Researchers Racing to Find Causes — and Cures — for Alzheimer’s Disease

Like thunderclouds billowing in the skies on a South Florida summer afternoon, the latest statistics for Alzheimer’s disease are a portent of stormy times ahead:

- Alzheimer’s disease is now the sixth leading cause of death in the U.S., killing more people than breast cancer and prostate cancer combined.
- A new case of Alzheimer’s is diagnosed every 65 seconds.
  - Nearly six million Americans live with Alzheimer’s, and that number is projected to jump to 14 million by 2050.
- Deaths from Alzheimer’s have increased 123 percent over the past 15 years.

Combine these alarming numbers with our rapidly aging population and the relatively uncharted waters of brain chemistry, and it’s clear that Alzheimer’s researchers face an epic challenge.

“If we can’t prevent Alzheimer’s, we will face an unimaginable public health crisis,” says David Loewenstein, Ph.D., a professor of Psychiatry and Behavioral Sciences and director of the Center for Cognitive Neuroscience and Aging (CNSA) at the University of Miami Miller School of Medicine.

Is it any wonder we click on headlines touting Alzheimer’s research breakthroughs?

To manage our impatience for a cure, it helps to understand what we’re up against. “The brain is the most complicated organ in the body,” Dr. Loewenstein says. “It’s made of more than 100 billion neurons and more than 100 trillion neurosynapses.”

In searching for new diagnostic methods and treatments for Alzheimer’s, scientists must first identify what causes the disease. A major clue may lie in the development of amyloid plaques, protein fragments that accumulate between nerve cells in the brain.

“We know amyloid build-up begins 10 to 20 years before symptoms appear,” Dr. Loewenstein says. “If we can detect amyloids early, we might be able to slow or stop Alzheimer’s progression.”

That is the goal of a clinical trial being led by Dr. Elizabeth Crocco, director of the Memory Disorders Clinic at the University of Miami Health System. She investigates how certain drugs might prevent amyloid build-up in older, high-risk individuals.
“A majority of recent and current studies on anti-amyloid agents have been negative,” Dr. Loewenstein says. “However, there’s hope that if we can prevent or remove amyloid in the earliest stages of the disease, it will show benefit.”

While many people have a high amyloid count, they never actually develop Alzheimer’s, or they die of other causes before it develops. Because multiple factors and processes contribute to cognitive impairment, Dr. Loewenstein believes that future treatments will use a combination therapy that simultaneously targets neurodegenerative brain processes.

“Combination therapies have been very effective in treating HIV infections, certain types of cancers, and various other diseases,” Dr. Loewenstein says.

**Inflammation also plays a role in cognitive decline**

Recently published research found that gum infections caused by a bacteria called *porphyromonas gingivalis* can inflame parts of the brain affected by Alzheimer’s. In clinical trials, this bacteria worsened symptoms in mice genetically engineered to have the disease, and caused an Alzheimer’s-like brain inflammation, neural damage and amyloid plaques in healthy mice. The study’s researchers said their data suggests that drugs inhibiting this bacteria could be useful in treating Alzheimer’s.

“This is interesting data but correlation does not always equal causation,” Dr. Loewenstein cautions. “Twenty-five years ago, when they found aluminum in the brain, it was thought to be a causal agent, but that turned out to be false. There are many things in the brains of Alzheimer’s patients that don’t cause the disease. We must wait for further research to know what role *porphyromonas gingivalis* plays.”

Diagnostic tests for Alzheimer’s are invasive and expensive, which is why researchers are racing to develop alternatives. A current study proposes that a simple blood test could aid in early detection of the disease. Study participants are limited to people age 65+ who are experiencing memory issues. If the test becomes available after the full results are published three years from now, it will be a start but won’t necessarily benefit the population as a whole.

Other researchers are exploring whether neck scans that analyze the pulse of blood vessels might become a routine test for cognitive decline. Larger studies must validate these findings, and it’s hard to know if the scan will be beneficial until complete data from the trial is published.

“This is a very preliminary study,” Dr. Loewenstein says. “We don’t yet have evidence that these findings are applicable to the general population.”

**Protecting your brain health**

While researchers investigate Alzheimer’s causes and cures, there are proactive steps people can take to maintain and promote brain health. Thirty percent or more of Alzheimer’s cases have modifiable factors
that could significantly delay clinical symptoms in older adults, says Loewenstein. Lifestyle habits that improve brain health and overall health include:

- Reducing cardiovascular risk factors
- Getting **150 minutes of aerobic exercise weekly**
- Adopting healthy eating habits, such as the Mediterranean diet
- Practicing good sleep hygiene
- Participating in activities that stimulate you cognitively and emotionally

Even though a cure doesn’t yet exist, people may be able to delay the onset of Alzheimer’s with easy-to-implement lifestyle changes such as these, according to Dr. Loewenstein. This should give people hope, he believes, along with the fact that the University of Miami is taking an international leadership role to stop this devastating disease.

“Many cancers were once considered incurable but, by determining pathologies, genetic factors and cell characteristics early in the disease process, researchers have been able to develop effective new therapies for treatment and prevention,” Dr. Loewenstein notes. “Insights about early detection will ultimately lead to better disease-modifying treatments for Alzheimer’s.”

**Looking ahead**

Researchers at the CNSA are making progress in developing new diagnostic tools. Similar in concept to an exercise electrocardiogram (EKG), the Loewenstein-Acevedo Scales of Semantic Interference and Learning is a cognitive stress test developed for patients at the CNSA. Neurological, behavioral, and memory disorder clinics now use this test around the world.

From this simple test, clinicians can determine if a patient has difficulty learning new things, based on a prior learning experience. If so, the patient may be at higher risk of developing Alzheimer’s and require more advanced tests.

“Many clinics don’t have PET scans and other diagnostic technologies at their disposal, however,” Dr. Loewenstein says. “As a university-based medical center, UHealth offers an important distinction for patients—access to all the latest discoveries and technologies.”

Dr. Loewenstein’s colleague, Rosie E. Curiel, Psy.D., assistant professor of Psychiatry and Neuropsychology, is pursuing another important initiative: Alzheimer’s disease in underserved populations.

“Dr. Curiel is one of the youngest Hispanic investigators ever funded by the NIH. She is developing computerized versions of cognitive assessment tools for diverse ethnic and cultural groups. This will help determine which cognitive markers can best predict baseline and longitudinal atrophy in AD-related signature brain regions on MRI. The measures will be compared to widely used cognitive outcome
measures in current Alzheimer’s disease clinical trials.

“Ethnic populations have an even greater risk of developing Alzheimer’s, but are totally underrepresented in the research. We’re now bringing cutting edge translational and epigenetics research to them,” Dr. Loewenstein says.

The work of Drs. Loewenstein, Crocco, Curiel, and their colleagues at the Miller School could lead to new therapies to treat and prevent Alzheimer’s disease.

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