Examining a Relationship Between Chronic Dietary Folic Acid Deficiency and Activation of p53 Gene in Down Syndrome Mice.

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Abstract

Cellular induction of tumor suppressor gene p53 effectively combats stressed cells through cellular arrest or apoptosis. Chronic folic acid deficiency (CFD) intake is an environmental factor that can induce cellular stress and subsequently activate p53. Down syndrome (DS) is a nondisjunction error known to cause fatal or detrimental lifelong complications. It is suspected that an individual affected by both DS and CFD may exhibit unusually high levels of phosphorylated p53 in relation to high levels of cellular stress. The objective of this study was to examine the relationship between a CFD diet and activation of tumor suppressor gene p53 in the skeletal muscle of DS mice. It is hypothesized that there will be significantly more phosphorylated p53 tumor suppressor gene in the skeletal muscle of DS mice compared to control mice. Protein was isolated from the skeletal muscles of mice using a Qiagen homogenizer kit. All samples were tested for protein concentration using a standard bicinchoninic protein assay. A Western blot was then performed to quantify the amount of phosphorylated p53 in each sample. A paired samples t-test was used to test for a significant difference of p53 in the skeletal muscle of Ts65Dn (control) mice as compared to their trisomic mates. No statistically significant difference was observed in the differences in p53 values between control and DS mice ($p > .05$). Studies looking to understand the correlation between a folic acid deficient diet and activation of the p53 tumor suppressor gene may find helpful evidence within these results. Protein loading concentrations may have limited the accuracy of the final p53 concentration values. The limitations of this experiment allow us to discuss priorities for future research.