The capacity for chronic low-grade exposure to an oxidative stressor to protect against acute high-dose oxidative stress events in MCF7 breast cancer cells

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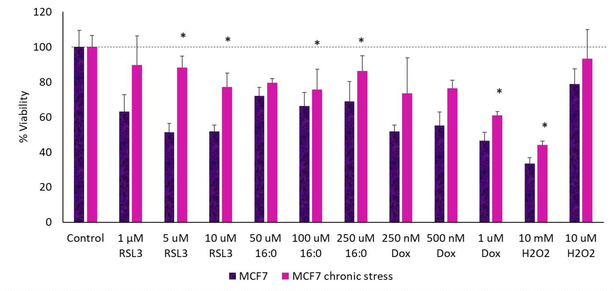
Abstract

In vitro studies are critical for elucidating the mechanisms contributing to disease development, such as how diet-induced obesity leads to increased risk and incidence of breast cancer. However, they are often limited to short-term trials which fail to mimic the prolonged exposure to energy excess that contributes to obesity development. This project investigates how acute and chronic exposure to the saturated fatty acid, palmitic acid, affects the oxidative stress response in MCF-7 breast cancer cells. In excess, palmitic acid increases cellular lipid load and leads to the production of reactive oxygen species (ROS), ultimately resulting in inflammation and cellular damage. However, chronic exposure to low doses of oxidative stressors can be protective against acute stress. The study compares short-term and long-term treatments to determine whether continuous exposure amplifies oxidative stress or activates cellular defense mechanisms. To do this, I have already been culturing MCF-7 cells in a low dose of palmitic acid, and will continue to do so for 3 months. Following chronic stress exposure, cells will be acutely treated with a high dose of palmitic acid for 24-48 hr. Basal ROS production will be compared ROS production after the high dose treatment in cells that have been chronically exposed to palmitic acid. Cells that have not been chronically exposed will serve as our controls. These studies will help us understand how chronic exposure to saturated fats alters oxidative balance in breast cancer cells and contribute to a better understanding of how diet influences cancer progression and cellular stress responses.

Results



Conclusions

Approach

Acknowledgements

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