Auburn University

Innovation Advancement & Commercialization

Novel *in vivo* Metal Clusters with Activity Towards Misfolded Proteins

Contact

Brian Wright
Auburn University
Innovation Advancement
& Commercialization
334-844-4977
brian.wright@auburn.edu
https://iac.auburn.edu/
Ref: Protein-binding particles

Inventors

Dr. Vitaly Vodyanoy
Professor of Physiology

Dr. Alexandre Samoylov
Research Fellow

Dr. Oleg Pustovyy
Research Assistant

Dept. of Anatomy, Physiology
and Pharmacology

Reference

Samoylov, A.M., et al. "Novel Metal Clusters Isolated from Blood Are Lethal to Cancer Cells." *Cells Tissues Organs* **179**:115–124, 2005. (Link)

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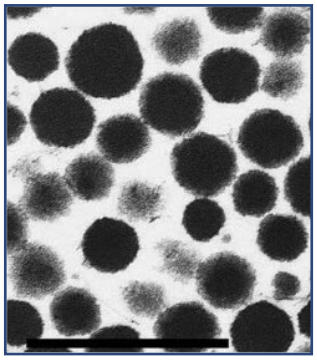
Overview

Auburn University is seeking a licensee or development partner for naturally occurring novel metal clusters that exhibit protein scavenging properties. Proteon nucleating centers (PNCs) consist of 1- to 2-nm nanoparticles that contain 40–300 non-ionic metal atoms. These nanoclusters have been shown to scavenge misfolded proteins to form proteons: clusters of up to 100,000 protein molecules with metal centers. Thus, PNCs have tremendous potential in the diagnosis and treatment of diseases associated with misfolded proteins, including prion-related diseases, neurological diseases, blood diseases & cancer.



TEM of proteons.
Scale bar = 0.5μm.

Advantages

- Naturally occur in blood, indicating inherent biocompatibility
- Scavenge misfolded proteins, suggesting numerous medical applications
- Lethal to cultured cancer cells (view video)
- Can be isolated and purified through simple methods
- Multiple production methods exist

Description

Unfolding and subsequent aggregation of proteins is a common phenomenon linked to many human disorders. In investigating a possible mechanism by which excess hemoglobin release may be controlled in blood plasma in the disease state, it was discovered that human blood contains particles ("proteons") that may reinforce hemoglobin scavenging. It was later determined that these proteons consist of a small core of metal atoms (PNCs) that have scavenged misfolded proteins to form a protein shell around the metal center. PNCs have been found and isolated from humans and numerous animal species.

This activity against misfolded proteins suggests numerous potential medical applications. Proteins that have misfolded and/or aggregated have been tied to many disorders, some of which do not currently have appropriate therapies. Such disorders include prion-related diseases (e.g., Bovine spongiform encephalopathy), neurological diseases including Alzheimer's and Parkinson's, and blood disorders such as sickle cell anemia and some autoimmune disorders. PNCs and proteons could also be used to collect misfolded proteins in a patient, allowing for a means to diagnose and measure progression of disease states.

Additionally, PNCs were found to be unexpectedly pro-apoptotic when added to cultured animal cells, showing much greater effectiveness against cancer cells than non-cancerous cells. This, along with their natural occurrence, suggests that PNCs could have significant effectiveness in cancer therapy. Preliminary studies also indicate PNCs could have applications in entirely different medical areas as well as non-medical areas.

Status

- Proteons and PNCs have been isolated and well characterized
- Activity against cancer cells has been demonstrated *in vitro*
- Issued U.S. Patents 7,138,255, 7,871,772, 7,872,108, and 8,298,793

Partnership Opportunities

- Available for exclusive, field of use, research or immediate non-exclusive licensing
- Joint development opportunities include collaboration, funded research or joint venture