Scientists identify one cause of damage in Alzheimer's disease, find a way to stop it

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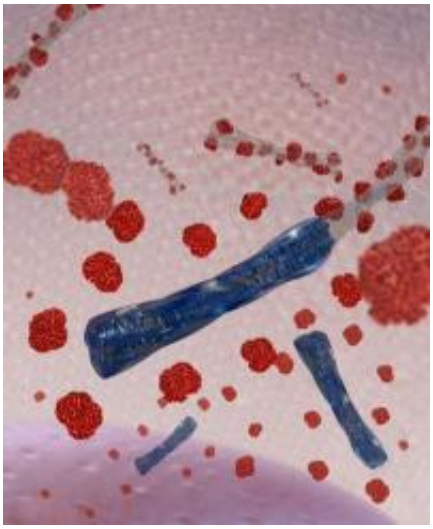

Clear strands of toxic aggregated amyloid beta peptides, a hallmark of Alzheimer's disease, interact with proteins such as the anti-oxidant enzyme catalase, shown in red. The interaction disables catalase, resulting in oxidative damage to neural cells in culture. Protein-resistant coating (blue) on the aggregated amyloids inhibit these harmful interactions and protect of cells from amyloid beta-induced oxidative stress and toxicity. Credit: Christopher Burke for UC San Diego

Researchers suspect that a protein superstructure called amyloid beta is responsible for much of the neural damage of Alzheimer's disease.

A new study at the University of California, San Diego, shows that

amyloid beta disrupts one of the brain's anti-oxidant proteins and demonstrates a way to protect that protein, and perhaps others, from amyloid's harmful effects.

"Amyloid seems to cause damage to cells," said chemistry professor Jerry Yang. "We have reported in a very detailed way one potential interaction of how amyloid can cause disease, and we found a way to stop it." His group's report of their results will appear in the Journal of Biological Chemistry in December.

Their study focused on catalase, an enzyme that mops up excess oxidants, because catalase normally helps to prevent the kind of damage seen in the brains of patients with Alzheimer's disease and previous work had found catalase proteins deposited within amyloid plaques.

Lila Habib, a bioengineering graduate student and the first author of the report, added amyloid to cultured neural cells and looked at its effects.

"We were able to determine that amyloid beta and this anti-oxidant enzyme, catalase, interact, and that this interaction harmed catalase so it wasn't able to perform its physiological function: to degrade hydrogen peroxide into oxygen and water," she said.

When Habib coated the amyloid with a small molecule designed to prevent its interaction with other proteins, she was able to restore the activity of catalase and return hydrogen peroxide to normal levels within the cells.

The coating Habib used to probe the interaction between amyloid and catalase is a candidate drug - one of a class of molecules that Yang's lab has developed.

"Not only are we learning more about the disease, but we are also

developing a potential strategy for treatment," said Yang, who is currently testing the new approach in a mouse model of the disease.

Provided by University of California - San Diego