Feast of Dietary Advice in Multiple Sclerosis

Hosted by

MS Society of Canada

Wednesday September 20, 2017



Multiple Sclerosis Society of Canada

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MS Society of Canada

- Mission Statement: To be a leader in finding a cure for multiple sclerosis and enabling people affected by MS to enhance their quality of life.

Feast of Dietary Advice in Multiple Sclerosis

Natalie Parks, MD, FRCPC

September 20, 2017

Multiple Sclerosis Society of Canada

Thanks for joining us!

Natalie Parks, MD, FRCPC

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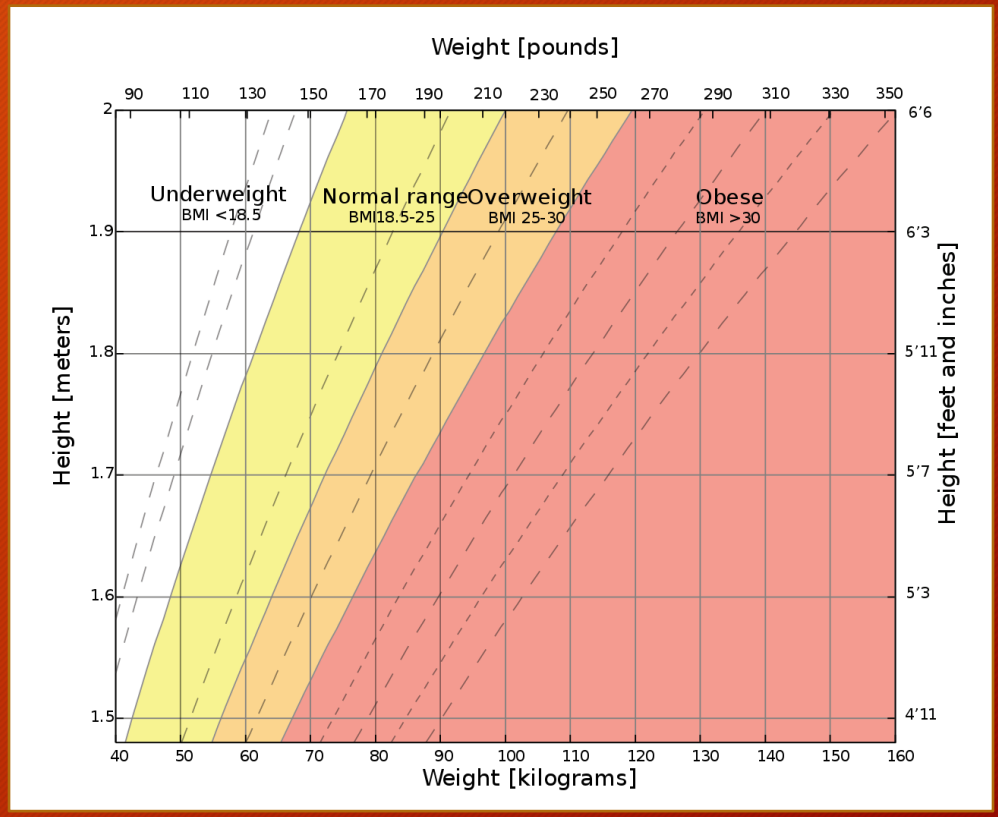
Tonight's Discussion

- How does body weight affect multiple sclerosis?
- How does diet influence multiple sclerosis?
- Is there evidence for supplementing diet?

Body Weight and MS

Body Weight

- Body mass index (BMI) = weight (kg) / height (m^2)
  - Underweight - <18.5
  - Normal – 18.5-25
  - Overweight 25-30
  - Obese >30
- **Association between pediatric/adolescent high BMI (overweight/obese) and multiple sclerosis**



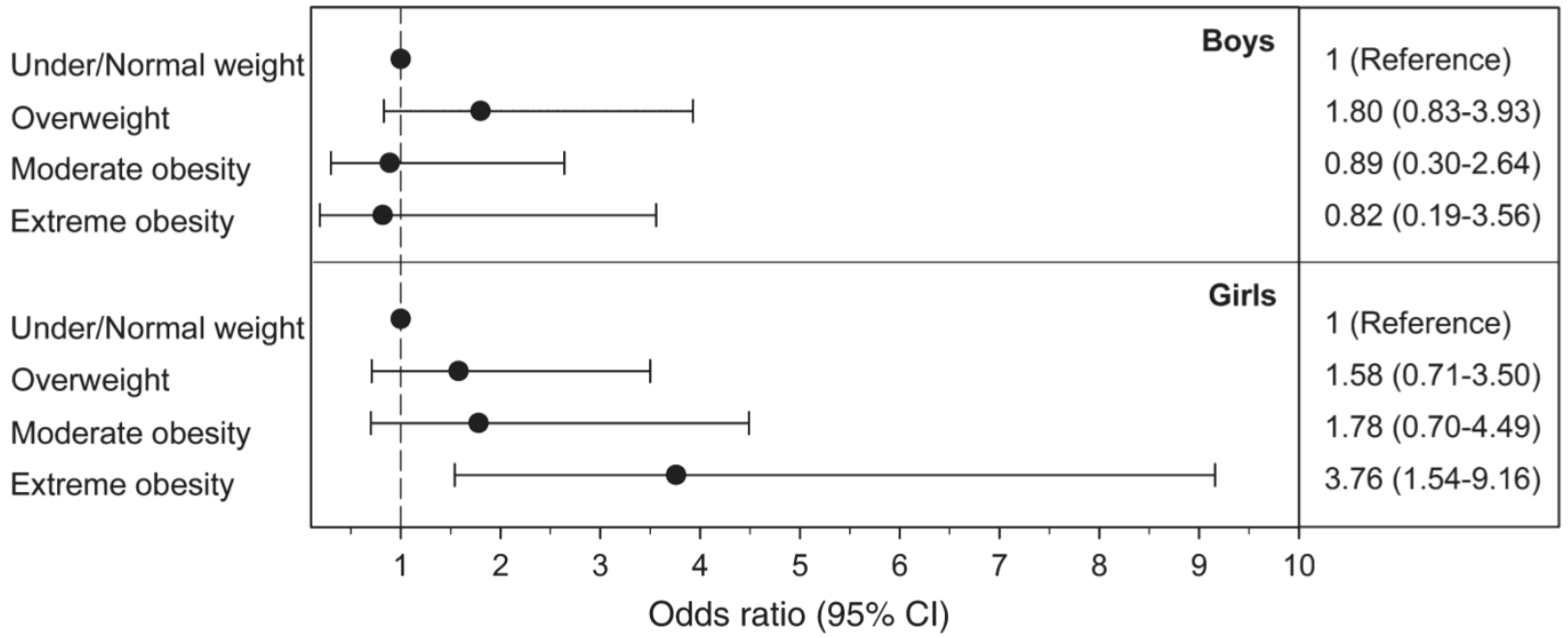
Pediatric/Adolescent BMI and MS

Copenhagen Prospective Cohort (Munger et al. 2013)

- ~300,000 Copenhagen School Health Records
- BMI 7-13 years and MS risk
  - Increased BMI associated with increased risk MS (1 unit increase BMI z-score, HR 1.15-1.18)
  - Effect attenuated in boys compared to girls

Pediatric/Adolescent BMI and MS

Figure **Association between weight class and pediatric multiple sclerosis/clinically isolated syndrome by sex**



Californian cohort (Langer-Gould et al. 2013)

- Diagnosis MS ≤18 years: 75 CIS/MS cases, ~913,000 controls
- Girls with extreme obesity (BMI ≥35) increased CIS/MS risk

Pediatric/Adolescent BMI and MS

Case-control study (Chitnis et al. 2016)

- Diagnosis MS <18 years
- 254 MS cases, 420 controls
- Overweight/Obese:
  - Girls: 54% MS, 33% controls ($p<0.001$)
  - Boys: 48% MS, 34% controls ($p=0.057$)
- Higher BMI associated with greater risk of MS
  - Post-pubertal girls – OR 1.60, 95% CI 1.12-2.27, $p=0.009$
  - Boys – OR 1.43, 95% CI 1.08-1.88, $p=0.011$

Pediatric/Adolescent BMI and MS

- Nurses Health Study (Munger et al. 2009)
  - Obesity age 18 years associated with increased risk MS
    - Multivariate analysis RR 2.25, 95% CI 1.50-3.37, $p<0.001$
  - No association between adult weight and risk MS

Take-Home Points: Body Weight

- Childhood and adolescent high BMI (overweight/obese) associated with increased MS risk (Gianfrancesco et al. 2016)
  - Strong evidence among girls
  - Mixed evidence among boys
- Mechanism for association between obesity and MS remains unknown (Gianfrancesco et al. 2016)
  - Proinflammatory state?
  - Lower vitamin D level

Advice: Body Weight

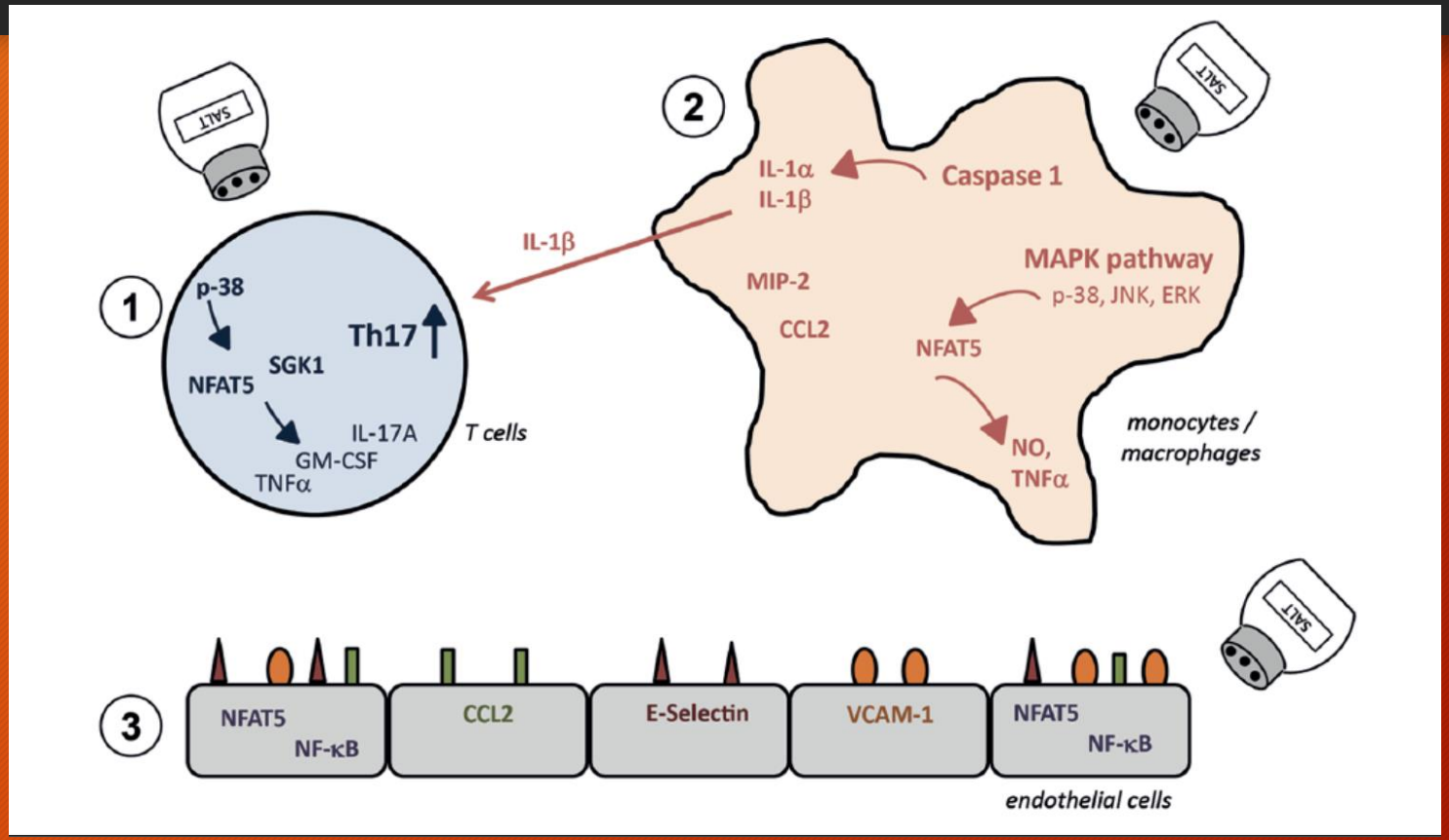
- Although evidence for association between obesity and MS is best established for childhood/adolescent weight:
  - Maintain a healthy weight (normal BMI) through diet and exercise
  - Canada's Food Guide
  - Canadian Physical Activity Guidelines
    - Adults (18-64 years) should accumulate at least 150 minutes of moderate to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more

Diet and MS

Diet: Sodium

- World Health Organization (WHO)
  - Strong recommendation for sodium <2 g/day

Diet: Sodium



- Sodium promotes a pro-inflammatory states (Hucke et al. 2016)

Diet: Sodium

- Estimated sodium intake from urine samples for 70 RRMS patients (Farez et al. 2015)
  - Risk of relapses:
    - Sodium <2 g/day – RR 1 (baseline)
    - Sodium 2-4.8 g/day – RR 2.75, 95% CI 1.3-5.8, p=0.008
    - Sodium >4.8 g/day – RR 3.95, 95% CI 1.4-11.2, p=0.01

Diet: Sodium

- Estimated sodium intake from urine samples for 70 RRMS patients (Farez et al. 2015)
  - Risk of MRI activity:
    - Sodium <2g/day – RR 1 (baseline)
    - Sodium 2-4.8 g/day – RR 2.86, 95% CI 1.52-5.4, p=0.001
    - Sodium >4.8 g/day – RR 3.42, 95% CI 1.37-8.55, p=0.008

Diet: Sodium

- Estimated sodium intake from urine samples of 465 clinically isolated syndrome (CIS) patients (Fitzgerald et al. 2017)
  - No association between sodium and:
    - Conversion to clinically definite MS
    - Relapse rate
    - EDSS progression
    - MRI activity

Take-Home Points: Sodium

- Mixed evidence for effect of high salt diet on MS activity

Advice: Sodium

- Follow WHO recommendation of sodium <2 g/day
  - Overall health benefit despite clear evidence of an effect on MS activity

Diet: Fats

Polyunsaturated fatty acids (PUFA)

- Omega-3
  - Alpha-linolenic acid
    - Plant-derived: Flax, walnut, soybean
  - Eicosapentaenoic acid and docosahexaenoic acid
    - Marine-derived: Cod liver, salmon
- Involved in inflammatory cascade
  - Arachidonic acid cascade

Diet: Fats

- Nurses Health Study (Bjornevik et al. 2017)
- ~175,000 participants, 479 incident MS cases
- Examined PUFA intake using food questionnaire
- PUFA intake at baseline inversely related to risk of MS
  - HR 0.67, 95% CI 0.49-0.90, p=0.01
  - Alpha-linolenic acid (plant-derived), only specific PUFA inversely related to MS risk
  - No association with marine-derived PUFA

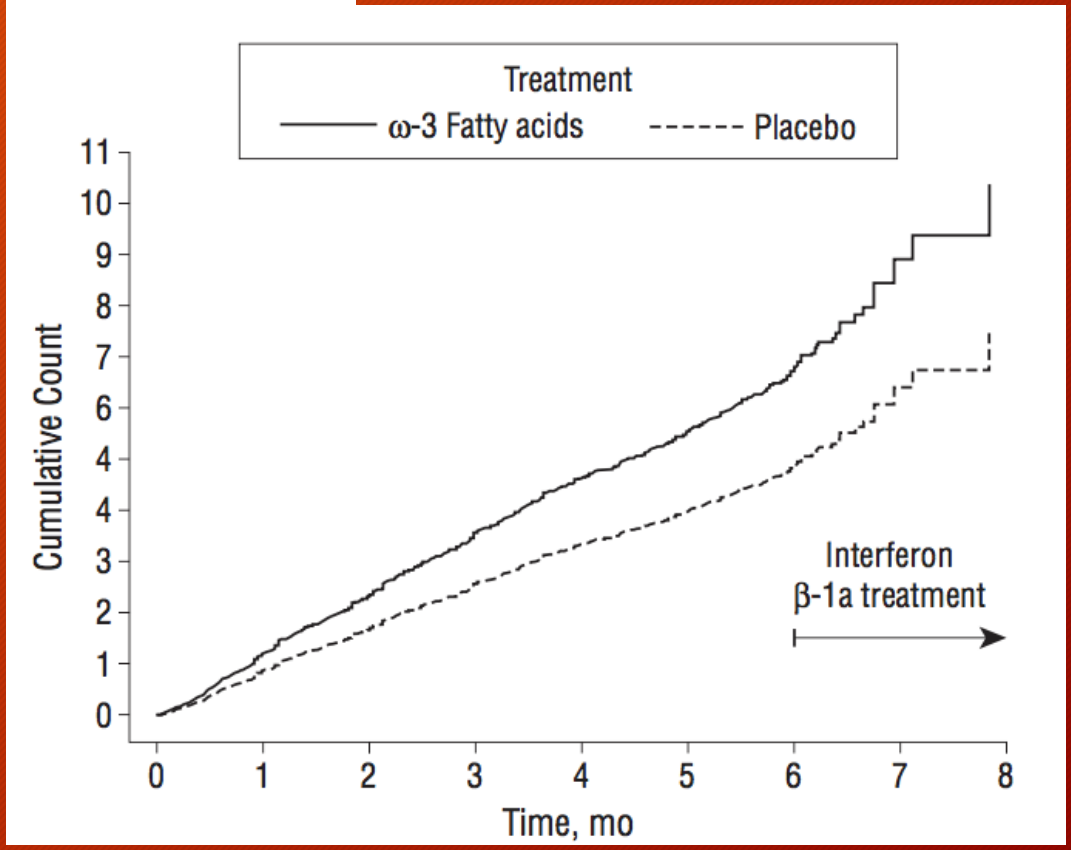
Diet: Fats

- PUFA intake examined using food questionnaire among 267 MS cases, 517 controls (Hoare et al. 2016)
- PUFA intake inversely associated with MS risk
  - OR 0.61, 95% CI 0.40-0.93
  - Marine-derived PUFA inversely related to MS risk
    - OR 0.54, 95% CI 0.31-0.93
  - No association with plant-derived PUFA

Diet: Fats

- Randomized controlled trial (Torkildsen et al. 2012)
  - 92 RRMS patients
  - Fish oil capsule (eicosapentaenoic acid/docosahexaenoic acid) vs placebo
  - No difference in MRI lesions, relapses or disease progression

GAD-Lesions



Diet: Fats

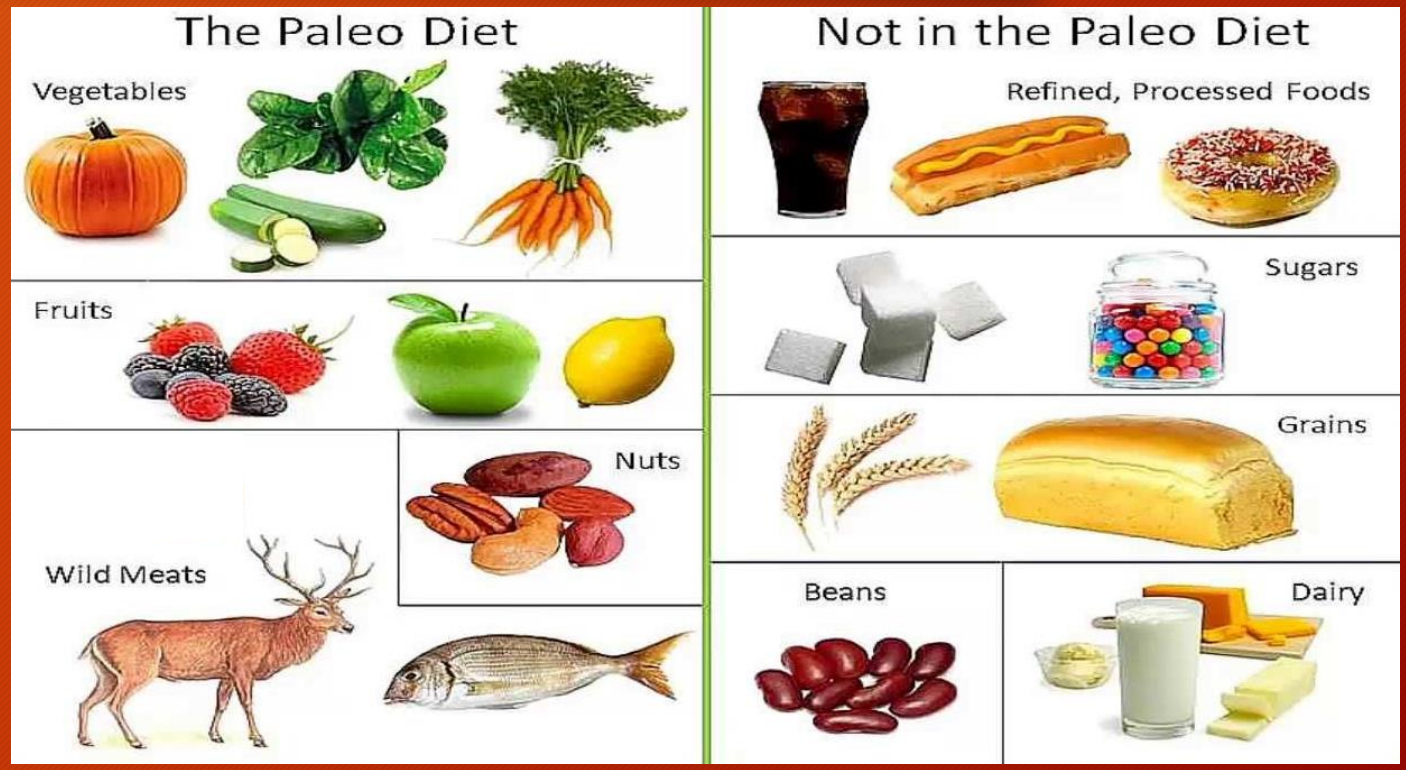
- American Academy of Neurology Guidelines (Yadav et al. 2014)
  - Fish oil supplementation is probably ineffective for reducing MS-related relapse, disability, or MRI lesions

Diets

- Paleo diet
- Swank diet
- McDougall diet

Diet: Paleolithic Diet

- Hunter/Gatherer diet
  - Vegetables/fruits
  - Lean meats
- No gluten, dairy, or eggs
- Single-arm, open-label trial (Bisht et al. 2014)
  - 10 SPMS patients
  - Multimodal intervention including paleo diet, exercise, electrical stimulation, massage
  - Primary outcome fatigue severity
  - Decreased fatigue over 12 months



Diet: Swank Diet

- Low in saturated fats
- Montreal Neurologic Hospital 1948-1952 cohort (Swank et al. 2003)
  - 144 MS patients placed on low-fat diet (“good dieters” saturated fat <20 g/d)
  - ”Good dieters” had improved survival

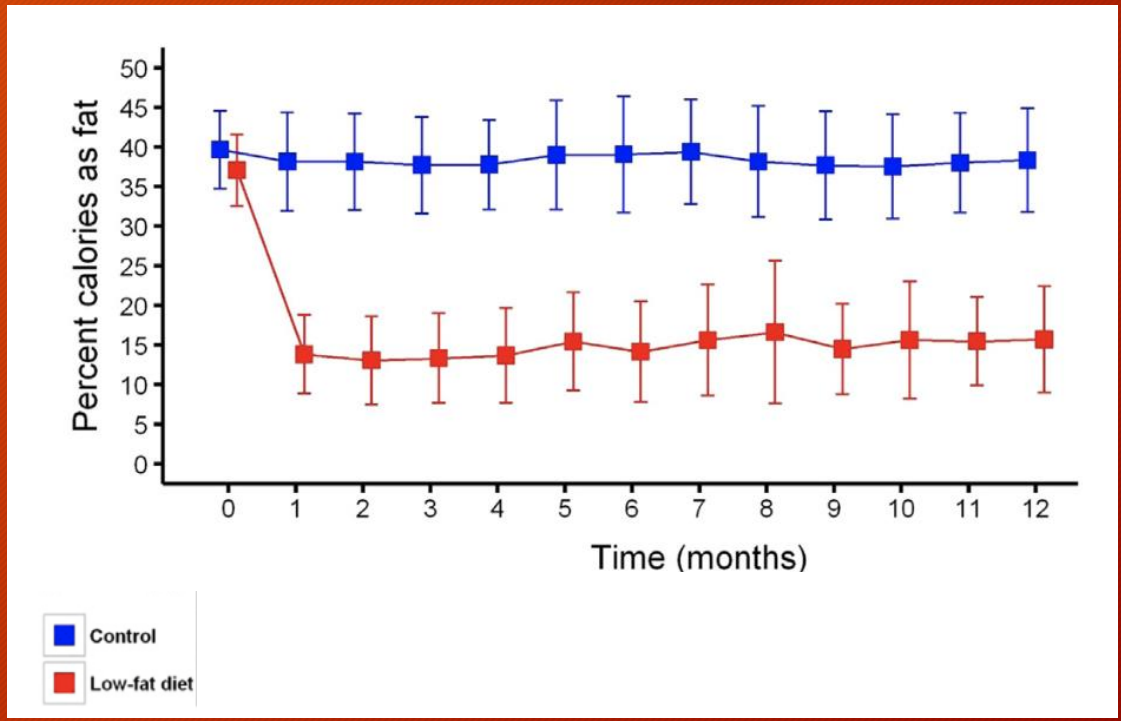
SURVIVAL RATE OF PATIENTS AFTER 34 Y ON LOW-FAT DIET*

	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)	

Diet: McDougall Diet

Randomized controlled trial (Yadav et al. 2016)

- 61 RRMS patients
- Randomized to very low-fat, plant-based diet or control
  - Meat, fish, eggs, and dairy prohibited
- At 1 years no significant difference in relapses, EDSS progression, or MRI lesions



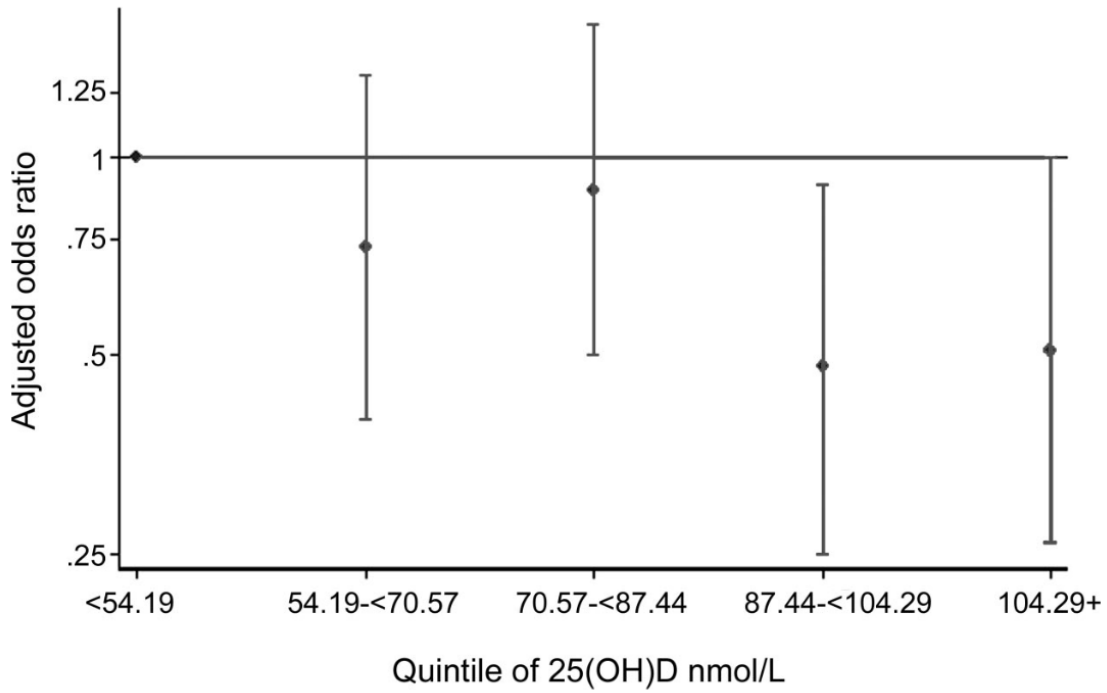
Supplements and MS

Supplementation: Vitamin D

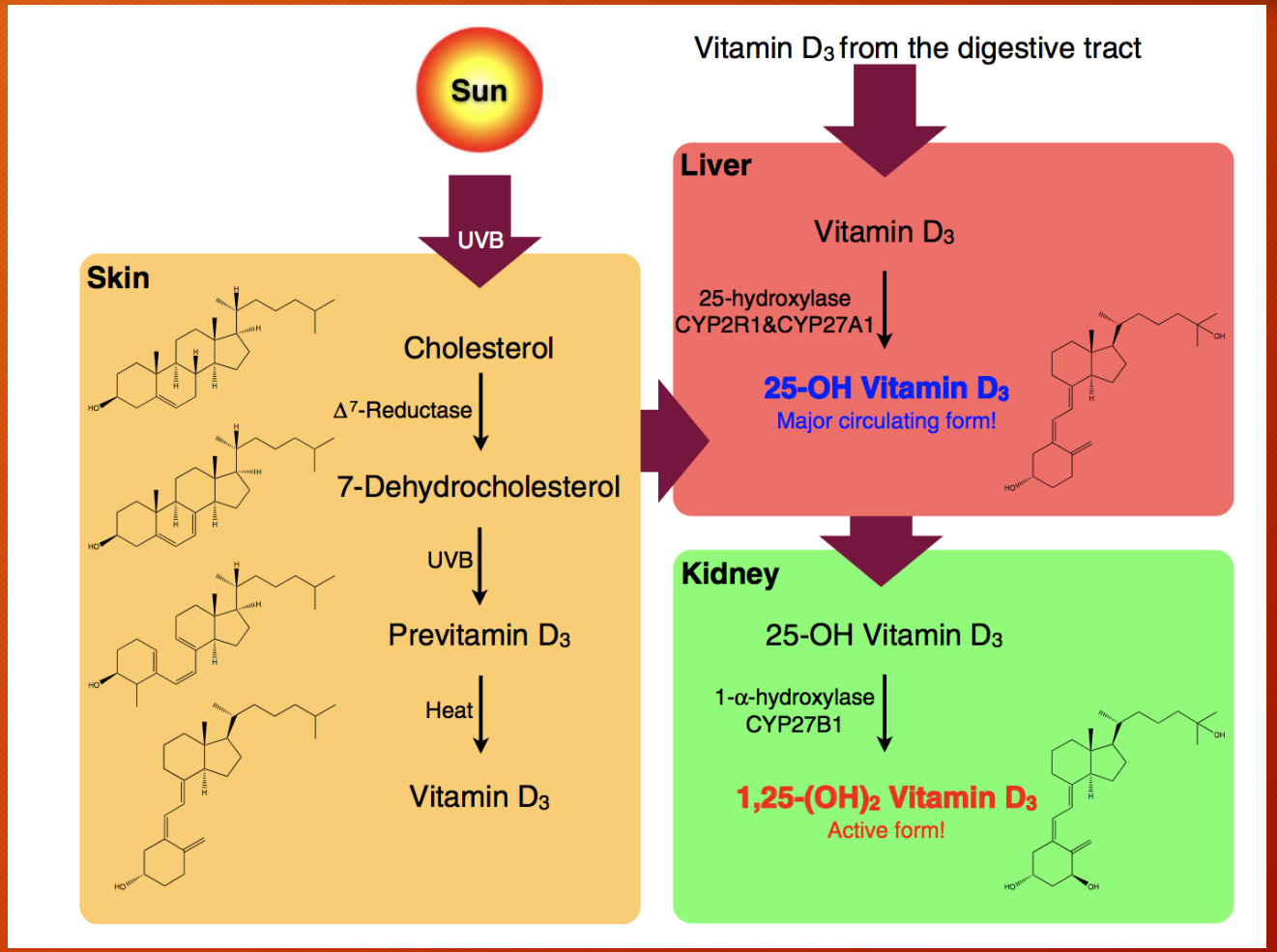
Vitamin D

- Strong association between vitamin D deficiency and increased MS risk (Amato et al. 2016; Lucas et al. 2011)

Figure Increasing serum 25(OH)D levels (in quintiles) and risk of a first demyelinating event



Supplementation: Vitamin D



Yang et al. 2013

Supplementation: Vitamin D

SOLAR (Stein et al. 2011)

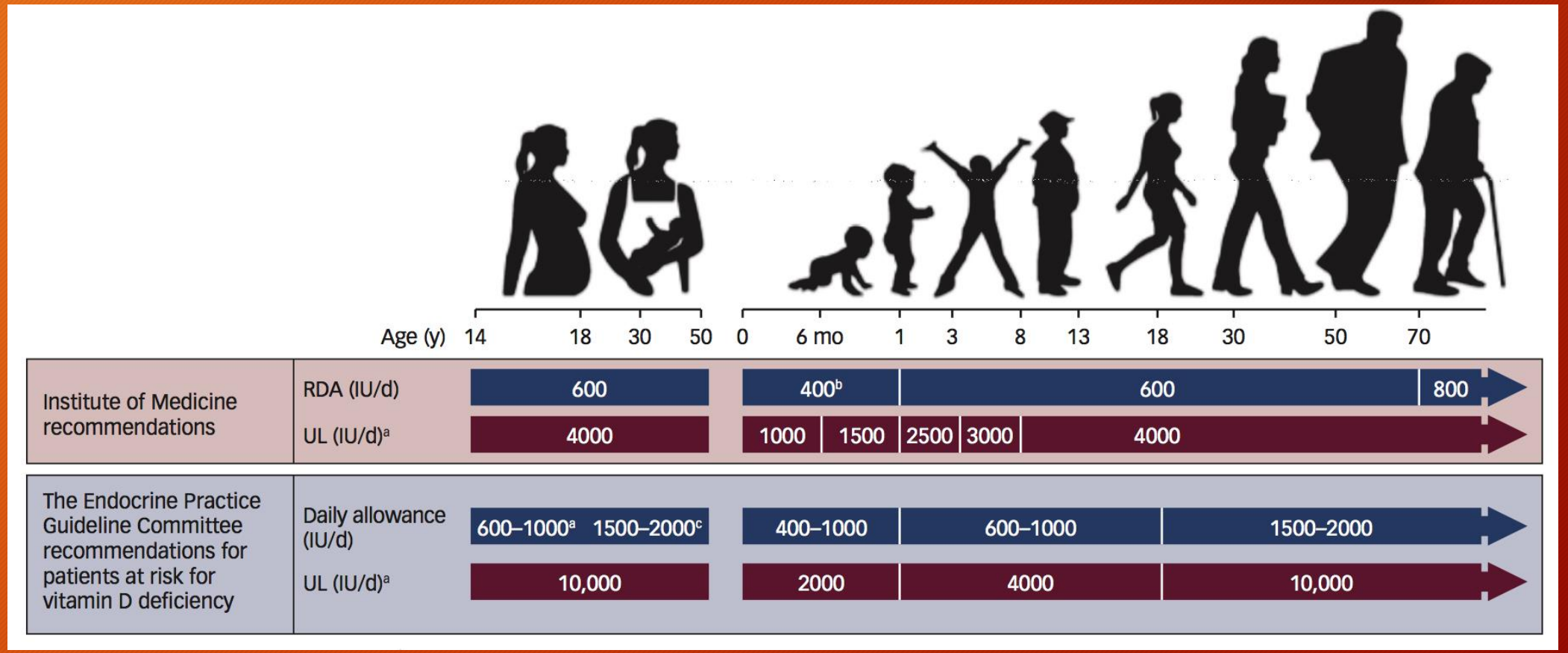
- Randomized controlled trial
- 23 RRMS patients
- Vitamin D2 13,000 units (targeted to 25(OH)D 130-175 nM) vs 1000 units daily x 6 months
- No benefit in MRI brain, progression, or relapse outcomes with vitamin D supplementation

Supplementation: Vitamin D

VIDAMS (Bhargava et al. 2014) – Vitamin D to Ameliorate Multiple Sclerosis

- Randomized controlled trial
- 172 RRMS patients
- Vitamin D3 5000 units vs 600 units daily x 96 weeks
- Study currently underway in USA

Supplementation: Vitamin D



Holick et al. 2015

Take-Home: Vitamin D

- Lower MS risk associated with serum 25(OH)D level >100 nmol/L
- Serum 25(OH)D level >100 nmol/L can be reached by taking vitamin D 2000-4000 units daily (Amato et al. 2016)

Advice: Vitamin D

- We recommend patients with multiple sclerosis take vitamin D 4000 units daily

Supplementation: Biotin

Biotin

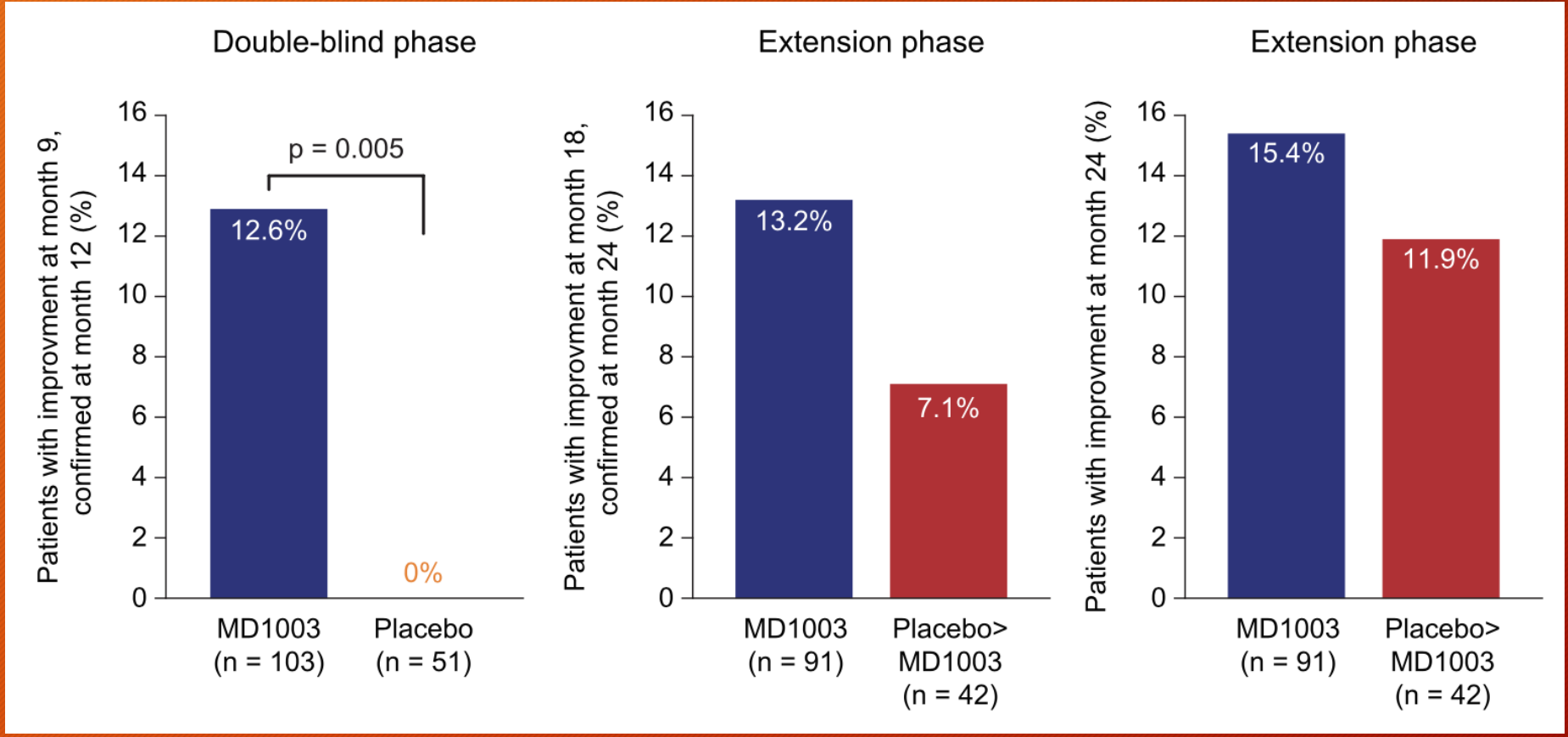
- Typical daily intake 30-100 mcg
- Cofactor for carboxylases involved in fatty acid synthesis
- May facilitate myelin repair by enhancing fatty acid synthesis (Tourbah et al. 2016)

Supplementation: Biotin

Biotin (MD1003) (Tourbah et al. 2016)

- Randomized controlled trial
- 154 SPMS/PPMS patients, EDSS 4.5-7
- Biotin 100 mg tid vs placebo x 12 months
  - Followed by extension phase where all participants biotin 100 mg tid x 12 months
- Primary end-point disability reversal (decrease EDSS≥1 or decrease ≥20% timed 25-foot walk) at 9 months confirmed at 12 months

Supplementation: Biotin



Tourbah et al. 2016

Take-Home: Biotin

Effect of MD1003 (high-dose biotin) in progressive multiple sclerosis

- SPMS/PPMS patients, EDSS 3.5-6.5
- Biotin 100 mg tid vs placebo
- Primary end-point disability reversal (EDSS or timed 25-foot walk)
- Several Canadian centers participating
  - Check clinicaltrials.gov

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