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# Resveratrol and Quercetin-Loaded Nanoparticles

Obesity and related metabolic diseases are a significant public health issue in the US and worldwide. Studies have shown that pathologically expanded white adipose tissue is associated with multiple obesity-related comorbidities including diabetes, cardiovascular disease as well as certain types of cancer. Current strategies to combat obesity and metabolic diseases such as lifestyle interventions, drugs, and surgical procedures suffer from low compliance, low efficacy, high side effects, and high costs. Moreover, these strategies have historically had little effect on overall obesity rates.

Phytochemicals like resveratrol (R) and quercetin (Q), have been shown to have numerous health advantages including anti-obesity, anti-inflammatory, and other beneficial properties. Unfortunately, their low solubility and stability limit their application and more widespread adoption.

Researchers at Arizona State University have developed novel resveratrol and quercetin-loaded nanoparticles (RQ-NP) for the treatment of metabolic diseases such as obesity and obesity-related disorders. These RQ-NPs have greater solubility, stability, bioavailability, and bioactivity than their free (non-nanoparticle loaded) counterparts. Loading them in nanoparticles offers many benefits including protection against degradation of those phytochemicals, and promotion of their controlled release. In mice studies, they were shown to decrease body weight and fat mass, and improve overall metabolic disorders, including reduced liver inflammation, restored gut integrity, and optimized gut microbiota composition. Targeting moieties (for adipose tissue of interest) can be incorporated into the RQ-NPs as well to activate brown adipose tissue or cause white or beige adipose tissue to be browned.

These novel RQ-NPs could be a great approach to combat obesity and improve metabolic health without the side effects and costs associated with current approaches.

## Potential Applications

- Treatment of metabolic disease or disorder

- Obesity, obesity-related diseases, diabetes, fatty liver disease, cardiovascular disease, etc.
- Reduce adipose tissues in desired areas of the body
- Used as the prebiotics to promote the growth of probiotics

#### Benefits and Advantages

- Greater solubility, stability, bioavailability, and bioactivity than their free (non-nanoparticle loaded) counterparts
- The NPs protect against degradation, and exhibit controlled release of encapsulated phytochemicals
- Low side effects
- Shown to decrease body weight, fat mass, and inflammation in mice studies
- Non-invasive compared to surgical treatment options
- More target specificity compared to current treatments on the market
- May provide for a longer lasting treatment
- Could enhance gut integrity and optimize gut microbiota profile
- improve glucose homeostasis

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

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

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

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