How diet and lifestyle affect our intestinal garden of microbes

Optimal health depends on our gut microbiome.

Intestinal epithelial cells play a significant role in the immune system by sensing components of microbial cells, including their metabolites, to make adjustments to the body’s immune response to microbes [1].

In addition, many enteric microbes directly influence the nutritional value of our food by imparting valuable nutrients such as vitamins in a readily absorbable state for our bodies [2]. It has taken millions of years of co-evolution with microbes for mammals to realize the full benefits of a symbiotic relationship with microbes. Our bodies harbor ten times as many microbial cells as our own, so it would behoove us to pay attention to these fellow travelers throughout life.

Unfortunately, our modern lifestyles have, in many ways, inhibited regular exposure and suitable conditions to harbor many of the microorganisms which have coevolved with previous generations.

Furthermore, switching from a low-fat, plant polysaccharide-rich diet to a high-fat/high-sugar “Western” diet can shift the structure of the microbiota, changing the representation of metabolic pathways in the microbiome, and alter microbiome gene expression [2]. That being said, there is a strong likelihood that dysbiosis could be responsible for many of the modern ailments we now suffer, particularly immune related disorders.

Factors such as sanitation practices and overuse of antibiotics have been thought to be the main culprits in separating us from essential microbiota from our immediate environment, but there are other key factors such as diet, temperature, and circadian effects that could be driving this as well [3,4,5].

Beyond lacking the right balance of microbiota, overly processed foods containing high levels of fat, sugar, and simple carbohydrates can promote the growth of organisms that compete against our...
innate microbes, thereby creating an environment where the food is difficult to metabolize. This may be an important reason why immune related diseases, such as irritable bowel syndrome, inflammatory bowel disease, allergies, and certain types of cancer, could be the end result of a poor diet [3].

Considering the essential role microbes play in our immune system, there is no reason to conclude that immune deficiencies and autoimmune disorders, such as diabetes, rheumatoid arthritis, lupus, multiple sclerosis, and other related diseases are not connected to our modern diet, and perhaps some additional unexpected aspects of our modern lifestyle.

According to Pavan Bhargava, MD of John Hopkins University:

“The gut bacteria metabolize certain components of the diet into short chain fatty acids that, besides helping in colonic health, can also act on immune cells and make T cells more regulatory. Additionally, diet can lead to alterations in the gut bacterial composition that can shift the immune system towards a pro- or anti-inflammatory state.”

Probiotic therapy in hospitals and over-the-counter usage is currently on the rise, and research shows targeted therapy can have a positive effect on overall health when combined with an appropriate diet. Recent research has directed efforts towards understanding the connection between disease and the disruption of homeostatic interactions between host and microbiota.

The development of newer, narrow-spectrum antibiotics, accompanied with rapid diagnostics, and, in some cases, microbiota replacement like fecal transplantation, are among the rising trends in patient therapy. Rigorous investigation is required to determine if individualized probiotic therapies and lifestyle recommendations are required.

The end result of individualized therapies could be cures or prevention for immune-related diseases which are not currently well understood.

We may one day have additional tools to modify our individual lifestyle and diet to accommodate the microbiota which our ancestors previously relied upon for good health for millennia.

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References: