Chemotherapy may lead to mitochondrial dysfunction in skeletal muscle

4 October 2018

Chemotherapy drugs to treat breast cancer may promote muscle mitochondrial dysfunction, according to new research. Dysfunctional mitochondria, the energy centers of the cells, may contribute to fatigue and weakness that some people with breast cancer experience through the course of disease treatment. The study is published ahead of print in the *American Journal of Physiology—Cell Physiology*.

Breast cancer, the most commonly diagnosed cancer in the U.S., has been considered one of the less-damaging cancers in terms of severe muscle wasting and weight loss (cachexia). However, some people with breast cancer may also suffer from muscle loss and fatigue that limits their daily activities. There is limited research on the effect of breast cancer and its treatments on the muscles in human patients.

Researchers from the University of Vermont compared muscle fibers from women with breast cancer who were undergoing chemotherapy after surgical removal of cancerous tumors. The women had a lower cross-sectional area of muscle fibers—an indication of muscle loss—when compared to a healthy control group. A reduced number of mitochondria was also seen in the cancer group.

The research team also treated mouse muscle cells with the chemotherapy drugs doxorubicin and paclitaxel, medications that are commonly used to treat breast cancer. Both of the drugs led to a lower number of mitochondria, increased oxidative stress and atrophy. Oxidative stress is a type of cellular damage that can lead to cell death and chronic disease.

The negative effect of chemotherapy drugs on muscle mitochondria "provides a possible explanation for the high prevalence of fatigue and functional disability across all cancer types, including those not typically characterized by cachexia, such as breast cancer," the researchers wrote. "Interventions designed to counter these effects on muscle may help alleviate some of the burden of the disease on patients."

More information: Blas A. Guigni et al, SKELETAL MUSCLE ATROPHY AND DYSFUNCTION IN BREAST CANCER PATIENTS: ROLE FOR CHEMOTHERAPY-DERIVED OXIDANT STRESS, *American Journal of Physiology-Cell Physiology* (2018). DOI: 10.1152/ajpcell.00002.2018

Provided by American Physiological Society