Multiple Sclerosis and Geology in Nova Scotia: Is there a correlation?

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INTRODUCTION

Multiple Sclerosis (MS) is a chronic inflammatory disease of the Central Nervous System (CNS)[1]. It is relatively common in Europe, United States, Canada, New Zealand and parts of Australia[3] (Figure 3), and is more prevalent in patients of European descent[2]. Nova Scotia has almost double the national average rate of MS. It is thought to be multifactorial and though genetic predisposition may be a contributing factor, this does not explain the change in incidence in migrants. This suggests there may be an environmental cause [4,5]. The high incidence and prevalence of MS may be related to some Carboniferous aged coal bearing or evaporite regions of Nova Scotia (NS) (Figure 4) [7].

Figure 1 – Graphic image of MS [6]

OBJECTIVES

To conduct a review of the medical and geological literature to assess the feasibility of further data collection and analysis of MS in specific geological areas of Nova Scotia.

METHODS AND SOURCES OF INFORMATION

A systematic review was performed using the following options

- **Dalhousie library search engines**
- **Pubmed - NCBI**
- **Google scholar and Google.com search engines**
- **The Nova Scotia multiple sclerosis integrated database (NS MSID) Project**
  - **Founded in 1979, and may be one of the longest running databases**

Keywords: Multiple sclerosis and one or more of the following: geology, geography, minerals, rocks, coal and medical geology.

Figure 2 - Loaded coal cars NS [16].

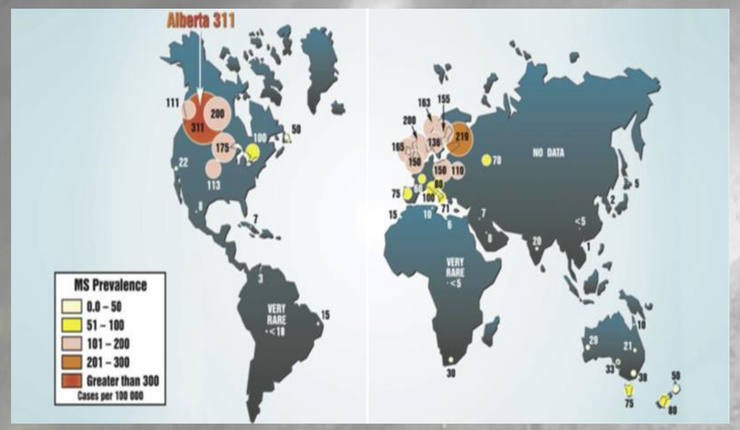

Figure 3. – Multiple Sclerosis rates across the globe [3]

RESULTS

- **There was no evidence showing a definitive caustive link between MS and geology including in coal mining areas.**
- **The risk of developing MS was related to the place of birth and early development in MS patients rather than the present place of residence if different from the birth place [9].**
- **A correlation between latitude and MS is well documented [1]**
- **An inverse correlation between MS and Vitamin D serum has been shown [10]**

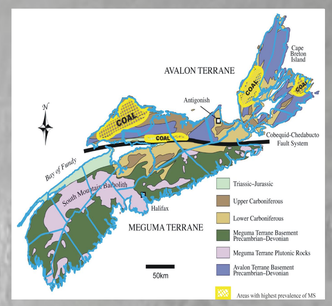

Figure 4 – Possible areas with highest prevalence of multiple sclerosis in Nova Scotia [7].

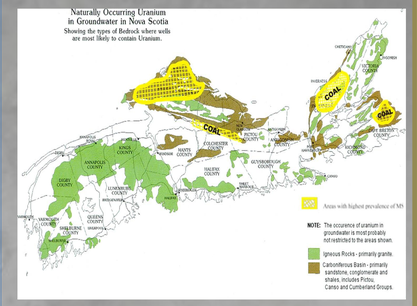

Figure 5. Map showing the bedrock where wells are most likely to contain Uranium [14].

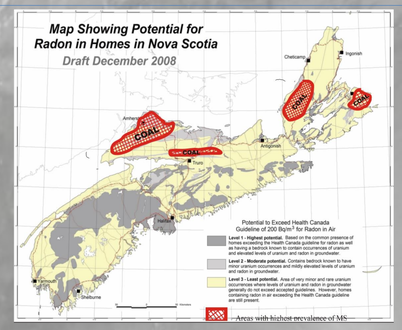

Figure 6. Preliminary map showing potential for radon in air within homes in Nova Scotia [15].

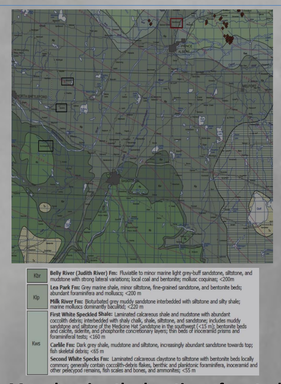

Figure 7. Map showing the location of control and study group in Henribourg, Saskatchewan.

DISCUSSION

Reports correlating MS with geography appeared in the literature as far back as 1948, when Limburg proposed a connection between the mean annual temperature and hence latitude[11]. There was interest in an etiologic link between the two based on articles in the 1950's and 1960's but there has been no new information. Recent evidence points to a correlation between MS and latitude and by extension exposure to sunlight and Vitamin D [9,10].

A report in 2003[12] did not find a clear connection to specific minerals such as radon and lead, that may be associated with geological rock types, but other reports have suggested further study based on results of minerals found in soil [13,14]. In Nova Scotia there was no overlap between the possible areas of MS and the presence Radon and Uranium (Figure 5&6). In a study of an MS cluster in Henribourg, Saskatchewan, the bedrock geology was the same in the study population in the cluster as it was in 2 of the 3 control groups (Figure 7).

Limitations

- **Difficult to obtain information online about incidence and prevalence rates at sub-provincial levels in Canada. Therefore it is difficult to identify clusters or areas of higher concentration and correlate this with the geology of the area.**

Recommendations

- **Collaborate with MS medical specialist.**
- **Examine data on MS cases from the NS MSID including place of residence by county, town or postal code.**
- **Design and implement questionnaire to identify the place of birth and childhood (up to age 15) if different from present residence for patients confirmed to have MS.**
- **Compare the incidence and prevalence of MS in different provinces and correlate with the geology.**

Figure 8. Images from Coal mining areas in Cape Breton: clockwise i) Glace Bay in 1980, ii) Miners [16]

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