

History, introduction of nutritional immunology.

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Introduction

Nutritional immunology is a field of immunology that focuses on studying the influence of nutrition on the immune system and its protective functions. Part of nutritional immunology involves studying the possible effects of diet on the prevention and management on developing autoimmune diseases, chronic diseases, allergy, cancer (diseases of affluence) and infectious diseases.[1] Other related topics of nutritional immunology are: malnutrition, malabsorption and nutritional metabolic disorders including the determination of their immune products [1].

The Role of Nutrition on the Prevention and Management of Diseases

Autoimmune diseases

The development and progression of many autoimmune diseases are generally unknown. The "Western pattern diet" consists of high-fat, high-sugar, low-fiber meals with surfeit of salt and highly processed food, which have pro-inflammatory effects. These effects may promote Th1- and Th17 - biased immunity and alter monocyte and neutrophil migration from bone marrow. A healthy diet contains a multitude of micronutrients that have anti-inflammatory and immune boosting effects that can help prevent or treat autoimmune diseases [2].

The impact of diet is studied in relation to these autoimmune diseases:

1. Inflammatory bowel disease (IBD)
2. Type 1 diabetes (T1D)
3. Multiple sclerosis (MS)
4. Systemic lupus erythematosus (SLE)
5. Rheumatoid arthritis (RA)
6. Celiac disease

Allergies

Nutrition can help prevent or promote the development of food allergies. The hygiene hypothesis states that a child's early introduction to certain microorganisms can avert the onset of allergies. Breastfeeding is considered to be the main method of preventing food allergies. This is because breast milk contains oligosaccharides, secretory IgA, vitamins, antioxidants and possible transfer of microbiota. Conversely,

a child's lack of exposure to specific microorganisms can establish a vulnerability to food allergies [3].

Diabetes

Diabetes mellitus is a disease in which one's blood sugar levels are elevated. There are two forms of diabetes: Type 1 diabetes and Type 2 diabetes. Type 1 is caused by the immune system attacking insulin-producing cells in the pancreas. Type 2 is caused by the underproduction of insulin and the cells in your body becoming resistant to insulin. A low-glycemic diet that is high in fiber is recommended for diabetics because low-glycemic foods digest slower in the body. Slower digestion helps stabilize blood glucose levels and prevents spikes in blood sugar [4].

Cancer

Cancer is a disease with multifactorial causes. Cigarette smoking, physical activity, viruses, and diet play a role in the development of cancer. Poor diet has been linked to the development of cancer, while a healthy diet has been shown to have positive effects on preventing and treating cancer. Cruciferous vegetables contain chemicals called Isothiocyanates (ITC's). ITC's have immune-boosting effects, as well as anti-cancer activity such as the prevention of angiogenesis. Angiogenesis is a process where tumors have their own blood supply in order to feed growing cancer cells. The alliinase containing food group, allium, has anti-cancer and anti-inflammatory properties. Alliinase is an enzyme, which acts as an angiogenesis-inhibitor and a carcinogen detoxifier. Mushrooms reduce cancer cell and tumor growth and prevent DNA damage. Mushrooms have aromatase inhibitors that decrease the levels of estrogen released in the bloodstream, slowing the production of breast tissue. Fruits and vegetables contain flavonoids, which are anti-carcinogens.

Macronutrients

Proteins

Proteins are large biomolecules made up of chains of amino acids, which are the organic compounds that make most bodily functions possible. Proteins are found naturally within the body and are found in foods such as meat, fish, dairy products, eggs, seeds and nuts, and beans and legumes. Throughout the body, proteins are found in hair, nails, muscles and bones; they also can function as enzymes and/or hormones. The role of proteins as enzymes and/or hormones is imperative for cell function and physiological processes as simple as growth.

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Proteins aid in muscle growth, speed up metabolism and lower blood pressure. Proteins are imperative for the body's tissues and organs, working in their function, structure and regulation. Proteins protect the immune system in the form of antibodies, y-shaped proteins that bind to viral, bacterial and parasitic infections, signalling to the rest of the body that there is a foreign cell that should be neutralized. Without antibodies, the body would not be able to target and fight infection [5].

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