

# Review of MS Patient Survival on a Swank Low Saturated Fat Diet

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## INTRODUCTION

The linking of the increasing incidence of multiple sclerosis (MS) with the increasing consumption of saturated animal fats was suggested first by Swank in 1950.<sup>1</sup> The testing of this hypothesis resulted in a 50-y experiment following patients who were placed on low-fat diets after being diagnosed with MS. The progress of this experiment was reported at intervals up to 34 y and was summarized in 1991 in *Nutrition*.<sup>2</sup> This article describes the most recent findings of the study and presents the striking result that approximately 20% of these MS patients on the lowest fat diet showed little or no neurologic deterioration as a result of the progress of the disease. This is a much higher percentage than the 4% of benign cases that could be expected within a large group of patients.<sup>3</sup> To put the original hypothesis into context, we briefly review the historical nutritional information and the changing incidence of MS in various populations. More details can be found in Swank<sup>2</sup> and the references therein.

Two hundred fifty years ago (circa 1750), each individual living in the industrial West consumed approximately 60 g of fat each day.<sup>4</sup> Improvement in transportation and the quality of food, greater cleanliness, cold storage, and bacterial control led to a more plentiful supply of food to urban and rural populations. Daily fat consumption gradually increased to 100 g per person by 1860.<sup>5-7</sup>

At this time, MS was being recognized by pathologists postmortem and by physicians of living patients. Charcot (1868–1872) first described the disease in much the same way as it is recognized today.<sup>8</sup>

During 1900, inexpensive margarine (a saturated fat) was produced by hydrogenation of fish and vegetable oils. By 1930, the personal consumption of fats (largely saturated) had increased to 125 g/d in the industrial West. During World War II, the daily fat intake of each person in America, Canada, and other industrial countries increased to 140 g/d due to the increased availability of meat, milk, butter, cheese, and margarine.

Detailed nutritional studies after World War II found remarkable differences between the large amounts of fat, largely saturated, consumed in the industrial nations and the small amounts consumed in the remaining non-industrial world. Japan was the exception. Although an industrial nation, its people consumed a small amount of fat (Table I).

Although MS was first recognized in the mid-1700s, when the average consumption of fat had reached about 100 g/d in the industrial West, MS remained an unusual, albeit very severe, disease. By the 19th century, most patients with MS became totally disabled and died during the first 15 to 30 y of the disease course.

Between 1945 and 1948 in rural Norway, the frequency of MS was found to be directly related to the amount of saturated animal fat consumed daily in different areas of the country.<sup>1,9</sup> This was confirmed in other countries.<sup>10-12</sup> The earlier observation in Norway led Swank et al. in 1951 to start a long-term study of the effect of a very low saturated fat diet by MS patients.

## THE DIET TEST

From 1950 to 1951, the daily intake of saturated fat by each MS patient was limited to 30 g to test the sensitivity of MS patients to a low-fat diet. Beginning late in 1951, saturated animal fat was then limited further to no more than 10 to 15 g/d, and unsaturated vegetable and fish oils were kept to 20 to 40 g/d. To this was added one multiple vitamin tablet and two vitamin A and D capsules to guard against vitamin deficiencies.

## EXPERIMENT

In part I of this study, 250 patients were admitted to the Montreal Neurologic Hospital for confirmation and treatment of MS. This occurred between 1948 and 1952. These patients were carefully examined to determine their suitability for a long-term study. They had marked fatigue and general weakness. Each patient had had two or more exacerbations of MS followed by remission. Each had marked or weak neurologic findings, and all were unable to work.

From this group of mildly or severely disabled patients, we selected 144, all of whom in our opinion had MS and neurogrades equal to  $4 < N_g < 5$  on the scale described by Kurtzke.<sup>13</sup> This categorization meant that they had neurologic indications and mildly impaired performance but were actively ambulant, although their gaits when fatigued often were slightly ataxic. They usually worked full or part time and sometimes experienced fatigue, periodic exhaustion, and occasionally some slight memory impairment. The average duration of the disease before the study was 6 y. Patients' ages ranged from 30 to 42 y. In addition, they were willing to enter our long-term nutritional study of the effects of the Swank low saturated fat diet in ameliorating the disease.

The 144 patients were placed on a low-fat diet. Before the study, their fat intakes had been approximately 125 g/d of saturated fat.<sup>2</sup> A group of 70 patients adhered strictly to the low-fat diet. This group was referred to as the "good dieters" and consumed less than 20 g/d of saturated fat. The remaining 74 patients, referred to as "poor dieters," consumed more than 20 g/d of fat, although they did restrict their fat intake. The actual fat intake of the good dieters averaged  $16 \pm 2.8$  g/d. Conversely, the poor dieters consumed an average of  $38.0 \pm 18.0$  g/d. Patients were followed initially at intervals of 2 wk and then at intervals of 1 mo for the first 2 y. Thereafter, patients made annual visits and quarterly reporting by telephone calls. Daily intakes of fats, oils, and proteins were recorded in 5-g units during annual examinations for the first 22 y.

There was a total of 23 deaths, with only 14 (20%) due to MS in the group of 70 good dieters and 58 deaths (80%) in the group of poor dieters and 45 (61%) of those were due to MS. Therefore, there were 47 (67%) among the 70 good dieters who survived the 34-y dietary experiment but only 16 (21%) of the 74 poor dieters for the 34 y. The results are shown in Table II. Table II is a simplified version of data taken from the interim report.<sup>2</sup>

The 63 surviving patients then continued to consume their original diets. Thus, the total duration of this experiment is 50 y.

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TABLE I.

DAILY FAT INTAKE IN COUNTRIES FROM 1934 TO 1938 GROUPED BY INCIDENCE OF MULTIPLE SCLEROSIS	
Country	Daily fat intake (g)
Denmark	150.8
British Isles	122.5
Canada	118.3
Norway	118.0
Sweden	116.0
Netherlands	114.7
Germany	111.4
Switzerland	104.7
Italy	60.0
Rumania	52.7
Brazil	51.7
South Africa	49.9
Cuba	48.6
Turkey	46.8
China	40.1
Japan	24.5

### CONTINUED OBSERVATIONS

The 47 surviving good dieters and the 16 surviving poor dieters continued without change of diet. During the first 34 y, the patients had been seen periodically and their diets evaluated. During part 2 of the experiment, patients were not seen during the next 15 y and therefore were forced to care for themselves without dietary instruction.

### FURTHER OBSERVATIONS

Contact was re-established by mailing the patients who had been examined at the 34-y stage. In 2000 it was possible to visit, observe, evaluate, and question 15 patients who had been on the diet for approximately 50 y. During that year, 13 of those patients were visited in Montreal. A year later, we interviewed two more: one in Portland, Oregon who journeyed from California, and the second in Edmonton, Alberta, Canada. Thus, a total of 15 patients who had lived on the low-fat diet for 50 y were evaluated.

### FINAL OBSERVATIONS

Of these 15 patients, all 72 to 84 y old, 13 were ambulant and normal in all respects. These patients were examined in their homes, so it was not possible to subject them to detailed clinical testing; thus, test scores are not available. The other two patients need some help to enable them to walk. One, a woman, could stand but not walk without support and recently had back surgery. The other, a man, could stand and walk only a few yards. Otherwise, he was mentally well and could care for himself. The remaining 13 patients were remarkably well. They were very active, could care for themselves, could walk as necessary, and were normal mentally.

Photographs were taken of all patients. Of the two weaker patients, one had to remain seated and the other could stand. The remaining 13 stood and were active and unusually youthful looking, with very smooth facial skin devoid of wrinkles due to good subcutaneous circulation. They were all in friendly, good spirits, had joyful laughter, and generally quite youthful behavior.

### CONCLUDING REMARKS

This study indicated that, in all probability, MS is caused largely by consumption of saturated animal fat. This study also indicated

TABLE II.

SURVIVAL RATE OF PATIENTS AFTER 34 Y ON LOW-FAT DIET*		
	n (%)	Actual fat intake
Fat intake <20 g/d		
Good dieters	70 (100)	16 ± 2.8 g/d
All deaths	23 (33)	
Total MS deaths	14 (20)	
Survivors	47 (67)	
Fat intake >20 g/d		
Poor dieters	74 (100)	38 ± 18 g/d
All deaths	58 (80)	
MS deaths	45 (61)	
Survivors	16 (21)	

\* Data from Swank.<sup>2</sup>

MS, multiple sclerosis

that patients with MS, if they rigorously follow the extremely low-fat diet proposed by Swank, which contains no more than 10 to 15 g/d of saturated fat, can expect to survive and be ambulant and otherwise normal to an advanced age.

Complete absence of saturated fat in a daily diet might prove beneficial to general health, particularly in relation to cardiac and other circulatory diseases. This likely is due in part to the maintenance of good, efficient microcirculation. We suggest that the impairment of the microcirculation and, hence, local tissue damage can occur subsequent to a meal high in saturated fats. The fats appear in the blood as chylomicra, and chylomicra and red blood cells have been shown to have a tendency to aggregate and be more adhesive when the chylomicra are formed from saturated fats.<sup>14</sup> We plan to discuss this in more detail in another paper.

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### REFERENCES

- Swank RL. Multiple sclerosis: a correlation of its incidence with dietary fat. *Am J Med Sci* 1950;220:421
- Swank RL. Multiple sclerosis: fat-oil relationship. *Nutrition* 1991;7:368
- MacKay RP, Hirano A. Forms of benign multiple sclerosis. *Arch Neurol* 1967;17:588
- Drummond JC. *The Englishman's food: a history of five centuries of English diet*. London: Jonathon Cape, 1939
- Consumption of food in the United States 1909-1948*. Washington, DC: US Department of Agriculture, 1949
- The state of food and agriculture in 1948*. Washington, DC: Food and Agriculture Organization of the United Nations, 1948
- The state of food and agriculture*. Rome: Food and Agriculture Organization of the United Nations, 1964
- Swank RL. *The multiple sclerosis diet book*. New York: Doubleday, 1987
- Swank RL, et al. Multiple sclerosis in rural Norway: its geographic and occupational incidence in relation to nutrition. *N Engl J Med* 1952;246:721
- Alter M. Multiple sclerosis in Mexico. *Arch Neurol* 1970;23:451
- Leibowitz U, Kahana E, Alter M. The changing frequency of multiple sclerosis in Israel. *Arch Neurol* 1973;29:107
- Alter M, Yamoore M, Harshe M. Multiple sclerosis and nutrition. *Arch Neurol* 1974;31:267
- Kurtzke JF. Rating neurologic impairment in multiple sclerosis: and expanding disability status scale (SDSS). *Neurology* 1983;33:1444
- Cullen CF, Swank RL. Intravenous aggregation and adhesiveness of the blood elements associated with alimentary lipemia and ingestion of large molecular substances—effect on the blood-brain barrier. *Circulation* 1953;9:335

(For an additional perspective, see *Editorial Opinions*)