SITA 1997. IX Seminario Internacional de Terapias Alternativas & Workshop I.A.T.E.C

Inmunology and Cancer (extract)

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The immunological system or defense system has evolved during hundreds of millions of years and its dynamics are very rapid and simultaneous. Each second of our lives it is waging a battle in our body against many trillions of microorganisms.

Because of this, the immune system finds it necessary to produce more than 200,000 new immunological cells and thousands of antigen molecules per second.

The immune response is very complex but we can describe different systems that act simultaneously and are synchronically coupled.

1. The Destruction by Phagocytes of Invading Agents

There is a marked relation between the phagocytic process and the activation of the immunological system. The macrophages are the ones responsible for the direct elimination of substances foreign to the body aid also through them a series of events are triggered that have as a result the production of antibodies.

The white corpuscles or leukocytes are cells designed to "eat up" bacteria or any foreign matter in the organism; they have an average life span of 6 to 12 hours. There are various types of white corpuscles or leukocytes: neutrophiles, basophiles, and eosinphiles.

The first line of defense in phagocytosis are the neutrophiles, half of the leukocyte army is made np of this type of cell; around 100,000 million of these warriors are produce daily in the bone marrow. When an invader enters, numerous substances are liberated al Ihe site of the invasion, since the products produced by 11w bacteria react with the plasma factors, producing numerous agents that attract the neutrophiles, this is call chemotaxjs.

The neutrophiles have the property of being able to penetrate 11w blood vessels' walls so as lo reach the battle site, this property is called diapedesis. The leukocytes have the particularity of selecting the matter to be phagocyted, otherwise they could be directed against the body's own structures.

The second fine of defense in phagocytosis is the moncytes which are produced iii the bone marrow and while still immature pass into the tissues. They grow up lo 5 times there initial diameter, developing in their cytoplasm a large amount of lysomes and mitochondria and are then called macrophages. These cells are capable of phagocyting up lo 100 bacterias much bigger than them

II. Production of Specialized Lymphocytes

The lymphocyte system has been in existence for more than 200 million years. The thymus is the soul of the immunological system and its principal products are T lymphocytes and T cells that are responsible for cellular immunity.

The T cells are programmed inside the thymus to recognize only one antigen, that is one T cell for one antigen, therefore it is necessary to program T cells that can recognize more than a million different antigens. A T cell performs its protection role during 60 years. There are several types of T cells: inducer cells, T lymphocytes, Suppressor Cells-TB. These cells have the capacity of inhibiting the production of antibodies and are designed lo maintain the immunological system in equilibrium thus controlling the intensity of the immunological response.

Killer Cells and Natural Killer Cells

These are cells that are found in the lymphatic ganglions and circulate in the blood but do not have sufficient physical characteristics in common with the T or B lymphocytes to be grouped with these families.

Killer Cells (KC) have the property of attacking cells covered with antibodies which permits a special defense against cancer. Antibodies are produced against cancer cell but they do nol seem lo be very' effective in destroying them, nevertheless Killer Cells have the ability of destroying these cells covered by antibodies.

Natural KiIIer Celle (NKC) also are cells that look hike lymphocytes, but should not be classified as T or B cells. They have the ability of killing certain organisms and cells, apparently without the help of other secretions of the immune system. They work efficiently in the presence of chemical substances liberated by the activated T lymphocytes.

III. Antibody Production System

The T Cell system can handle parasites, viruses and fungi with certain facility but has difficulty in handling bacterias of a large size and able lo divide rapidly spreading throughout the body. Humoral immunity, designed to protect the body from bacteria, and toxic substances and the B lymphocytes are responsible for carrying out this type of immunity. These cells only live a few weeks, thus the bone marrows is forced lo produce daily enormous amounts of B lymphocytes.

The B lymphocytes have on their surface receptors to contact specific antigens. Once the antigen has been located, these lymphocytes are stimulated to divide; the daughter cells are called Plasma Cells. These are designed to produce great quantities of antibodies which circulate in the blood bonded to the gamma globulin of the plasma and are called immunoglobulins.

The B lymphocyte, with more than half a million receptors for a single antigen are located in the lymphatic nodules awaiting the antigen for which they are programmed. The receptor, located on the membrane, is an immunoglobulin and when it recognizes the antigen it asks a T lymphocyte for permission lo bond with it and initiate the immunological response. Once the B cell receives permission to attack it is stimulated lo divide and form what is calla! a plasma cell done that is going lo secret great quantities of immunolobulins to neutralize and eliminate the antigen.

IV. Complement System - Properdin

The different chemical variations that occur in the site of the lesion is carried out thanks to the participation of the plasma's enzymatic system called complement system, which is activated by the products produced by the bacteria. This system can also be activated even in the absence of immunoglobulins thanks lo the activity of the other product present in the plasma called properdin.

When the complement system is activated II enzymes enter into action in a specific sequence, producing holes in the membranes of the sensitized cells with antibodies; the ions are filtered through these holes and the cells are finally destroyed.

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