



NEUROTRANSMITTER DISRUPTION AND ADRENAL DYSFUNCTION

What is Adrenal Dysfunction?

A traditional definition of adrenal dysfunction is an altered secretion of adrenal hormones that may begin with elevated cortisol levels, but typically results in reduced overall output and/or alteration in the diurnal pattern of cortisol production. A comprehensive approach to addressing adrenal dysfunction includes assessment of the HPA axis as well as related neurotransmitter levels. Cortisol and steroid hormones are produced in the adrenal cortex, while catecholamines including epinephrine, norepinephrine and a very small amount of dopamine, are produced in the adrenal medulla. Additionally, adrenal output is influenced by serotonin production, and serotonin levels are affected by adrenal function. Therefore, it is recommended to evaluate the entire neuroendocrine system for optimal clinical assessment.

The Neurotransmitter Connection

When a stress response is triggered, the HPA axis is stimulated to produce cortisol and DHEA in the adrenal cortex, and the adrenomedullary hormone system initiates norepinephrine and epinephrine production in the adrenal medulla. Initially, these neurotransmitter levels tend to be elevated – often causing a concomitant rise in inhibitory neurotransmitters such as GABA. Additionally, cortisol is required in the conversion of norepinephrine to epinephrine, so a compromise in cortisol levels (as seen with chronic stress) causes an imbalance in the ratio between these two neurotransmitters.

There is a dynamic relationship between cortisol and serotonin wherein healthy adrenal function is dependent on balanced serotonin and healthy serotonin is dependent upon balanced adrenal function. Serotonin is involved in hypothalamic stimulus to facilitate pituitary release of ACTH, which, in turn, is necessary for the release of cortisol and DHEA. An insufficient supply of serotonin will contribute to an insufficient release of cortisol. As the body continues to demand cortisol there will be a subsequent demand on serotonin to help produce ACTH that may result in depletion of serotonin levels. Furthermore, stress inhibits the conversion of tryptophan to 5-HTP, which is the rate limiting step in the production of serotonin.

Patients suffering from decreased adrenal function commonly complain of fatigue and may also experience sleep disruptions, weight changes, salt and/or sugar cravings, allergies, anxiousness, nervousness, low blood pressure and numerous other symptoms. The neurotransmitter imbalances that occur along with the alterations in cortisol production may cause or accentuate all of these symptoms. Addressing neurotransmitter imbalances is an essential component of the successful treatment of adrenal dysfunction. Simple, noninvasive urinary testing identifies specific neurotransmitter imbalances, and can be correlated to diurnal cortisol and DHEA levels. Targeted amino acids and other nutrient cofactors can modify neurotransmitter levels, thus promoting a fast and lasting recovery.

References

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