B12 and the Benefits of Good Gut Residents

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When their varying symptoms are finally given a name by a physician, most patients have difficulty wrapping their minds around those two words: “pernicious anaemia (PA)”. The causes that may explain and improve treatment of the effects of vitamin B12 deficiency, a hallmark of PA, are products of ongoing research and discussion on the PA web site and other forums. What does the family of structurally related compounds collectively known as vitamin B12 have to do with the bacteria in our gut? Jeffrey Gordon (M.D.), Director for the Center of Genome Sciences at Washington University in St. Louis, estimates that the number of bacteria colonizing our body surfaces exceeds the total number of our own cells by 10-fold and the majority of those bacteria reside in the gut (10-100 trillion!). It is perhaps surprising to learn that we cannot make our own B12 and rely on our “gut residents” or bacteria associated with our diet to produce B12.

B12 production is a complex process, involving in part the breakdown of a co-factor derived from another vitamin, B2 (riboflavin), to complete its synthesis. The cannibalization of a co-factor from one vitamin to produce another vitamin is rare according to the discoverers of this pathway at the Massachusetts Institute of Technology. PA patients produce antibodies against stomach parietal cells as well as intrinsic factor, a binding protein involved in the intestinal absorption of B12, one consequence is autoimmune gastritis. An association between infectious agents and PA-related gastritis has been reported in many studies.

With a few exceptions, most experts think that the bacterium associated with stomach ulcers, Helicobacter pylori, influences the absorption of iron and vitamin B12. A clinical case has been reported in which pernicious anaemia “clustered” with other metabolic derangements and infection caused by a diploid fungus, Candida. Another report implicates bacterial overgrowth of the small intestine in vitamin B12 malabsorption.

There is consensus on the merits of unraveling the microbial ecology of the human gastrointestinal tract in order to gauge the advantages of diet supplementation with prebiotics (nondigestable carbohydrates that can be fermented by bacteria) and with probiotics or beneficial bacteria. Positive effects of probiotics have been demonstrated for several chronic diseases including Helicobacter-induced gastritis, irritable bowel syndrome and inflammatory bowel diseases.

For ingested probiotics to aid PA patients in maintaining normal B12 levels, these bacteria must survive transit through the gastrointestinal tract. Some probiotics found in yogurt and kefir survive gut passage and stimulate the immune system better than other strains. Interestingly, some studies show that dairy propionibacteria have a remarkable tolerance to the human upper gastrointestinal tract and an ability to adhere to intestinal epithelia (in vitro studies show improved adherence using combinations of probiotic bacteria). Propionibacteria can be found in the soil, vegetables, fermented dairy products like kefir and Swiss-type cheeses. Some of the beneficial effects claimed for specific strains of propionibacteria are stimulation of “good” bacteria such as bifidobacteria and the beneficial modification of the metabolic activities of intestinal microflora.
While no single bacterium can be a panacea for PA, the addition of another member to the family of “good gut residents” (e.g. Lactobacillus, Bifidobacteria, Bacteroides) may provide symptomatic relief to some patients.

References: