Diet and Multiple Sclerosis

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Outline

- What is the best diet for Multiple Sclerosis?

- Essential Fatty Acids – Omega 3 and Omega 6

- Specific diets suggested for Multiple Sclerosis
  - Low gluten
  - Best Bet Diet
  - Swank Diet
  - The Overcoming MS Programme

- Vitamin D

- Summary
What is the best diet for Multiple Sclerosis?

There has been limited research into diet and MS. However the government recommendations of a ‘well balanced diet’ is based on research in the prevention of cardiovascular disease, stroke and cancer.

A balanced diet provides all the nutrients that we need to be as active and healthy as possible.

A balanced diet that is recommended for the general population is also recommended for people with MS.
What is a balanced diet?
## Essential fatty acids – omega 6 and omega 3

<table>
<thead>
<tr>
<th></th>
<th>Omega 3</th>
<th>Omega 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food sources</strong></td>
<td>Oily fish – sardines, mackerel, salmon</td>
<td>Sunflower, safflower, soy and corn oil</td>
</tr>
<tr>
<td></td>
<td>Certain nuts and seeds e.g. walnuts, linseeds, soybean</td>
<td>Foods made from these oils such as margarine, mayonnaise, salad dressings</td>
</tr>
<tr>
<td><strong>Evidence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NICE (2003)</td>
<td></td>
<td>17 – 23g linoleic acid per day may slow the disability</td>
</tr>
<tr>
<td>Cochrane review (2012)</td>
<td>No benefit in RRMS but more research needed</td>
<td>No benefit in disease progression in RRMS or progressive MS but more research needed</td>
</tr>
<tr>
<td>NICE (2014)</td>
<td>Awaiting publication</td>
<td>Awaiting publication</td>
</tr>
</tbody>
</table>
# Omega-3

**Figure 800:** Number with a relapse within 12 months

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>omega 3</th>
<th>placebo</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torkildsen 2012</td>
<td>10</td>
<td>46</td>
<td>1.22 [0.53, 2.82]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>46</td>
<td>45</td>
<td>1.22 [0.53, 2.82]</td>
</tr>
</tbody>
</table>

Total events: 10, 8

Heterogeneity: Not applicable

Test for overall effect: Z = 0.47 (P = 0.64)
**Omega-3**

**Figure 796: EDSS worse at 6 months – 2 years**

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>omega 3</th>
<th>placebo</th>
<th>Weight</th>
<th>Risk Ratio M-H, Fixed, 95% CI</th>
<th>Risk Ratio M-H, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.17.1 6 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torkildsen 2012</td>
<td>6</td>
<td>46</td>
<td>4</td>
<td>4.9%</td>
<td>1.37 [0.41, 4.52]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>46</td>
<td>42</td>
<td>4.9%</td>
<td>1.37 [0.41, 4.52]</td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall</td>
<td>effect: Z = 0.52 (P = 0.61)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 2.17.2 2 years    |         |         |        |                             |                             |
| Bates 1989        | 76      | 145     | 82     | 95.1%                       | 0.94 [0.76, 1.16]           |
| Subtotal (95% CI) | 145     | 147     | 95.1%  | 0.94 [0.76, 1.16]           |                             |
| Total events      | 76      | 82      |        |                             |                             |
| Heterogeneity:    | Not applicable |     |        |                             |                             |
| Test for overall  | effect: Z = 0.58 (P = 0.56) | |        |                             |                             |

| Total (95% CI)    |         |         |        |                             |                             |
| Total events      | 191     | 189     | 100.0% | 0.96 [0.78, 1.19]           |                             |
| Heterogeneity:    | Chi² = 0.38, df = 1 (P = 0.54); I² = 0% | |        |                             |                             |
| Test for overall  | effect: Z = 0.37 (P = 0.71) | |        |                             |                             |
| Test for subgroup | differences: Chi² = 0.37, df = 1 (P = 0.54), I² = 0% | |        |                             |                             |
**Omega-3**

**Figure 813:** Omega-3 versus placebo EDSS

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean 3</th>
<th>SD 3</th>
<th>Total 3</th>
<th>Mean 0</th>
<th>SD 0</th>
<th>Total 0</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Total</td>
<td>Mean</td>
<td>SD</td>
<td>Total</td>
<td>IV, Fixed, 95% CI</td>
<td>IV, Fixed, 95% CI</td>
<td></td>
</tr>
<tr>
<td>2.18.1 6 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramirez-Ramirez 2013</td>
<td>2.1</td>
<td>0.9</td>
<td>20</td>
<td>2</td>
<td>0.8</td>
<td>19</td>
<td>100.0%</td>
<td>0.10 [-0.43, 0.63]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>20</td>
<td>18</td>
<td>100.0%</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.37 (P = 0.71)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 2.19.2 12 months   |        |      |         |        |      |         |                    |                  |
| Ramirez-Ramirez 2013 | 2.2    | 1    | 20      | 2.2    | 0.8  | 19      | 100.0% | 0.00 [-0.57, 0.57] |                  |
| Subtotal (95% CI)  | 20     | 18   | 100.0%  | 0.00   |      |         |        |                  |                  |
| Heterogeneity: Not applicable |
| Test for overall effect: Z = 0.00 (P = 1.00) |

Test for subgroup differences: $\chi^2 = 0.06, df = 1 (P = 0.80), I^2 = 0\%$
Omega-6

Figure 792: Global improvement

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>omega 6 Events</th>
<th>Total</th>
<th>placebo Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bates 1977</td>
<td>7</td>
<td>76</td>
<td>7</td>
<td>76</td>
<td>70.9%</td>
<td>1.00 [0.37, 2.71]</td>
</tr>
<tr>
<td>Millar 1973</td>
<td>5</td>
<td>36</td>
<td>3</td>
<td>39</td>
<td>29.1%</td>
<td>1.81 [0.46, 7.02]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>112</td>
<td></td>
<td>115</td>
<td></td>
<td>100.0%</td>
<td>1.23 [0.56, 2.74]</td>
</tr>
</tbody>
</table>

Total events 12 10

Heterogeneity: Chi² = 0.47, df = 1 (P = 0.49); I² = 0%
Test for overall effect: Z = 0.52 (P = 0.60)
Omega-6

**Figure 793: Number with 1 or more relapses**

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>omega 6</th>
<th>placebo</th>
<th>Risk Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Events</td>
</tr>
<tr>
<td>Bates 1978</td>
<td>51</td>
<td>58</td>
<td>46</td>
</tr>
<tr>
<td>Millar 1973</td>
<td>25</td>
<td>36</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>94</strong></td>
<td><strong>96</strong></td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>76</td>
<td>76</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: $\chi^2 = 1.43$, df = 1 ($P = 0.23$); $I^2 = 30\%$

Test for overall effect: $Z = 0.25$ ($P = 0.81$)
Recommendations for dietary fats and the progression of MS

Following a diet which includes omega 6 and omega 3 fats is not harmful and may be beneficial in a cardio-protective diet.

No recommendations available for ideal intake for both omega 3 and omega 6

*Recommendation* – individual choice whether to include in diet, beneficial in cardio protective diet but no specific dosage recommendations for MS
Specific diets suggested for MS – Low Gluten

<table>
<thead>
<tr>
<th>What is it?</th>
<th>Gluten is a protein that is found in wheat, rye and barley.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence Base</td>
<td>24 papers in total. All but one of these papers found no association between gluten intake and MS. The one study found was very small in sample size with only 9 people</td>
</tr>
<tr>
<td>Recommendations</td>
<td>There is limited evidence to recommend a low gluten diet in the management or prevention of MS. However, you can achieve a well balanced diet on a low gluten diet with substitutions such as choosing potatoes, rice or gluten free alternatives for bread and pasta.</td>
</tr>
</tbody>
</table>
Specific diets suggested for MS – Best Bet Diet

<table>
<thead>
<tr>
<th>What is it?</th>
<th>This diet is based on the principle that MS is caused by a ‘leaky gut’. By healing a ‘leaky gut’ it can slow down and prevent intact food proteins from entering circulation. It recommends avoiding several foods including dairy, grains, red meat and legumes. It also suggests having allergy tests to discover other foods to avoid and taking up to 18 supplements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence base</td>
<td>Currently, there is no evidence on this diet and no evidence to suggest MS is due to a leaky gut No research papers on the Best Bet Diet</td>
</tr>
<tr>
<td>Recommendations</td>
<td>This diet may result in food restriction, possible nutritional deficiencies and may also be expensive. Not recommended in the management of MS</td>
</tr>
</tbody>
</table>
Specific diets suggested for MS – Swank Diet

<table>
<thead>
<tr>
<th>What is it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed in the 1940s by Dr Roy Swank.</td>
</tr>
<tr>
<td>Saturated fat should not exceed 15g per day</td>
</tr>
<tr>
<td>Unsaturated fat kept to 20-50g per day</td>
</tr>
<tr>
<td>No red meat for the first year</td>
</tr>
<tr>
<td>No fat or 1% or less for dairy products</td>
</tr>
<tr>
<td>No processed foods containing saturated fat</td>
</tr>
<tr>
<td>Cod liver oil and a multivitamin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evidence Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only one large research trial. This was undertaken by Dr Swank in 1950 over a number of years and concluded in 1991. However, there were a number of limitations to this study.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing animal products such as meat and dairy may reduce your protein intake, therefore you need to substitute this with alternatives like fish, beans and pulses.</td>
</tr>
<tr>
<td>The diet could be low in energy overall, therefore if you are losing weight, underweight or have very high energy needs then this diet may not suitable</td>
</tr>
</tbody>
</table>
### Specific diets suggested for MS – The Overcoming MS Programme

<table>
<thead>
<tr>
<th>What is it?</th>
<th>This was developed by Professor George Jelinek in 1999. Diet is part of a whole programme. It recommends cutting out dairy and meat, and reducing saturated fat intake. It also recommends vitamin D and omega 3 supplementation, exercise and meditation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence Base</td>
<td>No conclusive evidence. One study showed some improvements in people's wellbeing and quality of life. A large international observational cohort study commenced in 2011 and is ongoing by Professor Jelinek and others</td>
</tr>
<tr>
<td>Recommendations</td>
<td>Like the Swank diet not necessarily 'bad' for you but individuals need to be careful with protein intake, and substitute dairy and meat with appropriate alternatives. Individuals who are underweight/losing weight would also need to be careful, as this diet could result in lower energy intake</td>
</tr>
</tbody>
</table>
Considerations when following a specific diet

- What’s the evidence?
- Can you still enjoy your food?
- Will it adversely affect you?
- Is it practical?
Vitamin D

Vitamin D is important for normal development and growth of bones, through controlling the absorption of calcium and phosphate.

It has been suggested that low vitamin D levels may contribute to axonal inflammation and its progression and relapses with MS (Smoulder et al, 2014).

It has also been observed that people with MS, have lower levels of vitamin D.
Vitamin D

Sources
- The main source of vitamin D is exposure to sunlight
- Very few foods contain significant amounts of vitamin D but foods such as oily fish and some fortified foods such as margarine and cereal

Causes of vitamin D deficiency
- Avoidance of sun exposure and the use of sunscreen and sun-protective clothing are among the more common causes.
- Sun exposure is also related to time of year and geographic location. MS symptoms may reduce mobility, in turn reducing time spent outdoors and less sun exposure
- High skin pigmentation, decreases sun-induced vitamin D production in the skin and is therefore a risk factor for vitamin D deficiency.
Vitamin D – Recommended optimum levels

- Diagnosed via blood test – assessment of serum 25 (OH) D levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Concentration (nmol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>&gt;75</td>
</tr>
<tr>
<td>Sufficient</td>
<td>50 - 75</td>
</tr>
<tr>
<td>Insufficient</td>
<td>25 - 50</td>
</tr>
<tr>
<td>Deficient</td>
<td>&lt;25</td>
</tr>
</tbody>
</table>

Pearce et al, (2010)
Vitamin D and MS

- Only 5 studies on the effect of vitamin D and clinical outcomes in MS

- Small study sizes, differing dosage and type of vitamin D supplementation

- 4 out of 5 showed no effect with vitamin D

- 1 out of 5 showed improvement in brain MRI parameters
Vitamin D toxicity

- Vitamin D works with calcium - too much vitamin D may cause hypercalcemia (too much calcium in the blood)

- This excess calcium may damage the kidneys and also encourage calcium to be removed from the bones, which can soften and weaken them

- European Food Safety Authority recommends a upper limit of 4000IU (100ug) per day in adults and children over 11
Vitamin D - Recommendations

- Aim to get enough vitamin D through exposure to sunlight and diet - for some people with MS this may be difficult (reduced mobility, fatigue, poor appetite)

- Specific groups benefit from vitamin D supplementation: pregnancy, lactation, Asian women and children, those aged over 65

- Vitamin D supplementation if low levels, low intake, house bound or avoid sun exposure

- Estimated that more then 50% of adults have insufficient vitamin D (Pearce 2010) therefore dependent on Consultant preferences, baseline vitamin D levels in MS patients may be beneficial

- Levels should be checked annually at the end of winter months, to ensure optimum dosage and also monitoring of calcium levels (Cohcrane, 2010, Cannell and Hollis, 2008).
Vitamin D - Recommendations

- Supplement dosage may vary from person to person and dependent on prescriber

- The department of health recommends:
  - Daily 400IU (10mg) for all pregnant and lactating women, people aged over 65 or people who stay indoors a lot
  - Varying practice between neurologists from 800IU to 4000IU

  - *No current evidence for optimal dosage supplementation in MS*
Summary

- Aim to have a well balanced diet, providing nutrients from all food groups and maintain a healthy body weight

- If you wish to follow a ‘specific diet’ aim to achieve a well balanced diet, by using substitutions, and if you have any concerns with your weight/food restriction please see a dietitian

- Monitoring and supplementation of vitamin D only if low levels are found or for those at risk groups (this may be dependent on Neurologist and prescriber)

- Ongoing research is needed to help provide further recommendations
References

- Multiple Sclerosis Society (2008). MS Essentials: For people living with MS.
References

- Schwarz S, Leweling H. Multiple sclerosis and nutrition. Multiple Sclerosis 2005;11(1):24-32