



# Newsletter

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## Depression, Inflammation and Pain...The Clinical Link to Success

In clinical practice we routinely work with patients who are depressed, and also suffering from inflammation frequently coupled with life altering pain. While an individual patient may present with a single concern, exploration of their overall chemistry often reveals multiple co-morbid variables.

Depression and inflammation are strongly correlated, as demonstrated by a 2013 peer-reviewed report. The clinical findings of this report revealed significantly higher inflammatory index scores (a composite score including the inflammatory markers tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukin-6 (IL-6), interleukin-10 (IL-10), and C-reactive protein (CRP)) in individuals with major depressive disorder (MDD) who attempt or complete suicide when compared to both controls and patients with MDD and lower suicidal ideation.

Often thought of as affecting cognition and mood, depressive symptoms may manifest somatically as pain in some individuals and, as with suicidal ideation, may be linked to inflammation. A 2013 study examining participants with metabolic syndrome correlated the increased leptin levels seen in metabolic syndrome with somatic depressive symptoms but not total or cognitive depressive symptoms. The conclusion that leptin is independently associated with somatic depressive symptoms in patients with metabolic syndrome suggests that depression can hurt, independent of the patient's state of mind.

As practitioners, we can address the inter-relationship among depression, inflammation and pain not only with our typical hormonal, dietary and lifestyle interventions but also with neurotransmitter assessment and support. Often thought of as the main mood-regulating neurotransmitter, serotonin support may be key for many patients in this population. Pro-inflammatory cytokines including IL-6 and IL-10, among others, acutely stimulate central serotonin neurotransmission. Of particular note here is interferon gamma (IFN- $\gamma$ ) and its relationship with serotonin. IFN- $\gamma$  reduces serotonin production by stimulating the enzyme indoleamine 2,3-dioxygenase (IDO), which converts tryptophan into kynurenine. Overstimulation of IDO leads to depletion of tryptophan and, therefore, to reduced synthesis of serotonin.

In what other ways can supporting neurotransmitter balance benefit our patients with depression, inflammation and pain? How do neurotransmitter imbalances beyond serotonin affect these patients? Join us for our April 3rd webinar at 12:00 PST as we explore the integral role of neurotransmitters, adrenal function, other biomarkers and how these laboratory insights can expand and also focus our

therapeutic considerations. If you are interested in registering, [click here](#).

## Resources

1. Wichers M, Maes M. The psychoneuroimmuno-pathophysiology of cytokine induced depression in humans. *Int J Neuropsychopharmacol* 2002; 5:375-438.
2. Miller AH, Ancoli-Israel S, Bower JE, et al. Neuroendocrine-immune mechanisms of behavioural comorbidities in patients with cancer. *J Clinical Oncol* 2008; 26:971-982. Provides an excellent overview of the factors leading to depression in patients treated for cancer.
3. Levandovski R, Pfaffenseller B, Carissimi A, Gama CS, Hidalgo MP. The effect of sunlight exposure on interleukin-6 levels in depressive and non-depressive subjects. *BMC Psychiatry*. 2013 Mar 5;13:75.
4. O'Donovan A, Rush G, Hoatam G, Hughes BM, McCrohan A, Kelleher C, O'Farrelly C, Malone KM. Suicidal ideation is associated with elevated inflammation in patients with major depressive disorder. *Depress Anxiety*. 2013 March 15.
5. Chirinos DA, Goldberg R, Gellman M, Mendez AJ, Gutt M, McCalla JR, Llabre MM, Schneiderman N. Leptin and its Association with Somatic Depressive Symptoms in Patients with the Metabolic Syndrome. *Ann Behav Med*. 2013 Feb 23.

## Upcoming events

The Role of Neurotransmitters in Pain and Pain Management  
April 3, 2013  
[Register Here](#)

West Coast Core Training  
July 27, 2013  
[Register Here](#)