

Case ID:M23-079L

Published: 10/3/2023

Inventors

Shu Wang

Zhaoyang Fan

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Nanoencapsulation of Forskolin for Combatting Obesity

Obesity and related metabolic diseases are increasing in prevalence in the US and worldwide. Pathologically expanded white adipose tissue (WAT) has been associated with multiple obesity-related comorbidities including diabetes, cardiovascular disease, cancers and more. Lifestyle intervention, pharmacotherapy, and various surgical procedures are used to reduce obesity; however, they suffer from low compliance, low efficacy and high side effects and cost. Further, they have had little effect on overall obesity rates, as numbers keep rising.

Forskolin is a bioactive compound from the plant *Coleus barbatus*. It has been shown to increase cellular cyclic adenosine monophosphate (cAMP) concentrations, decrease inflammation, promote cardiovascular health and more importantly cause browning of WAT as well as activation of brown adipose tissue (BAT). Unfortunately, forskolin is highly hydrophobic and cannot be dissolved in physiological environments such as GI solutions, blood, etc. Additionally, oral or IV administration reduces efficacy as most of the forskolin gets metabolized by enzymes in the GI tract, liver or other tissues, such that very little actually reach adipose tissues.

Researchers at Arizona State University have developed a novel nanoencapsulated formulation of forskolin which has increased its solubility and stability. By selectively and locally delivering forskolin into WAT, BAT or beige adipose tissue, higher concentrations of cAMP can be achieved as well as greater browning or activation of adipose tissue of interest. Initial results in obese mice injected forskolin into subcutaneous WAT twice a week for 5 weeks, compared to control, showed significantly lower body weight and fat mass. Further, upon sacrificing the mice, treated mice showed higher browning of WAT and reduced subcutaneous and visceral WAT mass.

This novel nanoencapsulated forskolin formulation provides a more practical, efficient and breakthrough approach to combatting obesity and related comorbidities.

Potential Applications

- Treatment of obesity and obesity-related comorbidities
- Reduce adipose tissues in desired areas of the body

Benefits and Advantages

- Local and selective delivery bypasses the liver and other tissue
 - Enhances WAT browning and BAT activation
 - Greater body weight and fat mass loss
 - Enhances controlled and prolonged release and delivery of forskolin so that administration frequency and dose can be reduced
 - Diminished side effects and toxicity
- May improve metabolic health
- Biocompatible and biodegradable nanoencapsulation using GRAS compounds
- Can be conjugated with target ligands to increase targeted binding and delivery

For more information about the inventor(s) and their research, please see

[Dr. Wang's departmental webpage](#)

[Dr. Fan's departmental webpage](#)