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Exploring the impact of alcohol and SIV on skeletal muscle mitochondria in western diet-fed Rhesus Macaques

Background: Skeletal muscle (SKM) is primarily responsible for all movements performed by the body. The contraction of the muscle leads to the movement of specific bones for different functions. Along with structural support, SKM also acts as storage for glucose, in the form of glycogen, in times of starvation. Human immunodeficiency virus (HIV, or SIV in macaques) weakens SKM, causing inflammation. Chronic binge alcohol (CBA) has also been linked to dysfunctions found in SKM through the altering of protein synthesis in SKM mitochondria. When combined, HIV and CBA can impair mitochondrial function in SKM, thus not meeting the biogenetic demand of the cell, and these detrimental changes can increase in the presence of high sugars and fats. Without functioning mitochondria, SKM does not receive the energy needed to perform everyday tasks. Therefore, this study aims to understand how CBA and SIV directly affect mitochondrial health in the SKM. **Methods:** SKM biopsies derived from vehicle (naïve, n=4), or SIV-infected, ART-treated adult male rhesus macaques (VEH/SIV+, n=2) administered CBA (2.5g ethanol/kg/day) with (CBA/SIV+, n=4) or without SIV (CBA/SIV-, n=6) were homogenized for analysis. RNA was then isolated and transformed into cDNA with the use of reverse transcriptase enzyme and a collection of buffers. The cDNA was normalized, and mRNA analysis was performed through polymerase chain reaction (PCR) with the use of primers to identify the quantity of the following mitochondrial-associated gene targets within each sample: PGC1a, TFAM, UCP2, NRF1 and PPARg. **Results:** Our preliminary results show that looking at the mRNA expression of the gene targets PGC1a, NRF1, TFAM, and UCP2, there was no significant differences in comparison to the vehicle control groups. The gene target PPARg, however, demonstrated a significant decrease in mRNA expression in the CBA/SIV- group, showing that CBA affects PPARg mRNA expression in SKM mitochondria. **Summary:** The study of the effects of CBA and SIV on the SKM of male rhesus macaques has proven to alter mitochondrial biogenesis and turn over through PPARg. However, this is an on-going study and as the sample size is increased, we will expand on the analysis and possible changes of the mitochondrial health-associated genes.