

What a Preventive Neurologist Wants You To Know About Brain Health — & How You Can Optimize It

BY DR. KELLYANN NIOTIS

MARCH 30, 2023 1:53 PM



Optimizing Brain Health Paula Daniëlse/Getty Images, Image Source/Getty Images. Design: Danielle Giarratano/SheKnows

Dr. Kellyann Niotis is a preventive neurologist specializing in risk reduction strategies for neurodegenerative disorders including Alzheimer's disease, Lewy body dementia, and Parkinson's disease. She leads the

preventive neurology program at Early Medical. This is a transcript of Master Mind: Optimizing Brain Health from the SHE Media Co-Lab's Future of Health event at SXSW.

As we age, our brains age too. So I am going to talk to you about the very important topic of brain health. As a first-generation American, the first fellowship-trained preventive neurologist, and a brain health researcher, I'm excited to talk to you about something I'm so passionate about. While I do work to live, I also live to work — because my specialty has become such a personal passion of mine.

Historically, in our healthcare system, it has taken 15 to 20 years for new scientific findings and discoveries to be incorporated into the standard of medicine. My mission is to reach as many people as possible who are at risk for neurodegenerative diseases and challenge the shortcomings of our current medical system.

So what is brain health? Brain health represents the optimal state of mental, physical, social, and emotional well-being that enables us to function successfully throughout life. Neurodegenerative diseases like Alzheimer's, Lewy body dementia, and Parkinson's disease are a direct threat to our collective brain health. Right now, over 55 million people are living in the world with Alzheimer's disease, and that's expected to rise to 131 million people by 2050. Disease-related costs are expected to top \$2 trillion in the U.S. by 2040.

Brain Health

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What is brain health?

LEADING CAUSES OF DEATH IN THE USA IN 2021

Cause of death	No. of deaths
Heart disease	~750,000
Cancer	~600,000
COVID-19	~450,000
Unintentional injuries	~250,000
Stroke	~180,000
Chronic lower respiratory diseases	~150,000
Alzheimer's disease	~100,000
Diabetes	~100,000
Chronic liver disease and cirrhosis	~50,000
Kidney disease	~50,000

10 leading causes of death in the United States in 2021 (per 100,000 population)

Source: <https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>

- Over 55 million people globally living with Alzheimer's and 10 million living with Parkinson's
- Both diseases are rapidly increasing in prevalence

Photo : SHE Media

What Is Brain Health

The graph that I have here depicts the leading causes of death in the United States. Alzheimer's disease is ranked seventh; it kills more people than breast and prostate cancer combined. While Parkinson's disease doesn't affect as many people — about 10 million worldwide — it is the fastest-growing neurological condition and disease is expected to double by 2040.

While these are terrifying numbers, I do want to emphasize that no sum, no matter how astronomical, can really encompass the pain that individuals and entire families feel when they're suffering from one of these diseases.

When Does Disease Start

*If at Age 65, 10% have Alzheimer's and 1% have Parkinson's... Disease first started at **Age 35-45***

- We have a HUGE window of opportunity to intervene

Photo : SHE Media

When Does Disease Start?

Most people think they don't have to worry about these diseases until they're in their 60s or 70s, but that is a huge misconception. We are diagnosing and thinking about these diseases way too late. Typically, by the time we catch Parkinson's disease, half of the dopamine-producing brain cells have been lost. That means once the cells have died, we can't bring them back.

The disease starts decades before we're actually diagnosing it. So if we catch the disease at 65, it really started when someone was 35 to 45. That means there's a huge window of opportunity to do things about it. Before the brain cells die, we can reverse and halt progression. And in fact, data shows that there are a lot of things we can and should be doing today. So let's talk about those things.

Modifiable Risk Factors

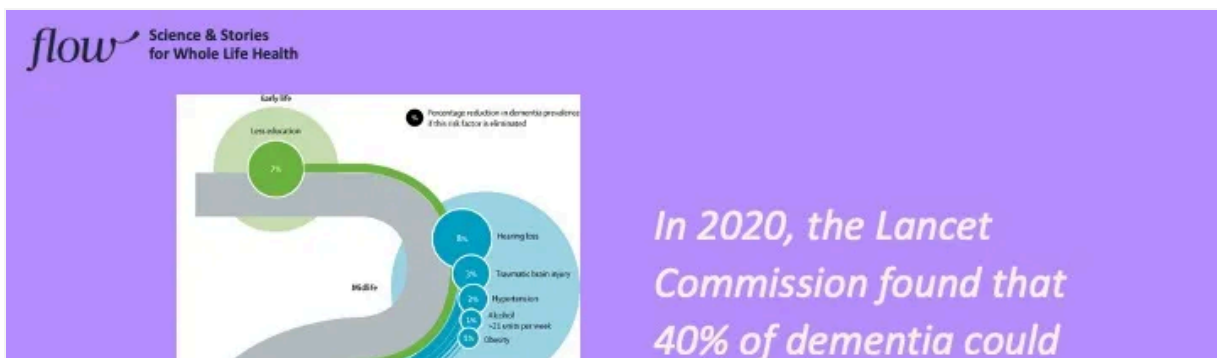




Photo : SHE Media

Modifiable Risk Factors

In 2020, [the Lancet Commission](#) published a report that said that 40 percent of all dementia could be prevented by acting on 12 modifiable risk factors. These were things like physical activity, hearing loss, smoking, excessive alcohol consumption, obesity, and others. These also happen to disproportionately affect minority communities, which is an entirely different discussion. So there are probably many, many more that haven't been fully appreciated because we don't have enough evidence to say that they are for sure.

But today, I'm going to talk to you about two risk factors that are not here because they're considered non-modifiable. They include genetics and biological sex. But just because they're called non-modifiable doesn't mean there aren't things that we can do to mitigate some of their potential harm.

One Size Doesn't Fit All

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No one-size-fits all: No magic pill is coming to save us from these diseases

GENETIC FACTORS

- Apolipoprotein E (APOE) is a CHOLESTEROL GENE
 - E2 ↑
 - E3 = "neutral" ~ 65% of population
 - E4 ↓

EPIGENETIC FACTORS

- Nutrigenomic
- Pharmacogenomic
- Lifestyle

Whole Genome Sequencing (WGS)

23andMe

KEY CONSIDERATION:

Different people with different genes need different care.

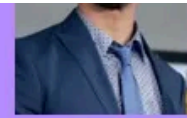


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One Size Doesn't Fit All

The first thing I want to talk about is genetics. I'm sure you've all heard the question, 'Is this nature, or is this nurture?' Well, for neurodegenerative diseases the answer is probably it's a combination of both. While our genes are definitely not our destiny, there are certain genes that can either increase or decrease your chances of developing one of these diseases. And there are certain lifestyle and environmental factors that can turn on or turn off the genes from expressing themselves. This is what we call epigenetics, and there are so many genes to talk about. But I'm going to focus on the best-studied and most referenced one, which is called APOE.

Before we do, I will give you a brief genetics 101. There won't be any pop quizzes, just so you know what genes are. Genes live on things called chromosomes; we have 23 different chromosomes. And we have two copies of each chromosome, which means we have two copies of each gene. When it comes to APOE, you can have different *types* or alleles of the gene; you can have either an E2, an E3, and an E4. And you get one copy from mom and one copy from dad. If you have one copy of APOE4, your risk for Alzheimer's disease is a little higher. You may recall that actor Chris Hemsworth recently revealed that he is part of the 2 to 3 percent of the population that carries two copies of the APOE4 gene, which increases his risk of Alzheimer's eight to 10 fold. But it doesn't just increase your chances of getting Alzheimer's; it also increases your chances of getting Lewy body and cardiovascular disease. And why? It's because APOE is a cholesterol gene. It stands for apolipoprotein E, lipids and proteins. It's involved in cholesterol metabolism throughout the body. It leads to high cholesterol, and high cholesterol is a risk factor for these diseases.

But remember: genes are not your destiny. When we learn that someone has one of these genes, we know what we're up against, because we understand what that gene does. And we have tools in our toolbox that we can use to

what that gene does. And we have tools in our toolbox that we can use to address what this gene does, which is causes hyper absorption of cholesterol and impaired clearance. We have medications for that. So, genes are so important for doctors because we can personalize our prevention strategy, and different people with different genes need different care.

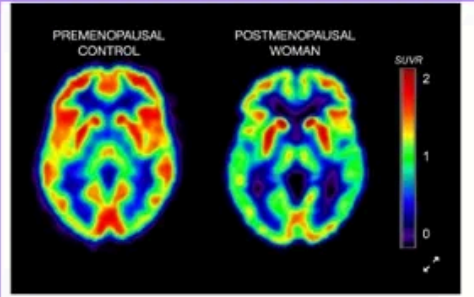
Most importantly, I want to emphasize that most people go around not even knowing that they're at risk for these diseases because we're not checking, and that means they're missing an opportunity to do something early.

Disproportionately Affected

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Women are disproportionately affected by neurodegenerative diseases

- Neuroprotective Hormones: 17 β -estradiol
- The discovery of the menopause transition period
- The potential role of HRT in optimizing women's brain health



PET scans comparing (r) a postmenopausal woman's brain, and (l) premenopausal woman's brain. The red color indicates areas of maximum metabolic activity, yellow-green indicates less activity, and green to blue indicates low to absent activity. Courtesy of Dr. Lita Mosconi, Weill Cornell Medical College

Photo : SHE Media

Women Are Disproportionately Affected

The next thing I want to touch on is biological sex. Women are disproportionately affected by neurodegenerative diseases. In fact, two out of every three cases of Alzheimer's disease is a woman. But on the other hand, women are at lower risk of developing something like Parkinson's disease. While we don't fully understand the cause of these disparities, we do now know that estrogen — specifically 17 beta-estradiol — has a neuroprotective function.

While total lifetime exposure to estrogen from things like later age of menopause, earlier age of menses, and oral contraceptive use all seem to help protect the brain, what we've really learned is, changes that occurred during the perimenopausal period negatively impact women's brain health. Neuroimaging studies recently identified changes in brain estrogen receptor expression, as well as metabolic activity during the pre-menopausal period. So you can see here, pre-menopausal, the women's brains are metabolically healthy and lit up in red, but post-menopause that activity really starts to decline.

What we also know is that surgically and medically induced menopause increases your chance of getting Alzheimer's and Parkinson's. So we understand now that it's this rapid drop in hormones that happens around the menopausal period that seems to put women at risk.

So it would make sense that we could do something like give hormone replacement therapy to get people through that rapid period of decline in hormones. But unfortunately, the [U.S. Preventive Services Task Force](#) and the [American College of Obstetrics and Gynecologists](#) recommend against the use of hormone replacement therapy, citing reasons like increased risk of breast cancer, increased risk of stroke, increased risk of dementia.

But the evidence that they used to fuel these guidelines has inherent flaws and emerging data — more recent data — actually suggests that hormone replacement, given at the right time during this perimenopausal period, has tremendous benefit for women's brain health.

Unfortunately, most gynecologists are sticking to these old, outdated guidelines and are missing this opportunity to help women and protect their brains. And I think that's a big mistake. The key is that we have to individualize our thought about using HRT in women.

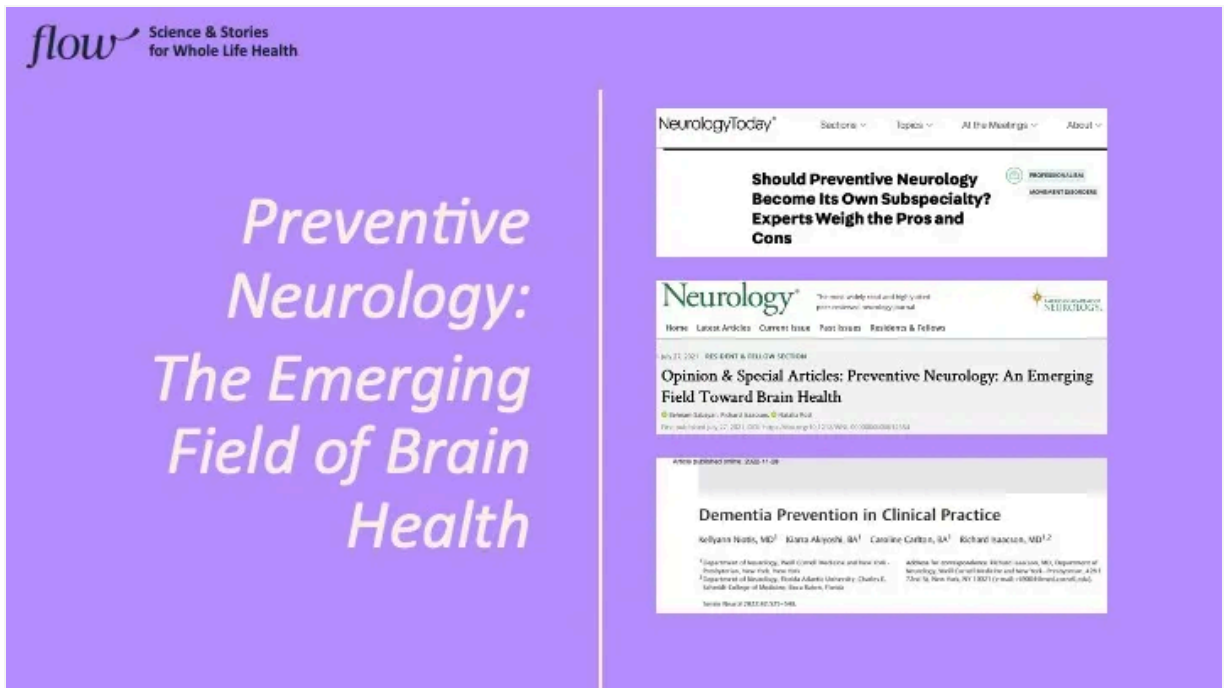
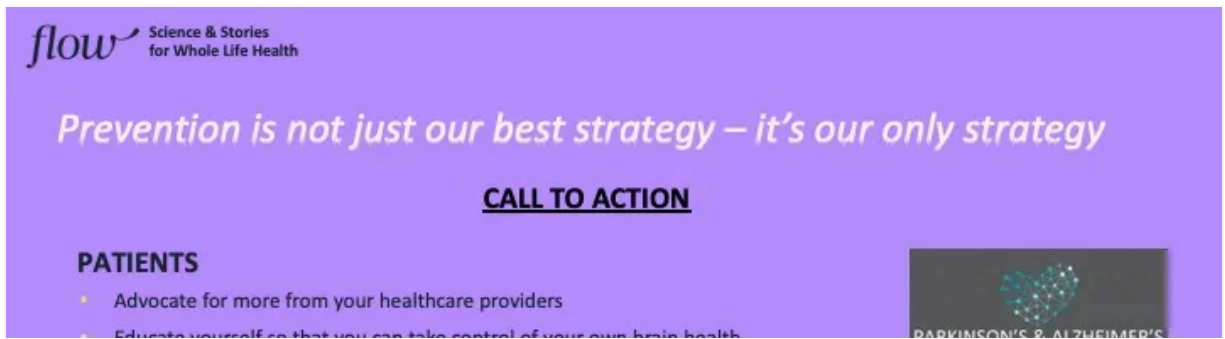


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Preventive Neurology

Finally, I just want to touch on this: I get asked all the time, ‘Why aren’t there more neurologists like you that think like you?’ and I get emailed weekly by tons of people asking for my help, and it breaks my heart that I cannot help all of the people that need help. Preventive neurology is an emerging field. And it’s very, very niche. Right now, there aren’t more of us because there are no training programs for doctors to learn how to care for patients like this. And even worse, as medical providers, we don’t have billing codes for preventive neurology services. So without insurance reimbursements, there’s no way that you can sustain this level of care in a standard medical practice. But change has to come somewhere.

Call to Action



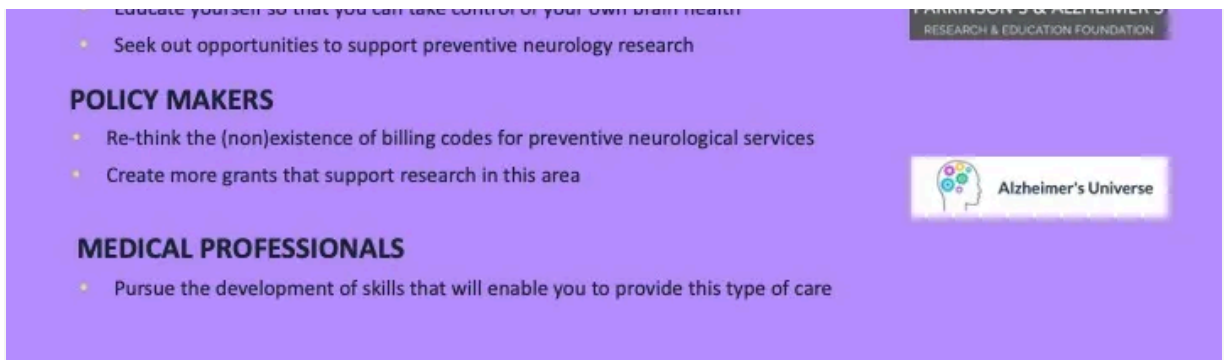


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A Call to Action

So my call to action for all of you is, as patients, please advocate for more from your health care providers. You don't have a bad doctor because they are offering new things. They just haven't been told or taught that there are things they can offer their patients to help their brains. But I hope I taught you all that there are things you can do and you can bring this to your doctor and have a discussion.

For policymakers out there, the field of preventive cardiology had to start somewhere. So please re-evaluate the non-existence of billing codes and please advocate for grants to support research in this area.

And for medical professionals: The only way that you can help is if you personally take on the burden of learning about this and educating yourself so you can help your patients. So that's my call to action for all of you. I hope that you all learned that we can take control of our brain health today. There is no magic pill to prevent these diseases, but we can do something.

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