

Nanoparticles may help inhibit Alzheimer's disease and other neurodegenerative disorders

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(PhysOrg.com) -- Nanoparticles of the right dimensions and shape may be the key in combating the plaque that destroys neurons and leads to symptoms associated with Alzheimer's disease, a new report shows.

University of Michigan chemical engineering professor Nicholas Kotov says the nanotechnology means can attract and capture the longer <u>fibrils</u> that are known to form plaque related to neurodegenerative disorders.

"Both amyloid <u>peptides</u> and <u>nanoparticles</u> exhibit a strong ability to selfassemble into fibrils," Kotov said. "We were open to any possible effect of nanoparticles on the amyloid fibrillation. We were very pleased to see amazing <u>inhibitory effect</u> on amyloids fibrillation which opens the door for new approaches to the development of drugs to prevent Alzheimer's disease."

By introducing tetrahedral nanoparticle that were comparable in size with growing fibrils, he discovered that the dangerous plaque readily bonded to them, and their geometry was strongly distorted. Such drastic change in shape results in complete inhibition of their further fibrillation.

Typical Alzheimer drugs bond to amyloid peptides in 1:1 ratio. This is known to be inefficient. The nanoparticles can inhibit the amyloid peptide fibrillation in minute quantities with much greater efficiency.



One nanoparticle can capture more than 100 amyloid peptides. This high efficiency of fibrillation inhibition makes nanoparticles similar to some proteins that human body uses to protect itself against the progression of Alzheimer's disease.

The implication here is that if a likely human compatible particle, for example, were introduced then the effect could help clear, or at least contain, the growth of the debilitating plaque. <u>Cadmium</u> is toxic to humans, but the revelations from this work indicate a big step forward in combating diseases like Alzheimer's. Kotov's laboratory is working toward engineering of such nanoparticles and better understanding their metabolism.

The paper is called "Mechanism of Fibrillation Inhibition of <u>Amyloid</u> Peptides by Inorganic Nanoparticles Reveals Functional Similarities with Proteins" and is published in the current journal *Angewandte Chemie*: <u>onlinelibrary.wiley.com/doi/10 ... e.201102689/abstract</u>

Provided by University of Michigan

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