Does Diet Make a Difference?
Nutrition and Supplements in MS

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Pillars of MS management

Disease-modifying therapies

Symptom management
- Weakness
- Foot drop
- Bowel and bladder problems
- Fatigue
- Spasticity
- Altered sensations

Lifestyle modifications
What do we mean by lifestyle modifications?

- Exercise
- Healthy Diet and supplementation
- Community
- Coping Strategies Resilience
- Kicking unhealthy habits
Why nutrition is so important in MS?

A healthy diet does not replace medical management and disease-modifying therapies!
Healthy diet may help control chronic inflammation

Western diet associated with higher levels of inflammation markers compared to high vegetable/low protein diet

Diet plays an important role in the composition of the gut flora and its impact on the immune system may be at least partly through the gut

Saresella et al., Front Immun, 2017
Healthy diet associated with better outcomes

Study of ~7,000 people with MS shows that individuals with healthy diet* have lower odds of severe fatigue, depression, motor disability, and cognitive impairment.

*Healthy diet= high in vegetables, fruits, legumes, whole grains, low in sugar and red meat

Fitzgerald et al., Neurology 2018
Importance of maintaining a healthy weight

High body mass index before age 20 is associated with increased risk for multiple sclerosis in both men and women

Anna K Hedström¹, Tomas Olsson² and Lars Alfredsson¹

Abstract
In a Swedish population-based case-control study (1571 cases, 3371 controls), subjects with different body mass indices (BMIs) were compared regarding multiple sclerosis (MS) risk, by calculating odds ratios (OR) with 95% confidence intervals (95% CI). Subjects whose BMI exceeded 27 kg/m² at age 20 had a two-fold increased risk of developing MS compared with normal weight subjects. Speculatively, the obesity epidemic may explain part of the increasing MS incidence as recorded in some countries. Measures taken against adolescent obesity may thus be a preventive strategy against MS.

People with BMI > 27 kg/m² at age 20 have a two-fold increased risk of developing MS
Importance of maintaining a healthy weight

Study of 460 patients suggests that obesity is associated with greater loss of brain tissue in MS

Mowry et al., Neurology 2018
Importance of cardiovascular disease prevention in people with MS

Cardiovascular risk factors such as high blood pressure, diabetes, high cholesterol are associated with more rapid progression in MS.

Lifestyle modifications are critical to prevent these risk factors.

Marrie et al., Neurology, 2010
Nutrition basics and frequent questions
Nutrition Basics: Macronutrients

**Carbohydrates**
- The body’s main source of energy
- Primary source of energy for red blood cells and brain cells
- 45-65% calories

**Proteins**
- Storage form of excess energy
- Trans, Saturated, Polyunsaturated, Monounsaturated
- 10-35% calories

**Fats**
- Protein source for growth and maintaining tissue
- Can be used as energy
- Important neurotransmitters and enzymes
- 20-35% calories
Nutrition Basics: Micronutrients

Vitamins
- A, Bs, C, D, E, K
- Fat soluble
- Water soluble
- Supplements

Minerals
- Trace
- Major
- Calcium, Phosphorus, Magnesium, Sulfur, Iron, Copper, Zinc, Manganese, Iodine, Selenium, Fluoride, Potassium
Current recommendation for healthy diet
Should I stop eating gluten?

• Gluten is a group of protein contained in certain grains such as wheat, barley, rye, etc...

• MS not associated with increased risk of Celiac Disease

• No sufficient evidence to assert that gluten is associated with MS

• In a large survey, 5.5% of American people living with MS were following a gluten-free diet, with 88% expressing satisfaction with their diet

• No nutritional deficiency expected if you chose to substitute with gluten-free products

Thomsen et al., Multiple Sclerosis and Related Disorders, 2010
Should I stop eating dairy?

• Early epidemiology study found a good correlation between liquid cow milk consumption and MS prevalence. Relationship was no longer present with processed milk products (cheese). Possible confounding factors not analyzed.

• High intake of milk in adolescence (3+ servings) associated with an increased risk of MS

Malosse et al., Neuroepidemiology, 1992; Munger et al. J Neurol, 2011
The truth about Salt...

• High salt diets thought to promote pro-inflammatory T-cells

• One cohort study found a higher risk of relapse and of new MRI lesions in people consuming a high salt diet

• Data in animal models of MS: increase production of pro-inflammatory cells with high sodium diet

• This was not observed in the pediatric MS population

Farez et al., JNNP, 2014; Sharrif et al., Autoimmunity reviews, 2018
What about fats?

Western diet:
- High intake of saturated fatty acids, omega-6 fatty acids, and trans-fat (meats, processed foods, dairy)
- Low in omega-3 (fish, chia seeds, flax seed)
- Low in flavonoids (vegetables)
- Low in fiber (necessary to produce beneficial short-chain fatty acids)
- Contributes to increasing inflammation

Matveeva et al., Ann NY Acad Sci, 2018
Should I follow a specific protocol?
<table>
<thead>
<tr>
<th>Diet</th>
<th>Basic guidelines</th>
<th>Restrictions</th>
<th>Possible deficiencies</th>
<th>Evidence for benefit in MS</th>
<th>Evidence for benefit in other diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paleolithic Diet²</td>
<td>Emphasizes consumption of game meats (30-35% of daily caloric intake) and plant foods (besides cereals), multiple daily servings of green, sulfur rich and intensely colored vegetables and fruits, with a high intake of PUFA to target a ratio of saturated to unsaturated fats of 1.4-2:1</td>
<td>Processed food, domesticated meats, dairy</td>
<td>Folic acid, thiamine, vitamin B6, calcium and vitamin D, insufficient caloric intake</td>
<td>Single observation study demonstrating possible improvement in fatigue in progressive MS patients (however diet was bundled with other interventions and there was no comparison group)⁹</td>
<td>Single study showed improvement in cardiovascular risk factors¹⁰</td>
</tr>
<tr>
<td>Mediterranean Diet²¹</td>
<td>High intake of whole grains, vegetables, fruits, legumes, olive oil and fish, a low intake of saturated fats (butter and other animal fats), red meat, poultry, dairy products and a regular but moderate intake of ethanol (mainly red wine)</td>
<td>No specific exclusions</td>
<td>None expected</td>
<td>None</td>
<td>Extensive evidence for a benefit on cardiovascular health, diabetes and possibly on cancer risk¹²,¹³,²¹,²²</td>
</tr>
<tr>
<td>McDougall Diet¹⁵</td>
<td>High carbohydrate, low fat, low sodium vegan diet with cereals, potatoes, and legumes as staples. Fruits and vegetables are allowed in any amount. Low sodium intake and small amounts of sugar are recommended.</td>
<td>Dairy, eggs, meat, poultry, fish and all oils</td>
<td>Iron, vitamin B12, vitamin D, calcium and ω3-fatty acids</td>
<td>None</td>
<td>One study showed improvement in cardiovascular risk factors with one week of the diet (did not look at long term effects)¹⁵</td>
</tr>
<tr>
<td>Swank Diet[^19]</td>
<td>Low fat diet that advocates reduction in the intake of saturated fats. Whole grain cereals are recommended, daily intake of 2 servings of fruits and vegetables, intake of white fish and shellfish and trimmed poultry is allowed. Low fat dairy is allowed and small quantities of red meat are permissible after the 1st year of the diet</td>
<td>Processed food with saturated fats, high fat dairy products, red meat for 1st year</td>
<td>None expected (possibly vitamin A, C, E and folate)</td>
<td>Observational data from a single cohort of patients treated with this diet suggested an improvement in relapses and functional status. (there was no control comparison group)[^19]</td>
<td>None</td>
</tr>
</tbody>
</table>

[^19]: Bhargava, “Diet and Multiple Sclerosis”, NMSS
What supplements should I take?
Vitamin D: a definite yes in MS!

• Low levels of vitamin D intake and sun exposure associated with increased risk of developing MS, risk of relapses and MRI activity

• Vitamin D3: 2000-5000 IU/day

• Vitamin K2 thought to enhance effect of D3 - possible benefit of joint supplementation (not tested)
High dose Biotin – Under trial...

- Initial trial of High-dose Biotin (300mg) in people with progressive MS (France): improvement of disability scores in 13% of subjects

- International trial underway

- Non pharmaceutical grade high-dose biotin may be purchased through online supplementation vendors (product quality not verified by FDA)

- Caution: interference with biochemical assay (thyroid assays +++)

Tourbah et al. Mult Scler, 2016
Supplements for symptom management

• **CoQ10:**
  • 1 small double-blind control trial showed efficacy in MS-related fatigue
  • Possible benefit in cardiovascular health
  • 500mg/day

• **Magnesium:**
  • Benefit shown in Migraine
  • Possible benefit for management of muscle cramps and tension
  • Possible help with constipation
  • Magnesium citrate 400mg/day or to intestinal tolerance
This is a lot of information. Where do I start?
A simple pragmatic approach

• Eat lots of vegetable and fruits (3+ cups a day)
• Eat fish and plant-based proteins regularly
• Eat plenty of healthy fats
• Do not eat highly processed, salty foods
• Limit consumption of milk (but not cheese)
• Take a daily vitamin D3 supplement
Join the Green Veggie Challenge

Eat 1 serving of green veggie per day for 2 weeks then up to 2 servings per day for 2 weeks then up to 3 servings a day!!

1 serving= ½ cup of cooked green veggies

or

1 serving= 1 cup of raw salad greens
Join the Green Veggie Challenge

Eat 1 serving of green veggie per day for 2 weeks then up to 2 servings per day for 2 weeks then up to 3 servings a day!!
Thank you very much!!!