Investigation of Hypothalamic Selenoprotein M in Energy Metabolism

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ABSTRACT

Selenoproteins represent a unique class of proteins that play a critical role in maintaining proper redox balance essential to health. They are characterized by the co-translational incorporation of selenium (Se) in the form of the 21st amino acid, selenocysteine. Selenoprotein M (SelenoM) is a relatively uncharacterized protein that is highly expressed in the brain. Recent studies have shown that SelenoM is highly expressed in hypothalamic regions involved in energy metabolism and that SelenoM deletion in mice causes obesity. We performed microarray analysis on hypothalamic tissue from wild-type and SelenoM KO mice to identify genes affected by SelenoM deletion. Two key genes implicated in energy metabolism and cell cycle control, Peroxisome Proliferator-Activated Receptor Gamma Coactivator 1 Alpha (PGC-1 alpha) and Cyclin Dependent Kinase Inhibitor 1A (Cdkn1a), were identified and verified by quantitative PCR. Further qPCR analysis showed that these genes were also significantly altered in immortalized hypothalamic cells where SelenoM was disabled using CrispR/CAS9 technology. These preliminary studies suggest a potential relationship between SelenoM, energy metabolism and cell cycle control.

Key words: Selenoprotein, Hypothalamus, Energy Metabolism