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# COMMONLY USED CHEMICAL 'DOSS' MAY PROMOTE OBESITY

Researching the possible mechanisms that lead to obesity for a compound found in everyday consumable products such as milk and stool softeners.

Docusate salt (DOSS) has recently been identified by researchers at the Medical University of South Carolina (MUSC), Dr. Demetri D. Spyropoulos and Alexis Temkin, as a probable obesogen. Obesogens are a class of compounds that promote obesity by interfering with the body's hormone signaling pathways related to energy use, fat cell regulation, and inflammation. These pathways are especially important in the developing fetus, where hormone signals influence development and may have long lasting effects on the health of the child after birth.

In an on-going human health study at MUSC, 35% of over 20,000 women in recent years reported taking a stool softener containing DOSS during their pregnancy, highlighting the need to understand more about the potential effects of DOSS.

Brian Wuertz, an REU student at the NSF funded College of Charleston Fort Johnson REU program, is investigating the potential of DOSS to promote inflammatory response in immune cells called macrophages found throughout the body. These immune cells in the placenta may influence the inflammation state of the developing fetus and are the target of the study.

The prevalence of obesity in the US has been called an "epidemic", contributing to the rise of many other diseases such as cancer, heart disease, and diabetes. Diabetes and other adverse health effects are promoted by obesity because it creates a state of chronic inflammation.

The first step of the research project was to isolate immune cells from the placenta and then culture them on plates, meaning to grow them so that they can be tested. This is a difficult process that is still being developed, so that human cells as well as dolphin cells can be tested in the future.

Wuertz used a mouse cell line for DOSS exposure and tested for signs of increased inflammation to preserve precious human and dolphin samples as he developed a method to test for increased inflammation.

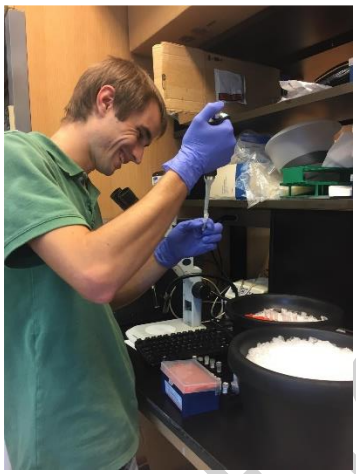
Wuertz used two methods to determine if inflammation can be measured in the study. These immune cells are macrophages and their job is to recognize and engulf bacteria. The rate of this activity can be measured by giving the macrophage bait that we can either see inside of the cells with a fluorescent microscope or measure the total amount of fluorescence of the cells after they have had time to engulf the bacteria. One way to test possible inflammatory state is to measure the rate that they engulf

bacteria. Fluorescent bacteria allow comparisons to be made between cells exposed to different levels of DOSS. If DOSS causes an inflammatory response, then cells exposed to DOSS would be activated and phagocytose more bait in the given time. Potential differences in activity are measured by differences in fluorescence after the immune cells have engulfed the bait.

The other way that inflammatory state is measured is by measuring the amount of template molecules for inflammation signals that immune cells produce, called RNA. RNA is extracted from the cells and then specific inflammatory molecules are selected and measured to see if the cells are producing more inflammatory signals. Wuertz is learning how to apply these laboratory techniques to answer questions he has about DOSS this summer, but will be able to take them with him when he returns to Warren Wilson College for the fall semester.

DOSS has been generally regarded as safe (GRAS). This designation allows it to be added to food products at low levels without being included explicitly in the label. Constant and unknown exposure to this chemical elevates the need to reevaluate its impact on human health. DOSS also continues to be used in oil spill clean-up efforts and may have an impact on the health of marine organisms as well.

*Brian Wuertz setting up an experiment to measure RNA. Photo Credit Hailey Conrad*



Blog with more information about this project: https://blogreu.wordpress.com/2017/07/14/cells-and-instruments-but-no-folsom-prison-blues/



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