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Hygiene and Immunity: Strengthening Immunity through Proper Hygiene

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Abstract: In the Western world, the incidence of infectious diseases has decreased dramatically due to improved hygiene, vaccines, and antibiotics. We have become too dependent on pharmaceuticals, forgetting the need to strengthen the immune system. We were reminded of this by the recent outbreak, which particularly affected vulnerable groups with weakened immune systems.

In addition, it turned out that the intestines play a more complex and important role than previously thought. It goes beyond digestion, which is the primary function of the intestines, and affects every system in the body. The gut microbiota is important, established at birth, and closely related to the immune system through complex digestive and metabolic functions. Intestinal microbiota together with intestinal epithelial cells form a protective barrier against pathogens, play an active role in the formation and functioning of the immune system, activate anti-inflammatory mechanisms and stop inflammatory mechanisms.

Key points: intestinal microbiota, epithelial cells of the intestine protected by the mucous layer; mucosal immune system.

The immune system is a highly complex system of the body consisting of a network of immune cells, tissues, and protein molecules through which immune cells communicate with each other. Its vital function is to protect against foreign bodies, harmful viruses and bacteria, as well as repair damaged tissues (wound healing), remove dead cells and those that act "incorrectly" (for example, cancer cells) from the body.

Although the immune system is working optimally, we do not notice it. When it is too weak, our risk of infection increases, and its activity, on the contrary, can lead to allergies, autoimmune diseases, etc.

The gut as the first line of defense

The intestine is the main site of absorption of nutrients in the body, where most of the metabolic processes between external and internal organ systems take place, and it is constantly exposed to foreign substances from the environment. Therefore, the immune system must always be "vigilant". At the same time, an important part of the functions of the immune system is the support of the intestinal microbiota. Therefore, 80% of immunity is concentrated in the intestines.

Intestinal microbiota plays a key role in the formation, development and functioning of the immune system and thus contributes greatly to the balance of the body.

The structure of the intestine prevents pathogens from easily entering the body. They are blocked by the "intestinal barrier" consisting of three layers:

gut microbiota;

epithelial cells of the intestine protected by a mucous layer;

mucosal immune system.

Both husband and wife care about gut health and improving the immune system.

Gut bacteria are the first line of defense

Gut microbiota plays several roles in forming the body's first line of defense. Colonizing the intestines, mainly beneficial intestinal microbiota prevents direct entry of pathogenic microorganisms into the intestinal cells and their entry into the blood.

How much? Good and bad bacteria fight for space and nutrients, produce toxic molecules to prevent pathogens from entering. The intestinal defense mechanism in the form of microorganisms fighting for nutrients and space is called colonization resistance.

Another role of a healthy gut microbiota is to strengthen and maintain barrier immunity, which limits microbial entry as well as inflammation and tissue damage. One of the most important tasks of any organ is to ensure its own safety, because strong unhindered immunity can have a destructive effect on beneficial microbiota, for example, in inflammatory bowel diseases.

In this way, the main strategy is to reduce the contact between microorganisms and the intestinal cell surface. This is achieved by the action of the intestinal epithelial cells that produce antimicrobial substances and mucus, which limit the contact between the intestinal microbiota and the intestinal tissues, and the action of "local" immune cells and the production of IgA antibodies. Such cells and antibodies quickly remove microorganisms that have entered the intestinal wall. Therefore, despite being physically separate, the gut microbiota and the immune system are linked.

Short-chain fatty acids, produced by intestinal bacteria during the fermentation of carbohydrates from food, play an important role in ensuring the production of sufficient mucus in intestinal cells.

Short-chain fatty acids help maintain close contact between intestinal cells, creating an acidic environment that is unfavorable for pathogenic bacteria. Gut microbiota also indirectly influences the production of antimicrobial substances and mucus in intestinal epithelial cells by regulating inflammatory mechanisms and stimulating intestinal cell regeneration. All of these are important for the functioning of a strong intestinal barrier, so any change in the composition of the microbe affects the thickness of the mucous membrane and the integrity of the tight junctions between intestinal cells.

Maintaining the balance between gut microbiota and human immunity is a continuous process. Unfavorable intestinal environment and disruption of intestinal microbiota increase intestinal permeability and increase penetration of microorganisms and lipopolysaccharides (endotoxins) into the blood, activate immune reactions and inflammatory processes.

Gut microbiota as a teacher of the immune system

Have you ever wondered which bacteria are bad for your immune system and which ones should be left alone?

After birth, the human immune system develops together with the gut microbiota. The first and most important interaction between the gut microbiota and the immune system occurs at birth. The fetal gastrointestinal tract is thought to be sterile before birth (although it has recently been shown that this is not entirely true), and the first colonization occurs when the baby exits the birth canal.

At this time, the baby's immunity is still immature, which makes him more susceptible to infections, but, on the other hand, it allows his microbiota to be established without inflammatory processes. The gut microbiota sends signals that stimulate the normal development and maturation of the immune system of the intestinal mucosa. Thus, an effectively regulated mucosal immune system prevents the invasion of pathogens and provides immune resistance to beneficial microorganisms.

A cheerful woman is walking through a meadow at sunset.

Gut microbiota affects the work of the entire immune system

Another important role of the immune system is to facilitate communication between distant body systems (eg, the gut-lung axis). Communication between the intestines and other organs (for

example, the lungs) is carried out through the lymphatic and circulatory systems. Thus, the gut microbiota not only influences the local immune system, but also contributes to immune responses at distant sites.

The effects of the gut microbiota and its metabolites also influence the immunity of other mucosal surfaces, such as the lung mucosa. How this happens is not yet known, but soluble metabolites from the gut microbiota enter the bloodstream and are recognized and responded to by immune cells at distant sites. For example, the gastrointestinal microbiota influences the differentiation of immune T cells into Th1, Th2, Th17, and helper T cells.

But communication between body systems is bidirectional, so the lung can also affect gut function through the migration of immune cells and inflammatory molecules.

It should not be forgotten that the intestinal microbiota synthesizes some vitamins and regulates the absorption of intestinal nutrients. Even a balanced diet and taking all kinds of supplements does not guarantee complete absorption of nutrients if the intestines do not work properly.

How to strengthen the immune system

We already know that the immune system and the microbiota are closely related. Therefore, at this stage, it makes sense to think about what has the greatest effect on the composition of the gut microbiota, because it also strengthens the immune system. What do they have in common?

The answer to this question: nutrition. Both the immune system and gut microbiota are highly sensitive to the nutritional status of the host. The composition and diversity of the gut microbiota is highly dependent on a person's diet and lifestyle, and the gut microbiota in turn regulates the immune system through a symbiotic relationship.

Diet is a key modulator of the immune system and gut microbiota

There are many nutrients that affect the immune system. The basics for a good immune system are:

proteins;

Vitamins D, C, E and other antioxidants;

minerals zinc and selenium;

Omega-3 fatty acids.

All of these nutrients play an important role in maintaining the integrity of physical barriers (mucous membranes and skin), speed of immune cell movement throughout the body, antibody production, pathogen recognition and response, and have antioxidant and antimicrobial properties. Any lack of essential nutrients disrupts the functioning of the immune system and lowers our immunity.

Let's not forget about dietary fiber, which is the main fuel for beneficial gut bacteria and is necessary for the formation of short-chain fatty acids. We already mentioned how important they are for our immune system.

Reduce your intake of highly processed foods and foods to which you are allergic or sensitive, as they affect the immune system and reduce its protective functions.

Include monounsaturated fatty acids (such as olive oil and avocados) and polyunsaturated fatty acids (such as fish and seeds) in your daily diet.

Make sure you get enough protein from quality animal and plant sources. Proteins are the building blocks of our body's cells, including immune cells; all the enzymes necessary for these processes, as well as cytokines - signaling molecules involved in the immune response.

Eating fiber and probiotic foods can improve the composition of the gut microbiota and increase the production of short-chain fatty acids, which is a great way to strengthen the immune system through the gut microbiota.

Try to eat at least four servings of vegetables and fruits of different colors every day to get enough antioxidants.

Of course, diet is not the only way to support immunity. Practice good sleep hygiene, be active, and manage daily stress through relaxation techniques (eg, meditation, breathing techniques, yoga).

How Donat helps to strengthen the immune system

With a unique mineral composition, Donat natural mineral water helps regulate digestion and improves well-being, which has been proven in clinical studies. By drinking half a liter of Donat mineral water a day, you will naturally improve your digestion and help your body absorb the nutrients it needs from healthy foods, which are important for strengthening your immune system. Donat is recommended for regular and long-term use as part of a digestive system support program:

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