

Scientific Studies

Hypothalamic-Pituitary-Adrenal Axis Dysregulation

“An acute stressor produced a significantly increased cortisol response in lead exposed children.”



Chronic fatigue syndrome (CFS), fibromyalgia (FM), and hypothalamic-pituitary-adrenal (HPA) axis dysfunction all share something in common. The question is whether they are correlated. And if they are correlated, which comes first? Can treating one, correct the other?

Patients with CFS and FM often experience debilitating fatigue and pain that alters their lives and sometimes results in total disability.

Scientists at the New York College at Oswego reviewed recent statistics that show animals exposed to heavy metal contaminants, such as lead, have a heightened HPA axis reactivity to acute stressors. This heightened reactivity may result in increased cortisol levels during stress. Continued overproduction of cortisol is believed to result in eventual adrenal fatigue.

The scientists performed the first replica of these animal studies on human children. Heightened reactivity was compared to low-level prenatal and postnatal lead exposure.

Lead exposure had no effect on cortisol levels during normal rest. However, an acute stressor produced a significantly increased cortisol response in lead exposed children.

These findings show that low levels of lead exposure, often unavoidable, have a health impact in increased cortisol levels at levels below 10 µg/dL blood lead level, deemed safe by the Centers for Disease Control and Prevention for public health purposes.

Adrenocortical responses to acute stress is altered in lead exposed children. This lead exposure may lead to eventual adrenal insufficiency if the adrenal glands of lead exposed individuals become overworked from ongoing acute stressors such as chemical exposure, illness, and injury.

Treatment with low doses of cortisol (hydrocortisone) is controversial. Cortisol is a steroid which increases appetite and suppresses the immune system, which may lead to side effects such as weight gain and infection.

When supplemental cortisol is taken, the adrenals reduce or stop producing their own cortisol, leaving the potential for a life-threatening adrenal crisis should supplemental cortisol be stopped abruptly. The adrenal glands will not produce sufficient cortisol immediately, if at all, and any change of supplemental cortisol should be done slowly and monitored closely by a doctor.

However, supplemental cortisol is often helpful for those with low baseline cortisol levels and/or low blood pressure. If adrenal fatigue is present, this may improve energy levels and stabilize blood sugar levels, which may improve CFS and FM symptoms. Additional research is necessary to reach a firm conclusion.

Reference

Gump, BB, Steward, P, Reihman, J, Lonky, E, Darvil, T, Parsons, PJ, & Granger, DA. Low-Level Prenatal and Postnatal Blood Lead Exposure and Adrenocortical Responses to Acute Stress in Children. *Journal: J of Chronic Fatigue Syndrome*. 2007;14(3);59-88.