Preventing Protein Aggregation using Thermal Protectants

Tech ID: 27110 / UC Case 2017-191-0

BRIEF DESCRIPTION

Protein aggregation in the brain are the causes of the neurodegenerative diseases Alzheimer's and Parkinson's. To study diseases and cellular mechanisms, biologists need to be able to efficiently synthesize, isolate and purify proteins. The invention herein is a synthetic nanoparticle (NP) that protects proteins from aggregation at temperatures, which normally cause aggregation. Furthermore, multiple stimuli can release the protein in high yield from the NPs.

FULL DESCRIPTION

After a protein is synthesized, it folds into its most thermodynamically favorable state, or its native state. Thermal stress, heating a protein above its native state, can cause aggregation of proteins. Protein aggregation leads to neurodegenerative diseases such as Alzheimer's and Parkinson's. To study these diseases, biologists need to efficiently synthesize, isolate and purify proteins. A major factor in the cost and efficiency of protein production is a loss of purified proteins resulting from protein aggregation.

Researchers at UCI have developed a synthetic organic polymer nanoparticle (NP), which can prevent protein aggregation. When combining IgG proteins with this novel NP, NP-IgG complexes show thermal stability and prevent aggregation of IgG proteins. Furthermore, multiple stimuli (pH, salt concentration, and temperature) were able to release bound IgG in high yield. Preventing protein aggregation using the novel NP will allow biologists to efficiently studying proteins and could lead to treatments for diseases such as Alzheimer's and Parkinson's .

ADVANTAGES

§ Prevents aggregation of proteins above their denaturation temperature

§ Only weakly binds proteins at room temperature or lower

§ Multiple stimuli (pH, salt concentration, and temperature) are able to release bound protein in high yield

§ Nanoparticles act as synthetic polymers and mimic natural heat shock proteins which prevent aggregation and loss of function

§ NPs can be synthesized to bind a specific protein of interest

STATE OF DEVELOPMENT

Synthetic organic polymer nanoparticles were developed and have been shown to bind IgG. Differential scanning calorimetry (DSC) studies confirm that NP-IgG complexes can withstand thermal stress when heated above the Tm of IgG (60° C for 5 min). Future plans include testing NP-IgG complexes in more complex settings such as cell lysates.

CONTACT

Steven T. Huyn
shuyn@uci.edu
tel: 949-824-7913.

INVENTORS

» Shea, Kenneth J.

OTHER INFORMATION

CATEGORIZED AS

» **Materials & Chemicals**
  » Nanomaterials
  » Polymers
» **Research Tools**
  » Protein Synthesis
  » Reagents
  » Screening Assays

RELATED CASES

2017-191-0

UCI Beall
Applied Innovation

5270 California Avenue / Irvine,CA
92697-7700 / Tel: 949.824.2683