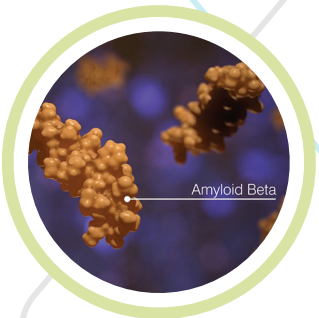
amazing things PODCAST

A RAY OF HOPE IN THE SEARCH FOR A TREATMENT FOR ALZHEIMER'S DISEASE



The statistics on Alzheimer's disease are daunting. More than five million Americans are living with the disease and by 2050 this number could be as high as 16 million. Alzheimer's is the sixth leading cause of death in the United States, but the only disease among the top ten killers that cannot be prevented, slowed or cured. In fact, Alzheimer's disease drug candidates have one of the highest failure rates of any disease area. The resulting human and economic tolls are significant: in 2017, Alzheimer's and other dementias will cost the nation $259 billion.

Yet, there is a potential, flickering light at the end of the tunnel. Dr. Li-Huei Tsai, Picower Professor of Neuroscience at MIT, and her team of researchers have discovered that LED lights, flickering at a specific frequency, substantially reduce the beta amyloid plaques seen in Alzheimer's disease, in the visual cortex of mice. Their work was published in the journal *Nature* in December 2016. If this finding bears out in humans, it is a game-changer.

Amyloid plaques accumulate in the brains of patients with Alzheimer's and are considered the "culprit of the disease," Dr. Tsai explains. However, the buildup of amyloid begins two decades before other pathological symptoms occur. During this time, the brain structure changes, cells die, and brain function slowly deteriorates to the point that medical help is sought. This fact led Dr. Tsai and her team to look at Alzheimer's disease as a "system-level failure" and to try to figure out what happens to the brain's circuits and networks during that two-decade period of amyloid buildup.

They began to look at brain waves and specifically gamma waves, which are associated with higher order brain functions like sensory perception, attention, decision making and working memory. They knew that others had found that gamma waves are disrupted in people with Alzheimer's disease and they wondered whether the

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RAY OF HOPE
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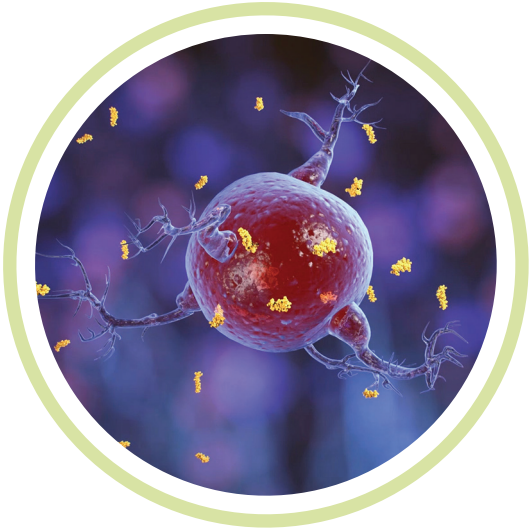

compromised gamma waves contributed to the development of the disease.

To attempt to answer that question they ran a series of experiments on mouse models of Alzheimer's disease using a system of flickering lights to mimic a specific gamma pattern and recording brain activity during the light treatment. What they saw was initially unbelievable — that inducing the gamma waves drastically reduced beta-amyloid in the brain. Further study bore out that finding and more. It wasn't just that light therapy reduced the production of amyloid, but that it actually stimulated the destruction of it. The brain's immune cells, microglia, which become very impaired with Alzheimer's, became active again as a result of exposure to the gamma wave-mimicking light and were actually getting rid of the amyloid.

Dr. Tsai is quick to caution that often what is observed in mouse models doesn't translate to humans. This is why she and a research partner formed Cognito Therapeutics in 2016 to pursue testing of their flickering light therapy in humans. If successful, she is very excited about the widespread availability and ease of access such a therapy could offer people with Alzheimer's.

Dr. Tsai's work was funded by the National Institutes of Health (NIH). This type of federal investment is essential because of the long-term and unpredictable nature of biomedical research, she says, adding that the payback can be extraordinary.

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