Researchers watch amyloid plaques form

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Researchers at the University of Toronto Scarborough (UTSC) and Osaka University applied a new approach to take a close look at amyloid plaque formation, a process that plays important roles in Alzheimer's disease. The technique would greatly aid the development and screening for novel therapeutics that can manipulate the formation of the toxic amyloid aggregates.

Anthony Veloso, Prof. Kagan Kerman's PhD student in Chemistry, used a laser to trap amyloid-beta peptides and examined them under a fluorescence microscope as they aggregate, giving them an exceptionally detailed view of the process. The work appears on the cover of the current issue of *Analyst*, a journal of the Royal Society of Chemistry.

"This technique could accelerate the drug discovery process. It gives us a new way to examine the early phase of plaque formation, when the most toxic species of oligomers are formed," says Prof. Kerman, a faculty with the Department of Physical and Environmental Sciences at UTSC and the corresponding author on the paper.

Amyloid plaques are protein deposits that form around neurons and interfere with their function. The major constituent of these deposits are amyloid-beta, a peptide that clumps together to form harmful plaques in Alzheimer's patients, but is otherwise harmless in normal individuals.

To get a look at the early stages of the process, the Canadian researchers and their Japanese collaborators used a technique called optical trapping. A laser is focused into a very thin beam and aimed at solution containing

amyloid-beta particles. The beam creates a small magnetic field, which attracts and holds the particles in place. Amyloid aggregates stained by a dye then glows under the laser light, and the image can be captured by fluorescence microscope.

By using this technique, A. Veloso and Prof. Kerman hope to explore how the aggregates are formed, and to eventually discover the role of amyloid aggregates in Alzheimer's disease. Utilizing the versatility of this technique, Prof. Kerman's research team can extend their studies to understand aggregate formation in other neurodegenerative diseases.

The technique will also become a novel strategy to test therapeutic compounds that could halt the formation of plaques. Prof. Kerman and A. Veloso are working towards the automation of the technique, allowing for many compounds to be tested efficiently.

Provided by University of Toronto Scarborough