

# Townsend Letter

## *The Examiner of Alternative Medicine*

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Perhaps the most remarkable interview that the *Townsend Letter* published in 2016, maybe ever, was Jacques Fernandez de Santos' interview of Marco Ruggiero, MD on the third brain. The interview is based partly on the book, *Your Third Brain*, authored by Peter Greenlaw and Marco Ruggiero. The book has a forward by John Gray, PhD, author of *Men Are from Mars, Women Are from Venus*. Greenlaw and Gray are both effusive in their enthusiasm about Ruggiero's "eureka moment", when he made the connection between the human microbiome and the third brain. This is not just a figurative description of the microbiota functioning as part of the brain. Ruggiero asserts that the microbiome plays a key role in our eating behavior, emotional moods, even our cognitive functioning. Even more intriguing, Ruggiero thinks that the microbiome can be pivotal in steering our decision making, our free will; indeed, in the book he opines that the intestinal bacterial organisms contribute more than our human brain, our first brain, in making those decisions. In his interview in this publication published nearly a year after the book, he modified this position stating that both the microbiome and human brain share, in a cooperative manner, different aspects of behavior, mood, and cognitive functioning. Whether the microbiome or human brain dominates is a careful balancing act subject to changes in each brain's physiological and metabolic needs. Not to be ignored is the neuronal activity of the intestinal tract and the vagus nerve thought to serve as a "second brain". Ruggiero further upends our understanding of brain functioning by defining a different microbiome that exists in our "cranial" brain—serving as a

fourth brain. In other words, we have two human brains, one in the cranium and one in the intestine, and two microbiologic brains occupying the same anatomy. While these divisions may seem arbitrary and without adequate substantiation, research poses tantalizing evidence in support of Ruggiero's work.

Alcock, Maley and Aktipis review how eating behavior can be manipulated by the gastrointestinal microbiota. They postulate that microorganisms have two potential mechanisms for how microorganisms might alter our eating behavior: (1) the organisms create cravings for eating foods that might suppress survival of competitive microorganisms; (2) the microbiota might elicit "dysphoric" emotions until we eat food that benefits their survival. Alcock et al. point out that a diverse microbiome composed of a large number of differing microorganisms has a greater ability to mutually provide for nutritional needs compared to a microbiome with less diversity. When the microbiome has less diversity, there is a greater neurochemical signaling to eat more to provide nutritional needs. Obese hosts tend to have limited microbiome populations. Numerous studies are cited of how microorganisms can play an important role in host eating behavior, including how their metabolic activity can modify the host's mood. *Lactobacillus* in breast milk is observed to increase tryptophan metabolism and a respective calming effect on the suckling infant. When microbiota are transferred to "germ-free" mice from anxious mice, the cohorts are notably more agitated than prior to the transplant. On the other hand, stressed mice fed *L. rhamnosus* had observable reduction in

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cortisone levels accompanied with calming behavior. *Toxoplasma gondii* reduces fear of cats in mice to the mouse's detriment; intestinal cat toxoplasma encourages feline pursuit of mice, providing the microorganism access to a mouse meal. Alcock et al. review neural mechanisms, particularly involving the vagal nerve, of how microbiota can alter eating behavior. Organisms of the microbiome have adapted to produce neurochemicals that closely mimic the human neurochemicals directly influencing emotional response. Alcock notes that the microbiome can be modified by the use of prebiotics and probiotics, microbiota transplantation, antibiotics, and other methods. The authors posit that these approaches may be used to unify our psychiatric state as well as cognitive functioning.

Ruggiero's *Your Third Brain* cites studies elaborating the interaction of the microbiome with the brain including its role in causing or contributing to mental and physical illness. We accept that depression is a neurochemical imbalance; we don't acknowledge that the imbalance dopamine or serotonin may be caused by the gut's microbiome. The explosion in the incidence of autism has been well recognized, but causation has been disputed. Mercury and chemical toxicity, vaccine insult, infection and other etiologies continue to be debated. The possibility that autism may arise from a microbiome that has been corrupted has been hypothesized. Indeed, the metabolic disruption of the microbiome is thought to be important not only in brain and neurologic dysfunction, but contributory to immune dysfunction and cancer. If the microbiome functioning can be restored, Ruggiero suggests, the pathogenesis of disease can be reversed or controlled. For the purpose of restoring normal microbiome functioning, he proposes using a unique probiotic formulation that ferments colostrum and provides probiotic organisms thought to be "normal" for the newborn infant. The formulation is rich in a peptide called GcMAF that is derived from the vitamin D binding protein. Ruggiero's book details how his research on vitamin D, the vitamin D receptor, and the vitamin D binding

protein led to his understanding of how GcMAF plays a key role in restoring microbiome balance. Although he provides anecdotal evidence that the use of this formulation is effective in microbiome restoration, there are no controlled clinical studies.

Greenlaw, who authors much of the text devoted to supporting "ordinary" brain functioning, advocates the use of a paleo-type diet. This diet emphasizes organic animal proteins, vegetables, and limited fruits together with the judicious use of various nutraceuticals including high quality whey protein, Ruggiero's formulation of probiotics, fermented colostrum, and GcMAF is available commercially as a product called Bravo. The product is the basis for a yogurt that is produced at home, each kit provides the ingredients to prepare what Ruggiero calls a dessert cup sufficient for a two weeks' supply. The authors also advocate the use of a specific whey protein from New Zealand that is claimed to be better than other whey products in restoring brain function as it contains less toxicants and hormones.

One other chapter in *Your Third Brain* discusses Ruggiero's experience with ultrasound and its potential application in restoring improved microbiome brain functioning. Ruggiero thinks that EMF produced by the myriad devices inside and outside the home and office have a more deleterious effect on the microbiome than human cells. He conjectures that ultrasound may reverse some of these adverse effects.

In *Your Third Brain*, Ruggiero makes the argument that the microbiome is the key to our free will. A dysfunctional microbiome portends less free will. From a philosophical perspective, from an artistic perspective, we are obliged to understand the microbiome and its needs.