Lowering the risk for Alzheimer’s Disease
Intake: Nutrition & AD

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Hippocampal & cortical brain regions are affected in AD.
Neurons lose connections (synapses)
Branches (dendrites) & eventually die in AD

Other cells involved include astrocytes, oligodendrocytes, microglia, & endothelia.
AD brain tissue has Aβ plaques & neurofibrillary tangles of p-tau
In a “library” of compounds we discovered “F03”, an sAPPα-enhancer.

It is now in clinical trials for Mild Cognitive Impairment.

Spilman et al Brain Research 2014
Early diagnosis & treatment with more than one drug. Drugs are more likely to work if overall health is improved.

Multimodal treatment

- Early & accurate diagnosis
- Combination drug therapy
- Healthstyle support
Intake
Scientific/biochemical bases for effects of nutrition & medication are discussed.

Output
Interactions, intellectual challenges, exercise, stress reduction & sleep are discussed.
Intake

- Healthy food
- Anti-oxidant rich
- Low sugar
- Fewer calories
- Reduce gluten
- Lower protein
- A little caffeine (if tolerated)
- A little red wine (not if an alcohol problem is present)
- Probiotics
- Folic acid, B6, B12, D3
Mitochondria (powerhouses of the cell) use $O_2$ ($O$:O) generating radicals ($O.$) missing an electron. Radicals will steal electrons from DNA & proteins, damaging tissue. Anti-oxidants are “radical scavengers” with electrons to donate.
High energy use generates radicals. Damage accumulates in long-lived neurons.

Positron Emission Tomography (PET) shows low glucose utilization in AD brain due to damage.

Anti-oxidants may prevent this damage.
Anti-oxidants: A Rainbow of Possibilities

Vitamin C & E in food best, excesses may not be of benefit

- Turmeric (curcumin)
- Blueberry (tocopherols)
- Apples (quercetin, catechin)
- Avocado (lutein)
- Cabbage (anthocyanin)
- Green tea (flavonoids)
Indian, Greek, Italian!

Cook to have control over your food
Increase vegetables for fiber
Increase fish, nuts for omega 3s
Reduce simple carbs & sugar
Concentrate flavors to be satisfied with smaller portions

The Mediterranean diet is lower in “Advanced glycation endproducts” (AGE!) & lowers risk for AD

Perrone & Grant. J Alzheimers Dis. 2015
Addition of carbohydrate or glucose to protein is glycation. Leads to stiffening tissues, cells, and arteries.

AGES reduced by:
- Cooking with moist heat
- Shorter cooking times
- Lower temperatures
- Addition of lemon juice or vinegar

Mark et al. Consumption of a diet low in advanced glycation end products for 4 weeks improves insulin sensitivity in overweight women. Diabetes Care. 2014
The B vitamins

Co-enzymes for energy production.

- Vitamin B$_1$ (thiamine)
- Vitamin B$_2$ (riboflavin)
- Vitamin B$_3$ (niacin)
- Vitamin B$_5$ (pantothenic acid)
- Vitamin B$_6$ (pyridoxine)
- Vitamin B$_7$ (biotin)
- Vitamin B$_9$ (folic acid)
- Vitamin B$_{12}$ (cobalamins)

Omega 3 is found in fish, fish oil, winter squash, flaxseed, & nuts. It lowers the risk of cardiovascular disease, & diabetes. It lowers the risk of AD by increasing brain-derived neurotrophic factor (BDNF).

CR triggers “autophagy” which clears old proteins & cellular debris

Consider intermittent fasting – one day a month?

Do not eat for 12 hours between dinner & breakfast; do not eat within 3 hours of sleep

Or reduce calories + increase exercise

Spilman et al. Inhibition of mTOR by rapamycin abolishes cognitive deficits and reduces amyloid-beta levels. PLoS One. 2010
High homocysteine (HC) found in AD – have level determined.

HC from the sulfur-containing amino acid methionine

Lower HC by increasing B6/B12 & folic acid

Sugar induces insulin production
Insulin degraded by neprilysin &
insulin degrading enzyme,
competing with Aβ.

Adult-onset diabetes a risk
factor for AD. Keep glycemic
index low

Ma et al Conversion of mild cognitive
impairment to dementia among subjects with
diabetes: a population-based study of incidence
and risk factors with five years of follow-up. J
Alzheimers Dis. 2015
Chronic dehydration can impair mental function & normal digestion

Older people at risk for dehydration due to low water consumption, chronic illness & certain medications

Consume some electrolyte (but low sugar)-containing liquid.

Accurate Diagnosis is Critical

Diagnostics include:

Computer-assisted tomography (CAT) for structural abnormalities
Positron emission tomography (PET) for glucose use and amyloid imaging
Function magnetic resonance (fMRI) for blood flow
Tests of cognitive function

Other causes of memory loss:
Depression, infection, multiple sclerosis, low B12, hypothyroidism, medication interactions, tumor

Not all dementia is AD:
Vascular dementia, Parkinson’s disease, frontotemporal dementia

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