



Camellia Newsletter



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Anti-inflammaging can be brought by suppression of bowel inflammation

In the last issue, we talked about inflammation in the blood vessels that promotes an accumulation of cholesterol and makes us prone to arteriosclerosis. Suppressing the chronic inflammatory condition in the vessels is very important when it comes to fight against aging. However, blood vessels are not the only location where we have to prevent inflammation. Inflammatory conditions in the intestines are deeply involved in disease and aging problems for us.

◆◆ Damages on the intestinal barrier allow the entry of foreign substances into the body

The intestines take on a crucial role to separate the inside and the outside of the body. Some of you might think that the place where foreign substances enter the body is the mouth. It is very much understandable point of view. Certainly, there are lots of layers of shields in the body like antimicrobial substances in our mouth and microbicidal action by gastric acid in order to defend ourselves against invasion of extraneous material. However, in the true sense of the term, it is the intestines what truly separates the inside and the outside of the body. The film called as mucosa run throughout the intestines in order to prevent the entry of foreign substances. This is also described as gut-barrier function and protects our bodies from the invasion of extraneous material, pathogens, toxins, and substances that triggers inflammation.

However, the intestines become inflamed when the barrier is damaged, which in turn make us to get sick. This barrier dysfunction is involved in a variety of diseases like inflammatory bowel disease (IBD) including ulcerative colitis and Crohn's disease, celiac disease, asthma, hay fever, food allergies, nutritional disorders, and rheumatism. The more we lift the lid on the relationship of inflammation in the intestines with these diseases, the more connections between bowel inflammation and aging are being studied.

◆◆ Inflammaging: chronic inflammation that advances aging

The term “inflammation” sounds like something bad happening. However, the inflammatory response is an absolutely essential biological response of tissues in order to protect the body from foreign enemies. Inflammation represents an aggressive response in the immune system. Here is an example of our immune reaction: When the pathogens or extraneous substance try to enter our bodies, our immune system repulses those enemies by using a biological response called inflammation. This aggressive response is an imminent attack to the enemies and usually they are suppressed by the immune cells with anti-inflammatory property. As you can see, our immune is a defense system of our bodies where it is built on a favorable balance of the inflammation and anti-inflammation properties.

The balanced immune system will tend to keep a mild but chronic inflammatory condition as people get older. This condition is resulted from the constant inflammatory immune response against foreign substances, viruses, pathogens, chemicals and additives over a long time span. Eventually, this chronic inflammatory condition will be involved in morbidity and mortality associated with age-related diseases. Now, this chronic low-grade inflammation

is described as inflammaging (Inflammation + Aging). Scientists are considering that disorders increasing with age like cancer, arteriosclerosis, obesity, Alzheimer's dementia, and even the whole symptoms of aging progress are due to the inflammaging phenomenon. The chronic low-grade inflammation does not manifest as symptoms when we are young, but it keeps accumulating and eventually develops disorders when we get old. In the advance research fields, the relationships between intestines, aging and immunity are attracting the scientists' attention whereas the close relation between aging and inflammaging are brought up to discussions.

◆◇ **Suppression of inflammation in the intestines is a key to counter the aging**

60% ~ 70% of the total immune cells that are involved in inflammaging are present in the intestines. Why are this much immune cells concentrated in the intestines? The reason is deeply associated with the role of the intestines. Intestines are a key boundary that separates the inside and the outside of the body and functions as a gate guard would to repel a foreign invasion. In the normal condition, the inflammatory response, which works as an imminent attack to the enemies, is restrained by anti-inflammatory property of immune cells in order not to cause chronic inflammation in the intestines. Once the anti-inflammatory action fails to work due to aging, chronic inflammatory response continues which in turn drives the intestines to the inflammaging condition. Recent studies revealed that particular immune cells with inflammatory property existing in the intestines engage in the developments of autoimmune diseases and chronic inflammation. These cells are usually indispensable to defend our bodies against pathogens. If the immune system fails to suppress these cells and inflammation become chronic and persistent, the cells with inflammatory property start attacking to own cells instead of pathogens or other extraneous substances. This behavior of attacking own cells will expand to cause chronic inflammation.

Fortunately, there are immune cells having anti-inflammatory properties in order to counter the inflammation in the intestines. Those cells are called regulatory T cells (Tregs). Tregs facilitate our guts health by suppressing inflammation, maintaining immune homeostasis, and fighting against inflammaging. The key factor that contributes to activation of Tregs is intestinal bacteria. The intestinal bacteria generate diverse metabolic substances from what we are eating every day through the fermentation process with their enzymes. The generated metabolic substances transform to signals and affect to general health. Butyrate, one kind of short-chain fatty acid, has attracted researchers' attention as a necessary compound to counter the aging of the intestines. Scientists have confirmed that butyrate has a capacity to activate Tregs, and recover the damaged cells and mucous membranes in the intestines by being energy of those that were damaged by inflammation. Moreover, it supports the peristaltic movement by stimulating the bowel which in turn helps elder people who tend to be constipated by aging.

Now, how we can increase the number of bacteria that contribute to synthesize butyrate? Researchers have revealed that those bacteria produce butyrate from resistant starch. Beans and bananas are rich in resistant starch. In order to raise the number of bacteria that produce butyrate, eating those resistant starch rich foods is effective. Not only beans and bananas, but also rice and brown rice contain resistant starch, especially cold rice has higher amount of resistant starch than hot rice. So, cold rice balls can be an easy but efficient resistant starch source.

The other key ingredient to synthesize butyrate is acetate. Acetate is produced by bifidobacteria. Activating bifidobacteria to produce more acetate is important because this produced acetate will eventually become other bacteria's source to synthesize butyrate. In addition, acetate that is elaborated by bifidobacteria through enzymatic action functions as a defense against infection caused by *E. coli* O157:H7. Acetate serves a dual purpose, doesn't it! Boosting good bacteria (bifidobacteria) makes our bodies suppress inflammation that will be conducive to counter the aging from the intestines.