THE IMMUNE SYSTEM--PART 1

Home
Breeder's Directory
Article Index
Journey Into Learning
News and Views
Important Info about NR News
Ordering Info
How to contact us
Search
Read Me
Catalogue

Journey Into Learning

Introduction
Nutrition And Supplements
Diet
Vaccinations
Homeopathy Basics
Homotoxicology - Some Basics
Fundamentals of Homotoxicology
Redefining The Modern Dog
Steroids: The Great Pretender
The Rise (and Fall) Of Antibiotics
Can Antibiotics Cause Infections
BioSET New Millenium Medicine
Bioset - Page 2
Bioset - Page 3

The immune system is perhaps one of the most complex and fascinating systems of the body. Although we all understand that it is the immune system's job to defend the body against foreign invaders, understanding the methods used to accomplish this is relatively new knowledge. As we move along in this series, I will attempt to provide you with definitions of the "language" used to describe the system. For you science buffs out there, I apologize for oversimplifying a complex subject in an effort to pass along some basic concepts. Bear with me while we start from the beginning and move along to modern theory and some conjecture.

By the time we are through, you will have an understanding of what vaccinations attempt to do, the role of nutritional supplements, and some speculation of how nosodes may work.

When we talk of this herb or that substance having anti-microbial properties, are we saying that it directly hunts out and kills the microbe? When we speak of "immunization" (be it vaccination or nosode) are we talking about something we put inside the body that directly attacks the offender ?

NO!

In all cases we are speaking of helping the body's immune system to function at an optimum level. True health cannot be achieved unless the immune system is operating as nature intended. The magnificent design of this system is breathtaking in its concept. Consider if you will, the remarkable ability to distinguish between the body's own cells as "self" and foreign cells as "non-self". When immune defenders encounter cells or organisms carrying markers that say "foreign," they quickly swing into action to get rid of them in one way or another. Anything that can trigger this immune response is called an ANTIGEN. In other words, if you don't carry the right "passport" you're in deep doo-doo with the system.

The secret to the success of the system, is an elaborate and dynamic communications network. Millions and millions of cells, organized into sets and subsets, pass information back

and forth like clouds of bees swarming around a hive. It can recognize millions of different enemies, and it can produce secretions and cells to match up with and wipe out each of them!!

Some immune cells are "general purpose" warriors and will take on all comers. Others are highly specific and will only deal with selected targets. To work effectively, most immune cells need cooperation of their fellows. Sometimes immune cells communicate by direct physical contact, sometimes by releasing chemical messengers. There is also new evidence of "electronic" communication.

When the immune system is crippled or damaged in some way, it is an invitation not only for microbial infection but also a prime setting for cancer to take hold.

In abnormal situations, the immune system can mistake "self" for "non-self" and launch an attack. The result is called "autoimmune" disease. Some forms of arthritis and diabetes are examples of this.

In other cases the immune system responds inappropriately to a seemingly harmless substance such as pollen, certain foods, etc. The result is allergy. This kind of antigen is called an ALLERGEN.

So lets get into the bits and pieces that make up the "system" and try to fit them together. As the immune system is composed of the lymphatic vessels and organs (thymus, spleen, tonsils and adenoids, and lymph nodes), white blood cells (lymphocytes, neutrophils, basophils, eosinohils, monocytes, etc.) specialized cells residing in various tissues (macrophages, mast cells, etc.) and specialized serum factors, we do have a lot of ground to cover just to get a handle on the basics.

For now lets start with a word that everybody recognizes but may not realize their limited function--- ANTIBODIES. We were all taught that antibodies wipe out specific antigens. While this is true to some extent, it needs to be emphasized that antibodies only ambush antigens in the body's fluids. They are powerless to penetrate cells.

The job of attacking target cells (either cells that have been infected by microbes or cells that have been distorted by

cancer) is left primarily to T lymphocytes and other immune cells, which we will get into later.

The difference is so basic that medicine describes the immune system as having two separate branches.

1. "Humoral" immune system: Antibodies are produced to recognize and neutralize antigens. Sometimes referred to as the "specific" or "secondary" system. It is not dependent on the Thymus but rather on the "B cells" (white blood cells that originate in the bone marrow).
2. "Cell Mediated" immune system. This refers to immune mechanisms not controlled or mediated by antibodies. This involves white blood cells called T-cells (Thymus dependent) and other specialized immune cells. Sometimes referred to as the "primary" or "non specific" immune system. It is this system that provides the deeper immunity and is critical in protecting against the development of cancer and allergies.

In this section we will primarily cover some of the basics of the humoral system.

These two branches of the immune system have a reciprocal relationship. That means when the humoral branch is over stimulated (ex. vaccines, allergies), the cell-mediated branch tends to be relatively inactive. Vaccines do not stimulate the cell-mediated branch.

Normal microbial infection (what you or I would call "street infection") does stimulate the cell-mediated branch and can stimulate the humoral branch as well. In nature, the humoral system is only activated when the cell-mediated system has failed to look after the problem and needs help.

One of the fascinating aspects of the immune system is that it has a memory and the capacity to learn. Long ago physicians realized that people who had recovered from the plague would never get it again--they had acquired immunity. In order to have room for all the cells needed to match millions of possible enemies, the immune system stores just a few of each kind. When an antigen appears, those few matching cells multiply into a full-scale army. After their job is done, they fade away except that the system forever retains a "blue-print" for rapid

reactivation should it ever be needed.

Within the humoral system, the prime responsibility for the immune response lies with the B cells. Each B cell is specific to the production of one type of antibody. When a B cell encounters an antigen, it gives rise to many large cells know as "plasma" cells. Every plasma cell is essentially a factory for producing antibodies. Each of the plasma cells from a given B cell manufactures millions of identical antibody molecules and pours them into the blood stream.

An antibody matches an antigen much as a key matches a lock. Some match exactly; others fit more like a skeleton key. But whenever antibody and antigen interlock, the antibody marks the antigen for destruction.

Vaccines contain microorganisms--or parts of microorganisms--that have been treated so they will be able to provoke an antibody response but not full-blown disease. (They also contain a lot of other stuff that would be considered an "antigen" by the body--but that's a whole other subject).

The amount or concentration of a particular antibody that is in solution can be measured in a laboratory. This is called a "Titer Test". Common sense would indicate that if a Titer Test revealed that antibodies for a particular disease already exist at appropriate levels--booster shots are not required!

Here is something more to think about. Even if antibody levels do not test out as appropriate, a booster will not be necessary if the "factory" (the B cell) is healthy and fully prepared to produce them on demand! The pattern is stored in memory and providing the proper raw materials are on hand, the humoral system is capable of reacting very rapidly to a previously recognized antigen.

Actually, antibodies belong to a family of large molecules known as IMMUNOGLOBULINS. Some of you will be familiar with these from seeing lab reports with the symbols IgG, IgM, IgA, IgD, IgE. These five different types play different roles in the immune defense strategy.

For example, immunoglobulin G (IgG) works efficiently to coat microbes, speeding their uptake by other cells in the immune system. Immunoglobulin M is very effective in killing bacteria.

Immunoglobulin A concentrates in body fluids--tears, saliva, the secretions of the respiratory tract and digestive tract--guarding the entrances to the body. It's believed that immunoglobulin E (whose natural job is probably to protect against parasitic infection) is one of the villains responsible for the symptoms of allergy.

One other factor plays a major role in the humoral system and that is the COMPLEMENT SYSTEM. As mentioned in previous issues, complement proteins circulate in the blood in an inactive form. The complement system is made up of about 25 body chemicals (manufactured in the liver and the spleen) that work together to "complement" the action of antibodies in destroying microbes. Complement also helps to rid the body of antibody-coated antigens (complexes).

When the first protein in the complement series is activated--typically by an antibody that has locked into an antigen protruding from a cell--it sets in motion a domino effect. Each component takes its turn in a precise chain of steps known as the "complement cascade". The end product is a cylinder inserted into, and punching a hole in, the cells' wall. With fluids and molecules flowing in and out, the cells swell and burst. Complement proteins, which cause blood vessels to become dilated and then leaky, contribute to the redness, warmth, swelling, pain, and loss of function that characterize an INFLAMMATORY RESPONSE.

In the part 2 we will deal with some basics of the "Cell Mediated" immune system.

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