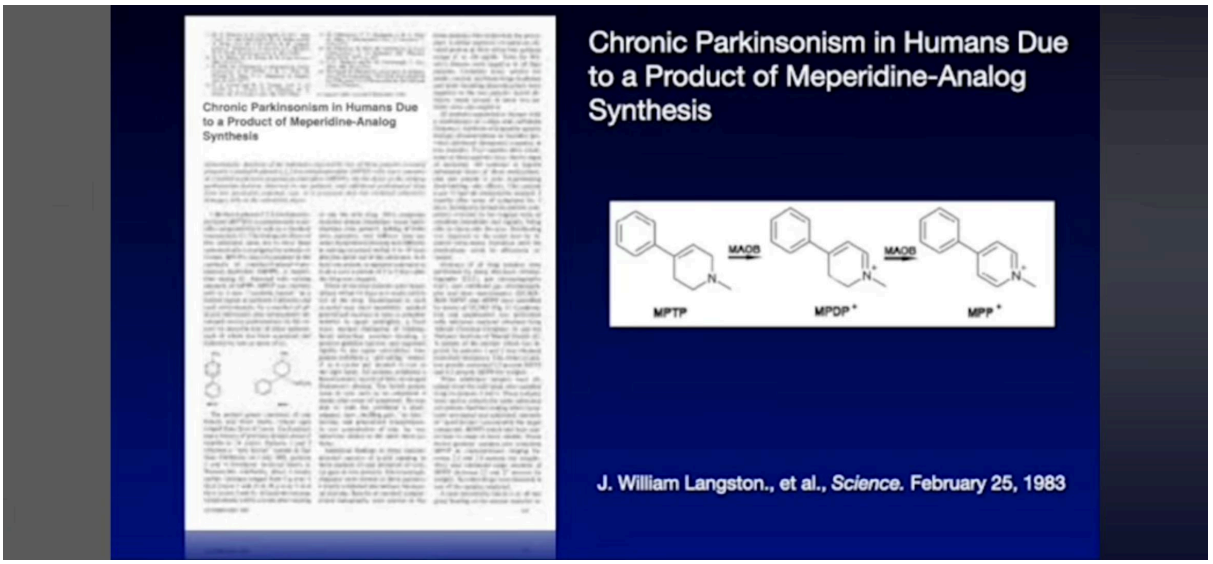
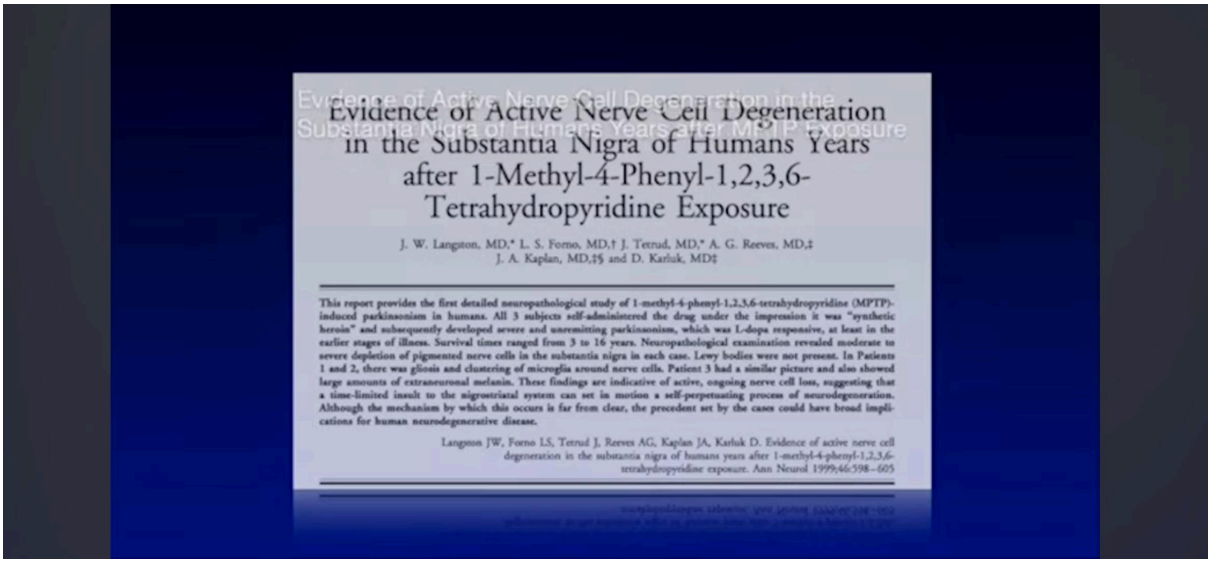
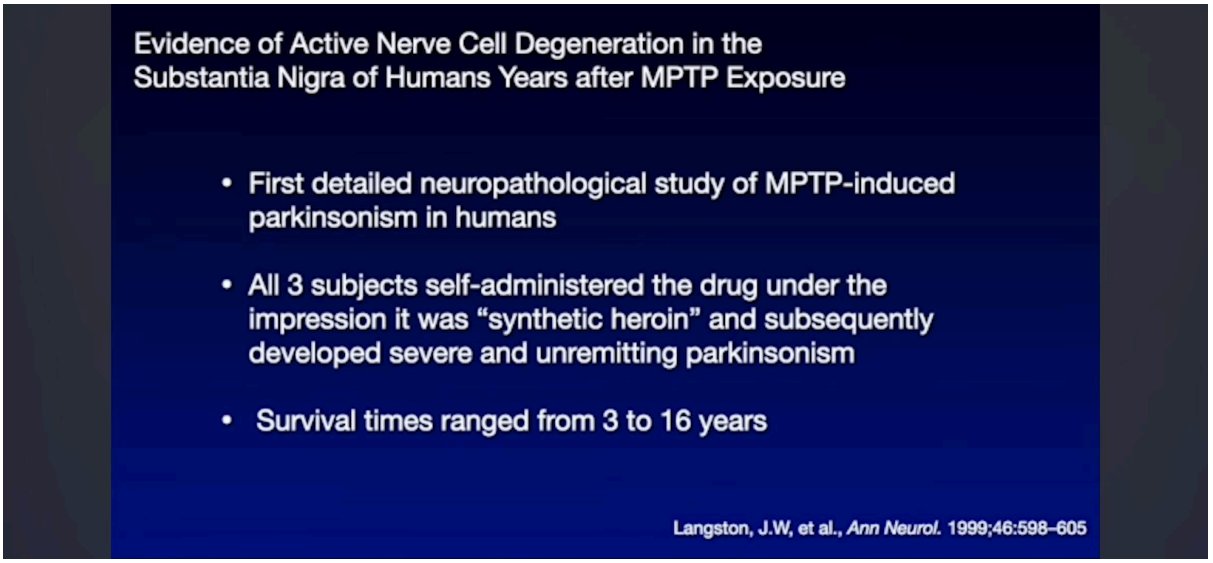
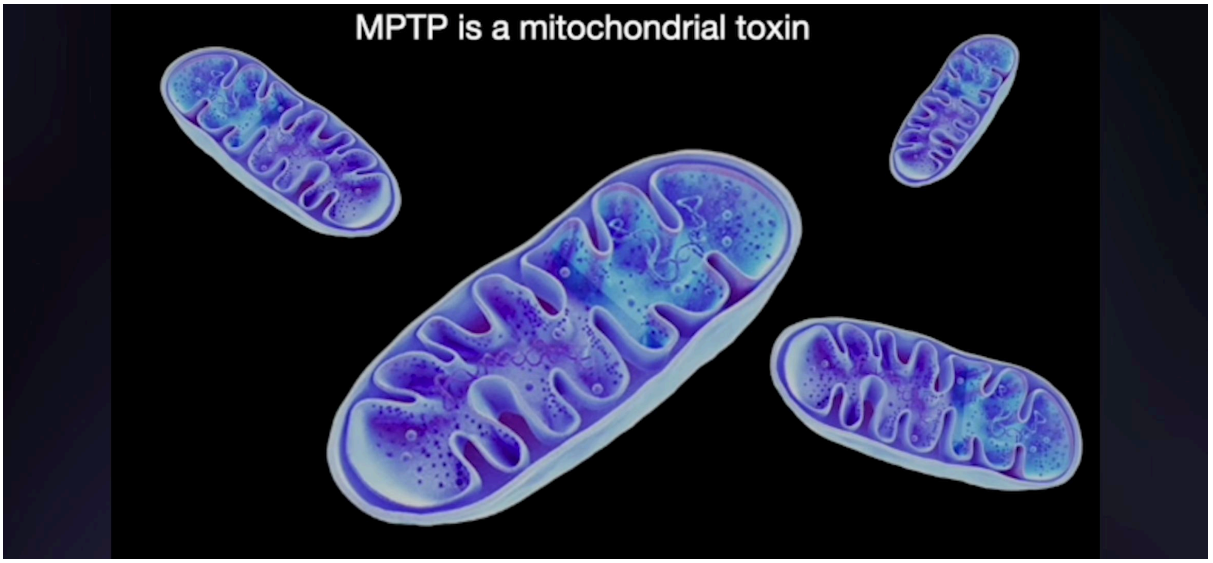
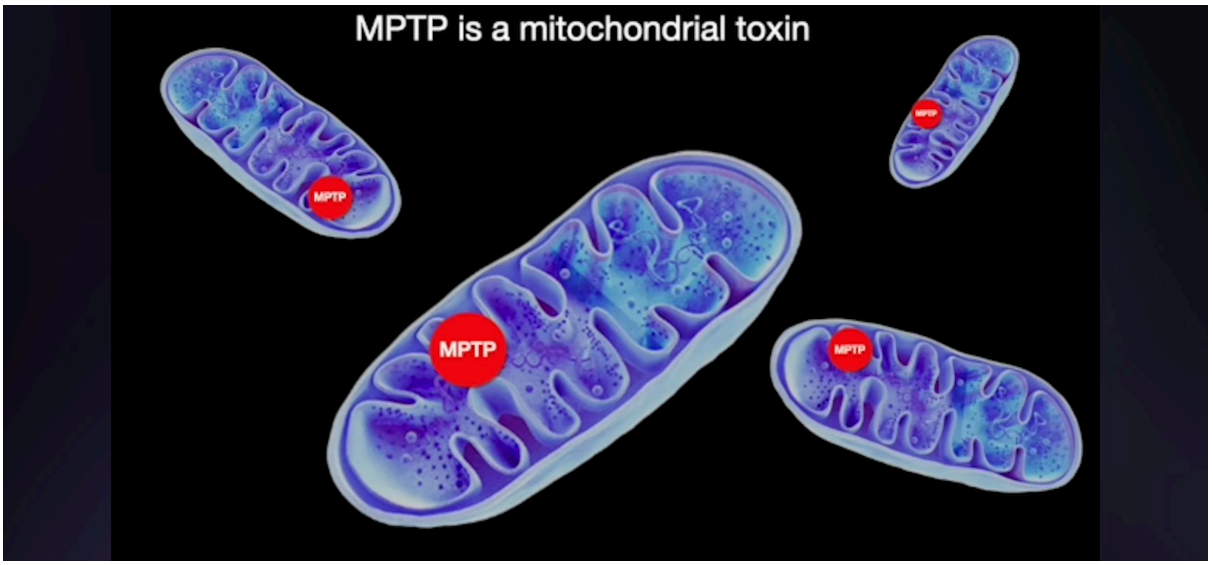
ALZHEIMERS IS CAUSED BY YOUR IMMUNE CELLS TURNING AGAINST YOU- featuring mainly Microglial cells, that allow blood brain barrier to operate correctly and help neurogenesis, but can be transformed into toxic attackers of our brain and enter a decades-long destructive degenerative cycle by mitochondrial toxins like paraquat and long covid unless corrected.
https://youtu.be/2Az4a6CKI_4?si=FkCwHOvmnfJMGZUV Slide 3571
~When these cells change due to epigenetic environmental conditions like paraquat and long covid they can switch and transform the microglial cells into toxic attackers.
Hurting brain neurogenesis and metabolism, and hurting the blood brain barrier
And causing Alzheimer's disease.
~The reason ***Act Rx*** works on Alzheimer's so well is the microglia, once transformed to M1 enter a glycolytic cycle that uses 15 times more iron than normal, similar to cancer cells, that are both very prone to the peroxide moiety on the artemisia/ artemisinin molecule, creating violent ferroptosis reaction killing the cell selectively: **ferroptosis**, an iron- dependent form of cell death driven by lipid peroxidation. When excess intracellular ferrous iron (Fe2+) reacts with hydrogen peroxide (H2O2), it triggers the **Fenton reaction**, producing highly toxic hydroxyl radicals (OH-) that destroy cell membranes and cause ferroptosis.



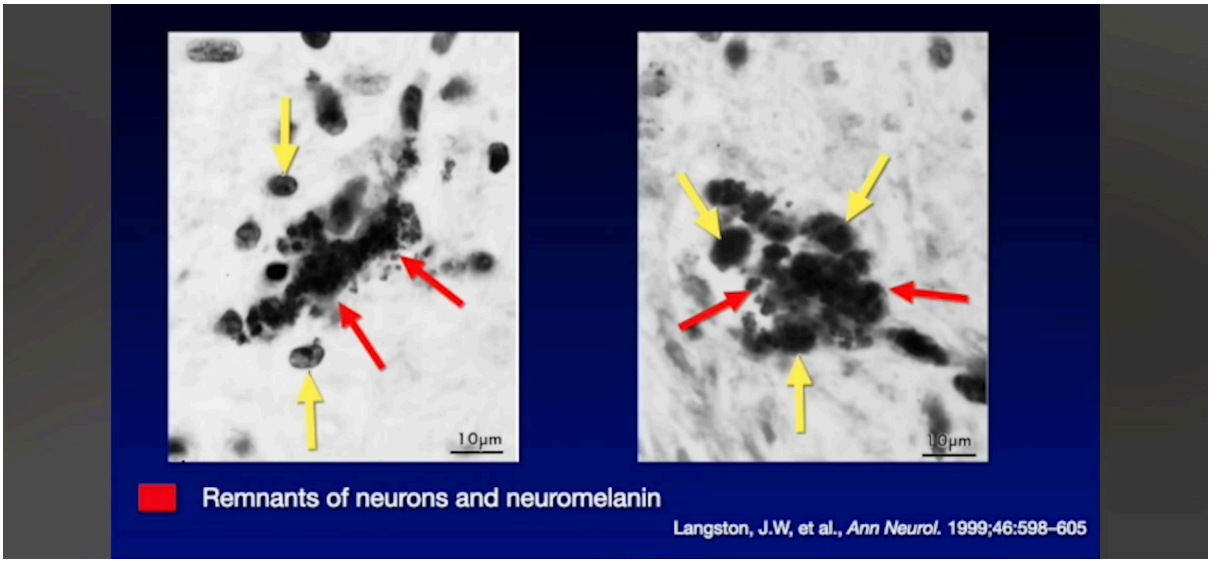




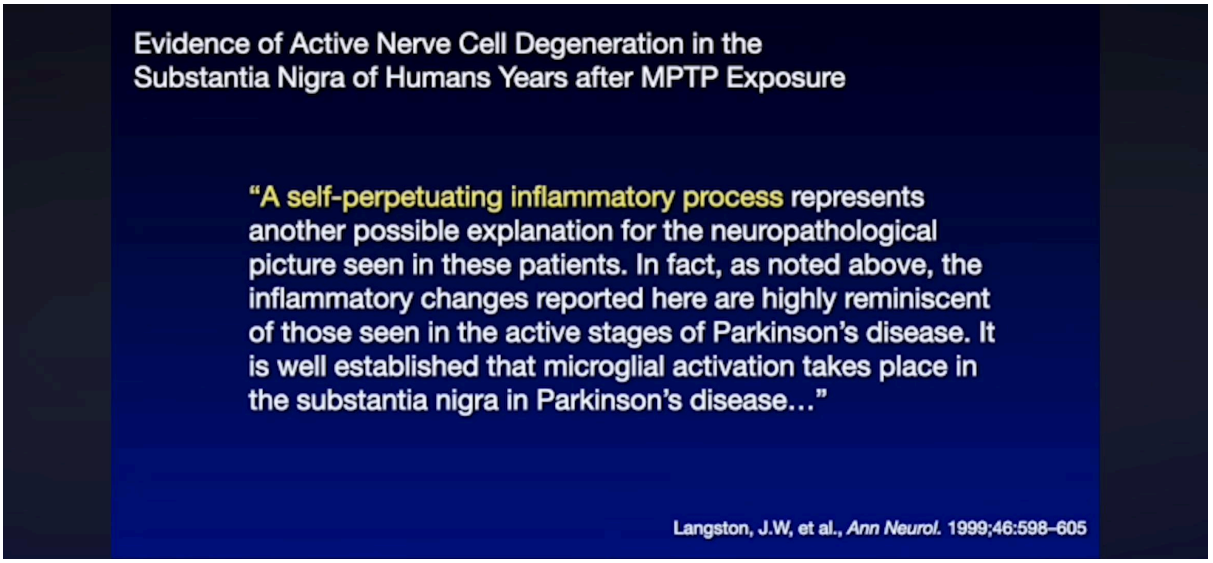


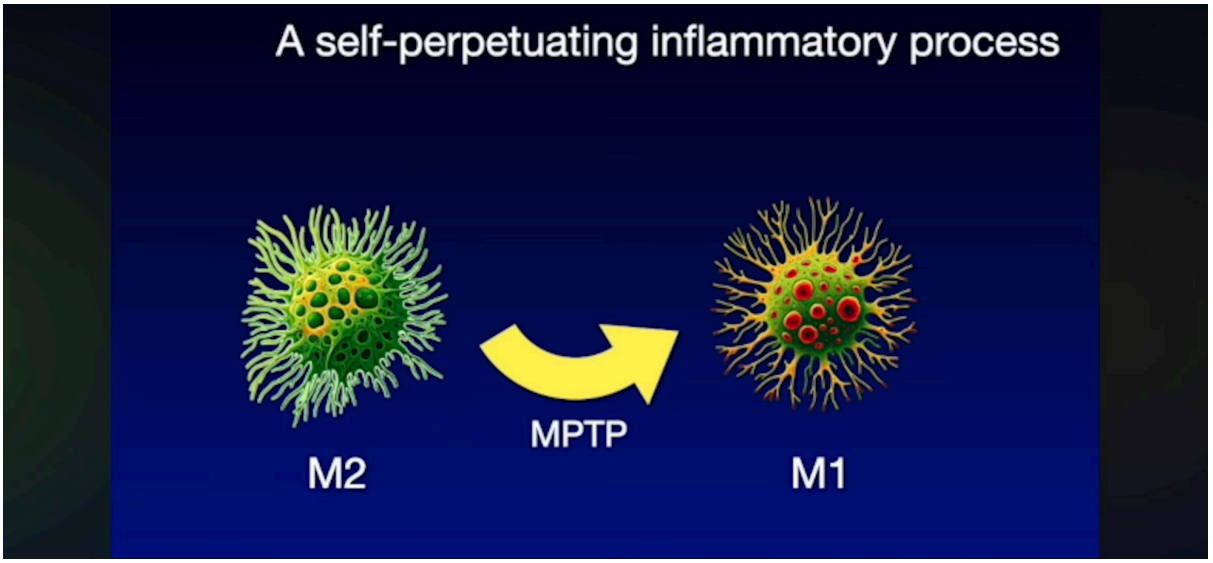


MPTP Affected dopamine producing cells in substantia nigra creating palsy.



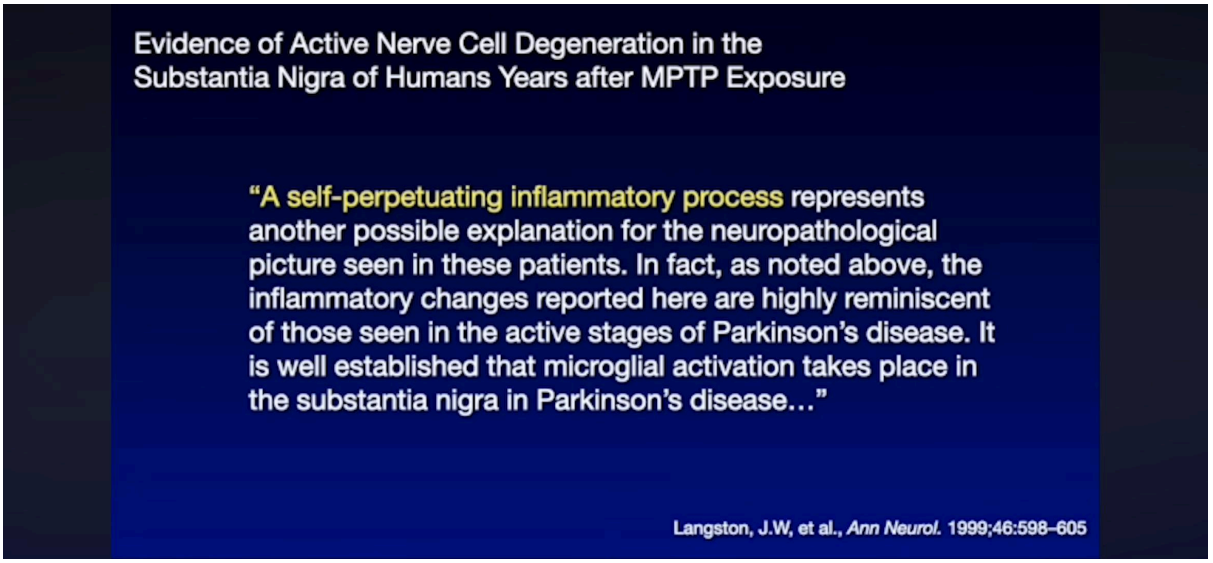
The melanin is digested away and M2 microglia shown are attacking the substantia migration cells because their mitochondria was poisoned 3 years prior, and created an inflammation and immune response that is self- perpetuating and killed the patient at 42 from MPTP

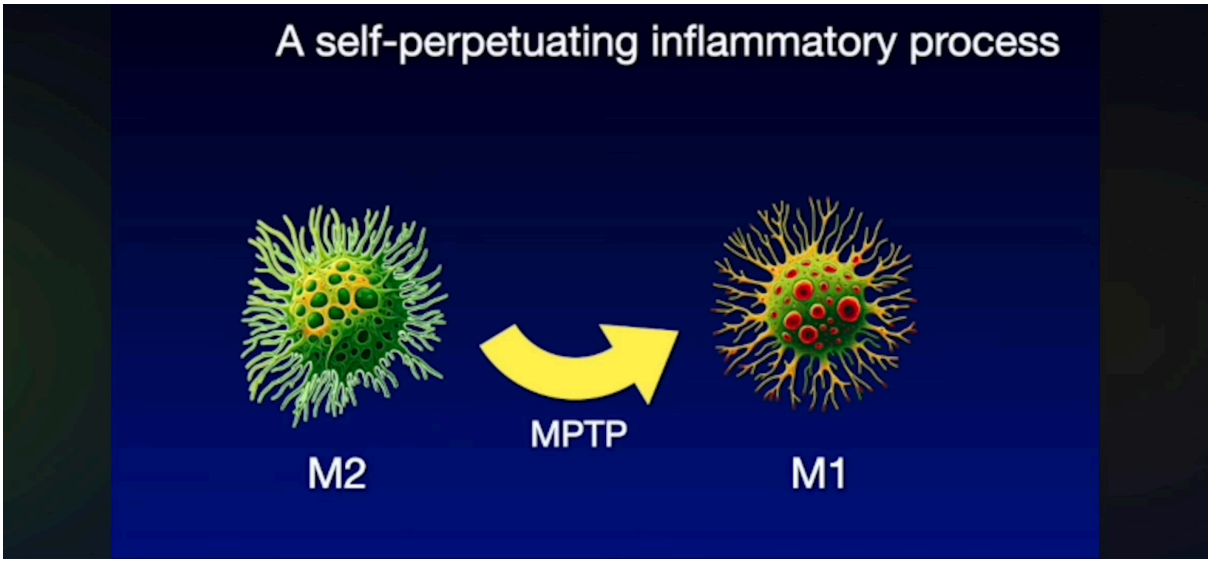


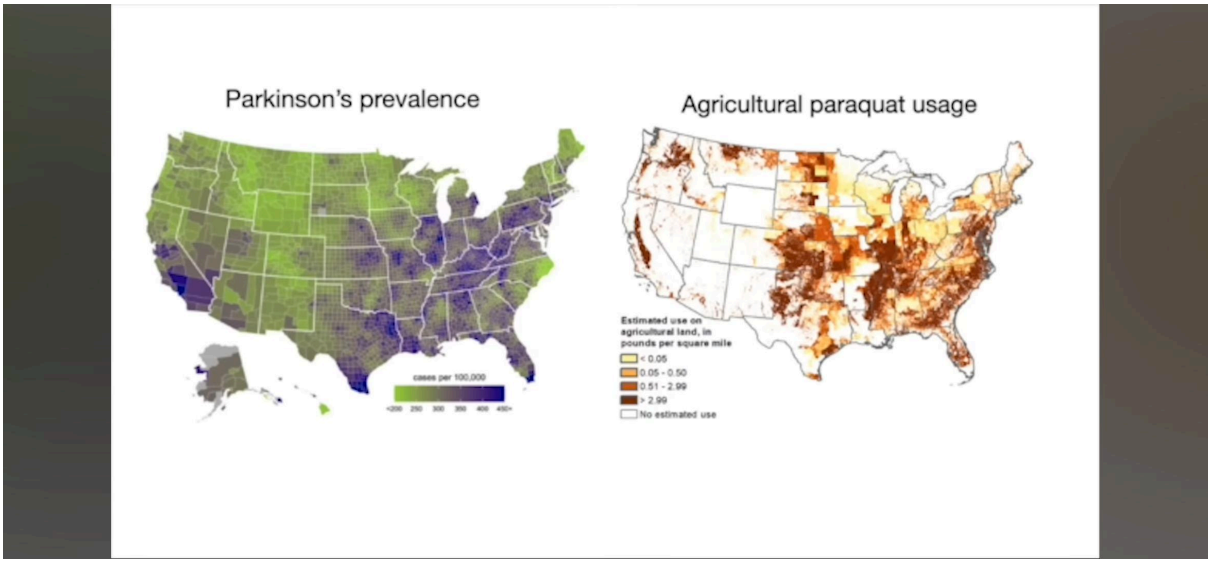


Activated microglia destroying blood brain barrier
Shift from helping M2
To M1
Destroying brain cells
Make cytokines and shifts more M2 cells to M1
Long <u>covid</u> <u>DOES</u> <u>THE</u> <u>SAME</u>
PTSD
<u>PARAQUAT</u>- INCREASEs by 60% PARKINSON'S- which is a mitochondria poison, which causes inflammation, switching the phenotype of microglial M2 to the destructive M1.

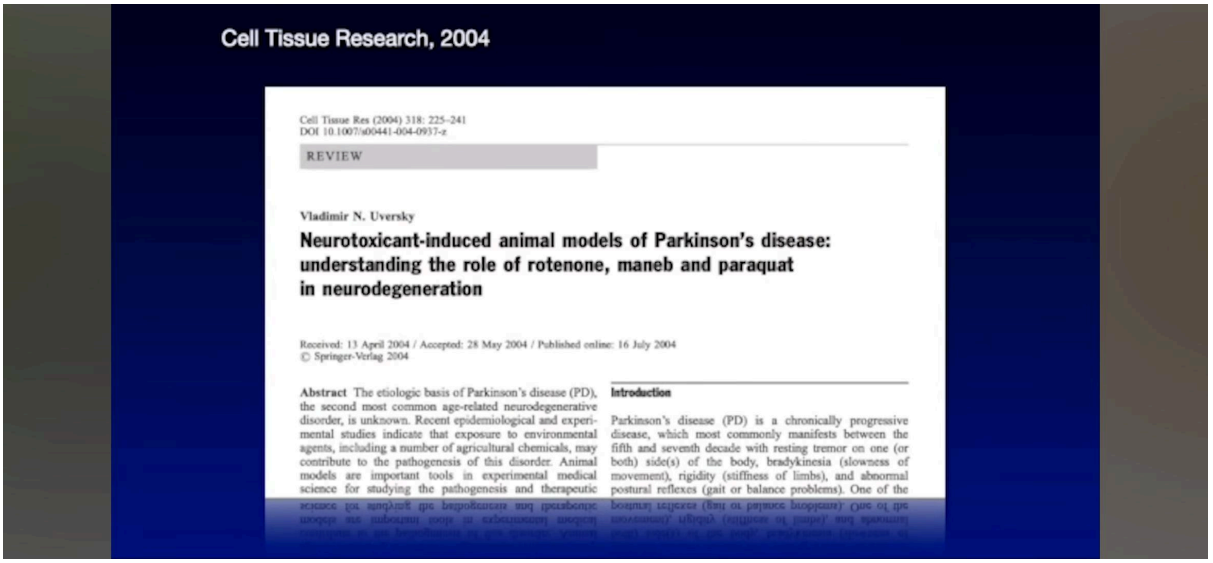
Paraquat is used in the lab to create Alzheimer's in animals. Meanwhile our use has increased dramatically (above chart) in the American agriculture today because pests are becoming immune to glyphosate.



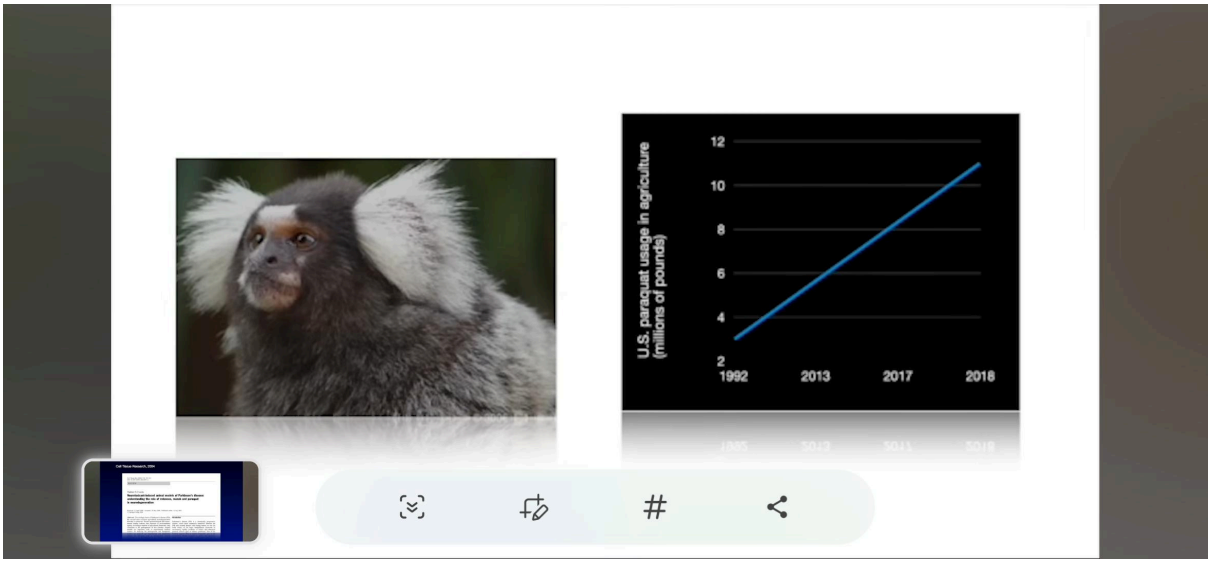


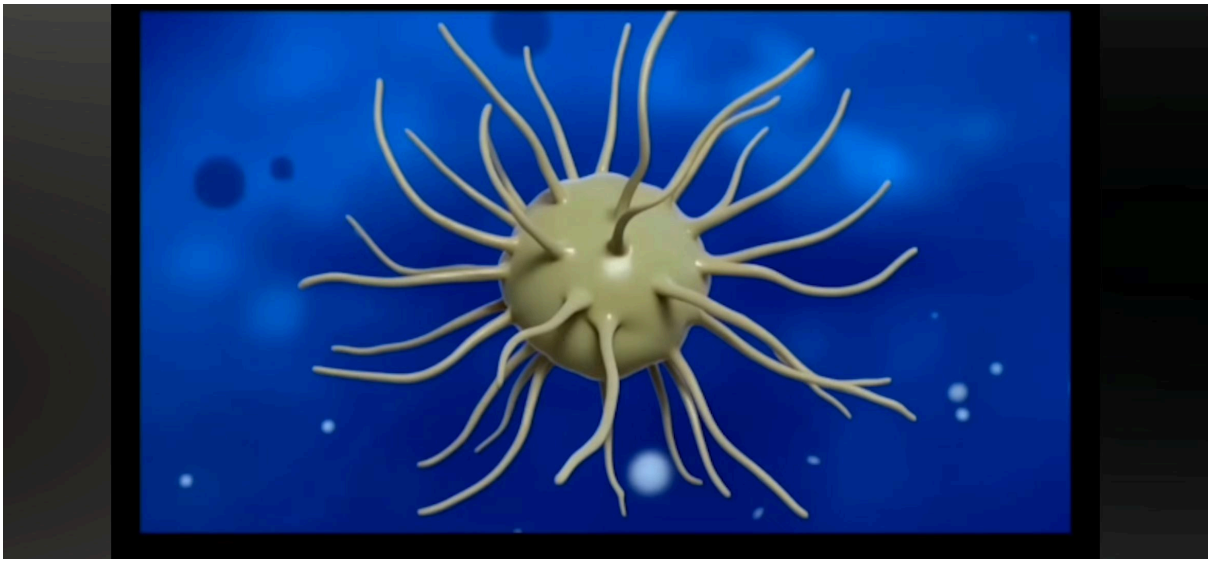


The incidence of Parkinson's matches the heavy use of paraquat shown above on left.

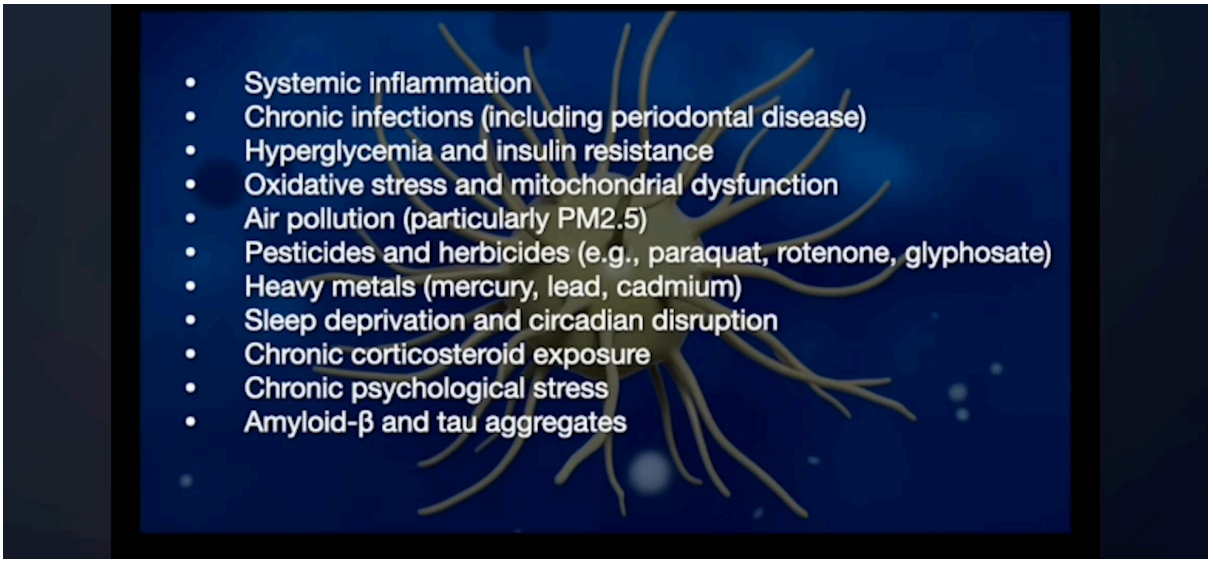


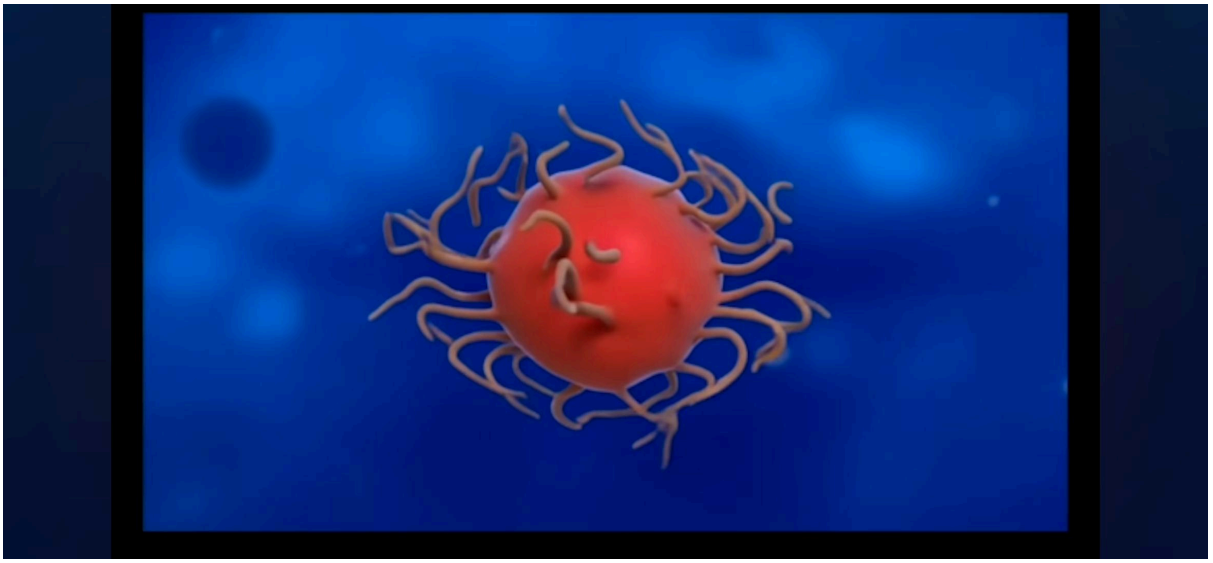
Thus, everything you've been told about Alzheimer's, that it's caused by sticky plaque building up in your brain, is missing the real story?



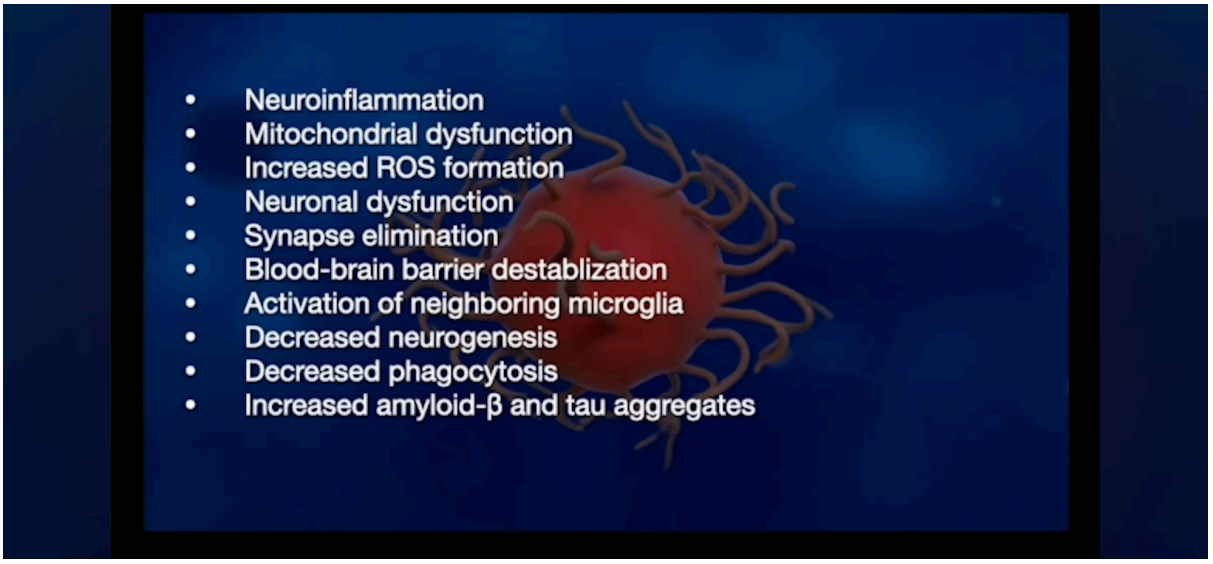


M2 microglial cell that is part of the body's immune system and nurtures neuron cells and growth and helps maintain blood brain barrier.





The M1 microglial cell is quite destructive once activated and changes from oxidative phosphorylation (the TCA cycle) to anaerobic glycolysis, just like cancer cells.



- Systemic inflammation
- Chronic low-grade "inflammaging"
- Acute infections (viral, bacterial, fungal)
- Periodontal infection
- Endotoxin/LPS translocation
- Dysbiosis
- Increased intestinal permeability
- High glucose/hyperglycemia
- Insulin resistance
- Advanced glycation end products (AGEs)
- High-fructose intake
- Uric acid elevation
- Obesity/visceral adiposity
- Dyslipidemia/oxidized LDL
- Ceramides/lipotoxicity
- Mitochondrial dysfunction

- Mycotoxins
- Air pollution PM2.5
- Diesel exhaust/ultrafine particles
- Ozone and NOx
- Cigarette smoke/secondhand smoke
- Microplastics/nanoplastics
- Endocrine-disrupting chemicals (phthalates, BPA)
- Glyphosate and other agrochemicals
- Chronic pain
- Hyperhomocysteinemia
- Ionizing radiation
- Persistent viral reservoirs (e.g., post-viral)
- Poor omega-3 status
- Excess omega-6 linoleic acid
- Alcohol misuse
- High salt intake

- Reactive oxygen species (oxidative stress)
- Reactive nitrogen species (nitrosative stress)
- Hypoxia/sleep apnea
- Sleep deprivation
- Circadian disruption/light at night
- Psychological/chronic stress
- Social isolation
- Sedentary behavior
- Traumatic brain injury/concussion
- Stroke/ischemia–reperfusion
- Blood–brain barrier breakdown
- Excitotoxicity/glutamate excess
- Amyloid-β oligomers
- Tau aggregates
- α-Synuclein aggregates
- Huntingtin fragments

- Iron overload
- Copper/zinc dyshomeostasis
- Heavy metals (mercury, lead, cadmium, manganese)
- Pesticides (e.g., rotenone, organophosphates)
- Herbicides
- Industrial solvents/volatile organics
- Mycotoxins
- Air pollution PM2.5
- Diesel exhaust/ultrafine particles
- Ozone and NOx
- Cigarette smoke/secondhand smoke
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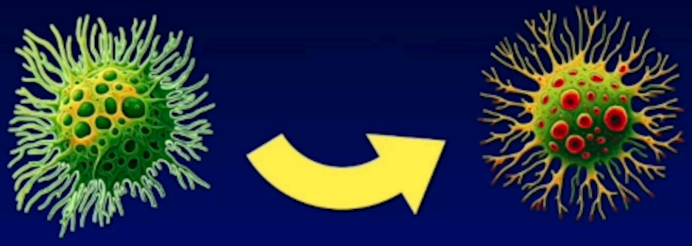
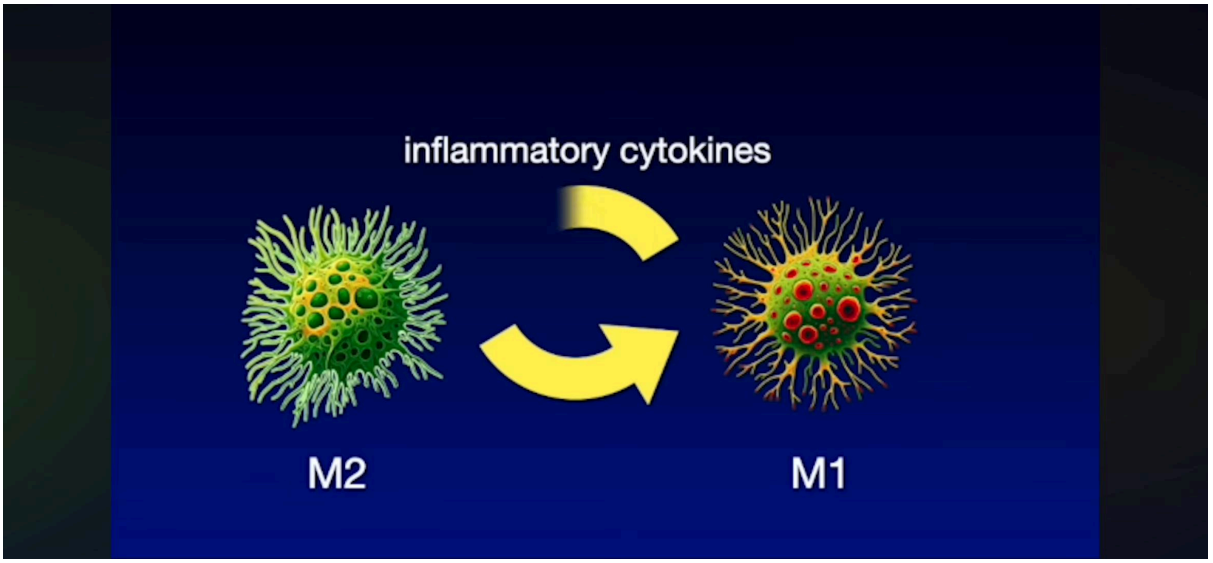
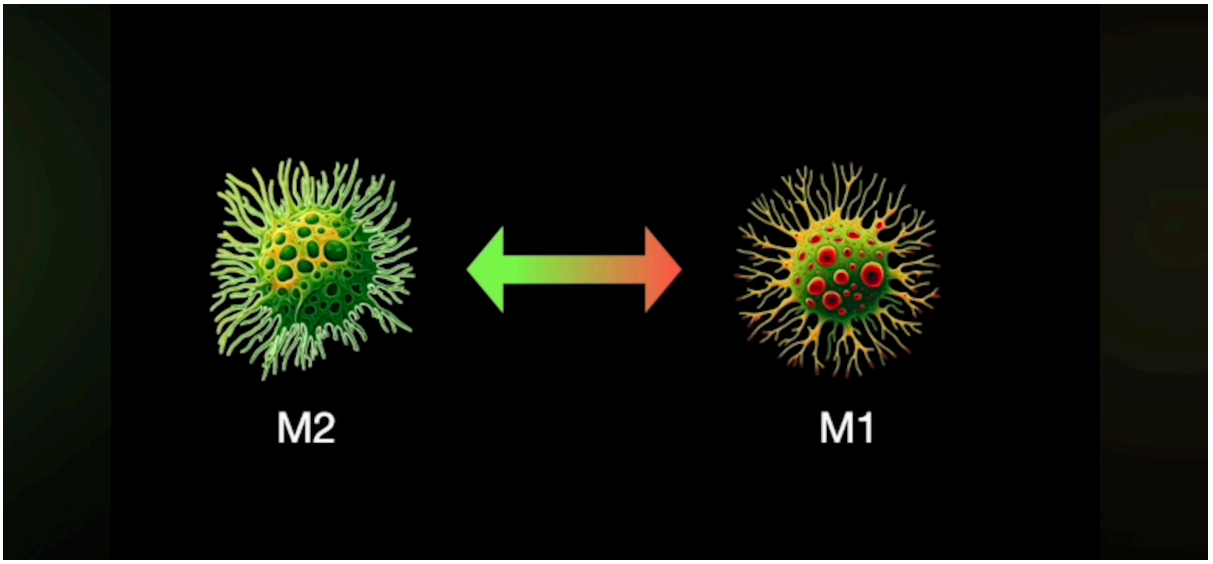


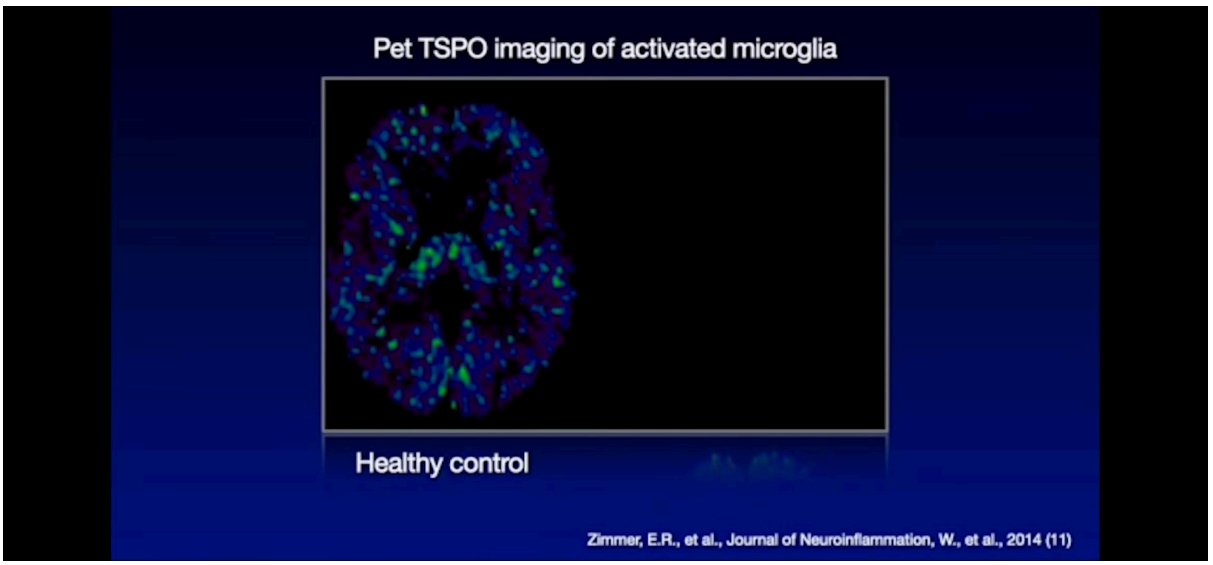
M2 M1

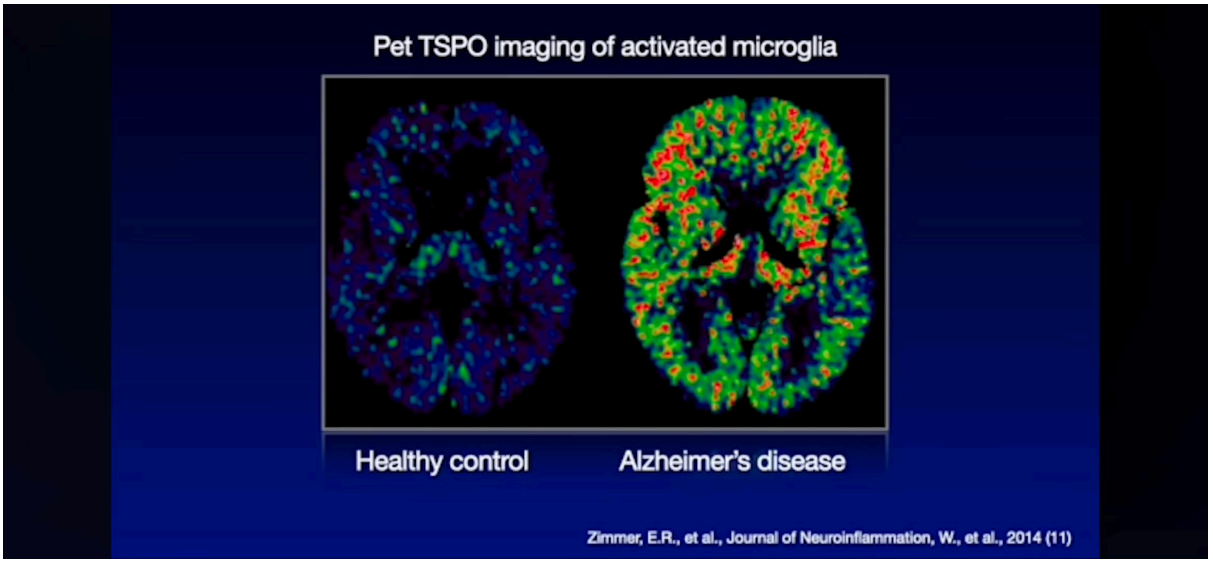


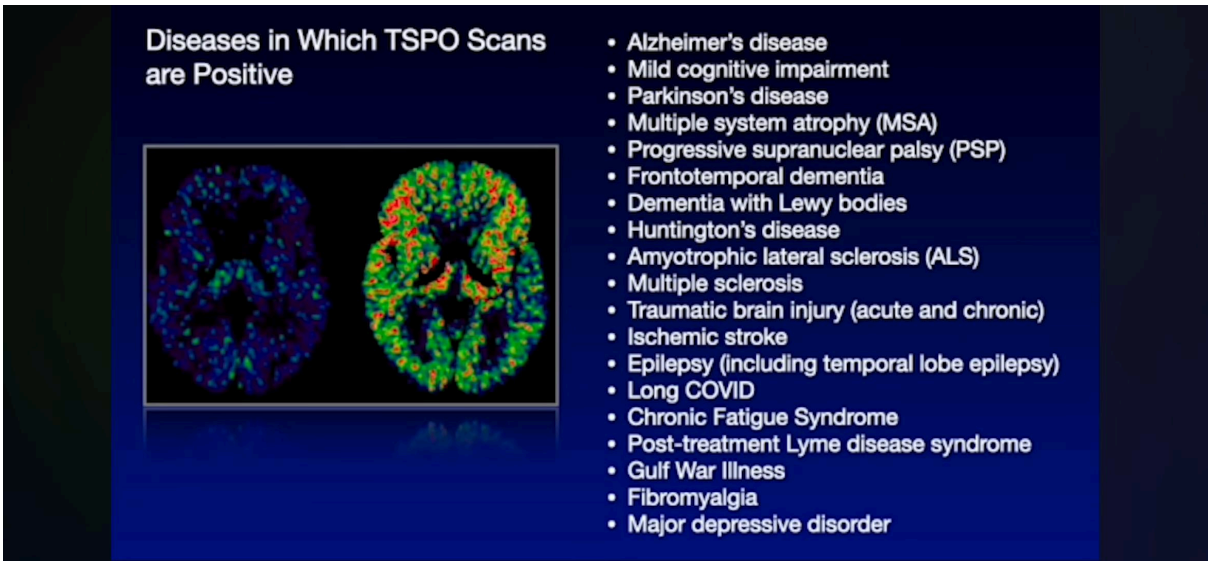
The M2 feedback loop is created by M1 cytokines being released and transforming M2 to M1 cells, and this pattern can turn into an endless feedback loop for many years and decades unless stopped.



Dr. David Perlmutter shows that the true driver of neurodegeneration isn't plaque at all. It's your own brain's immune cells turning against you.

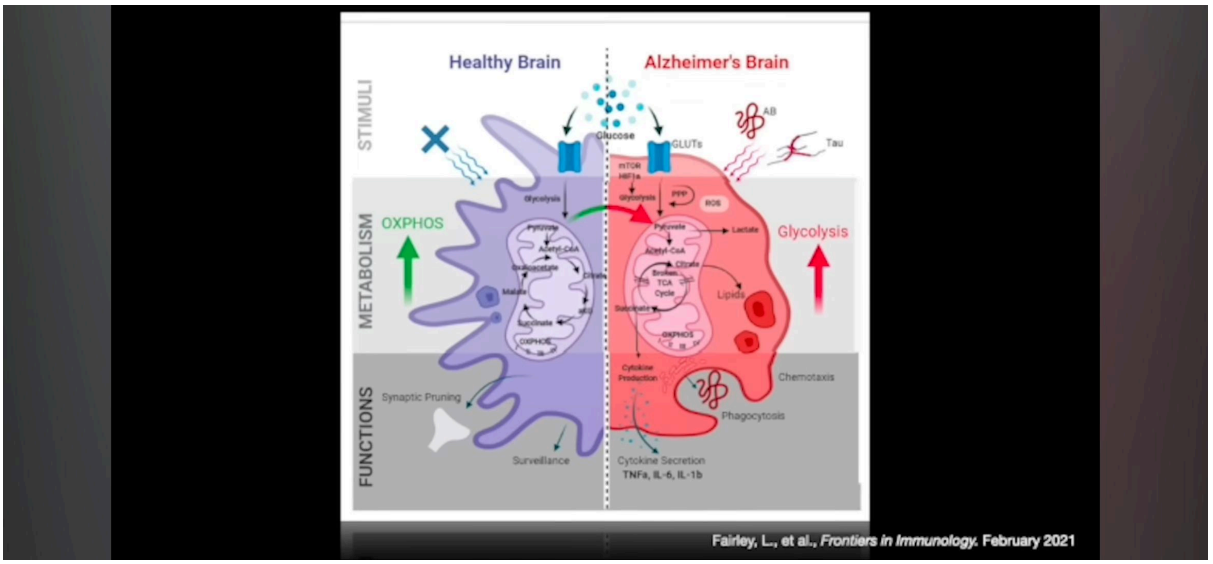




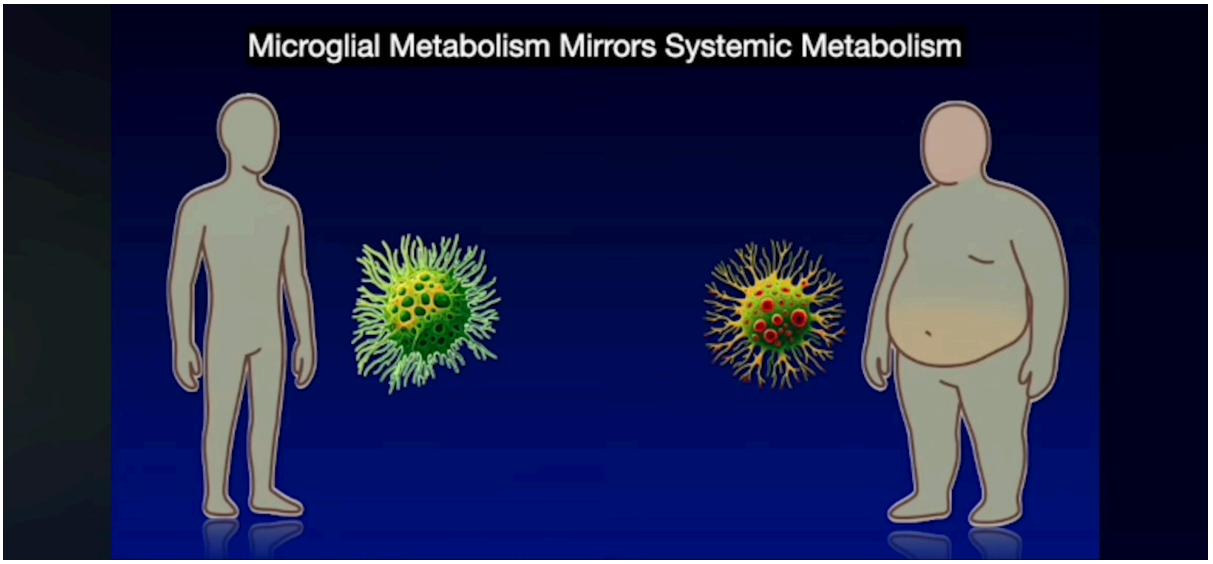


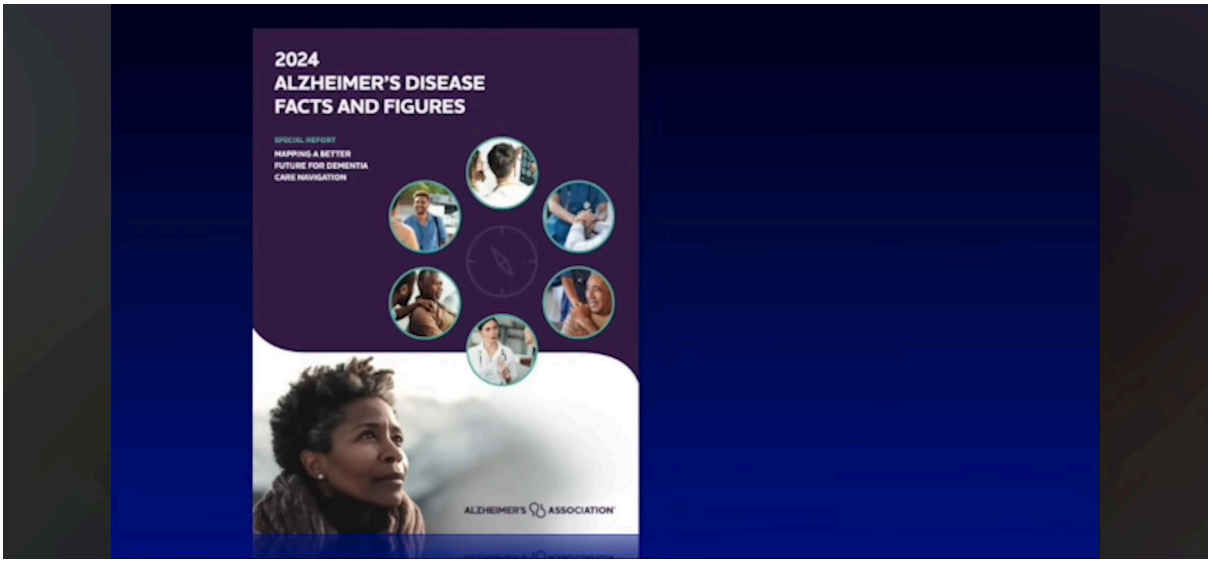
For decades the field blamed beta-amyloid protein for Alzheimer's. Perlmutter walks through a mechanism reshaping the science: the dysregulation of microglia, the immune cells that can either protect your brain or actively destroy it depending on how you live.

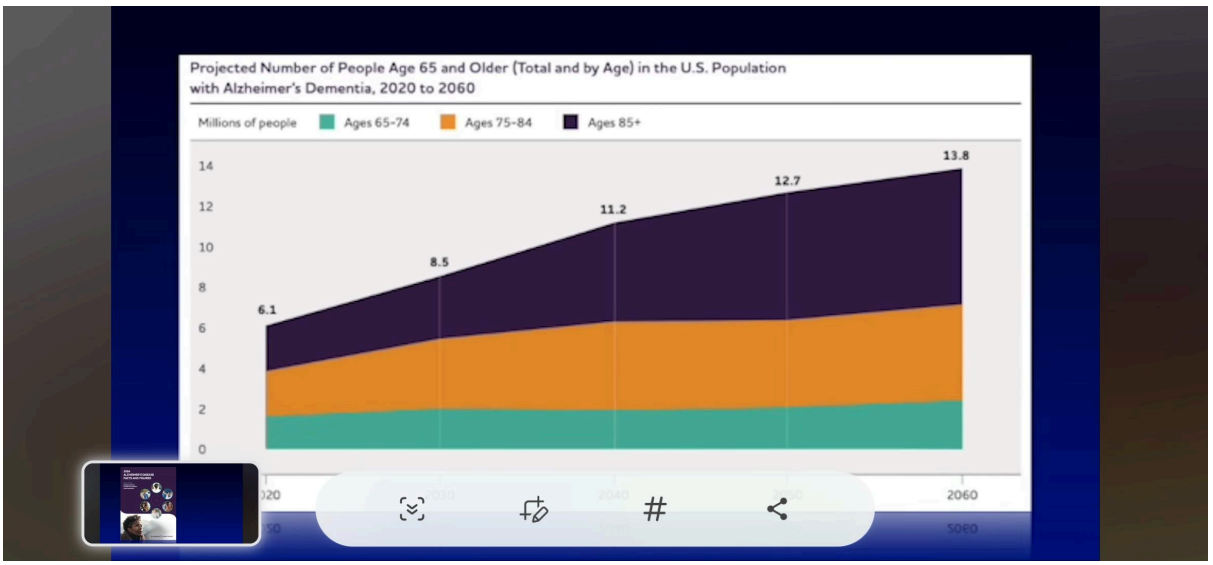
This transformation of microglial cells is what causes Alzheimer's and how pesticides and long covid cause a type of self attacking on immune system on the brain that builds up long after the initial incursion

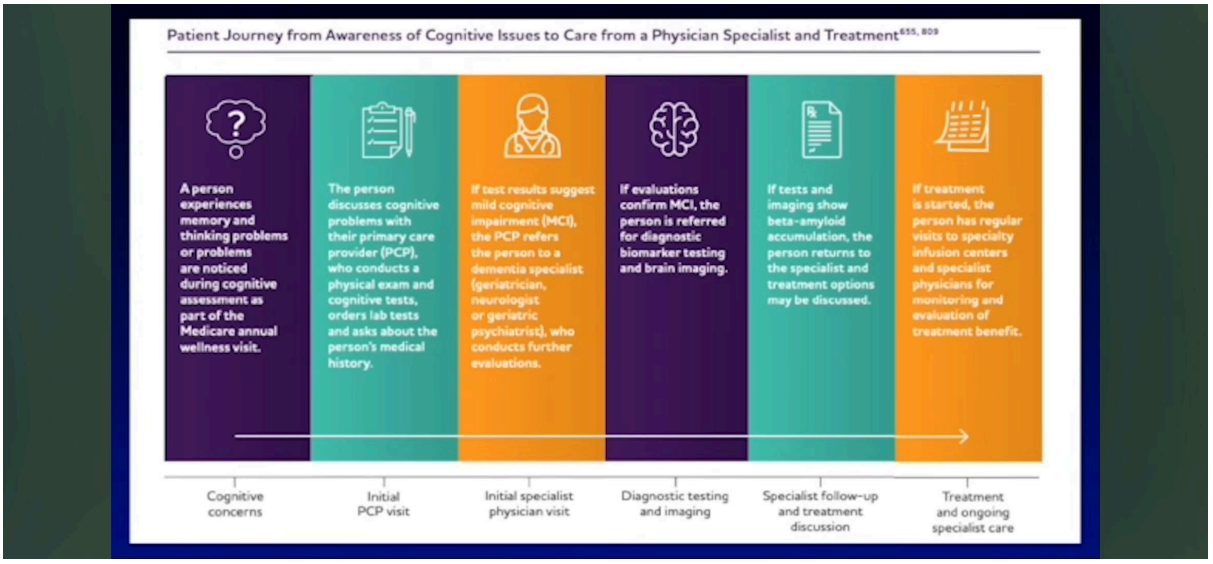


We dig into the chilling Parkinson's case where contaminated heroin froze patients like statues and revealed immune cells still attacking the brain decades later, why the same self-perpetuating inflammation shows up in CTE, long COVID, and PTSD, how your gut and blood sugar flip these cells into attack mode, the 14 metabolic risk factors that could prevent up to half of dementia cases, and the MIT-pioneered 40 Hz light and sound therapy that slowed cognitive decline and stabilized brain volume in human trials.






Projected Number of People Age 65 and Older (Total and by Age) in the U.S. Population with Alzheimer's Dementia, 2020 to 2060
Millions of people
Ages 65-74
Ages 75-84
Ages 85+
14
12
10
8
6
4
2
0
6.1
8.5
11.2
12.7
13.8
2060


Patient Journey from Awareness of Cognitive Issues to Care from a Physician Specialist and Treatment[655, 809]
A person experiences memory and thinking problems or problems are noticed during cognitive assessment as part of the Medicare annual wellness visit.
The person discusses cognitive problems with their primary care provider (PCP), who conducts a physical exam and cognitive tests, orders lab tests and asks about the person's medical history.
If test results suggest mild cognitive impairment (MCI), the PCP refers the person to a dementia specialist (geriatrician, neurologist or geriatric psychiatrist), who conducts further evaluations.
If evaluations confirm MCI, the person is referred for diagnostic biomarker testing and brain imaging.
If tests and imaging show beta-amyloid accumulation, the person returns to the specialist and treatment options may be discussed.
If treatment is started, the person has regular visits to specialty infusion centers and specialist physicians for monitoring and evaluation of treatment benefit.
Cognitive concerns
Initial PCP visit
Initial specialist physician visit
Diagnostic testing and imaging
Specialist follow-up and treatment discussion
Treatment and ongoing specialist care


I'm cognitively Intact and plan to keep it that way, thank you very much
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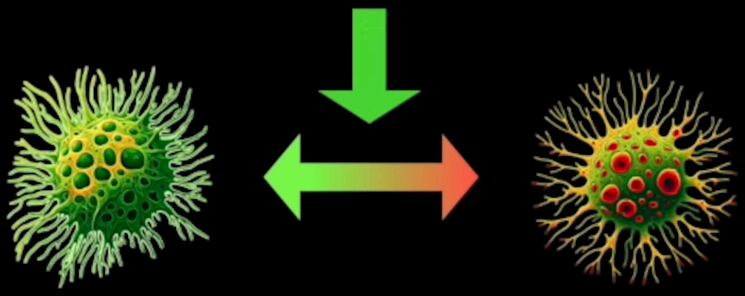
Metabolic Reprograming of Microglia in the Regulation of the Innate Inflammatory Response

- Microglia represent an intriguing target for the treatment of neurodegenerative diseases and targeting their metabolism in order to change their immunological phenotype could represent a promising future therapeutic approach.

Lauro, C., et al., *Frontiers in Immunology.* March, 2020

Can we intervene here?



M2 M1

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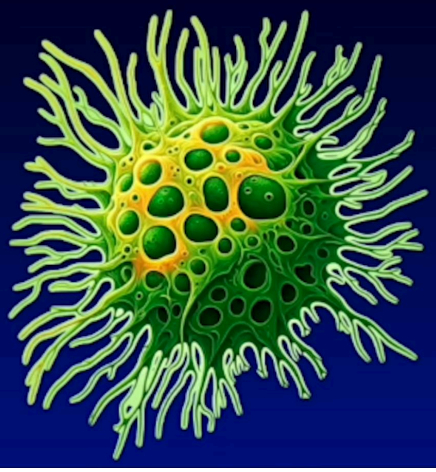
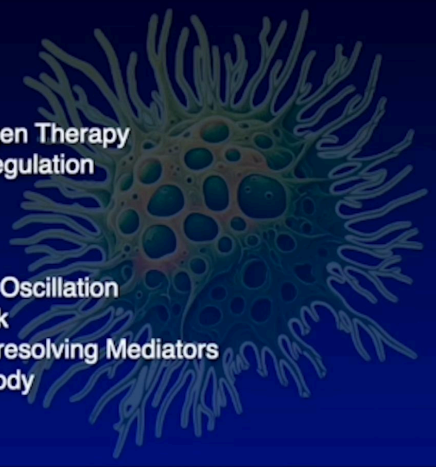
Microglial Metabolism Mirrors Systemic Metabolism

Lauro, C., et al., *Frontiers in Immunology.* March, 2020

Reprogramming Microglia

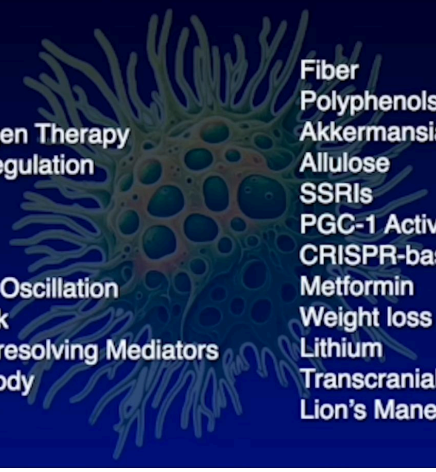


Reprogramming Microglia



Ketogenic diet
Exercise
Hyperbaric Oxygen Therapy
Nitric Oxide Upregulation
Urolithin-A
Fasting
GLP-1 Agonists
Evoked Gamma Oscillation
EEG biofeedback
Specialized Pro-resolving Mediators
TNF-alpha antibody
Improved Sleep

Reprogramming Microglia



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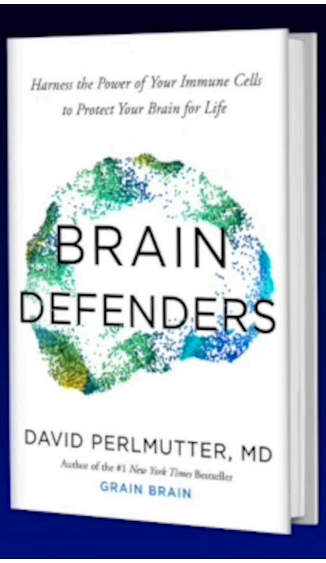
Fiber
Polyphenols
Akkermansia Mucinophilia
Allulose
SSRIs
PGC-1 Activators
CRISPR-based genetic tools
Metformin
Weight loss
Lithium
Transcranial Ultrasound
Lion's Mane



BRAIN DEFENDERS

Harness the Power of Your Immune Cells to Protect Your Brain for Life

"A science-based actionable blueprint to shift the brain from decline to repair."

— David A. Sinclair, PhD, author of *Lifespan*, *Professor of Genetics, Harvard Medical School*

David Perlmutter, MD

August, 2026

BrainDefenders.com

Li-Huei Tsai, Ph.D.
Director, The Picower Institute for Learnng and Memory,
Massachusetts Institue of Technology

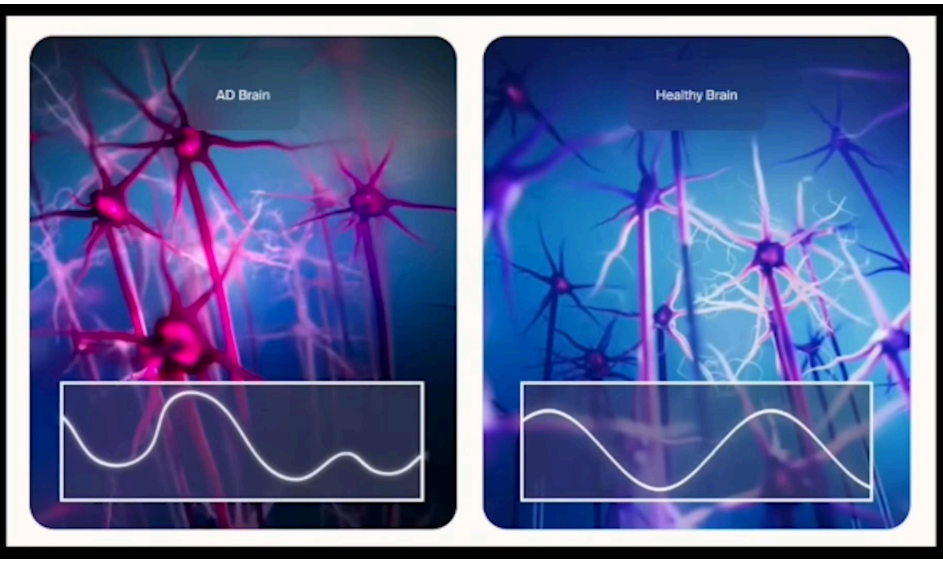
Gamma frequency entrainment attenuates amyloid load and modifies microglia

- Gamma entrainment refers to the modulation or synchronization of brain wave activity in the gamma frequency range (typically around 30-100 Hz), which is associated with various cognitive functions, such as attention, memory, and perception.

Iaccarino, H.F.,., et al. *Nature*. December, 2016

Changes or abnormalities in gamma entrainment are observed in multiple neurological disorders:

- Alzheimer's disease
- Schizophrenia
- Autism Spectrum Disoreder
- Bipolar Disorder
- Epilepsy
- Parkinson's Disease
- Major Depressive Disorder



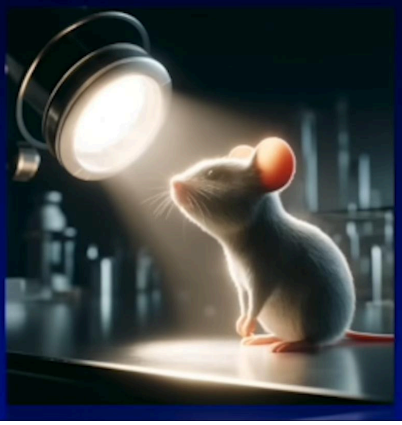
Gamma frequency entrainment attenuates amyloid load and modifies microglia

- Reduced gamma occilations *before* plaque formation and cognitive decline in mouse model of Alzheimer's disease

Iaccarino, H.F.,., et al. *Nature*. December, 2016

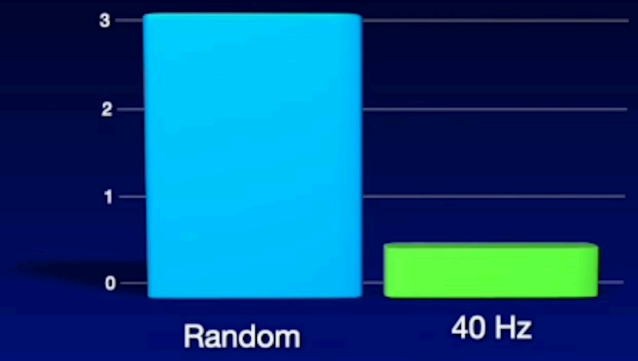
Gamma frequency entrainment attenuates amyloid load and modifies microglia

- Visual stimulation with 40 Hz flicker



Iaccarino, H.F.,., et al. *Nature*. December, 2016

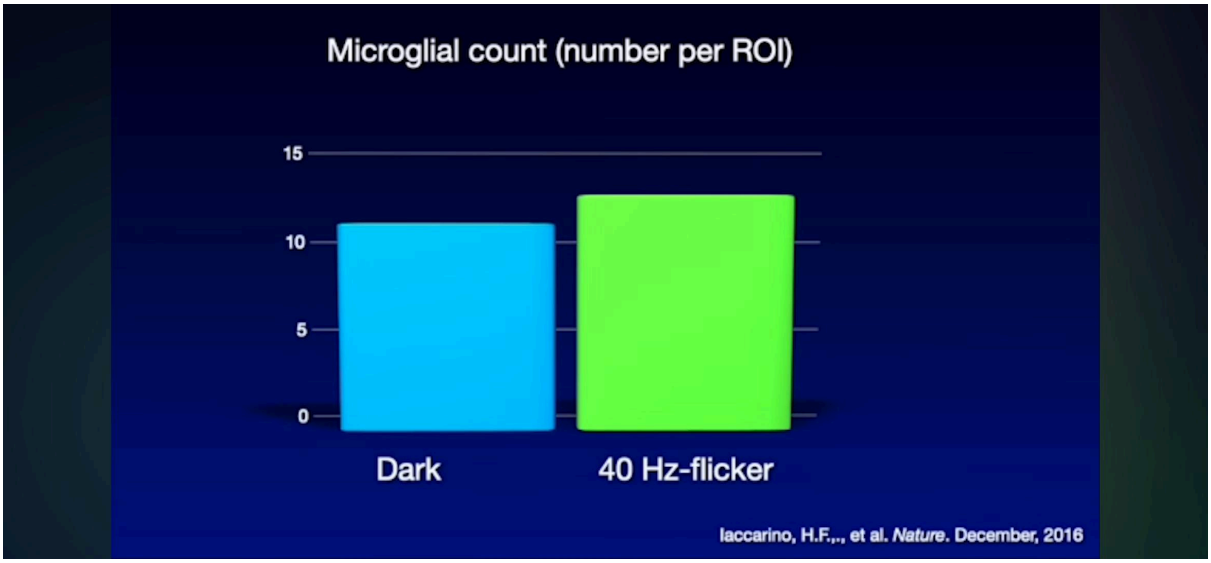
Aβ in hippocampus of AD mouse



Iaccarino, H.F.,., et al. *Nature*. December, 2016

Aβ 1-40 in visual cortex of AD mouse

Iaccarino, H.F.,., et al. *Nature*. December, 2016



Safety, tolerability, and efficacy estimate of evoked gamma oscillation in mild to moderate Alzheimer's disease

- Randomized, double blind, sham-controlled, 6 month trial
- 6-month, 76 participants, mild to moderate Alzheimer's
- MMSE scores between 14-26
- 2:1 intervention vs control (sham)
- EEG-verified gamma occilation induced by auditory and visual stimulation, 1 hour daily

Hajós, M., et al. *Frontiers in Neurology*. March, 2024

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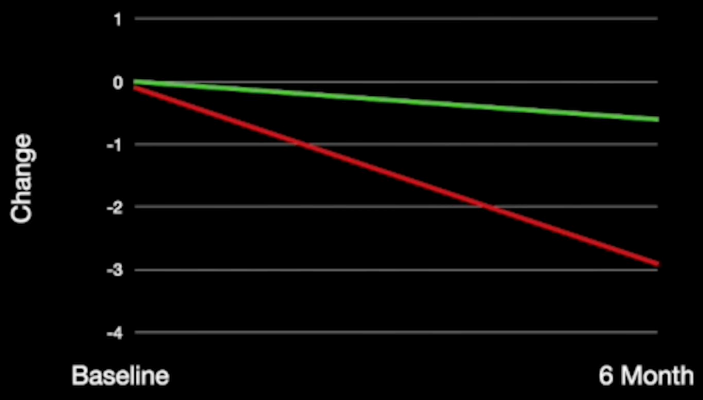
Hajós, M., et al. *Frontiers in Neurology*. March, 2024

Mini-Mental State Exam



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Alzheimer's Disease Cooperative Study-ADL Scale

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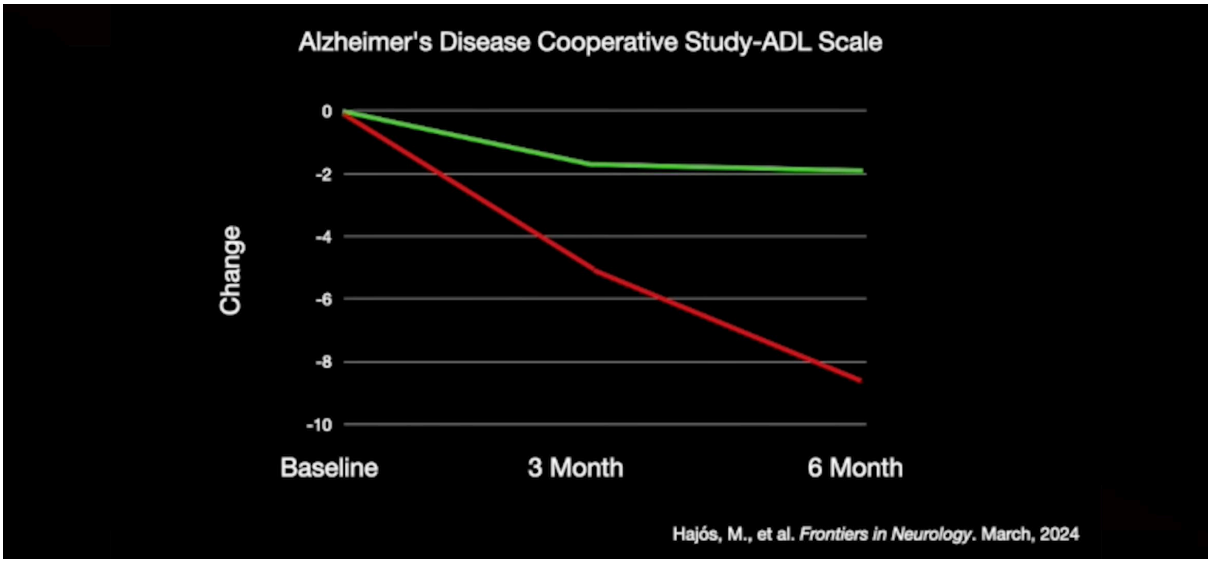
Alzheimer's Disease Cooperative Study-ADL Scale
0
-2
-4
-6
-8
-10
Change
Baseline
3 Month
6 Month
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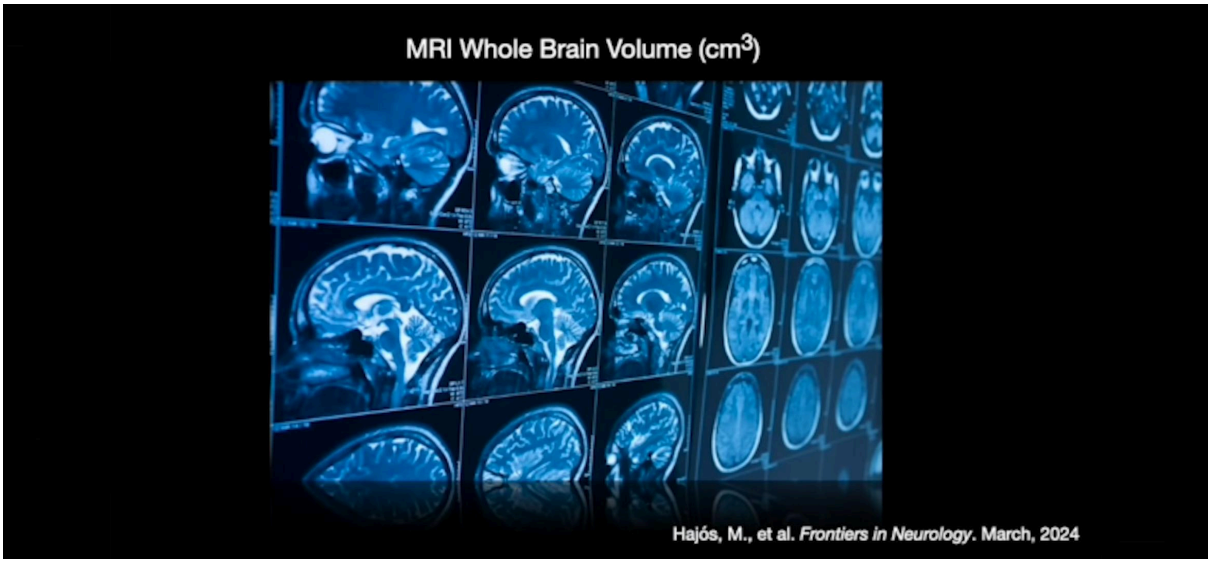
MRI Whole Brain Volume (cm3)
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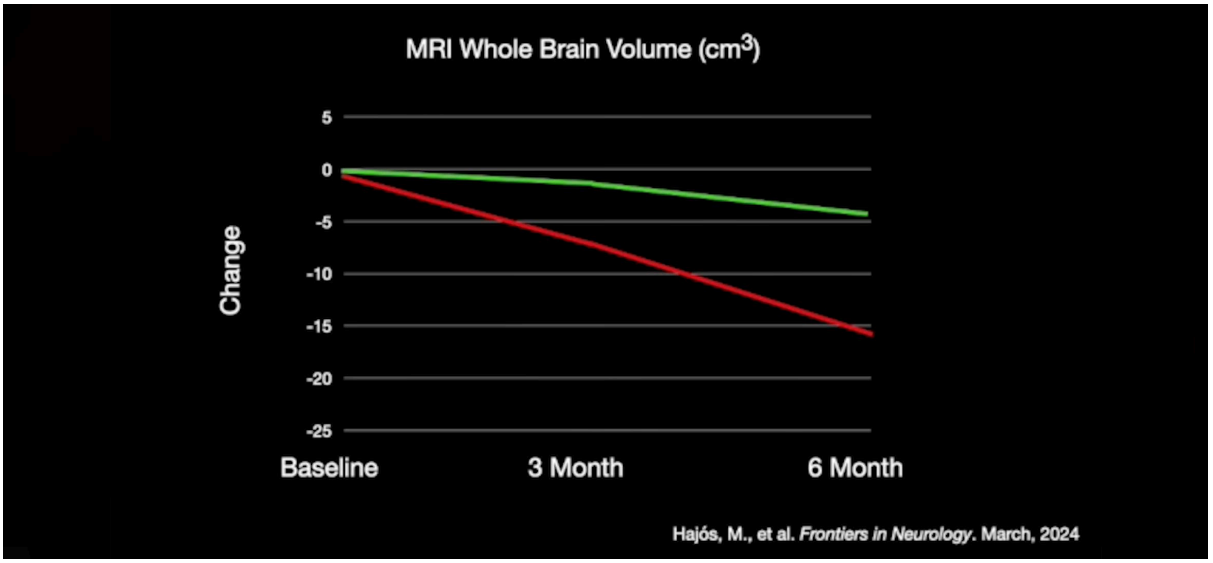

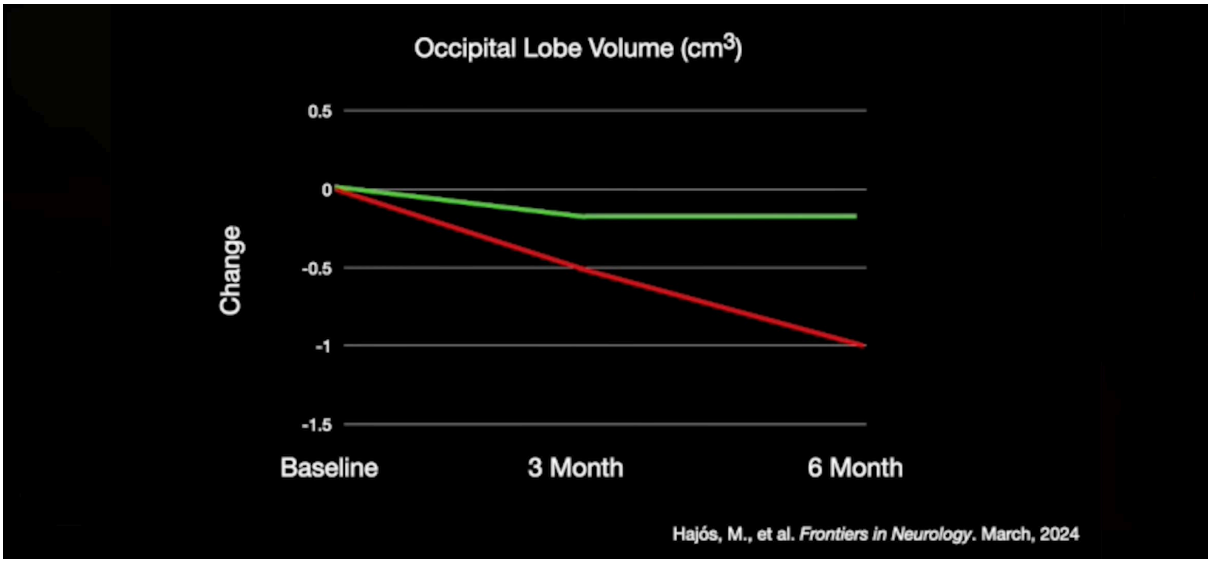

~The Plaque Theory of Parkinson's and Why It's Incomplete
~Meet the Microglia: Your Brain's Immune System
~Supportive vs. Threatening: The M1/M2 Switch
~Why This Underlies Nearly Every Neurodegenerative Disease
~The Frozen Patients: A Parkinson's Mystery at Stanford
~Contaminated Heroin and the MPTP Discovery
~How a Mitochondrial Toxin Destroys Dopamine Cells
~Microglia Still Attacking Decades Later
~The Self-Perpetuating Inflammatory Cycle
~The Same Pattern in CTE, Long COVID, and PTSD
~Paraquat, Pesticides, and Parkinson's Risk
~What Flips Your Cells Into Attack Mode
~Leaky Gut, the Microbiome, and Your Brain
Imaging Threatening Cells in Living People
~Immunometabolism: Why Brain Cells Change Function
~14 Risk Factors That Could Prevent Half of Dementia
~The Breakthrough: Reprogramming Your Microglia
~Don't Wait for Symptoms: Intervene Early

~The Toolkit: Diet, Exercise, Fasting, Sleep, and More
~40 Hz Gamma Frequency: MIT's Pioneering Technology
~Light Flicker Studies and Beta-Amyloid Reduction
~Conclusion: You Are the Architect of Your Brain

Dr. David Perlmutter, MD is a board-certified neurologist and author: ***Brain Defenders***: Harness the Power of Your Immune Cells to Protect Your Brain for Life (Avery / Penguin), focuses on microglia and is scheduled for publication in August 2026.
