كلية العلوم الصحية
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Undergraduate Students, Population, Health & Wellness

Profile Of Oxidative Stress Genes In Response To Obesity Trearment

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ABSTRACT

Oxidative stress is an imbalance between the production and accumulation of reactive oxygen species. Studies showed its correlation along with inflammatory conditions to the increase risk of developing metabolic disorders such as obesity, which Sulforaphane (SFN) can protect against. The aim of this study is to explore the role of oxidative stress in mediating the SFN action in DIO mice via profiling of the oxidative stress genes and its pathways involved in skeletal muscles.

INTRODUCTION

Obesity is one of the fundamental global health burdens in the 21st century and it's considered a chronic, multifactorial disease linked with several comorbidities like diabetes and cardiovascular diseases [1]. Several studies have correlated oxidative stress to the increased risk of developing metabolic disorders such as obesity [2]. Thus, many studies were conducted to find prospective treatment for obesity. SFN action on multiple genes of oxidative stress genes were found promising in reducing the body weight. [3]

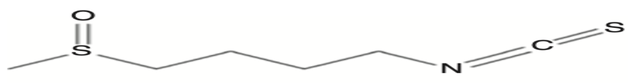
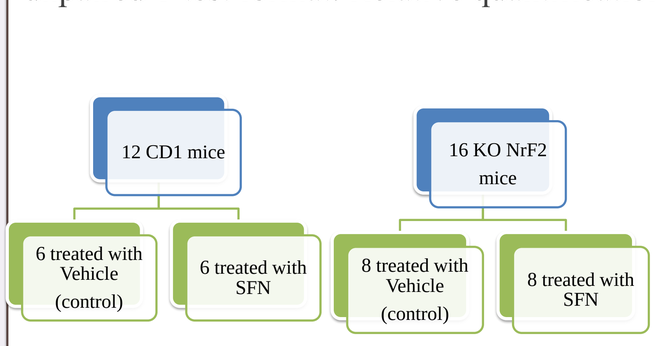


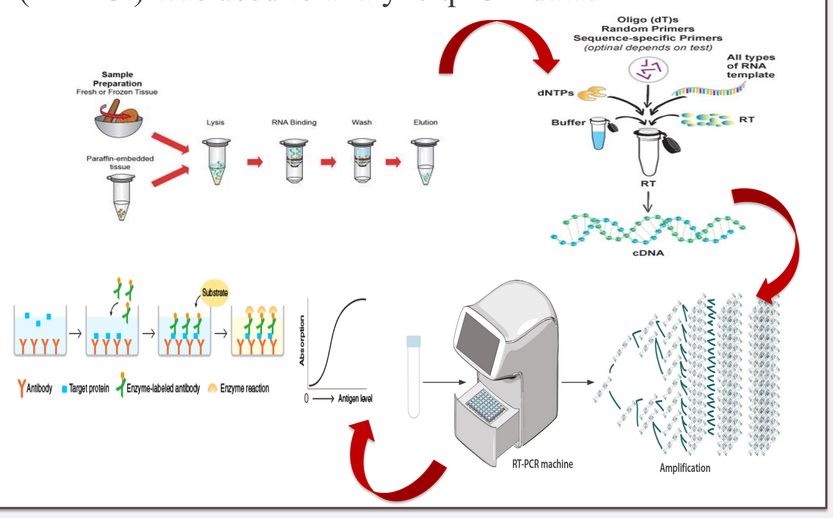
Figure1. Chemical structure of sulforaphane [4].

METHODOLOGY

Wild-type CD1 male mice and NrF2 knockout mice were fed high fat diet (HFD) to induce obesity. Subsequently, each group was later subdivided into two subgroups and received either Vehicle or SFN via intraperitoneal (ip) injections, for 4 weeks. The body weight was measured daily and preformed a glucose tolerance test (GTT) after 21 days of injection. Afterwards, mice were decapitated, and blood and tissue samples were collected; tissues immediately snap frozen in a liquid nitrogen. Skeletal muscle and epididymal white adipose tissue (eWAT) stored at -80C before conducting gene expression. SPSS program used to calculate gene expression statistics, and GraphPad Prism to plot graphs utilizing unpaired T-test format. Relative quantification (2-ΔΔCt) was used to analyze qPCR data.



Diagrams *illustrate the way the experimental mice groups were divided in the treatment period.*



RESULTS

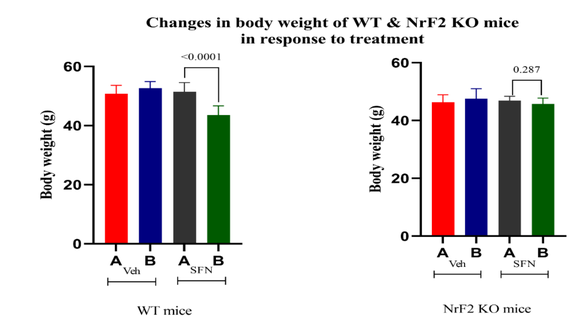


Figure2. Body weight of WT and Nrf2 KO mice before and after treatment of SFN.

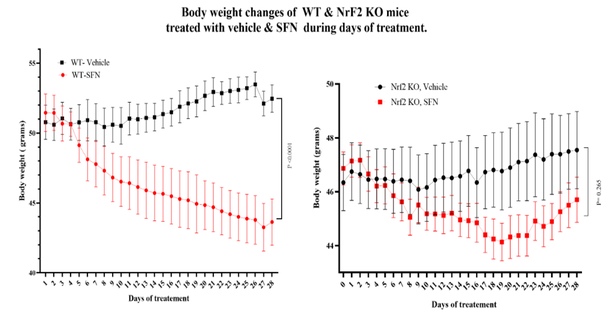


Figure3. Change in daily food intake (g) in WT DIO-mice and KO NrF2 in response to SFN .

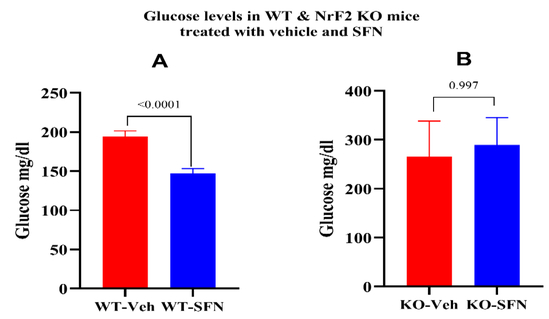


Figure4. Plasma glucose levels of both the WT and NrF2 KO, after 4 weeks of treatment by SFN.

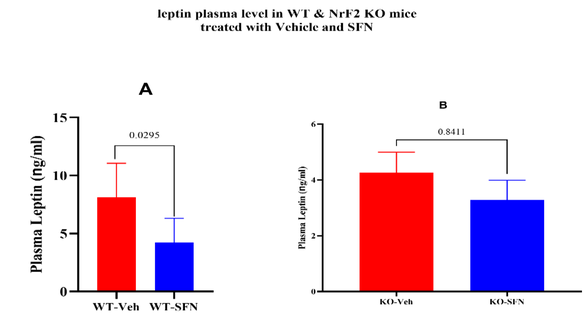


Figure5. Plasma leptin levels (ng/ml) of both the WT and NrF2 KO, after 4 weeks of treatment by SFN.

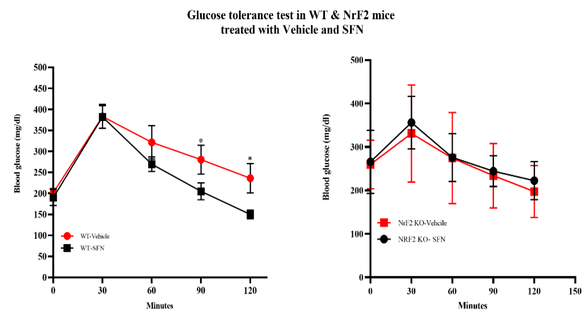


Figure6. ipGTT measurements (mg/dl) of both the WT and NrF2 KO, after 4 weeks of treatment by SFN.

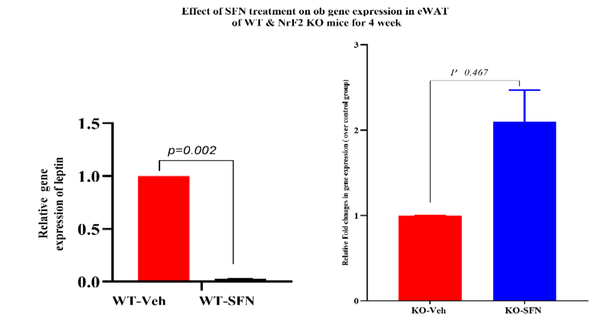


Figure7. Leptin gene expression in eWAT of both the WT and NrF2 KO, after 4 weeks of treatment by SFN.

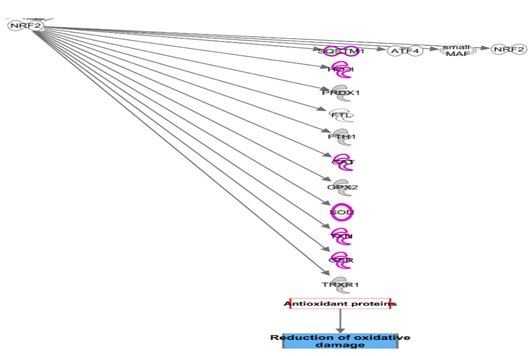


Figure8. Data set of genes involved in NRF2 mediate oxidative stress pathway.

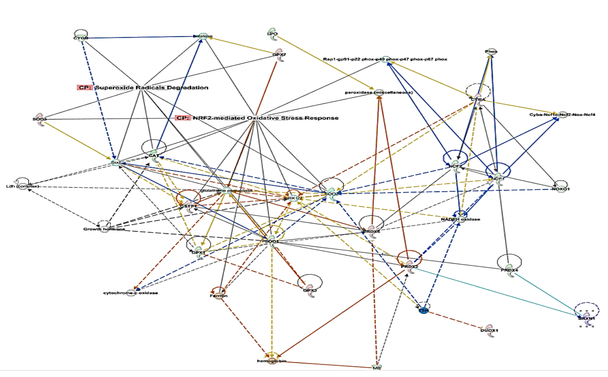


Figure9. Network displays Free Radical Scavenging, Molecular Transport, and Small Molecule Biochemistry functions associated the data set of oxidative stress genes and interaction with the canonical pathways;

CONCLUSION

In conclusion, this study has demonstrated that SFN has positively aided in the reduction of body weight in WT mice, through exerting its action on multiple oxidative genes in skeletal muscles downregulating them and upregulating antioxidant genes, while NrF2 KO mice did not show similar findings. Considering the complexity of the NRF2 mediated effects and their context dependency, it is inappropriate to define that NRF2 activation as strictly beneficial or harmful and more detailed research is needed to clarify the potential implementation of NRF2 modulation in obesity.

ACKNOWLEGEMENTS

We express our deep sense of gratitude to Dr. Nasser Rizk for his supervision, help, and valuable guidance. Thanks to Miss. Amina Saleh, Dr. Abdelrahman El-Gamal, Miss. Dena, and Miss. Omnia.

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