Immunomodulation and Modified Arabinoxylan from Rice Bran (BioBran/MGN-3)

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The phenomenon in which exposure to an infection once prevents the possibility of catching it again is called immunity. Jenner first applied this concept to vaccination against smallpox. Nowadays, immunity is understood in a broader sense, to mean the ability to distinguish between self and not-self, which is essential for maintaining homeostasis. If a harmful pathogen enters the body or a cancer cell develops, the body tries to eliminate it in a selective manner. Immunity is a basic function possessed by animals which is essential for survival, and is characterised by its selective response and specific memory. The immune organs include the spleen, lymph nodes, thymus, and the bone marrow, where lymphocytes and macrophages interact with each other to develop immune responses. Lymphocytes comprise B cells, T cells and natural killer cells, all of which have several subsets. Immunity can be categorised as humoral immunity, which involves immunoglobulin, and cellular immunity, which involves sensitised lymphocytes. There are innate immune responses, which are inherent, and acquired immune responses, which lead to immunity induced by the different pathogens and substances derived from plants or animals that enter the body after birth. Immune function is known to be affected by various environmental factors, including nutrition, exercise, sleep, environmental hormones, radiation, and stress. Nutrition is one of the most

important of these factors. Some functional foods and health foods can exert an immunomodulatory effect. When the immune system is compromised, it may be possible to strengthen biological defense and to work towards the prevention of diseases by taking those functional foods.

A variety of health foods have recently entered the market, including oligosaccharides, chitin, chitosan, yoghurt, colostrum, agaricus, salt, and soybean products. This is an indication of health awareness, showing that people's needs have diversified. In Western countries, the number of people who are using health foods and supplements has greatly increased. Many users want to be informed about the effects of these products, based on reliable data. However, the current flood of information is often confusing for many people. There is a need to evaluate health food products properly and produce data. It is likely that health foods where the effect is proven would be useful in preventing diseases and improving health.

Functional food is defined scientifically as "food designed and processed so that its functions can be used efficiently." The requirements for a food to qualify as a functional food are: 1. it must be produced for a clear purpose, 2. it must be orally effective, 3. the chemical structure of the functional factor in the food must be clear, 4. its form within the food (whether it is bound or free) must be clear, 5. the mechanism by which the functional factor acts must be known, 6. it must be very safe (i.e. the ratio of the unsafe dose to the effective doses must be high), 7. the functional factor must be stable in the food, and 8. it must be acceptable as a food. Food has the the following three types of function: 1. nutritional, providing the components of the body's materials and energy sources (the primary function), 2. sensory, including possession of the taste and texture suitable for a food (the secondary function), and 3. bioregulatory, fulfilled by special groups of substances originating from food (the tertiary function). Functional foods are designed such that these functions can be used efficiently and appropriately for the purposes intended. The following is a summary of the bioregulatory functions of food. The functions with respect to the digestive system include inhibiting the absorption of bile acid by peptides, lowering serum cholesterol, inhibiting the secretion of gastric acid, and increasing bifidobacteria. The functions within the cardiovascular system are lowering blood pressure, inhibiting platelet aggregation, and preventing cerebral strokes. The functional factors for the endocrine system include the various hormones involved in lactation, hormones derived from animals, factors to increase the secretion of insulin, and glucagon-like peptides. The functions related to the nervous system are associated with intestinal peristalsis and memory improvement. Functional factors in the biological immune defence system involve immunoglobulins (antibodies), transferrin, polysaccharides, and linoleic acid, which are associated with immunomodulation, host defence, and decreasing the action of allergens.

BioBran/MGN-3 has been reported to activate NK cells and macrophages. It also promotes the production of interferon γ and cytokines in lymphocytes. The following is an explanation of the immunomodulatory action of BioBran/MGN-3.