

# **Effects of Silica Inhalation on Metabolic Obesity in a Western Diet-Induced F344 Rat Model; silica inhibits adipose function and diet-induced inflammation**

## **Introduction**

Adipose tissue (AT), an endocrine organ, plays a central role in maintenance of whole-body energy homeostasis through its release of adipokines. Obesity, affecting over 40% of American adults, disrupts adipocyte metabolism leading to chronic systemic inflammation and metabolic dysfunction (MetDys). MetDys is associated with impaired lung function, pulmonary hypertension, and asthma. The aim of this study was to investigate the effects of silica inhalation in a pre-existing MetDys animal model to determine if an occupational exposure of silica dust has the potential to initiate or further the progression of MetDys associated conditions.

## **Methods Collection**

- This laboratory-based investigation studied the effects of respirable crystalline silica on metabolic function in a high fat western diet (HFWD)-induced MetDys F344 rat model.
- Six wk old male rats were fed a HFWD or standard (STD; control) for 16 wk prior to inhalation exposure to respirable crystalline silica dust (6 h /d, 5 d / wk, 39 d) with end point measurements taken at 0, 4 and 8 wk post-exposure to silica.
- Animals were maintained on their assigned diet for the duration of the study.
- Repeated measures of fasting glucose and laser-Doppler flowmetry were made prior to exposure and at 0, 4, and 8 wk using the same cohort of animals.
  - Animals were fasted 12 h overnight for fasting glucose measurement; blood glucose was measured using a hand-held glucometer.
  - Rat tail arterial function and blood flow was measured for 15 minutes using the non-invasive laser-Doppler flowmetry.

- Endpoint measurements taken made following removal of tissues/organs from euthanized animals in in vitro studies. Endpoint measurements included:
  - Anthropometric measures of weight, length, abdominal girth, ependymal fat pad weight
  - Measurement of serum insulin, leptin and adiponectin hormones and blood clinical chemistry
  - Hematology measures

### **Citations**

Thompson, J.A., Krajnak, K., Johnston, R.A., J.S., Kashon, McKinney, W., and Fedan, J.S., (2021). Effects of Silica Inhalation on Metabolic Obesity in a Western Diet-Induced F344 Rat Model; silica inhibits adipose function and diet-induced inflammation. *To be submitted to Toxicol Sciences. [In clearance]*

### **Acknowledgements**

Funding for this project was provided by the National Institute for Occupational Safety and Health.

Janet A. Thompson, [jsd7@cdc.gov](mailto:jsd7@cdc.gov)

Kristine Krajnak, [ksk1@cdc.gov](mailto:ksk1@cdc.gov)

Richard A. Johnston, [rfj1@cdc.gov](mailto:rfj1@cdc.gov)

Michael L. Kashon, [mqk1@cdc.gov](mailto:mqk1@cdc.gov)

Walter McKinney, [wdm9@cdc.gov](mailto:wdm9@cdc.gov)

Jeffrey S. Fedan, [jsf2@cdc.gov](mailto:jsf2@cdc.gov)

### **Contact**

For further information, contact:

Pathology and Physiology Research Branch (PPRB), Health Effects Lab Division (HELD), National Institute for Occupational Safety and Health (NIOSH), Morgantown, WV.

304.285.5831