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In most cases, the immune system does a great job of keeping people healthy and preventing infections. But sometimes problems with the immune system can lead to illness and infection. Through a series of steps called the immune response, the immune system attacks organisms and substances that invade body systems and cause disease. The immune system is made up of a network of cells, tissues, and organs that work together to protect the body. One of the important cells involved are white blood cells, also called leukocytes, which come in two basic types that combine to seek out and destroy disease-causing organisms or substances. Leukocytes are produced or stored in many locations in the body, including the thymus, spleen, and bone marrow. There are also clumps of lymphoid tissue throughout the body, primarily as lymph nodes, that house the leukocytes. The leukocytes circulate through the body between the organs and nodes via lymphatic vessels and blood vessels. In this way, the immune system works in a coordinated manner to monitor the body for germs or substances that might cause problems. The two basic types of leukocytes are: If doctors are worried about a bacterial infection, they might order a blood test to see if a patient has an increased number of neutrophils triggered by the infection. Other types of phagocytes have their own jobs to make sure that the body responds appropriately to a specific type of invader. The two kinds of lymphocytes are B lymphocytes and T lymphocytes. Lymphocytes start out in the bone marrow and either stay there and mature into B cells, or they leave for the thymus gland, where they mature into T cells. B lymphocytes and T lymphocytes have separate functions: T cells are like the soldiers, destroying the invaders that the intelligence system has identified. These cells trigger the B lymphocytes to produce antibodies, which are specialized proteins that lock onto specific antigens. This is also how immunizations prevent certain diseases. Although antibodies can recognize an antigen and lock onto it, they are not capable of destroying it without help. Some T cells are actually called "killer cells. Antibodies also can neutralize toxins poisonous or damaging substances produced by different organisms. Lastly, antibodies can activate a group of proteins called complement that are also part of the immune system. Complement assists in killing bacteria, viruses, or infected cells. All of these specialized cells and parts of the immune system offer the body protection against disease. This protection is called immunity. Immunity Humans have three types of immunity â€" innate, adaptive, and passive: Innate Immunity Everyone is born with innate or natural immunity, a type of general protection. Innate immunity also includes the external barriers of the body, like the skin and mucous membranes like those that line the nose, throat, and gastrointestinal tract , which are the first line of defense in preventing diseases from entering the body. Adaptive Immunity The second kind of protection is adaptive or active immunity, which develops throughout our lives. Adaptive immunity involves the lymphocytes and develops as people are exposed to diseases or immunized against diseases through vaccination. Passive Immunity Passive immunity is "borrowed" from another source and it lasts for a short time. This can help protect the baby against infection during the early years of childhood. Some people never seem to get infections, whereas others seem to be sick all the time. As people get older, they usually become immune to more germs as the immune system comes into contact with more and more of them. Immunodeficiencies also can be acquired through infection or produced by drugs these are sometimes called secondary immunodeficiencies. Immunodeficiencies can affect B lymphocytes, T lymphocytes, or phagocytes. Examples of primary immunodeficiencies that can affect kids and teens are: IgA deficiency is the most common immunodeficiency disorder. IgA is an immunoglobulin that is found primarily in the saliva and other body fluids that help guard the entrances to the body. People with IgA deficiency tend to have allergies or get more colds and other respiratory infections, but the condition is usually not severe. SCID is a serious immune system disorder that occurs because of a lack of both B and T lymphocytes, which makes it almost impossible to fight infections. DiGeorge syndrome thymic dysplasia , a birth defect in which kids are born without a thymus gland, is an example of a primary T-lymphocyte disease. The thymus gland is where T lymphocytes normally mature. Acquired or secondary immunodeficiencies usually develop after

someone has a disease, although they can also be the result of malnutrition, burns, or other medical problems. Certain medicines also can cause problems with the functioning of the immune system. Acquired secondary immunodeficiencies include: It is caused by HIV, a virus that wipes out certain types of lymphocytes called T-helper cells. Without T-helper cells, the immune system is unable to defend the body against normally harmless organisms, which can cause life-threatening infections in people who have AIDS. Newborns can get HIV infection from their mothers while in the uterus, during the birth process, or during breastfeeding. People can get HIV infection by having unprotected sexual intercourse with an infected person or from sharing contaminated needles for drugs, steroids, or tattoos. Immunodeficiencies caused by medications. Some medicines suppress the immune system. One of the drawbacks of chemotherapy treatment for cancer, for example, is that it not only attacks cancer cells, but other fast-growing, healthy cells, including those found in the bone marrow and other parts of the immune system. The substances that provoke such attacks are called allergens. The immune response can cause symptoms such as swelling, watery eyes, and sneezing, and even a life-threatening reaction called anaphylaxis. Medicines called antihistamines can relieve most symptoms. Asthma , a respiratory disorder that can cause breathing problems, often involves an allergic response by the lungs. If the lungs are oversensitive to certain allergens like pollen, molds, animal dander, or dust mites , breathing tubes can become narrowed and swollen, making it hard for a person to breathe. Eczema is an itchy rash also known as atopic dermatitis. Although not necessarily caused by an allergic reaction, eczema most often happens in kids and teens who have allergies, hay fever, or asthma or who have a family history of these conditions. Allergies of several types can affect kids and teens. Environmental allergies to dust mites, for example , seasonal allergies such as hay fever , drug allergies reactions to specific medications or drugs , food allergies such as to nuts , and allergies to toxins bee stings, for example are the common conditions people usually refer to as allergies. Cancers of the Immune System Cancer happens when cells grow out of control. Leukemia , which involves abnormal overgrowth of leukocytes, is the most common childhood cancer. Lymphoma involves the lymphoid tissues and is also one of the more common childhood cancers. With current treatments, most cases of both types of cancer in kids and teens are curable.

Chapter 2 : Immunology - Wikipedia

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This section does not cite any sources. Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. February Learn how and when to remove this template message Classical immunology ties in with the fields of epidemiology and medicine. It studies the relationship between the body systems, pathogens , and immunity. The earliest written mention of immunity can be traced back to the plague of Athens in BCE. Thucydides noted that people who had recovered from a previous bout of the disease could nurse the sick without contracting the illness a second time. The study of the molecular and cellular components that comprise the immune system, including their function and interaction, is the central science of immunology. The immune system has been divided into a more primitive innate immune system and, in vertebrates , an acquired or adaptive immune system. The latter is further divided into humoral or antibody and cell-mediated components. The immune system has the capability of self and non-self-recognition. An antigen is a substance that ignites the immune response. The cells involved in recognizing the antigen are Lymphocytes. Once they recognize, they secrete antibodies. Antibodies are proteins that neutralize the disease-causing microorganisms. The humoral antibody response is defined as the interaction between antibodies and antigens. Immunology rests on an understanding of the properties of these two biological entities and the cellular response to both. Besides, there are direct implications of the immune system in the infectious diseases tuberculosis, malaria, hepatitis, pneumonia, dysentery, and helminth infestations as well. Hence, research in the field of immunology is of prime importance for the advancements in the fields of n the modern medicine, biomedical research, and biotechnology. February Learn how and when to remove this template message Clinical immunology is the study of diseases caused by disorders of the immune system failure, aberrant action, and malignant growth of the cellular elements of the system. It also involves diseases of other systems, where immune reactions play a part in the pathology and clinical features. The diseases caused by disorders of the immune system fall into two broad categories: Other immune system disorders include various hypersensitivities such as in asthma and other allergies that respond inappropriately to otherwise harmless compounds. In fact, many of the infections acquired by neonates are caused by low virulence organisms like Staphylococcus and Pseudomonas. In neonates, opsonic activity and the ability to activate the complement cascade is very limited. Phagocytic activity is also greatly impaired in newborns. This is due to lower opsonic activity, as well as diminished up-regulation of integrin and selectin receptors, which limit the ability of neutrophils to interact with adhesion molecules in the endothelium. Although, the number of total lymphocytes is significantly higher than in adults, the cellular and humoral immunity is also impaired. At birth, most of the immunoglobulin present is maternal IgG. Some IgA is provided by breast milk. These passively-acquired antibodies can protect the newborn for up to 18 months, but their response is usually short-lived and of low affinity. If a child is exposed to the antibody for a particular antigen before being exposed to the antigen itself then the child will produce a dampened response. Passively acquired maternal antibodies can suppress the antibody response to active immunization. Similarly the response of T-cells to vaccination differs in children compared to adults, and vaccines that induce Th1 responses in adults do not readily elicit these same responses in neonates. This can be the reason for distinct time frames found in vaccination schedules. Oestradiol usually begins to act around the age of 10 and testosterone some months later. Other androgens, however, such as DHEA , increase immune response. Physical changes during puberty such as thymic involution also affect immunological response. Ecoimmunology and Behavioral immune system Ecoimmunology, or ecological immunology, explores the relationship between the immune system of an organism and its social, biotic and abiotic environment. More recent ecoimmunological research has focused on host pathogen defences traditionally considered "non-immunological", such as pathogen avoidance, self-medication, symbiont -mediated defenses, and fecundity trade-offs. For example, the Monarch

butterfly often lays its eggs on certain toxic milkweed species when infected with parasites. These toxins reduce parasite growth in the offspring of the infected Monarch. However, when uninfected Monarch butterflies are forced to feed only on these toxic plants, they suffer a fitness cost as reduced lifespan relative to other uninfected Monarch butterflies. Aphids , for example, rely on several different symbionts for defense from key parasites, and can vertically transmit their symbionts from parent to offspring. Immunotherapy The use of immune system components to treat a disease or disorder is known as immunotherapy. Immunotherapy is most commonly used in the context of the treatment of cancers together with chemotherapy drugs and radiotherapy radiation. However, immunotherapy is also often used in the immunosuppressed such as HIV patients and people suffering from other immune deficiencies or autoimmune diseases. Immunodiagnostics The specificity of the bond between antibody and antigen has made the antibody an excellent tool for the detection of substances by a variety of diagnostic techniques. Antibodies specific for a desired antigen can be conjugated with an isotopic radio or fluorescent label or with a color-forming enzyme in order to detect it. Cancer immunology The study of the interaction of the immune system with cancer cells can lead to diagnostic tests and therapies with which to find and fight cancer. Reproductive immunology This area of the immunology is devoted to the study of immunological aspects of the reproductive process including fetus acceptance. The term has also been used by fertility clinics to address fertility problems, recurrent miscarriages, premature deliveries and dangerous complications such as pre-eclampsia. Theoretical immunology[edit] Immunology is strongly experimental in everyday practice but is also characterized by an ongoing theoretical attitude. Many theories have been suggested in immunology from the end of the nineteenth century up to the present time. The end of the 19th century and the beginning of the 20th century saw a battle between "cellular" and "humoral" theories of immunity.

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Acknowledgments, vii How to Use This Book, viii This book is neither a comprehensive text nor an exam-review tool. It is an overview of the immune system, designed to give anyone who is learning immunology a feel for how the system fits together. Focusing in on one player at a time makes it hard to understand the game. Here we view the action from the grandstands to get a wide-angle picture of what the immune system is all about. Lecture 3 B Cells and Antibodies, 27 B cells and the antibodies they produce are part of the adaptive immune system. This defense evolves during our own lifetime to protect us against invaders that we, personally, have never encountered before. This feature keeps these important cells focused on the particular attackers which they are able to defend against. This requirement helps insure that only useful weapons will be mobilized. Lecture 6 T Cells at Work, 63 Once they have been activated, helper T cells orchestrate the immune response, and killer T cells destroy infected cells. Lecture 7 Secondary Lymphoid Organs and Lymphocyte Trafficking, 72 B and T lymphocytes travel through secondary lymphoid organs looking for the intruders they can defend against. Once activated in the secondary lymphoid organs, B and T cells are dispatched to the particular areas of the body where they can be most useful. Lecture 8 Restraining the Immune System, 84 The powerful weapons of the immune system must be restrained lest they become overexuberant. Lecture 9 Self Tolerance and MHC Restriction, 88 T cells must be trained to focus on appropriately presented invaders, and B and T lymphocytes must learn not to attack our own bodies. Lecture 10 Immunological Memory, 98 The innate immune system remembers pathogens which have been attacking humans for millions of years. In contrast, B and T cells remember pathogens we have encountered during our lifetime. Memory B and T lymphocytes respond more quickly and effectively to a subsequent attack by the same invader. Lecture 11 The Intestinal Immune System, The human intestines are home to trillions of bacteria, viruses, fungi, and parasites. How the immune system deals with these potentially dangerous intestinal residents, which frequently invade the tissues surrounding the intestines, is a hot topic in immunology. Lecture 12 Vaccines, Vaccines safely mimic the attack of an invader so that our immune system will be primed and ready for a future challenge by the same invader. Lecture 14 Immunodeficiency, Serious disease may result when our immune system does not operate at full strength. Humans who are infected with the AIDS virus have profoundly impaired immune systems. Lecture 15 Cancer and the Immune System, The human immune system is not very good at defending us against cancer. Indeed, there is a built-in conflict between the need to minimize the chance that its weapons will attack our own bodies, and the need to destroy wannabe cancer cells.

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Chapter 8 : Aids to immunology (Book,) [calendrierdelascience.com]

It is now 10 years since the first AIDS cases were reported in the USA. In that relatively short period of time, study of the disease has moved from the level of early clinical description to exhaustive and extensive laboratory characterization of the human immunodeficiency virus (HIV), the immune responses directed towards it and reasons for their failure.

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