

Nutrition and Ataxia

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NAF webinar, Aug 2026

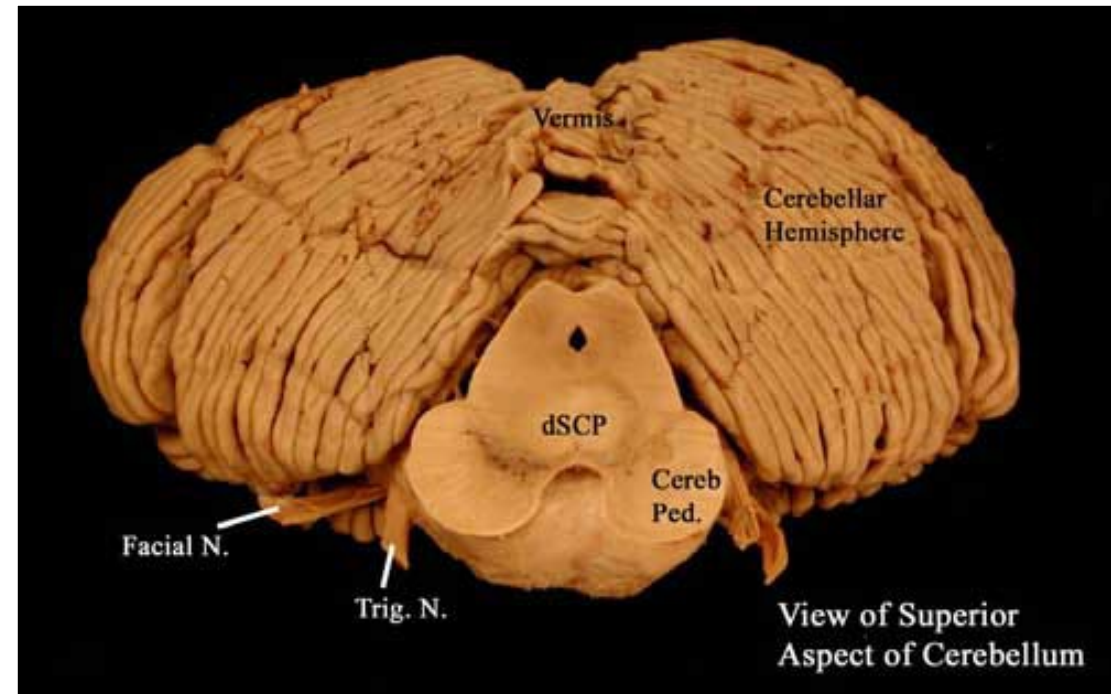
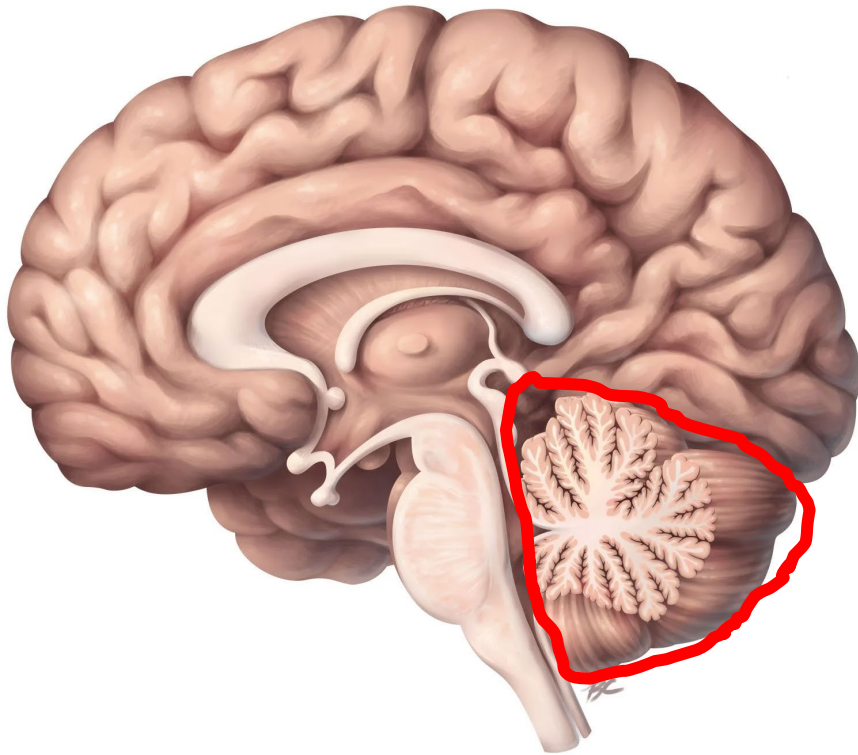
Overview of talk

- Why nutrition matters in ataxia
- What is the best diet for those with ataxia? How convincing is the evidence?
- What about nutritional supplements? Is there any convincing evidence?
- What can we learn from related brain diseases about brain health generally?

Overview of talk

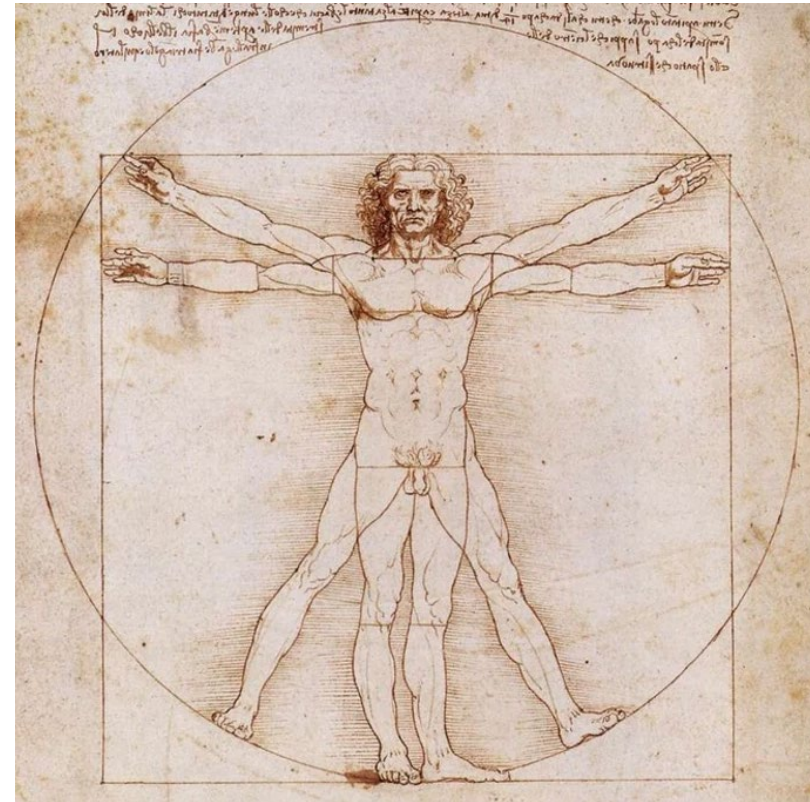
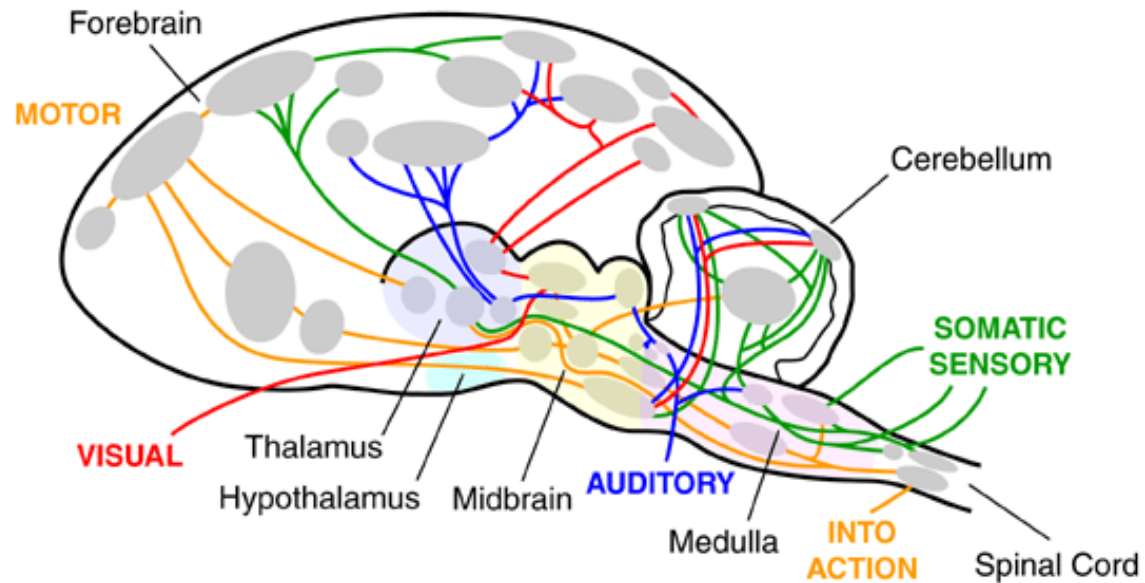
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In ataxia, cerebellum typically
is front and center...



...but damage throughout nervous system can cause ataxia. Accordingly, causes of ataxia are diverse -- Some are acquired and some are genetic.

Ataxia can occur from damage nearly anywhere in the nervous system



Causes of Ataxia

Genetic

Vitamin E deficiency
CoQ-responsive conditions
Biotin-responsive conditions
Riboflavin-responsive conditions
Mitochondrial ataxias

Acquired

Alcohol /toxin exposure
Nutritional deficiency
Thiamine deficiency
B12 deficiency
Copper deficiency
Immune-mediated
Celiac disease
Vascular

Idiopathic

??

Important ataxia-causing deficiencies to treat

- Thiamine (B1) deficiency (Wernicke's encephalopathy)
- Vitamin E deficiency (AVED = ataxia with vitamin E deficiency)
- Vitamin B12 deficiency
- Copper deficiency, including zinc-induced copper deficiency
- Rare genetically confirmed riboflavin-, biotin/thiamine-, and CoQ10-responsive diseases
- Magnesium deficiency

Let's talk about alcohol

- Overall, no alcohol is best
- But probably OK if in moderation
- Alcoholism often comes with nutritional deficiencies
- Potential for negative effects on balance and speech.



Caffeine comes up again and again

- Some (very weak) evidence that it may be “neuroprotective”
- May help with fatigue
- May worsen tremor



I mentioned celiac disease... so what about a gluten-free diet?

- This is important for those with celiac disease, which can cause ataxia (so called “gluten ataxia”)
- For most people with ataxia, gluten is not an issue and is unlikely to cause or worsen ataxia
- For those with gluten sensitivity, maintaining a gluten-free diet has become much easier with the increased number of people adhering to a gluten-free diet.

What about a ketogenic diet?

- This is important for those with a specific, rare genetic defect: GLUT1 deficiency
- GLUT1 deficiency impairs glucose transport into the brain and can cause seizures, dystonia, episodic exercise-induced dyskinesia, and ataxia
- Ketogenic diet supplies ketones as an alternative “brain fuel” and can improve symptoms.
- Requires special dietary supervision because nutritional deficiencies, kidney stones, dyslipidemia, and growth effects are possible.

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No specific diet has been proven in randomized clinical trials to prevent, halt, or reverse a neurodegenerative disease, including ataxia...

... but we still should do what we think is right when it comes to diet and nutrition.

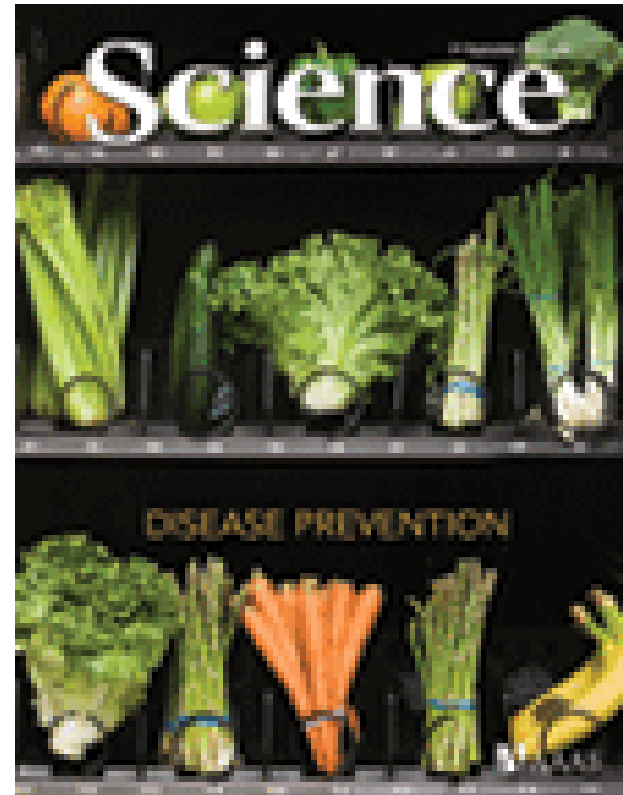
And with ataxia, of course, there may be constraints on what precisely we can eat/drink and how we choose to eat/drink it

Diet – General Tips



- No special “ataxia diet” that everyone must follow
- Focus on balanced, healthy eating
- Eat a variety of foods - no need to be perfect!
- Include fruits and vegetables, especially colorful ones (berries, leafy greens, peppers)
- A Mediterranean-style diet is a good overall guide (plants, whole grains, healthy fats, lean protein)
- Variety is most important for good nutrition
- Stay hydrated - fluids are just as important as food
- Alcohol should not be a prominent part of that diet!
- Swallowing issues need to be taken into account

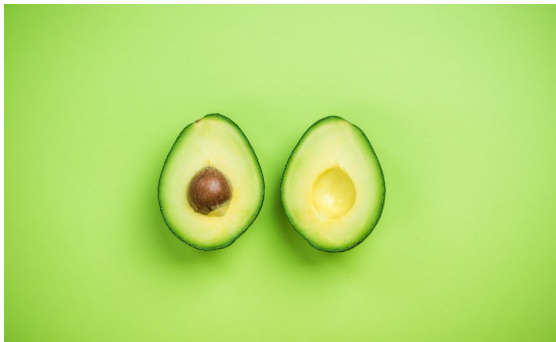
“North American Diet” (high fat, high sugar, low fiber) is not good for our brains... or our bodies!



Supported by prospective epidemiologic studies, and studies using animal models of high fat diets and obesity

Mediterranean Diet

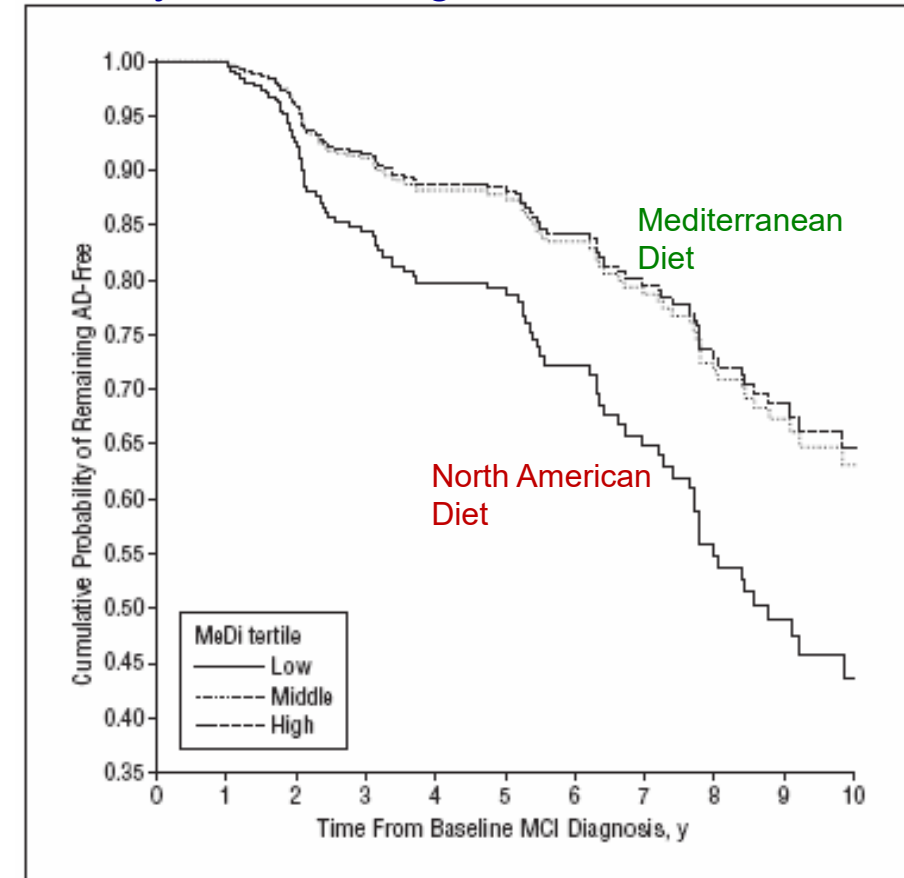
- Emphasizes vegetables, fruit, legumes, whole grains, nuts, olive oil, fish
- Allows moderate dairy and poultry
- Minimizes processed meat, refined carbohydrates, and ultra-processed foods



Mediterranean Diet Study

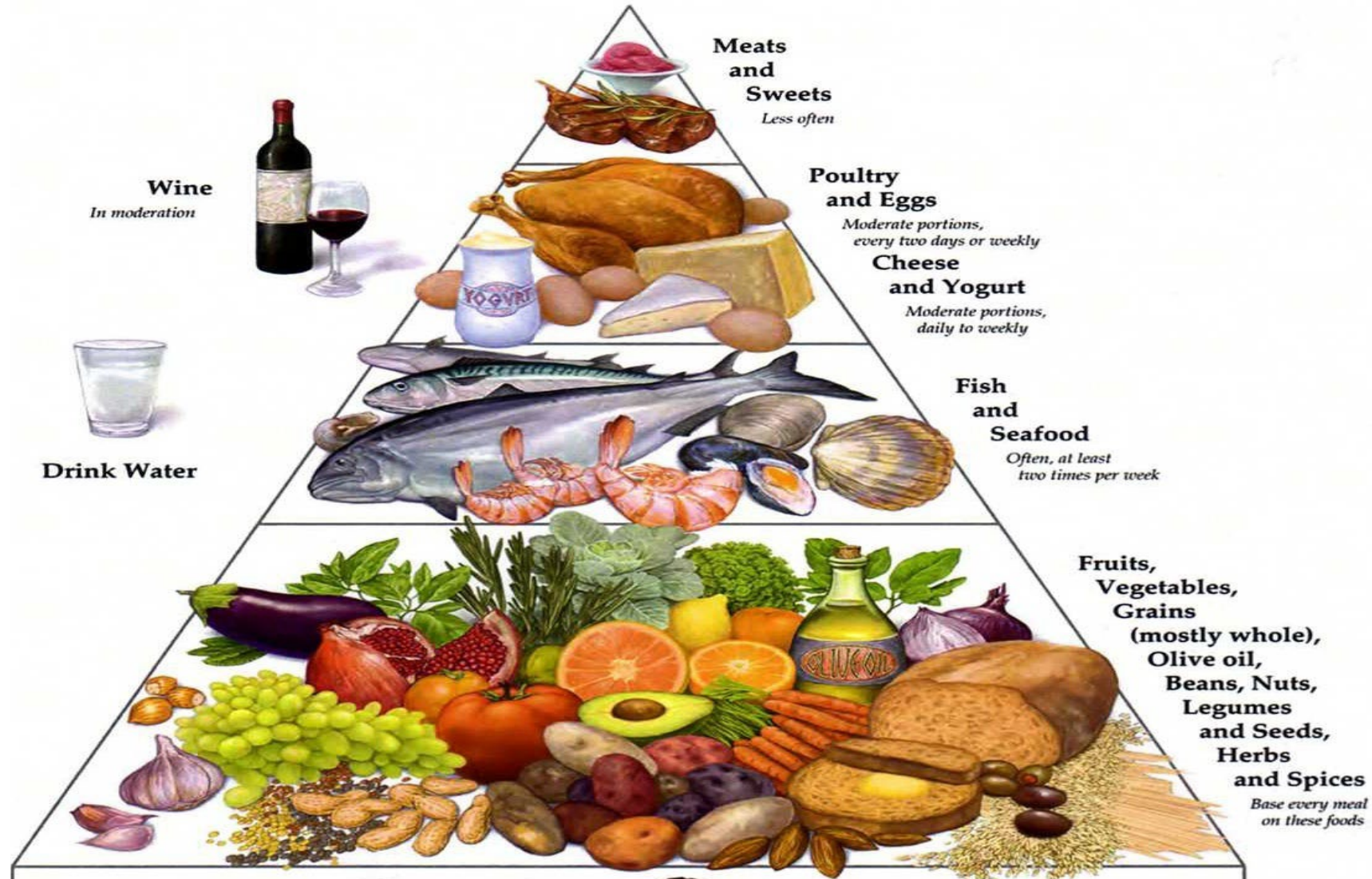
- 2,258 older persons without dementia
- Assessed for adherence to Mediterranean diet
- Over 4 years of follow-up, 262 persons developed AD
- Those who were “most adherent” to diet had 40% reduction in risk compared to those “least adherent”

Probability of remaining “Alzheimer’s disease-free”



(Scarmeas, Ann Neurol, 2006)

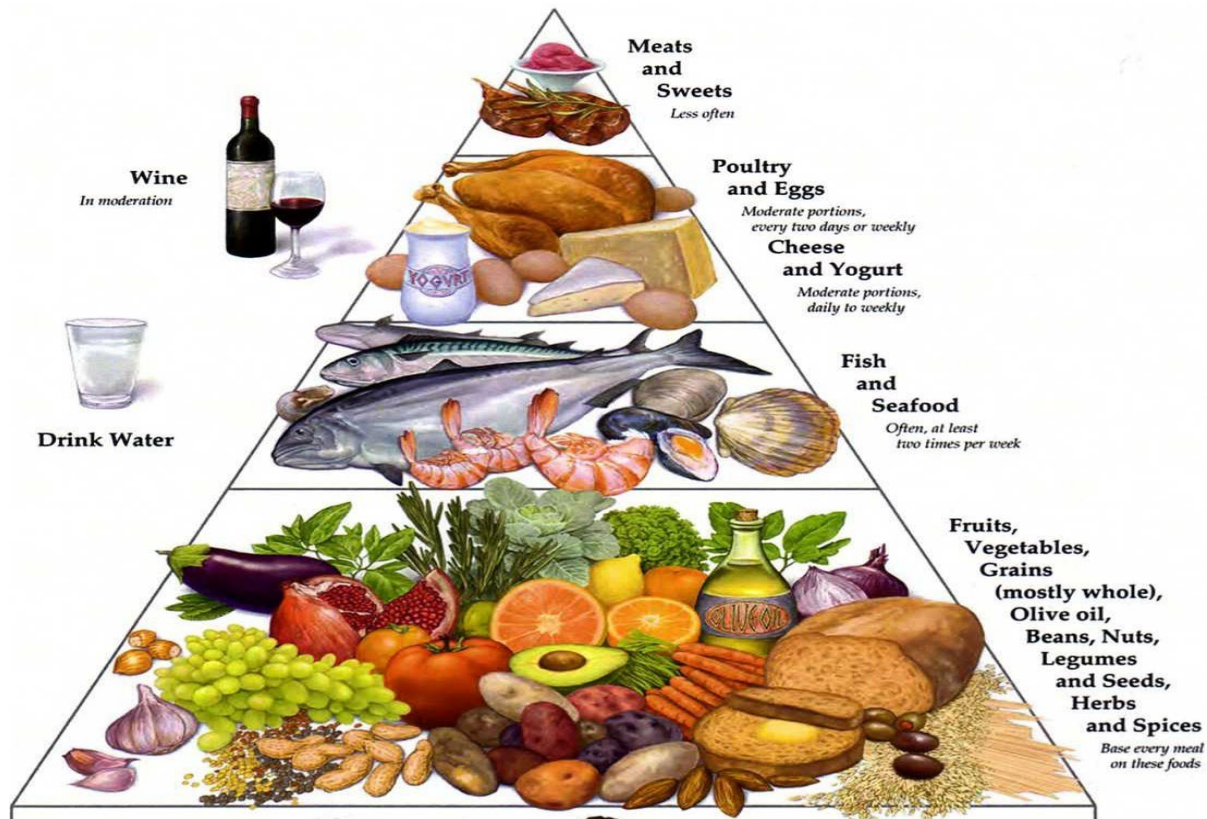
Mediterranean Diet



Anti-oxidant rich foods

- Antioxidant-rich foods are thought to protect your cells from damage. The assumption is that oxidative stress contributes to neurodegenerative disease processes.
- Top food choices:
 - colorful fruits like blueberries and strawberries
 - dark leafy greens like kale and spinach
 - nuts such as pecans and walnuts
 - dark chocolate
 - green tea

Mediterranean Diet food pyramid versus revised US government-recommended food pyramid



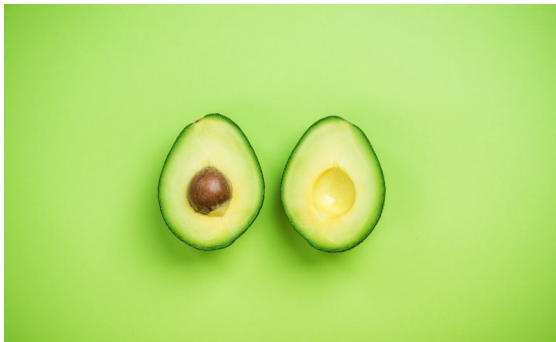
Mediterranean Diet pyramid



New food pyramid from US gov't

What about the MIND Diet?

- Combines Mediterranean and DASH principles
- DASH = Dietary Approaches to Stop Hypertension
- Emphasizes leafy greens, other vegetables, berries, nuts, beans, whole grains, fish, poultry, and olive oil while limiting red meat, butter, cheese, sweets, salt and fried food



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Specific supplement trials, mostly in Friedreich ataxia

Safety and efficacy of individualised exercise and NAD(+) precursor (Nicotinamide riboside) supplementation in patients with Friedreich's ataxia in the USA: a single-centre, 2 × 2 factorial, randomised controlled trial. *Lancet Neurol.* 2026.

Combination of **nicotinamide riboside** plus exercise was safe and increased cardiopulmonary fitness in children and adults with Friedreich's ataxia.

Double blind trial of a deuterated form of linoleic acid (RT001) in Friedreich ataxia. *J Neurol.* 2023.

Decreasing lipid peroxidation (LPO) might ameliorate disease progression. Study tested whether a deuterated form of **linoleic acid** (D2-LA) altered disease severity in patients with FRDA . No evidence for a significant benefit

Safety and Efficacy of Acetyl-DL-Leucine in Certain Types of Cerebellar Ataxia: The ALCAT Randomized Clinical Crossover Trial. *10.1001/jamanetworkopen.2021.*

This study investigated a modified essential amino acid **acetyl-DL-leucine**. It was not superior to placebo.

Coenzyme Q10 and vitamin E deficiency in Friedreich's ataxia: predictor of efficacy of vitamin E and coenzyme Q10 therapy. *Eur J Neurol.* 2008.

CoQ(10) and vitamin E levels were significantly decreased in FRDA patients. Many FRDA patients have decreased serum CoQ(10) level which was best predictor of clinical response to **CoQ(10)/vitamin E** therapy

L-carnitine and creatine in Friedreich's ataxia. A randomized, placebo-controlled crossover trial. *J Neural Transm (Vienna).* 2005.

These are natural compounds that enhance cellular energy transduction. **Creatine** had no effect in FA patients. **L-carnitine** potentially is promising but larger trials are warranted.

Supplements

- No dietary supplements have yet been proven to be helpful, in general, for ataxia or other neurodegenerative diseases
- Vitamin and mineral intake is most beneficial when obtained through the diet and not additional supplements (*e.g. fish vs fish oil pill*)
- A multivitamin daily is reasonable (it's what I do; my wife also takes vit D)



What about Supplements?

Most supplements lack rigorous clinical trial validation

FDA does not regulate supplements as strictly as drugs, meaning manufacturers do not have to prove efficacy or safety before marketing

TAKE AT YOUR OWN RISK (and don't empty your wallet in the process)

Talk to your neurologist about supplements and only take if recommended for a true deficiency such as B12, B6, iron, folate, vitamin D, etc.

What about peptides?

- Peptides are small proteins – a specific string of amino acids.
- Some peptides are well established, vital medicines
 - Insulin
 - GLP1 receptor agonists (“GLP1s”)
 - Growth hormone
- Some peptides are poorly understood and not well regulated
 - BPC-157, GHK-Cu, TB-500
 - These need to be studied rigorously in humans, and proven effective in humans, before I would recommend them
- Only take such peptides if you need them due to a specific deficiency
- Until there is evidence that a specific peptide is helpful , don’t risk injecting/ingesting/applying them

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FINGER* trial, a multi-domain approach to prevent cognitive decline in older people, showed modest benefit in cognitive outcomes

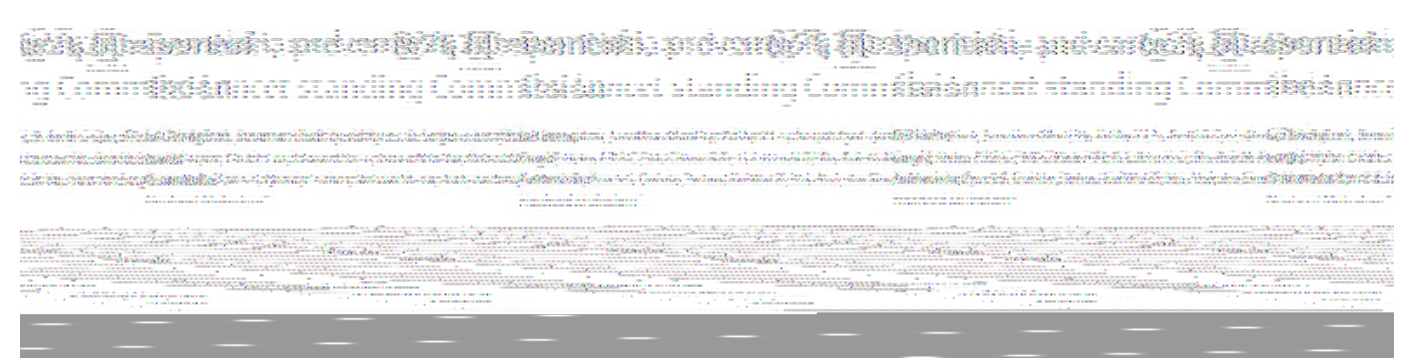


Nutritional intervention based on Finnish Nutrition Recommendations: high consumption of fruit /vegetables, wholegrain products, low-fat milk and meat products, use of margarine instead of butter, fish at least 2x/week, limited sucrose intake.

Exercise training consisted of individually tailored programs for progressive muscle strength training and aerobic exercise, including exercises to improve postural balance.

Cognitive training included group and individual sessions, employing computer-based training at home or at study site

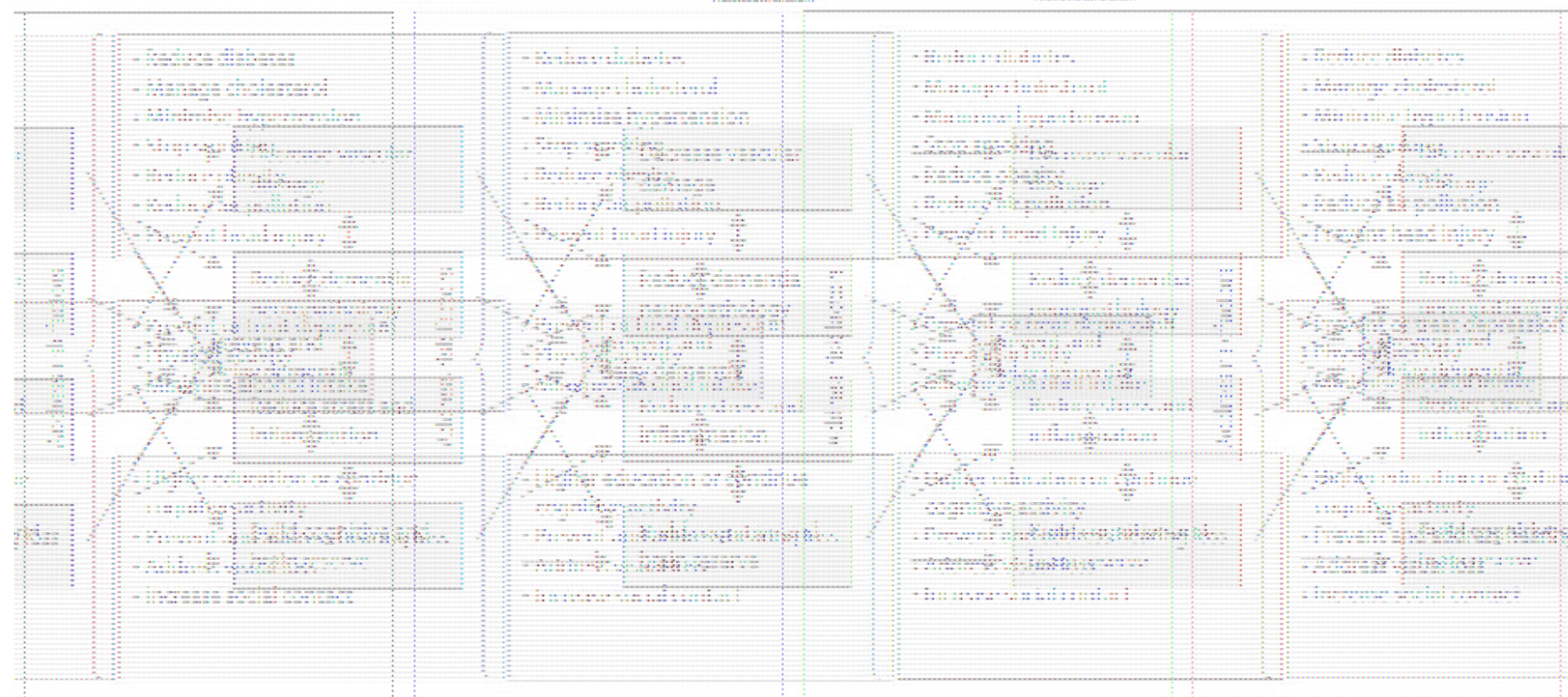
*Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability



Many things under our
control can help keep our
nervous system operating
a well as possible

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Here's what I emphasize through my Alzheimer's Disease Research Center...

Maintaining and enhancing brain health



Cognitive & Social Engagement

Studies suggest that remaining socially and mentally active throughout life may support brain health and possibly reduce the risk of Alzheimer's disease and related dementias.



Education

People with more years of formal education are at lower risk for Alzheimer's disease and related dementias than those with fewer years of formal education.



Traumatic Brain Injury (TBI)

TBI is the disruption of normal brain function caused by a blow to the head or penetration of the skull by a foreign object. TBI increases the risk of dementia. The risk of dementia increases with the number of TBIs sustained.



Cardiovascular Disease

Exercise!

Many factors that increase the risk of cardiovascular disease are also associated with a higher risk of dementia. These factors include smoking, diabetes, obesity, high blood pressure and high cholesterol. Management of these risk factors through physical activity and consuming a heart-healthy diet have been shown to help reduce the risk of developing dementia.



Sleep

Current research suggests that sleep disturbances like sleep apnea may be linked to a greater risk of developing dementia. Getting enough quality sleep could help to reduce your risk.



Best “medicine” for brain health?

Sleep better...

Eat right...

Keep moving...

Use it or lose it...

How can I make changes in my diet and behaviors?

SMART goals can be helpful

One goal-setting strategy is the SMART goal checklist. A SMART goal allows you to focus on a particular aspect of what you want to address (ie, diet and nutrition) rather than overhauling everything at once.

- **Specific:** Be specific when setting any goal.
Every day this week, I will eat a breakfast that has a variety of whole grains, protein and fruits and vegetables.
- **Measurable:** Making the goal one you can measure.
I will keep track of when and what I eat using a food diary/nutrition tracking application.
- **Attainable:** Avoid aiming too high or too low.
Taking 2-5 minutes to log my breakfast food is achievable for me. To help me remember to log food, I will put sticky notes on the pantry.
- **Relevant/Realistic:** Choosing a realistic goal that a person can meet will reinforce their efforts and keep them moving forward toward the goal.
Eating a breakfast with nutritional value will help my physical and mental health.
- **Time-Bound/Trackable:** Choosing specific, measurable goals means you can track their progress over time. Write your efforts down on a goal sheet so progress can be tracked.
I will log my breakfast foods for at least 3 days a week for a month.

How to get that nutrition into our bodies?

Food Preparation Tips

- Use pre-cut veggies, meal kits, or frozen healthy meals if cooking is challenging.
- Meals on Wheels for delivered prepared meals.
- Explore “food train” or meal support networks
 - Investigate free home-delivered homemade meals from volunteers.
- Use grocery delivery services to reduce physical strain and conserve energy.



Let's end by revisiting those diet tips



- No special “ataxia diet” that everyone must follow
- Focus on balanced, healthy eating (better than supplements!)
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Questions?