FAST FORWARD

Is Alzheimer's Disease Brain Diabetes?

By Melissa Pandika

Why You Should Care

Here's some food for thought: Those Fritos, fries and frosted doughnuts aren't just stuffing your waistline — they might be starving your brain cells. So say a growing number of scientists,

Because Alzheimer's disease might be Type 3 diabetes, and that link might be a giant

who believe that a poor diet can trigger not only obesity and diabetes, but Alzheimer's disease, too.

In fact, some believe that Alzheimer's may simply be another

Insulin is crucial for not only digesting glucose, but also producing neurotransmitters ...

Most of us are familiar with two types of diabetes. In Type 1, the immune system ravages the pancreatic cells that make insulin, the hormone that tells cells to take up glucose from the bloodstream and convert it to energy. Type 2 often results from overeating; the pancreas pumps out *so much* insulin to break down excess glucose that the cells can't keep pace and stop responding to insulin altogether.

Recent research suggests a similar process is at work in Alzheimer's. Brain cells also stop making and responding to insulin — crucial for not only digesting glucose, but also producing neurotransmitters, which neurons use to communicate with each other. As a result, brain cells starve to death and cognitive processes falter.

African-Americans are about twice as likely to have Alzheimer's and other forms of dementia as older whites and 1.7 times as likely to suffer from diabetes.

Identifying insulin signaling abnormalities as the root cause of Alzheimer's has "huge implications," says Suzanne de la Monte, a neuropathologist at Brown University. Some scientists think we could repurpose Type 2 diabetes drugs for Alzheimer's, and a clinical trial to test an insulin nasal spray for the disease is now recruiting participants. And of course, Alzheimer's roots in insulin resistance only underscore the importance of healthy eating, as well as public health initiatives that broaden access to fresh produce in low-income neighborhoods.

Insulin signaling isn't the only cause of Alzheimer's. Genetics, exercise and social networks could be at work, too, according to Angela Winkler a Ph.D. candidate at the University Hospital Essen in Germany. But few would argue against a fresh approach.

About 44 million people worldwide live with some form of dementia, including Alzheimer's disease, which has no cure. Drug candidates for the disease failed in clinical trials at a rate of 99.6 percent from 2002 to 2012.

The Study of Nasal Insulin to Fight Forgetfulness is testing whether an insulin nasal spray improves memory.

The 1997 Rotterdam study of more than more than 6,000 elderly participants offered early evidence linking Alzheimer's and diabetes, reporting that having diabetes almost doubled the risk of Alzheimer's disease. De la Monte and her lab coined the term "type 3 diabetes" for Alzheimer's about seven years later, when they discovered that blocking insulin signaling in rats' brains led to neuronal damage and learning problems. The researchers also saw signs of abnormal insulin signaling in the brains of Alzheimer's patients.

Since then, more evidence has surfaced to bolster de la Monte's hypothesis. Last year, a *Diabetes Care* study of late middle-aged adults with early Alzheimer's correlated insulin resistance with brain degeneration. And in July, the Geriatric Research Education and Clinical Center reported that insulin resistance might contribute to amyloid plaques — clumps of proteins that impede brain signaling — in areas affected by Alzheimer's. Meanwhile, Winkler's study showed that mild cognitive impairment occurred twice as often in middle-aged participants with Type 2 diabetes as in their healthy counterparts.

SOURCE
Mark Weiss/Corbis

Some researchers believe that oral Type 2 diabetes drugs designed to boost insulin sensitivity — like metformin and Avandia — could treat Alzheimer's, although not enough is known about whether they could cross a dense layer of cells known as the blood-brain barrier to actually

reach brain cells. But synthetic versions of three hormones that activate the insulin pathway — also taken orally — *do* readily cross the barrier. The FDA has approved one called Symlin to be used with insulin to treat diabetes, for example, but others are still awaiting the green light for the disease.

Intranasal insulin also bypasses the blood-brain barrier, speeding along the olfactory nerve fibers in the nose, straight to the brain. A 2012 trial found that older adults who sniffed insulin for four months showed marked memory improvements. And the Study of Nasal Insulin to Fight Forgetfulness (SNIFF) is actively recruiting participants for a phase 2 and 3 trial to test whether an insulin nasal spray improves memory in adults with mild memory impairment or Alzheimer's.

But like cancer patients, Alzheimer's sufferers will probably need a combination of drugs. To combat such a complex disease, "you have to hit multiple parts," de la Monte says.

Scientists haven't quite nailed the culprits of brain insulin resistance. De la Monte largely blames the overconsumption of sugary, processed foods — especially those that contain a class of food additives called nitrosamines, often added to meat. She and many others have observed that they trigger the same molecular pathways as those activated in Alzheimer's. "I think it just boils down to eating simpler and cleaner," de la Monte says.

That recommendation could apply to a host of diseases. Researchers have found that mechanisms similar to those that drive diabetes and Alzheimer's also underlie fatty liver disease, polycystic ovary syndrome and more. "There's a whole crisis of insulin insufficiency that's emerged" as more countries embrace an American diet, she says.

All the more evidence that we really are what we eat — right down to how we think.

AUTHOR
Melissa Pandika
Follow @mmpandika

Melissa Pandika is a lab rat-turned-journalist with eye to all things science, medicine and more. Like? Distance running, snails, late-night Korean BBQ + R&B slow jams.

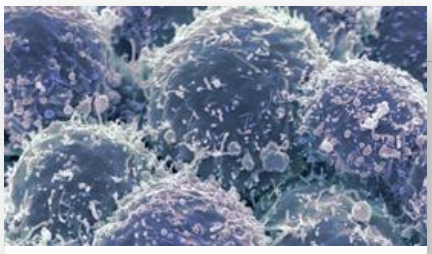
Join the Conversation

GOOD SH*T

Cinnamon: The Unsung Superfood

FAST FORWARD

Ill-Fitting Genes



FAST FORWARD

How Cancer Could Lead Us to the Fountain of Youth

GOOD SH*T

Cinnamon: The Unsung Superfood

By Gabrielle Lipton

Why You Should Care

Because – who knew? – 1/4 teaspoon of cinnamon a day could help keep the doctor away.

Not everything we should know about food shows up in the nutrition table. Like, say, baby carrots are made from regular-size carrots. Honey is nature's best face mask. Mentos + Diet Coke = mini-geysers (in a glass, not your stomach).

Or this: the many wondrous benefits of a powder everyone stores in their spice rack — cinnamon. Sure, it's able to transform a sugar cookie into a Snickerdoodle with a single shake, but cinnamon has even greater powers: Like countering some of the effects of Type 2 diabetes and Alzheimer's disease.

Research coming out over the last decade has found that, at the cellular level, cinnamon affects how our bodies handle glucose, the simple sugar that circulates through our bloodstream and feeds our cells.

Last year, a study found that cinnamon helps inhibit the aggregation of tau proteins, common in Alzheimer's patients.

A little basic human biology: Ideally our blood-sugar levels should stay even, never drastically spiking or falling, which results in energetic highs and lows. The hormone insulin regulates levels by entering the bloodstream after we eat, and keeping our glucose concentration in check.

Type 2 diabetes develops when the body ceases to respond to its own insulin, resulting in too much glucose coursing through the bloodstream and blood-sugar levels reaching toxic levels. Cinnamon, however, stimulates insulin receptors and inhibits an enzyme that inactivates insulin receptors and increases the ability of cells to metabolize glucose.

A study published by the American Diabetes Association in 2003 found that even one gram (approximately a quarter-teaspoon) of cinnamon per day significantly reduced blood-sugar levels in men and women with the disease. It's not a cure, but in some cases it can really help.

Cinnamon powder.

SOURCE *Stepan Popov/Getty*

Alzheimer's is often associated with a reduced expression of insulin receptors in the brain. A study last year found that cinnamon's ability to improve insulin sensitivity extends to the brain by helping feed and protect its neurons. And a different study from earlier last year found that cinnamon also helps

inhibit the aggregation of tau proteins, common in Alzheimer's patients, which destabilizes neurons and speeds up degeneration.

Muscle spasms, arthritis, vomiting, diarrhea, colds, loss of appetite, erectile dysfunction — it turns out that homeopathically, cinnamon is used to help treat these as well.

So the next time your energy is flagging in the late afternoon, skip the espresso and try a spoonful of cinnamon instead — or at least dust your latte with a teaspoon of the fragrant spice. Sprinkle on high-carb foods like toast or oatmeal. Use it as an excuse to have a slice of pie.

Or you could buy it in capsule vitamin form — but that wouldn't taste nearly as good.

AUTHOR
Gabrielle Lipton