Prevention and Treatment for the Aging Brain

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Financial Disclosure: Nothing to Declare
Aging

• Aging is a process; It is not a disorder
• It is not a slow deterioration
• Intellectually, the brain can be quite active and productive throughout life
• Clint Eastwood was born in 1930
• The world’s third wealthiest man, Warren Buffett is 86
• Queen Elizabeth II is 91
• Prince Philip is 96
• Administration of Aging of the Dept of HHS: in 2014 there were 46.2 million elderly, or 14.5% of the population of the U.S.

• By 2030 there will be about 72 million, or 20% of the population.
The Brain

• It is the only organ almost completely surrounded and protected by bone: the skull

• The brain weighs 3 lbs or 2% of our body weight, yet uses 20 – 30% of the calories we consume.

• From the carotid and vertebral arteries, it receives the most oxygenated blood emerging from the heart.

• 60% of the weight of the brain is fat (beware of statins)
The Brain

• The brain uses 20% of the oxygen absorbed by the lungs.

• The hourly blood flow through the brain is 13 gallons, or 20% of all the blood pumped by the heart.

• There are over 400 miles of blood vessels, mostly capillaries, that reach all 100 billion neurons in the brain.

• The brain differs from other organs in that it depends almost entirely on glucose as a source of energy.
The Brain

- 100 billion neurons, with 1,000 synaptic connections per cell.
- The neurons in the visual cortex have around 12,000 synapses.
- The neurons in the prefrontal cortex have around 80,000 synapses.
- Each of these are firing every second.
- The transmission speed along the axon is 200 mph.
The Brain

Every person’s thoughts, memories, emotions, actions, and reactions are activated in the neurons via **neurotransmitters**.
Dementia

Acquired persistent and progressive impairment in intellectual function with compromise of memory and at least one other cognitive area: word finding difficulty, impaired executive function, apraxia (difficult or impossible to make certain motor movements, even though muscles are normal), agnosia (loss of the ability to recognize familiar objects or stimuli).
Dementia

- According to a Rand Corp study: 14.7% of the population over 70.
- Yearly cost per person: $56,800
- There is no pharmaceutical treatment for dementia.
Alzheimer’s Disease

About 3/4 of dementia cases are Alzheimer’s disease.

- Alzheimer’s disease affects 5.5 million Americans or one in eight people over 65.
- It is the 3rd leading cause of death in the U.S. after CVD and cancer.
Alzheimer’s Disease

- 65% of patients are women:
- More common than breast cancer.

- Monotherapies have failed.
- There is no known cure.
Annual Cost Comparison for the U.S.

- Cancer: $77 Billion
- Heart Disease: $102 Billion
- Alzheimer’s Disease: $236 Billion
- By 2025: $1.1 trillion
Parkinson’s Disease

- Second most common neurodegenerative disorder affecting 1 million Americans.
- 60,000 new cases a year; 250 a day.
- Related to environmental factors: insecticides, pesticides and industrial chemical exposure.
Parkinson’s Disease

Nebraska has the highest rate in the U.S. as a result of high agricultural use of pesticides.

Cost of care exceeded $25 billion in 2013.

Several medications available.

**BUT**: Drug side effects are a serious problem.
Environmental Contributing Factors to Dementia

- Glyphosphate residue in our food supply.
- Glyphosphate is the active ingredient in the herbicide Roundup used on GE crops.
- More glyphosate is used in the U.S. than all other countries in the world combined.
- 880 million pound used annually.
- It is a potent mineral chelator leading to zinc deficiency which can contribute to AD and Parkinson’s.
Deaths from Parkinson's disease plotted against glyphosate use on corn & soy and % GE corn & soy planted. Sources: USDA:NASS; CDC
Figure 2. Deaths due to intestinal infections ICD A04, A09; 008, 009 with glyphosate applications to wheat ($R=0.9834$, $p\leq3.975e-09$). Sources: USDA-NASS; CDC. (Figure courtesy of Nancy Swanson).
Pesticides in Produce:
12 most contaminated.

- Peaches
- Apples
- Sweet Bell Peppers
- Celery
- Nectarines
- Strawberries
- Cherries
- Pears
- Grapes
- Spinach
- Lettuce
- Potatoes
Pesticides in produce:
12 least contaminated

- Onions
- Avocados
- Sweet Corn (frozen)
- Pineapples
- Mango
- Asparagus
- Sweet Peas (frozen)
- Kiwi fruit
- Bananas
- Cabbage
- Broccoli
- Papaya
Other Contributing Factors to Dementia

- Stress: illness of death of spouse, partner, child; assault, robbery, MVA, financial issues, etc.
- General anesthesia
- ICU stays
Obesity and Dementia

- According to the NIH, 68.8% of Americans are obese, with a BMI greater than 30kg/m2.

- Public Health England: 66% of adults and 25% of children between two and 10 years old are overweight or obese.
Obesity
Gut Dysbiosis, Gut Inflammation, Gut Barrier Dysfunction

Lipopolysaccharides
Pro-Inflammatory Cytokines, Gut-Brain Axis (Vagal), Afferent Dysfunction

Systemic Inflammation

Neuroinflammation
Efferent Gut-Brain Pathway Dysfunction (Vagal), Hippocampus/Cerebellum, Hypofunction/Dysfunction

Amyloid Deposition, Tau Phosphorylation, NeuroCognitive Impairment & Vulnerability to Alzheimer’s Dementia
Dysbiosis and AD

Changes in gut microbiota – dysbiosis, gut inflammation, increased levels of lipopolysaccharide (LPS), increased intestinal permeability, metabolic endotoxemia, and development of obesity, all lead to metabolic dyshomeostasis, cognitive dysfunction and Alzheimer’s disease.
Chronic Inflammation and Dementia

- Much of Western-style diets consist of pesticide-sprayed, high-glycemic, highly processed, low-fiber, high in saturated fat and sugars, food-like substances in plasticized containers. The habitual consumption of these high-fat meals that are common, readily accessible, and at low cost throughout the industrialized world, is one of the prime contributors of postprandial endotoxemia, leading to chronic inflammation via intestinal permeability.
Ultra-processed foods

- Breads and breakfast cereals.
- Cake, ice cream, and other sweets.
- Soft drinks and fruit drinks.
- Frozen and packaged meals.
- Pizza.
- Salty snacks.
- Milk-based drinks.
- Packaged baked goods.
- Chicken and fish nuggets.
- Instant noodles and soups.
- Packaged cheeses.
- Bottled dressings and sauces.
Obesity Increases the Risk:

- Alzheimer’s disease
- Reduced cognitive function
- Heart disease
- Stroke
- Type 2 diabetes
- Early death
Advanced Glycation End Products

• Prolonged hyperglycemia, dyslipidemia and oxidative stress result in:
• increased production and accumulation of:
• **Advanced Glycation End products (AGEs).**
Advanced Glycation End Products

- How do you produce AGEs? Eat foods that increase blood glucose levels. Once formed, the process cannot be reversed.
- In Alzheimer’s dementia, brain AGEs content is 3 times that of a normal brain.
Advanced Glycation End Products

• Diabetic have 60% higher blood levels of AGEs when compared to non-diabetics.

• In diabetics, dementia is 500% more common.
Advanced Glycation End Products

• All carbohydrates increase AGEs, including your 7 grain cereal, your Florida orange juice, your tomato and cheese focaccia, and especially anything made with wheat.

• So are cured meats: bacon, sausages, hot dogs, salami, etc.

• **Avoiding these is anti-aging.**
AGES Accumulation Results in:

- Dementia
- Alzheimer’s Disease
- Atherosclerosis
- Cataracts
- Stroke
Loss of NO is Associated with Atherosclerosis

As we age, we lose 85% of our ability to make Nitric Oxide.
Consequences of NO insufficiency

• Alzheimer’s disease
• Hypertension
• Atherosclerosis
• Thrombosis
• Peripheral artery disease
• Sexual dysfunction
• Mitochondrial dysfunction
• Lack of energy
The Gut

• The most important characteristic of age-related gut dysbiosis is the decline in the abundance, diversity, and adhesive properties of commensals.

• This is associated with an increased susceptibility to gastrointestinal and systemic infections, as well as inflammatory conditions commonly encountered with aging.
Effects of the Microbiome on the CNS

• The microbiome generates numerous neurotransmitters:
  • Lactobacillus and Bifidobacterium produce gamma-aminobutyric acid (aka GABA), the main inhibitory neurotransmitter of the brain.
  • Lactobacillus species make acetylcholine.
  • Bacillus species make dopamine.
  • Bacillus, Escherichia, and Saccharomyces produce norepinephrine.
  • Candida, Streptococcus, Escherichia, and Enterococcus produce serotonin.
Tryptophan & Serotonin

• The Brain-Gut Axis is a bidirectional communication network between the brain and the gut. For example:

• Tryptophan and its metabolite serotonin are fundamental to health.

• Tryptophan is an essential amino acid which must be supplied in the diet, and can cross the BBB, and participates in serotonin synthesis in the CNS.

• The vast majority of serotonin is in the gut.

• Serotonin affects mood, sleep, aggression, and sexual behavior. Serotonin is converted to melatonin.

• Tryptophan: egg whites, cod, chocolate, dates, red meat.
The Gut

• The reduced numbers of beneficial microbes along with an increase in pathogenic species lead to a decline in immunological function and an increase in inflammation.

• Therefore, replacement with the appropriate probiotics is essential.

• Probiotics must make it through gastric acids and bile acids in the small intestines, so use probiotics that contain bacillus spores.
Yogurt

• $30 billion spent by consumers annually.
• All commercial yogurts are made from pasteurized milk. Pasteurization kills off potential pathogens, as well as destroying all beneficial bacteria.
• Yogurt is also pasteurized after it has been allowed to ferment, then bacteria are added back to the product after this last step.
• Many commercial yogurts found in supermarket in the U.S. contain artificial coloring, chemical additives and sugars, including high fructose corn syrup and aspartame.
• A publication from Reading University with the Food Safety Authority of the United Kingdom, the FDA of the U.K., showed that less than 10% of the usual commercial strains of Lactobacilli and Bifidobacterium in probiotics are able to get to the colon.
Do you REALLY know what’s in your probiotic?

A recent publication by UC Davis examined 16 probiotic products from local California stores to check if the strains claimed on the label matched those that were found in the product. They found that only ONE out of 16 actually matched the label claim. In some products there was pill-to-pill variation in the same bottle.
What is a TRUE probiotic?

✓ Most probiotics are not technically a “probiotic” but instead they are “dead bacteria therapy”. Some of these have been shown to have a transient effect in the gut as they move through.

✓ The “Probiotic Paradox” has been studied. They are Biological Response Modifiers or Metabolic Response Modifiers, not probiotics. They DO NOT go and live in the gut and cause a shift between good and bad bacteria; instead they have a temporary metabolic effect, in some cases favorable, but there is no real functional change in the health of the gut.
What is a TRUE probiotic?

✓ The Bacillus genus are spore forming bacteria; they survive the transit through the stomach and small intestines to reach the microbiome in the colon, where they germinate, proliferate, then re-sporulate.

✓ Thus, they offer significant advantages over the more common Lactobacillus and Bifidobacterium, which are non-spore forming.
What is a TRUE probiotic?

✓ Studies have shown that orally ingested Bacillus subtilis spores are immunogenic and can disseminate to Peyer’s patches and mesenteric lymph nodes.

✓ Bacillus indicus HU36 spores produce a number of carotenoids, including lycopene, lutein, beta-carotene and astaxanthin.
Benefits from Bacillus Spores

Studies in humans show the following benefits from Bacillus spores:

✓ Immune stimulation of peripheral T- and B-lymphocytes

✓ Decrease in frequency of urinary tract infections and positive cultures

✓ Effective treatment for small intestinal bacterial overgrowth (SIBO)

✓ Improvement in pain scale in Rheumatoid arthritis patients
Prevention and Treatment

• The Lancet International Commission on Dementia Prevention, Intervention and Care reported that more than one third of global dementia cases may be preventable through addressing lifestyle factors that impact an individual's risk. These potentially modifiable risk factors have been identified at multiple phases across the life-span, not just in old age.
Prevention and Treatment

➢ **Alzheimer Study:**

➢ 156 elderly with mild cognitive impairment and followed for 2 years in a randomized study (2013)

➢ Neuropsychological testing before and after

➢ MRI before and after

➢ 0.5 mg vitamin B12

➢ 0.8 mg folic acid

➢ 20 mg vitamin B6
Results of the study:
- Decrease in grey matter atrophy
- Slowed cognitive decline
- Other studies came to the same conclusion:
  - 321 elderly at Ewha Woman’s University in Korea (2013)
Prevention and Treatment:

- Gluten-Free Diet for Parkinson’s Disease:
  
  - Report of dramatic improvement in a patient with Parkinson’s disease who had silent celiac disease and was put on a gluten-free diet.
Prevention and Treatment: The ACTIVE Study

• The ACTIVE study consisted of 2,832 participants, ages 65 to 94. The sample was 74 percent white and 26 percent African-American and 76 percent women.

• This 10-year study showed that speed training computer exercises that get users to visually process information more and more quickly demonstrated better results than memory and reasoning exercises.
Prevention and Treatment: The ACTIVE Study

The researchers showed that a total of 11 to 14 hours of speed training reduced the potential of developing dementia 10 years later by 48%.
Prevention and Treatment

• Most of the foods we eat every day are produced or imported, labeled, and sold with almost no oversight.

• The seafood industry is rife with fraud and substitution.

• In any restaurant in any state, if you order grouper or red snapper, you will not get what you ordered. It will most likely be substituted for mercury-rich tilefish.
Foods to Avoid

- Breads and breakfast cereals.
- Cake, ice cream, and other sweets.
- Soft drinks and fruit drinks.
- Frozen and packaged meals.
- Pizza.
- Salty snacks.
- Milk-based drinks.
- Packaged baked goods.
- Chicken and fish nuggets.
- Instant noodles and soups.
- Packaged cheeses.
- Bottled dressings and sauces.
Prevention and Treatment

- Avoid: Wheat, barley, rye and sugar
- Avoid statin drugs
- Avoid flu vaccines (aluminum hydroxide)
- Avoid aluminum (foods and personal care)
- **DO:** Exercise 30 to 40 minutes daily
- **DO:** Reduce stress (Yoga, meditation, music, etc.)
Prevention and Treatment

• Eat organic grass fed beef

• Eat healthy fats: avocado, walnuts, salmon, lamb, etc.

• Eat foods high in DHA

• Eat organic blueberries ½ cup daily
Prevention and Treatment

- EVOO: California’s McEvoy Ranch; Australia’s Cobram Estate.
- U.S. beef: naturally raised, grass-fed. It cost 17% more to raise beef on grass than grain.
- True grass fed and not grain-finished beef: higher in vit A, E, antioxidants, and omega-3.
- Labels: USDA Organic; Niman Ranch; Certified Angus Beef Natural.
- Angus means nothing; eat Aberdeen Angus.
Prevention and Treatment

• Bison: free range, no fences, eating an entirely natural diet, no drugs. There are no bison feedlots.

• New Zealand lamb: all grass.

• Fruit Juice: almost all juices in the US contain apple juice concentrate from China, even the expensive ones in glass containers.
Prevention and Treatment

- Beef: “no hormone administered”
- Pork and Chicken: “no antibiotics added”
- Most reliable for pork and chicken: USDA organic.
- Smart Chicken by Tecumseh Poultry
- **Meaningless**: pasture raised, pasture finished, no additives, no animal by-products, free range, free roaming, green fed, humane, pesticide free.
- Also: free range carrots, stone ground eggs, and hand-woven honey.
Prevention and Treatment

• Use coconut oil in foods
• Take ginkgo biloba
• Eat nutritious organic foods, whether it be vegetables, fruits, meat, poultry, etc.
• Line caught fish.
• Cinnamon: inhibits aggregation of tau protein particles (also help lower blood sugar)
Prevention and Treatment

• IMPORTANT: Take Nitric Oxide
• Take magnesium daily
• Take B complex vitamins
• Take curcumin (turmeric) daily
• Take vitamin D3 5,000 IU daily
• Take DHA 1000 mg daily
Eating habits for better brain health

• Set aside time to cook: a dozen hard-boiled eggs; a few chicken breasts; saute several servings of vegetables, etc.

• If it can go bad, it’s good for you.

• Anti-Alzheimer Trio: grass fed beef, avocados, and coconut oil.

• Have a cup of coffee: up to a 65% reduction in risk for AD.
Conclusion

For age is opportunity no less,
Than youth itself, though in another dress,
And as the evening twilight fades away,
The sky is filled with stars, invisible by day.

Henry Wadsworth Longfellow
The secret of staying young is to live honestly, eat slowly, and... lie about your age.
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