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2. Show evidence of a close reading.
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Alzheimer's Time Bomb

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A looming epidemic of dementia has left scientists racing to find a cure for a disease that destroys minds. Here's everything you need to know:

How common is Alzheimer's?

More than 5.3 million people in the U.S. currently suffer from the debilitating brain disorder, and that number is about to skyrocket. In 2011, the first of the 76 million Baby Boomers turned 65 — the forerunners of a "silver tsunami" that will double the number of senior citizens by 2050. Alzheimer's predominantly affects the elderly, so scientists predict the number of people afflicted will balloon to as many as 13.8 million in coming decades. With drug companies yet to find a way to cure, prevent, or even delay this highly complex disease, Alzheimer's treatment costs could hit \$1.1 trillion and consume as much as 31 percent of Medicare's budget. Nursing homes will be swamped, and millions of family members — who already contribute an estimated 17.9 billion hours a year of unpaid care for loved ones with dementia — will be forced to dedicate much of their lives to looking after people who can no longer take care of themselves. "If you know anyone who has Alzheimer's," says Dallas Anderson at the National Institute on Aging, "you know how dire this projection is for the nation."

What causes Alzheimer's?

More than a century after Alois Alzheimer discovered the disease, scientists still don't know. Numerous factors have been found to play a role, including lifestyle, diet, genetics, and cardiovascular health, which affects the flow of blood to the brain. What researchers do know, however, is that the disease physically manifests itself in the brain through the abnormal buildup of two proteins: the first, beta-amyloid, forms clumps of plaque in and around the neurons; the second, tau, creates tangles that choke the neurons. This neural "gunk" interferes with communication between brain cells, blocking them from sending messages. Over time, the protein tangles trigger the immune system to attack the brain itself, creating a wildfire of inflammation that destroys neurons and shrinks the brain dramatically. The result is a progressive loss of memory and thinking skills that leaves victims adrift in an all-encompassing mental fog, with pronounced mood swings and an inability to recognize loved ones or function in daily life. In its late stages, Alzheimer's can destroy the ability to speak, walk, or even swallow.

Are there any treatments?

Only five Alzheimer's drugs have ever been approved. All of them mildly improve memory loss, but none addresses the underlying pathology. Several drug companies have identified drugs that fight amyloid formation in the brain and tested them with success on mice, but these compounds have mysteriously failed during human trials — or have even caused people's dementia to worsen. Researchers now believe they've been testing anti-amyloid drugs on patients whose brains are already too damaged to benefit from their effects. Recently, scientists learned that amyloid plaques can start developing in a person's brain a full 15 years before any Alzheimer's symptoms appear, but they had no way of detecting that process when it began. Then in 2012 scientists began using an imaging technique called positron emission tomography (PET) to detect amyloid plaque in a person's brain during the disease's early stages. PET scanners have enabled

drug companies to identify and start testing their drugs on early-stage patients who might actually benefit from the anti-amyloids — and the results already look promising.

What else is being done?

While drug companies hunt for ways to prevent or break down the plaques associated with Alzheimer's, other researchers are trying to determine *why* these proteins start accumulating in the brain, in the hope of interrupting that process. But since so many factors seem to affect a person's likelihood of developing Alzheimer's — including genetics, diabetes, vascular disease, diet, loneliness, mental activity, and even levels of education — neurologists now think fighting Alzheimer's may be similar to fighting cancer, requiring different medications and treatments for different forms of the disease. "We have to get away from the notion that all Alzheimer's patients are the same," says Sid O'Bryant, a researcher at the University of North Texas Health Science Center.

Is the government helping?

Belatedly, yes. In response to the scale of the coming epidemic, the federal government in 2012 unveiled its first ever "National Plan to Address Alzheimer's Disease." The plan pours \$600 million a year into research, testing, and treatment, with the goal of finding a way to prevent or effectively treat the disease by 2025. But this influx of money still leaves Alzheimer's funding lagging way behind that for HIV and cancer, which receive \$3 billion and \$5.3 billion a year, respectively. Despite the added funding, many Alzheimer's researchers are pessimistic about meeting the government's 2025 goal. Even if a promising anti-amyloid treatment now being developed works in human trials, says neuroscience professor Simon Lovestone, it could still take a full 10 years to bring it to market. And if it doesn't, and researchers have to start from scratch, Lovestone says, we're unlikely "to have a new drug in less than 20 years."

Real hope for a cure?

A new treatment is causing a buzz in the world of dementia research. In March, biotechnology company Biogen unveiled an anti-amyloid called aducanumab, or "adu" — the first drug that has substantially reduced the brain plaque associated with Alzheimer's in a human trial. Researchers had noticed a certain kind of antibody in the immune cells of elderly patients who remained mentally sharp. Biogen developed that antibody into adu, a lab-created "monoclonal antibody"; in a test on 166 early-stage sufferers, researchers found that adu attacked the amyloid plaques in the brain, gradually eliminating the clumps. Within a year, those participants who'd taken adu performed better in cognitive tests than those who had taken a placebo. Buoyed by the results, Biogen has jumped straight to a final trial involving a much larger group of people — and scientists are crossing their fingers for success. "If the treatment's clinical benefit is confirmed," says Alzheimer's researcher Dr. Eric Reiman, "it would be a game changer in the scientific fight against Alzheimer's."

Possible Response Questions:

- As America's population ages, what other health issues may emerge? What effect will these issues have on families? On the economy?
- Select any passage and respond to it.