Studies Examining Nutritional Supplementation in Down Syndrome

This study examined the effect of antioxidant intervention on inflammation and oxidative stress in 18 children with Down Syndrome. The results showed that the antioxidant intervention reduced the systemic oxidative damage in DS patients, even after a relatively long period of time where no supplementation was given.

This review discusses the supplementation of the maternal diet with additional choline which may serve as an effective and safe prenatal strategy for improving cognitive, affective, and neural functioning in DS.

This study provides evidence that in mothers who are genetically susceptible to deliver a DS child, pre-conceptional nutritional supplementation and antenatal care could potentially reduce the risk of a DS child. Additionally, nutritional strategies could possibly be used for better management of the symptoms of DS children.

PMID: 25962746 “Green tea EGCG plus fish oil omega-3 dietary supplements rescue mitochondrial dysfunctions and are safe in a Down's syndrome child” Clinical Nutrition, Aug 2015

This study examined the effect of antioxidant intervention on oxidative stress in 15 patients with Down Syndrome. The result showed that both oxidative stress parameters and DNA damage improved in the patients after antioxidant administration.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4455011/

The study focused on fish oil supplementation in mice pups over a period of 5-weeks with the purpose of reducing RCAN1 expression. The results suggest the potential use of fish oil in treating Down syndrome.

PMID: 25621938 “Antioxidants and biomarkers of oxidative damage in the saliva of patients with Down’s syndrome” Archives of Oral Biology, Apr 2015
This study of 30 patients ages 14-24 years with DS found evidence of oxidative stress in their saliva, as indicated by increased levels of malondialdehyde and superoxide dismutase concentrations.

Early dietary interventions of DS children afford an opportunity for decreasing the risk or delaying some of the DS associated conditions from appearing, thus beneficially impacting their quality of life.

This study supports the hypothesis that the dysregulation of HO-1/BVR-A system (found on the 21st chromosome) contributes to the early increase of oxidative stress in DS and provides potential mechanistic paths involved in the neurodegenerative process and Alzheimer’s disease development.
http://www.ncbi.nlm.nih.gov/pubmed/?term=25391381%5Buid%5D
The article discusses how the identification of common oxidized proteins by redox proteomics in both Down syndrome and Alzheimer’s disease can improve our understanding of the overlapping mechanisms that lead from normal aging to development of AD.

The study evaluated the effects of supplementation with antioxidants α-tocopherol and α-lipoic acid (ALA) on oxidative stress biomarkers in 93 children with Down syndrome. The results showed that α-tocopherol supplementation of the diets of children with DS may attenuate oxidative stress at the DNA level.

PMID: 24797412 “Roles of sirtuins in the regulation of antioxidant defense and bioenergetics function of mitochondria under oxidative stress” Free Radical Research, Sep 2014
This article discusses oxidative stress-elicited down-regulation of Sirt3 playing a role in the pathophysiology of diabetes, cardiac hypertrophy, mitochondrial diseases, and age-related diseases. In addition, the physiological role of newly identified lysine acylation mediated by Sirt5 and its biochemical effects on oxidative metabolism are also discussed.

PMID: 24901945 “Memory decline in Down syndrome and its relationship to iPF2alpha, a urinary marker of oxidative stress” PLoS One, Jun 5, 2014
This study evaluated memory assessments of 32 adults with Down syndrome along with urinary samples measuring isoprostane 8, 12-iso-iPF2alpha over a four year period. The result showed that a change in iPF2alpha over time may act as a biomarker for memory decline in Down syndrome and possibly also track progression of MCI to AD in the general population.

The study results demonstrate that antioxidant intervention with vitamins E and C attenuated the systemic oxidative damage present in DS patients.

This article discusses lipid peroxidation biomarkers for evaluating oxidative stress and the production mechanisms of reactive oxygen species in some neurological disorders, including Down syndrome.

Early prenatal diagnosis offers a 28 week window to positively impact brain development and improve postnatal cognitive outcome in affected individuals.

PMID: 24900808 “Oxidative stress and Down syndrome. Do antioxidants play a role in therapy?” Physiological Research, 2014
This paper examines the impact of antioxidant interventions as well as a positive effect of physical exercise on cognitive and learning disabilities of individuals with DS.