low. Throughout most of the province, no vitamin D can be obtained from the sun from mid-October to mid-March due to the low angle of the sun during this time. It is emphasized that even though Alberta is very sunny during the winter, no vitamin D can be generated. This long “vitamin D winter”

DAIRY AND GLUTEN PRODUCTS, BOTH OF WHICH HAVE THE POTENTIAL TO DRIVE AUTOIMMUNE ACTIVITY THROUGH CROSS-REACTIONS, DOMINATE THE DIET OF ALBERTANS.

guarantees most Albertans are deficient in vitamin D at some time during the year. A recent study of the vitamin D status of Calgarians confirmed this, and almost everyone in the study (97%) was deficient at some time during the year.

Grain-fed beef, pork and chicken dominate the meat supply in Alberta and these meats have almost no omega 3 EFA. This, in combination with low fish consumption, ensures that most Albertans are likely deficient in omega 3 EFA. Finally, the carbohydrate portion of the diet is dominated by foods prepared from grains (wheat, corn, rice) and sugar. Fruit and vegetable consumption is low and this results in deficiencies in anti-oxidants.

In summary all five causal environmental factors of MS are very common in Alberta and these factors are impacting on a population that has a relatively high genetic susceptibility to MS.

Why MS is So Common in Alberta

With an understanding of the MS disease process and the environmental factors that cause MS, the main reasons why MS is so common in Alberta become evident.

Alberta, like the rest of Canada, has a population that is dominated by people of European descent and a consequent relatively high susceptibility to MS.

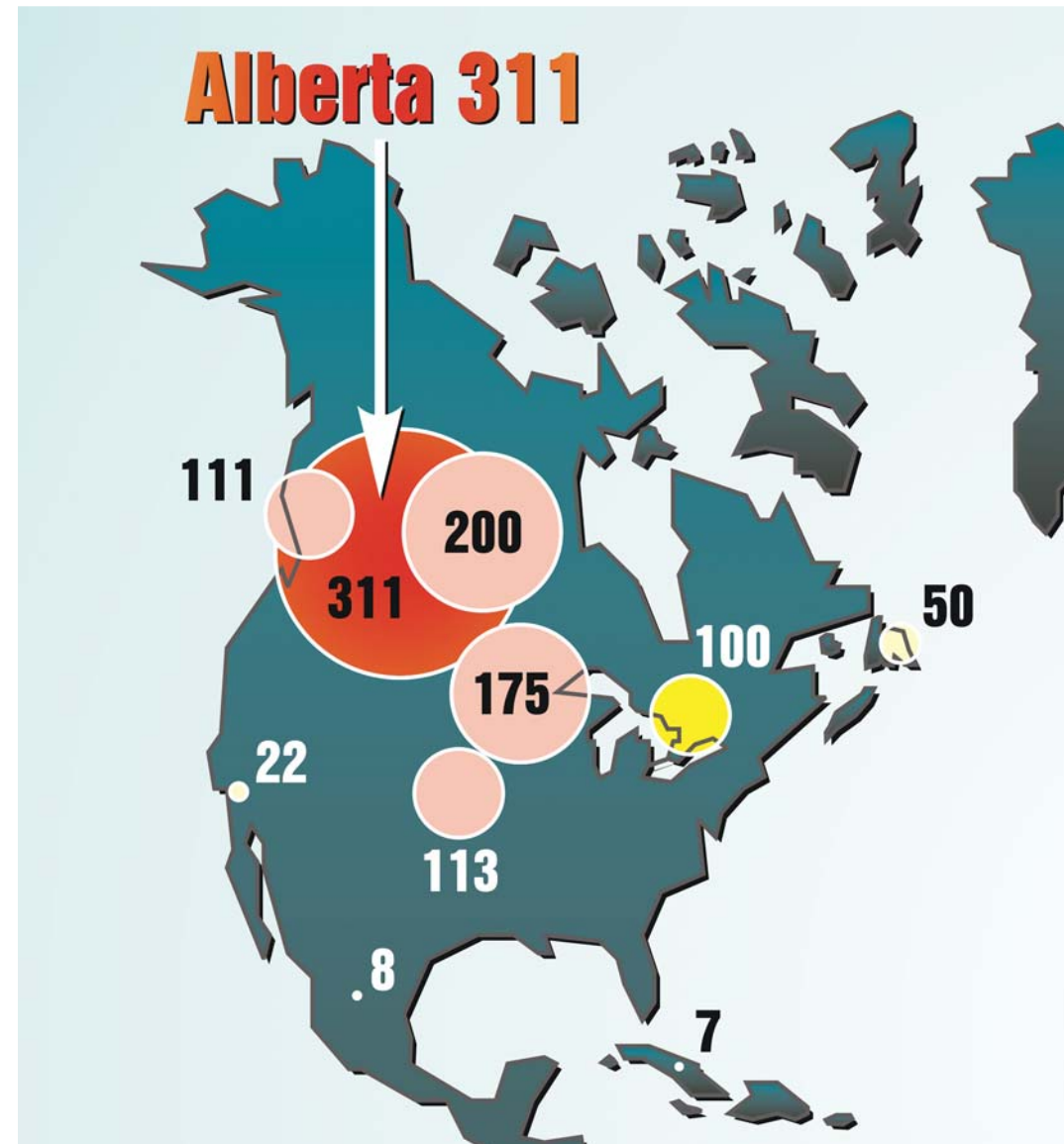
Also like the rest of Canada, common childhood infections affect most people, and dairy and gluten products dominate the diet. The diet of Albertans like that of most Canadians is also deficient in omega 3 polyunsaturated fat and anti-oxidants. Given all these factors, one can understand why MS prevalence in Canada is relatively high. However, the question becomes why is the prevalence of MS in Alberta twice that of most other areas in Canada.

The one key environmental factor involved in MS that can explain the anomalously high MS rate in Alberta is vitamin D deficiency. Vitamin D deficiency is more common in Alberta than

THE LOW SUPPLY OF VITAMIN D PROVIDES THE BEST REASON WHY MS IS MORE COMMON IN ALBERTA THAN MOST OTHER AREAS OF CANADA.

other provinces, except perhaps Saskatchewan, because of the high latitude of the populous areas. Half of the population of Alberta resides at latitude greater than 53 degrees north. This contrasts with the populations of Ontario and Quebec that mainly reside south of latitude 50 degrees. The populations of other provinces, with the exception of Saskatchewan, also reside at significantly lower latitudes than the population of Alberta. Not surprisingly, limited data indicate that MS rates in Saskatchewan may be nearly as high as those of Alberta.

Albertans get a lower vitamin D supply than most other Canadians due to the high latitude of the province. Given that MS is best characterized as a long latency vitamin D deficiency disease, this low supply of vitamin D provides the best reason why MS is more common in Alberta than other areas of Canada and anywhere else in the world.



Hydrocarbons and Multiple Sclerosis – A Baseless Speculation

Alberta is the main producer of hydrocarbons in Canada and some people have speculated that perhaps environmental factors related to hydrocarbon production might help to explain the high rate of MS in Alberta.

Currently there is no reliable scientific evidence to support such a speculation.

First of all, there is no known way for increased exposure to hydrocarbon products either to activate myelin-attacking cells or to negatively affect the suppressor side of the immune system. If hydrocarbons are invoked as an environmental factor in MS, then the autoimmune process of the disease has to be denied. Given the large amount of scientific information supporting MS as an autoimmune disease, such a denial is not reasonable.

CURRENTLY THERE IS NO RELIABLE SCIENTIFIC EVIDENCE TO SUPPORT SUCH A SPECULATION.

Another strong argument against a role of hydrocarbons in MS is the occurrence of low rates of MS in other areas in North America that produce large quantities of hydrocarbons. Major petroleum-producing areas such as south Texas, Louisiana and southern California all have a low MS prevalence that is similar to adjacent, non-petroleum producing areas. In support of this, a recent site-specific study found that persons living near an old oil refinery in Missouri did not an increased risk of MS.

In summary there are presently no immunological, epidemiological or animal experimental data to support the speculation that exposure to hydrocarbons is a factor in the anomalously high rate of MS in Alberta.

The Cost of Multiple Sclerosis

Multiple sclerosis is usually diagnosed when a person is close to 30 years old. Because it affects young adults and can have a devastating effect through multiple disabilities, the cost of MS to our society is large indeed. The human suffering associated with MS is great and this includes not only the person with MS but also their families.

THE COSTS OF MULTIPLE SCLEROSIS TO OUR SOCIETY ARE VERY LARGE IN TERMS OF HUMAN SUFFERING AND ECONOMIC LOSS.

Besides the human costs there are also huge financial costs associated with MS. Due to physical disabilities and overwhelming fatigue, many people with MS are forced to stop working in their potentially most productive years. They draw on disability insurance and other various social programs. This loss of well-trained workers has a significant impact on the economy.

The medical costs associated with MS are also very large. It has been estimated that each person with MS costs the medical system \$40,000 a year. The largest of these expenses is the current MS drugs that cost up to \$20,000 a year per person. Unfortunately these drugs have little, if any, effect on MS progression and the accumulation of disability for most. Thus they do not contribute to any lessening of the cost of MS.

In summary the costs of multiple sclerosis to our society are very large in terms of human suffering and economic loss. It is important that these costs are substantially lowered as soon as possible.

What Albertans Can Do to Lower Their Risk of MS

With the knowledge of what causes MS, it becomes rather straightforward how one can greatly lower the risk of MS for themselves and their loved ones.

As emphasized earlier, MS is a multifactorial disease and a variety of environmental factors are involved in MS onset and progression. However, it is clear that one environmental factor, vitamin D deficiency, plays a very critical role in MS. Most importantly the current data reveal that an adequate intake of vitamin D throughout childhood and later adulthood protects most, if not all, persons from MS. Thus adequate vitamin D intake appears to be the key to lowering one's risk.

The obvious question becomes how much vitamin D is required to ensure protection against MS. One's vitamin D status is determined by measuring the level of a form of vitamin D, known as hydroxyvitamin D (25(OH)D), circulating in the blood. Recent research indicates that it is important to maintain a blood level of circulating vitamin D of 100-140 nmol/l (40-55 ng/ml) and to ensure it never falls below 80 nmol/l (32 ng/ml). In Alberta, where vitamin D supply is very low, it is necessary to use a substantial vitamin D supplement throughout the year to achieve and maintain an optimal level of circulating vitamin D throughout the year. Of course one does not want to have too high a vitamin D level, and it is important that the circulating vitamin D level does not exceed 200 nmol/l (80 ng/ml) for a long period of time.

Because of differing genes and lifestyles, there is no single supplementation level which fits everyone. Studies indicate that most people need to take a daily supplement of 4000 IU to achieve and maintain a suitable level of circulating vitamin D. Because, for some people, 4000 IU of vitamin D might not be enough and for others it might be too much, it is important to have one's circulating vitamin D level measured in the fall and spring for the first few years of supplementation.

This is a simple, cost-free blood test that can be arranged by your family physician. A suitable supplementation level for the year can be determined on the basis of the test result and consultation with one's physician. The following table provides suggested dosages of vitamin D based on test results. The best source of a vitamin D supplement is the use of 1000 IU pills which can be bought at most drug and grocery stores for a very low price (~\$5 for a month supply).

It is emphasized that a circulating blood level of vitamin D of 100-140 nmol/l is perfectly safe and is regarded as high normal. It is well below any excess level and is comfortably above a deficiency level. Unfortunately very few Albertans maintain such a level and most have a level below 75 nmol/l during the winter/early spring period. This significantly increases their risk of numerous chronic diseases including MS.

In summary an Albertan can greatly lower the risk of MS by using an adequate daily supplement of vitamin D that results in an optimal blood level of circulating vitamin D.

VITAMIN D, 25(OH)D LEVEL <i>Test every October and April for first 2-3 years</i>	SUGGESTED DOSE
Less than 75 nmol/L in Oct or April	4000 IU all year round
Between 75 and 100 nmol/L in Oct Between 75 and 100 nmol/L in April	4000 IU from Oct. to April; 2000 IU from May to Sept.
Between 100 and 125 nmol/L in Oct Between 100 and 125 nmol/L in April	2000 IU from Oct. to April; 1000 IU from May to Sept.
Between 125 and 150 nmol/L in Oct Between 125 and 150 nmol/L in April	1000 IU from Oct. to April; No supplementation from May to September
Above 150 nmol/L in October or April	No supplementation until next test indicates a need

What the Alberta Government can do to eliminate the “Alberta Disadvantage”

The Government of Alberta should be very concerned about how common MS is in the province and how the rates are steadily increasing. As mentioned previously, the prevalence of MS in Alberta increased by 50% in the 1990s. The government must take appropriate and decisive actions to reverse this trend and to eventually eliminate MS from the province.

A few programs which would help accomplish this goal are:

- 1) The initiation of a major information campaign that lets people know that MS is most likely a long latency vitamin D deficiency disease, and that adequate intakes of vitamin D are required to ensure protection against MS.
- 2) The undertaking of a province-wide survey of vitamin D levels of Albertans to allow the extent and magnitude of vitamin D deficiency in the population to be established.
- 3) Physicians and public health nurses must be encouraged to ensure that all their patients, from babies to seniors, are maintaining an optimal level of circulating vitamin D through appropriate testing and counseling.
- 4) The role of vitamin D in health and disease as well as the need for adequate vitamin D supplementation throughout life should be part of all school health programs.
- 5) Pamphlets on vitamin D and the need for supplementation in Alberta should be published and made widely available.
- 6) An adequate research fund needs to be established to support both laboratory and clinical research on vitamin D and disease.

Just as extensive government programs in the 1920s and 30s ensured that most children received enough vitamin D to avoid rickets, there is no doubt that, with enough resolve, the Alberta government can raise the awareness of all Albertans for the need for adequate vitamin D supplementation. The payoffs from greatly reduced incidences of multiple sclerosis and a host of other long latency vitamin D deficiency diseases such as type 1 diabetes, rheumatoid arthritis, Crohn’s disease, breast, prostate and colon cancer as well as osteoporosis will be astronomical in terms of both greatly decreased human suffering and major health care savings.



DIRECT-MS – The Proactive MS Charity

DIRECT-MS was formed in 1998 by families affected by MS and is committed to two main goals:

- To provide reliable, science-based information on the role that nutritional factors play in MS so as to allow those affected by MS to make an informed decision on whether or not to use dietary strategies for managing the disease and for preventing it in close relatives.
- To fund scientific research which properly tests the effectiveness of dietary strategies for slowing or halting MS progression and for preventing it in the first place.

As a grass-roots charity, Direct-MS is completely volunteer-driven with very low overhead costs and no paid staff. 98% of the funds raised through donations go directly to funding scientific research. Funds raised through special events are used for producing information booklets such as this one.

For more information on nutrition and MS and the role of vitamin D in MS, visit the DIRECT-MS website at <http://www.direct-ms.org>



DIRECT-MS
defy the diagnosis