Gold nanoclusters: New frontier for developing medication for treatment of Alzheimer's disease

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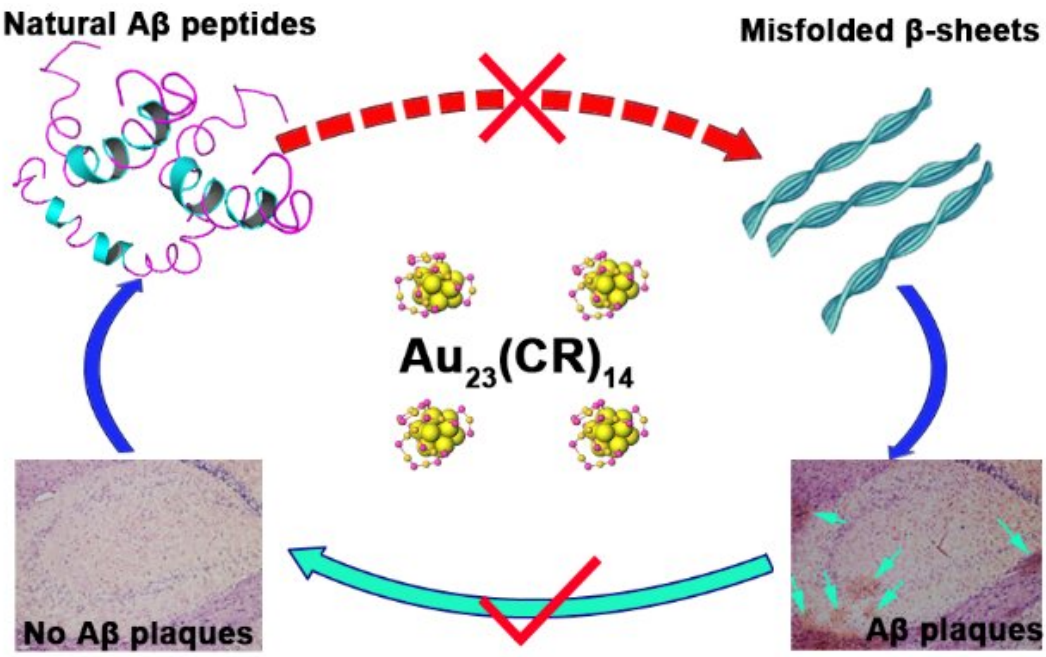

Au23(CR)14 Nanocluster functions in multiple stages of the progression from Aβ monomer to Aβ plaques. Credit: ©Science China Press

Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by amyloid-β (Aβ) fibrillation and plaque formation. While more than 50 million people are devastated by AD, no treatment is available. Recently, anti-Aβ antibody-based immunotherapy has failed

in clinical trials, partially due to the increased cytotoxicity of soluble Aβ oligomers. Therefore, developing a medication for AD treatment becomes an even more important challenge.

In a new research article published in the Beijing-based *National Science Review*, scientists at the State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology in China explored the possibility of treatment with gold nanoclusters.

Au23(CR)14, a novel gold nanocluster modified with Cys-Arg (CR) dipeptide, functions in multiple stages of the progression from Aβ monomer to Aβ plaques. It inhibits the misfolding and fibrillation of amyloid-β (Aβ), fully dissolving the preformed/mature Aβ fibrils and restoring the conformation of Aβ peptides from misfolded β-sheets into unfolded monomer state with abolished cytotoxicity, and more importantly, completely dissolving endogenous Aβ plaques in the brain slices from transgenic AD model mice. Furthermore, Au23(CR)14 has good biocompatibility and infiltration ability across the blood brain barrier (BBB).

This article not only presents a compelling nanotherapeutic candidate for AD treatment, but also opens a new frontier for developing nanomaterial-based medications for AD treatment. Undoubtedly, more researches studying the basic mechanisms by which gold nanoclusters dissolve Aβ plaques will spur the development of new medications for AD treatment.

More information: Wenkang Zhang et al, Au23(CR)14 Nanocluster restores fibril Aβ's Unfolded state with abolished cytotoxicity and dissolves endogenous Aβ Plaques, *National Science Review* (2019). DOI: 10.1093/nsr/nwz215

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