

1096-92-279

Laurel A. Ohm* (laurelohm@gmail.com). *Folic acid supplementation and recovery from spinal cord injury: a mathematical model*. Preliminary report.

The folate cycle is vital to the human body, serving, among other functions, as an important step in DNA methylation. Injuries to the spinal cord and central nervous system (CNS) tissues have been shown to alter folate distribution in the body, causing a decrease in concentration of methionine synthase, the main methyl donor. Folic acid, a folate form rarely found in natural foods, has been shown to increase neuronal regeneration following CNS injury when taken as a dietary supplement. Additionally, experimental data shows biphasic concentration changes in methionine synthase and other key players in the folate cycle in response to increasing doses of folic acid, suggesting that moderate supplementation best enhances regeneration. To determine a possible mechanism for the observed biphasic neuronal regeneration, an existing ODE model of folate metabolism was modified to account for CNS injury and subsequent folic acid supplementation. The resulting model suggests that the experimentally observed changes to the folate cycle may relate to the cell's folic acid uptake scheme, especially concentration-dependent changes in folic acid receptor FolR1 activity and competitive inhibition of folic acid uptake by other folate substrates. (Received August 26, 2013)