CHAPTER NO. VI

REVIEW OF IMMUNITY

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REVIEW OF IMMUNITY

1. IMMUNITY A GENERAL CONSIDERATION

Immunity may be defined as the ability to recognise, destroy, and eliminate the antigenic material, which is foreign to the body.

Antigens are the substances with molecular weight of more than 5000 which, when introduced in the body, stimulate the formation of antibodies specific to the substance only.

Antibodies are the specific products formed in the body in response to the entry of a particular antigen.

Interferons are the antiviral protein products formed in minute amount in the body early during virus infections. The study of interferons may give a new break in the therapeutics of cancer and virus diseases.
Immunoglobulins are very important in the study of immunity. These are groups of serum globulins, formed by the reticulo endothelial system in the body. The various immunoglobulins are IgG, IgD, IgE, IgA, and IgM. Of these IgG is clinically most important.

The process of immunity has two main mechanisms viz. immunoglobulin and cellular immunity. The two main types of lymphocytes concerned with the immunological processes are T-cells of thymus and B-cells from bone marrow. B-Cells form antibodies. The T-cells help in formation of anti-bodies and also ▁▁ to suppress immunoglobulin synthesis.

1) Exit from the body to re-enter the new host.

2) Ability to survive in external environment before affecting.

**TYPES OF IMMUNITY**

1) Natural

2) Acquired (a) Active or (b) Passive

Natural (Innate) immunity is the resistance possessed by a person to a disease to which he has not been previously exposed. This resistance is due to heredity and individual's state of health. This immunity may by individual or racial. Immunity present in a community is termed as herd immunity.

Acquired immunity may be active or passive.
Passive artificial immunity is acquired by injecting antibodies already present in the serum and is short lived. The serum may be antitoxin serum, or convalescent serum etc.

Active immunity: The body cells are stimulated to form the specific antibodies against that very specific diseases by introduction of killed or attenuated micro-organisms in form of vaccines.

1) Active natural acquired immunity: Some diseases produce lasting immunity i.e. small pox, tetanus, or whooping cough.

2) Artificial active acquired immunity can be obtained against following diseases.

   a) By living attenuated micro-organisms e.g. smallpox vaccine, B.C.G. vaccine (Tb) and yellow fever vaccine.

   b) By killed micro-organisms e.g. T B vaccine, cholera vaccine, antirabies vaccine.

   c) By filtrates of micro-organisms e.g. Diphtherial tetanus.

Classification of active immunity: Active immunity can be classified into two main types viz. cellular immunity (T-cell type) and homoral immunity (B-Cell type).

i) Cellular immunity (T-cell type): In this type there is activation of macrophages, mononuclear inflammatory reactions, and delayed hypersensitivity as seen in cases of brucellosis, tuberculosis and rejection of grafts etc.

ii) Humoral immunity (B-cell type): The antibodies in this type are produced by plasma cell on exposure to foreign matter like bacteria, viruses, toxins etc.
Defence of the organism against infections is not solely provided by phagocytosis, but is also due to humoral factors, i.e by substance formed in the cells that render bacterial and the products of their activity harmless. In certain illnesses, caused by bacteria (infectious diseases), for example, substances (antitoxins) are produced and accumulated in the body that neutralize (probably by chemical binding) the bacterial poisons, or toxins. Repeated introduction of toxins into the blood of animals leads to the accumulation of corresponding antitoxins in it. The blood serum of these animals is used in treatment.

During many infectious diseases (e.g. during measles, smallpox, typhus, etc.) substances known as antibodies, or immune bodies, that inhibit bacterial development are produced in body. Consequently, some diseases rarely recur in the same person. The serum of the once infected person suppresses the causative agents of the disease. This condition of insusceptibility to diseases, due to the presence in the blood and tissues of substances that inhibit development of the infection and owing to a change in the ability of the body cells to react against the causative agent, is called immunity. Antibodies are produced by the cells of the reticulo-endothelial system.
The formation of immune bodies is stimulated not only by bacteria, but also in response to the parietal introduction (not by way of the digestive tract) of any foreign protein into the body. Serum derived from an animal immunized against a foreign protein causes that protein to clot and precipitate in flakes. The phenomenon is known as precipitation, and the substances responsible for it as precipitins. Immune bodies also include the haemolysins, the agglutinins, etc.

When immune bodies are present in the body at birth the condition is known as congenital or inherited immunity. Accumulation of immune bodies during the individual's lifetime is called acquired immunity. Inherited immunity explains the insusceptibility of humans and some animal species to certain diseases. Man, for example, does not contract cattle plague. Congenital immunity can be impaired by external factors. Fowl which are normally insusceptible to anthrax, acquire the disease it exposed to chilling. Ionizing irradiation also lowers body resistance to infection.

Congenital immunity is mainly due to the phagocytic capacity of the leucocytes. The spores of B.anthraxs introduced into a rabbit are destroyed by the leucocytes, which ingest and digest them ; in rabbit serum (invitro), however, the spores grow well.
Bacterial or other foreign proteins, entering blood stream and tissues, are called antigens. Antigens are generally composed of protein nucleus and polysaccharides or mucopolysaccharides (haptens). The specific proteins formed in blood plasma as a result of these antigens are antibodies or immune bodies. They are members of the y-globulin fraction of plasma proteins. The antibodies may be of four types:

1) Agglutinins - those which clump together the antigens.

2) Cytolysins or Haemolysins - antibodies those are responsible for haemolysis of the R.B.C. or cytolysis of cells.

3) Precipitins - those which cause the precipitation of foreign proteins.

4) Antitoxin - produced as a result of entry fo certain toxins, to neutralise them.

Immunity is a defense mechanism against -

i) micor-organisms,

ii) toxins produced by micro-organisms or

iii) foreign proteins.

An animal might be permanently resistant to any of the above three agents from birth in which case it is named as natural immunity. An active acquired immunity might be due to resisted attack from a) particular micororganism, b) closely similar micor-organism. c) micro-organism artificially made less hostile, d) killed micro-organism, e) modified toxin.

Serum of an animal containing antitoxin produced as a result of active immunity, if injected into human beings produces passive immunity within a short time.
LEUCOCYTES

Leucocytes, or white blood corpuscles, play an important role in both defence and restorative processes in the organism. Their main functions are: 1) phagocytosis, 2) production of antibodies, and 3) destruction and removal of toxins of protein origin.

The number of leucocytes is much less than the number of erythrocytes (about 0.125 to 0.16 percent). There are between 6,000 and 8,000 leucocytes per cubic millimeter of adult blood. An increase in their number is known as leucocytosis, and a decrease as leucopenia. Leucocytosis is characteristic of a number of pathological (inflammatory) processes, but it may also be encountered in healthy individuals (during digestion of food, muscular work, in pain, and during strong emotion). For example, an increase of the leucocyte count to 11,000 has been observed in students taking a difficult examination.

Leucocytes are divided into two main groups - granular (granulocytes) and agranular or non-granular (agranulocytes) which differ in origin and function. Granulocytes (eosinophils, basophils, and neutrophils) develop from the myeloblasts of bone marrow.

Eosinophils from one to four percent of the leucocyte count and stain with acid stains (eosin and other). They take part in the destruction and detoxication of toxins of protein origin and foreign proteins. Under the influence of the latter their number in the blood increases.
Basophils make up 0 to 1 percent of the leucocyte count and stain with basis dyes, e.g. methylene blue and others. Their protoplasm has granules containing heparin.

The number of basophils increases during the regenerative (terminal) stage of acute inflammation, and the other products of these cells hamper coagulation of the blood in the focus of inflammation and thus facilitate reabsorption and healing.

Neutrophils (70 percent of the total leucocyte count) stain with neutral dyes. Their main function is phagocytosis and the production of antibodies. Neutrophils accumulate in vast number at sites of injury to tissues and bacterial penetration. These relatively large cells are capable of active penetration of the endothelium of the capillaries and cative spread in the tissues to the place where bacteria have entered. Neutrophils have amoeboid movement due to positive chemotaxis. Their rate of movement reaches 40 microns per minute i.e. a distance three or four-time their own diameter. Having made contact with the bacterial, neutrophils engulf, digest, and destroy them. The phenomenon was discovered by metchini koff and named phagocytosis (greek phagein to set ; phagocytes - cells that ingest.)

One leucocyte may engulf 15 to 20 bacteria, but having done so, it may itself die (in that case the bacteria inside it continue to multiply)
As well as liberating proteolytic enzymes that digest bacteria, neutrophils secrete a number of substances (antibodies) that render bacteria harmless and facilitate phagocytosis. Neutrophils ingest both live and dead bacteria, disintegrating cells of the organism itself, and foreign particles. Figuratively speaking, they are the "scavengers" of the body. The neutrophil blood count increases markedly in acute inflammatory processes.

Normally, blood contains a definite number of mature polymorphonuclear leucocytes (neutrophilic) and of their precursors, immature stabnuclear cells (3 to 5 percent) and juvenile forms (0 to 1 percent). In neutrophilic leucocytosis the number of these immature forms increases, and myelocytes, from which the juvenile cells derive, may by encountered in the blood.

The agranulocytes include monocytes and lymphocytes (large and small). Monocytes make up 4 to 8 percent of the leucocytes count. They are thought to originate in the bone marrow, lymph nodes, and connective tissue. Arriving at a site of inflammation from the blood, they are transformed into macrophages (giant phagocytes).

It should be mentioned here that an accumulation of incompletely oxidized products at a focus of inflammation brings about an acid reaction which inactivates neutrophils. Macrophages differ from them in requiring an acid medium for their phagocytic and digestive activity. When inflammation develops they take the place of neutrophils.

Lymphocytes (21 to 35 percent) of the leucocyte count) develop mainly in the lymph nodes, but partly in the spleen, thymus, and mucous membranes. They are the most plastic all the blood cells, and can change into monocytes and macrophages or into tissue histiocytes and connective tissue fibroblasts. These cells participate in the restorative, or reparative, process following inflammation.
IMMUNOGLOBULINS

From the early days of immunology, antibodies have been described in terms of their various reactions with antigens as precipitins, lysins, antitoxins, agglutinins, etc. and it was believed that these effects were due to the same kind of antibody acting in different circumstances. It is now clear on two scores that not all antibodies reacting with the same antigen are of the same kind. Firstly, different antibodies may react with antigenic determinants of varying specificity on the same substance (e.g. a protein molecule). Secondly, the immunoglobulin classes (IgG, IgM, IgA, IgD and IgE) differ in their biological properties.

Structure of Immunoglobulins—Immunoglobulins are made up of distinct subunits held together in the whole molecule by disulphide (S.S.) bonds. The bonds can be broken by reducing agents, so that the molecule falls apart into pairs of polypeptide chains called light and heavy, chains as determined by their molecular weights. Two types of light chain exist, K and L, of which individual immunoglobulins have only one type. The enzyme papain splits the immunoglobulin molecule into two antigen binding fractions and one crystallisable fraction. The Fc fragment of the heavy chain is responsible for the antigenic differences between the classes of immunoglobulin which enables their ready quantitation by antisear. It is the Fc fragment of the heavy chain which carries the predominant part of the molecule responsible for complement activation or fixation. This depends upon changes in the configuration of the immunoglobulin molecule when reacting with antigen. The Fc fragment also contains sites for macrophage fixation and for fixation to the killer (K) lymphoid cells of Type VI reactions.
CLASSIFICATION AND FUNCTIONS OF IMMUNOGLOBULINS

IgG: In healthy adults, the total IgG (about 80 g) accounts for 73 percent of the immunoglobulins in normal serum and is distributed equally between the blood and interstitial tissues, about a quarter passing across the capillary walls each day and the same amount returning via the thoracic duct. In man IgG is the only immunoglobulin that is transported across the placenta to reach the foetal circulation and provide the body with passive immunisation during its early life. IgG antibody is particularly suited to neutralising soluble toxin such as that of C. diphtheriae.

IgM: The macro-molecular IgM is predominantly intravascular, it constitutes only seven per cent of the serum immunoglobulins and is made up of five immunoglobulin units inked with disulphide bonds to provide ten identical combining sites instead of the two of IgG. IgM is especially effective in activating complement to produce immune lysis of foreign cells by digesting holes in the cell membranes at the sites where antibody has reacted. Fifty micrograms/100 ml of IgM antibody could destroy half the red cells in the circulation. IgM antibodies are much more efficient than IgG antibodies in linking particulate antigens together for agglutination and phagocytosis and would seem to be specially adapted for dealing with cell debris or bacteria in the bloodstream.
IgA: which accounts for 19 percent of the total serum immunoglobulins, is preferentially secreted into colostrum, saliva, intestinal juice and respiratory secretions. The major sites of IgA synthesis are the laminae propriae underlying the mucus membranes throughout the respiratory tract and the gut. The monomer produced locally by plasma cells is largely taken up by the epithelial cells, when two of them link together and a secretory piece is added which protects the molecule from digestive enzymes. Secretory IgA is available right through to the colon and these antibodies are vital in the defence of the gut against enteroviruses, e.g. poliomyelities. In general, IgA plays a major role as part of an antisepsic sereation over the mucous surfaces of the body.

IgD: These som of the properties of the globulins, although little is known of their exact role.

IgE: These have a very low serum level (250 pg/ml) and the distinctive property of possessing an affinity for cell surfaces. They are an int egral part of immediate hypersensitivity reactions such as occur in hay fever and in some cases of asthma (p.38) The portions of the IgE antibodies combine with sites on the surface of mast cells especially in the nasopharynx and bronchi and also in the gut, leaving the antigen combining sites freely availabve. The combination of antigen (in the circumstances sometimes referred to as reagin) with IgE antibody on the surface of the mast cell trigers the release of vasoactive substances which mediate anaphylactic (immediate hypersensitivity) reactions. The physiological function of IgE antibodies is obscur but they may possibly have a role in the defence against helminths.
CHAPTER NO. VI

2. CRITICAL STUDY OF IMMUNITY

Since the subject of the project is related to the immunity it is worthwhile to add about new dreadful disease of today's worldwide health problem that is AIDS. Fortunately, the virus i.e. causative factor of AIDS is known to the field and searching for its preventive and curative treatment.

How was the HIV found?

When patients undergo Kidney or other transplants, they generally receive immunosuppressive medicines. These medicines suppress the immune system and could lead to infections called **Opportunistic infections**. However in the early 1980s doctors were surprised to find patients who have never received these medicines suffering from such infections. It was obvious that something else was causing these disorders and scientists started searching for this mysterious agent. In 1983, three scientists, a Frenchman Luc Montagnier
and 2 Americans Robert Gallo & Jay Lery simultaneously discovered the HIV in these patients which was causing the suppression of the defence mechanisms i.e. immune system.

In the last decade, Medical researchers have shown that the function of the immune system is the most critical element in the body’s ability to naturally maintain or strengthen its status of health. AIDS, Cancer, Diabetes, Herpes Zoaster all seem to stem from immune system deficiencies. Many life treatening diseases are growing fastly; which has no remedy still. With the race of medicine the viruses, micro-organisms stands in first rank.

**Immune System or Opportunist Infections**

Our body’s immune system is a collection of cells whose main function is to fight bacteria and viruses that cause infection. A certain type of immune system cells are the White Blood Cells called Leucocytes.

In case of Human Immuno-deficiency Virus, it attacks the Leucocytes - more specifically T-Lymphocytes - enters into it, it kills them, thus reducing the number of these cells and making the immune system weak. Hence a person with the HIV infection has very poor immunity. The process of weakening the immune system takes place over many years till a stage is reached when the person starts suffering from various infections like Tuberculosis, Pneumonia, Fungal infections and some forms of cancer. It is at this point that the person is said to have AIDS - is a specific group of diseases caused due to the damage of the immune system.

The science of **immunology** arose from the study of man’s resistance to infection. The most striking feature of this resistance is the specific nature of its enhancement in individuals following infection. Thus, antigenic stimulation & antibody production began to be elucidated in the context of infections disease & immunity to it. Terms such as ‘immunology’, ‘immunisation’, & ‘specific immune response’ are derived from these origins.
The Immune System:

The antigenicity of a substance (i.e. its ability to induce an immune response) is determined by one or more specific molecular groups on its structure known as antigenic determinants. When immunocompetent lymphocytes recognise a foreign substance (antigen) they respond by undergoing transformation into lymphoblasts & then into antibody-producing plasma cells or lymphocytes.

Components of the Immune System:

The main cells involved in immune response are lymphocytes, plasma cells and macrophages. Anatomically, the immune system can be subdivided into the ‘Central’ and ‘peripheral’ lymphoid tissues. The central lymphoid tissue consists of the thymus and in mammals the tonsils and the lymphoid tissue of the gut. The major peripheral lymphoid tissues are the spleen and lymph nodes.

The development of immune mechanism depends on the evolution of the thymus and organised lymphoid tissues. The thymus glands increase in size until puberty and then slowly atrophies, but is still present even in old age. The fully developed thymus is incompletely divided into lobules composed of a central medulla surrounded by a cortex. The cells in the thymus are of three main types: lymphocytes, epithelial cells and mesenchymal cells. The lymphocytes, which look the same as those in the circulation or in lymph nodes, are heavily concentrated in the cortex.

The rate of small lymphocyte production is very high in the thymus and is comparable to the rate of division in lymph nodes under condition of maximal antigenic stimulation.
Immune reactions are mediated by humoral or cellular mechanisms or by both. The humoral factor consists of antibody (immunoglobulin) secreted by plasma cells. The cellular component is made up of lymphocytes sensitised to specific antigens and reactive with those antigens without the presence of free antibody. In addition, certain lymphoid cells and monocytes, although not themselves specifically sensitised, can gain specificity in the presence of antibody or antigen-antibody complexes on the surface of the target cells or on their own surface. This is known as antibody-dependent cell-mediated cytotoxicity reaction. (ADCC, type VII). The lymphoid cells involved are referred to as Killer or K Cells.

Immunological responses mediated by humoral antibody and by cells both depend initially upon the activity of small lymphocytes which stem from precursors in the bone marrow.

**STEM CELL**

**(Bone marrow and fatal liver)**

Stem-cells originating in the bone marrow differentiate to form two main lymphocyte populations. One is dependent on the presence of the thymus (T lymphocytes) and is responsible for cell-mediated hypersensitivity. The other is independent of the thymus but dependent on the bursa of Fabricius or its equivalent in man (B Lymphocytes) and is responsible for humoral antibody synthesis.

They also differ in their distribution and probably in their life span. T Lymphocytes constitute a greater part of the pool of small lymphocytes that circulate in the blood, interstitial spaces and Lymph and most of them have a relatively long life (months or years in man) while the B lymphocytes are more restricted to lymphoid tissue and most of them appear to be short-lived (several weeks.)

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Role of T Lymphocytes, B Lymphocytes and K Cells in immunological responses. Many of these events involve active active Cell for proliferation, but for simplicity this has not been shown.
There is evidence for the existence of sub-classes, presumably with differing functions within these main classes, e.g. short-lived T-lymphocytes and long-lived B lymphocytes. Thus immunological memory (स्मृति) is achieved by the existence of long-lived T & B cells.

The thymus plays an essential role in inducing the differentiation of immunologically competent thymus dependent lymphocytes (T Cells) from non-competent precursors. This function is dependent upon the integrity of the epithelial cells in the thymus medulla which secrete a factor or hormone that effects this change.

About 70% of lymphocytes in the peripheral blood are T Cells and about 20% are B Cells. The non-sensitised lymphoid cells that are neither T nor B Cells but can gain specificity by means of antibody or antigen-antibody complexes (K cells) are included in the remaining 10%.

**Mechanism of the Immune response**

The recognition of antigen by B lymphocytes is believed to be mediated by antibody synthesised in the cell and bound into the surface membrane, the specificity of the antibody being determined by the genetic characteristics (programming) of the individual lymphocyte. T lymphocytes, on the other hand, do not have detectable antibody on their surface but have antibody-like receptors for antigens, the exact nature of which is not clear. In both instances combination with the appropriate antigen then triggers off the immunological response.

The T lymphocyte sensitised to a specific antigen undergoes blast transformation and proliferation on contact with the antigen. In addition, the interaction of antigen with T lymphocytes leads to the release of non-specific soluble factors (Lymphokines) which bring about a number of tissue changes associated with cell-mediated hypersensitivity reactions.
We come across a very complex network of immunity in human body. The white blood cells, Leucocytes, CD4 Cells, T-Cells, B-Cells functions through chemicals.

Millions of antibodies in the blood are on the watch of microbes & virus, and the movement they are detected antibodies attack and destroy them. This fight goes on forever and saves human beings from failing ill/sick frequently though so many virus, microbes enter human body through air, water and food. This ability to resist attack is known as Immunity. This Immunity gives man personality like his brain and intelligence.

AIDS virus is relatively very weak. It can neither survive nor multiply outside the human body. At 56° Sc. i.e. half of the temperature of the boiling water it dies, ever an grdinam detergent is capable to kill it at 37° centigrade temperature.

G.P. 120 protein is found on the corpuscle of the AIDS virus, so is the case with our T-Cells. The receptor for this protein is on the T-Cells, i.e. a suitable place for AIDS virus to fit in and enters the respective T-Cell.

The DNA with human genes is located in the nucleus of the body cell. In AIDS Virus there is no DNA but similar chemical called RNA in due course of time with the help of R.T. enzyme (Reverse Transcriptase enzyme) it creates it’s own DNA which later on mixes with the DNA available in T-Cells. It further uses the facility available of multiplication and increases its number.

The movement it comes out of the nucleus it starts producing new Cell with the help of the enzyme Called Protease. As the number of viruses increases in T-cell, it bursts and joins the blood stream. The cycle continues and millions of viruses join the blood stream.
1. HIV attaches to receptors on a host cell, releasing its genetic material as RNA.

2. An enzyme called reverse transcriptase (RT) converts the viral RNA into DNA. Drugs called RT inhibitors can interrupt this process.

3. An enzyme called integrase splices the viral DNA into the host cell's chromosomes. Scientists hope to develop a new class of drugs called integrase inhibitors, which will add another obstacle.

4. The infected cell produces new viral RNA, which generates proteins and other virus constituents.

5. The protease enzyme cuts the viral proteins into shorter pieces. Protease inhibitors replication by neutralizing the enzyme. They're even more effective when combined with RT inhibitors.

6. The newly milled proteins fold together to form new HIV capsules.

7. Completed HIV capsules bud away to infect other cells.

8. The newly milled proteins fold together to form new HIV capsules.
As a result the number of viruses increase to such extent that the entire army of T-Cells [Gets destroyed & a time comes when] become unarmed as the powerful enzymes and chemicals (antibodies) are not only taken away but also used for their own multiplication. Consequently in the absence of T-Cells human immunity gets paralysed and the result is total chaos.

As there is natural/inborn immunity present at the initial stage, the symptoms of the disease are not so noticeable. As a result the diagnosis misleads to minor diseases such as Flu etc.

Another noticeable characteristic of these viruses is that with every new birth it undergoes a slight change making their detection by T-Cells rather difficult. In due course of time T-Cells get trained enough to detect and destroy these viruses, but meanwhile other T-Cells get affected. This process continues for such a length of time depending upon the (inborn) immunity of the victim concerned.

Finally, the weakened T-Cells fall short to resist the growing attack of the virus hence the person becomes prone to death due to any minor disease. In short the AIDS Virus doesn’t kill the victim but it opens the doors for any other deadly viruses of other diseases to attack and finish the person.

No doctor can ever predict the exact or even approximate timing of death in such cases as it all depends on the scale of the multiplication of viruses attacking and destroying them and (rejuvenation of T-Cells) alias Immunity.
Approximate life in such cases is around ten years but the attacks of various illnesses/diseases in between lessen his life span. T-Cell / CD4 Cells count coming down to 5 to 10% results in number of minor diseases such as diarrhoea, intermitant fever, weight loss at the rate of 1/10th per month, leading to Pneumonia, Herpies Zoaster, Kaposi Cancer etc. etc.

The presumption that the patient dies in around ten years after getting infected is not true as it is not possible to know the duration of the infection as the deterioration of health starts since long. Occassionally in Such/Some cases the brain gets so much affected that even nursing becomes impossible.

In a Country like India, **T.B. Virus** is so abundant that there is no death of T.B. Patients with so low a **CD4 Cell** count as 200 only. Naturally they are easy prey for AIDS virus. Recent survey in this field pointed out that almost 11% T.B. patients are **HIV +ve**. It is growing rapidly hence it is said that AIDS in India is moving around every one of us in the form of T.B.

T.B. being a contagious infective disease the result is T.B. patients with AIDS are going to infect those who are not HIV +ve. Preventive medicines meant for T.B. won’t work, as AIDS virus will develop resistance and result in creating havoc, due to this new generation of T.B. virus.

It is relatively easier to protect ourselves from AIDS with due precautions, but it’s not so, as far as T.B. is concerned because it spreads through sputum, breathing etc.
India - June 1996
International Conference on AIDS
Dr. Ramdev Chaham
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3. EMPHASIS ON AYURVEDIC INTERPRETATION

The world "AIDS" stands for "Acquired Immunio Deficiency Syndrome". I may argue that this is not a very exact description; as a matter of fact, the victim does not 'acquire' anything quite the contrary, he loses something essential, the cellular immunity and becomes defenseless against pathogens and malignancies.

Since last decade medical scientist have been confronted with a new menace of truly global proportions. This new mysterious and invincible disease is claiming a steadily growing number of victims. Experts in all parts of the world are searching for a cure from the new killer disease. WHO experts believe that from one to five million people will contract AIDS by the end
of this century. The AIDS epidemic which knows no boundaries or territorial obstacles, can only be contained by concerted efforts of all countries and researchers. Fifteen years into the epidemic, we have together answered many questions, but many remain. Progress remains possible only if creativity overshadows preconception, and innovation governs all we do.

The growing global challenge of HIV/AIDS demands appropriate and feasible strategies for vastly different socio-economic situations. The propagation of practical solutions to everyday problems can offer hope to all parts of the world.

The first AIDS cases were diagnosed in 1981 among homosexuals of New York and San Francisco. They developed grave forms of Pneumonia and Sarcoma Kaposi. Examining the patients, the doctors found disturbances of the immunologic status. The disease received its present name - Acquired Immune Deficiency Syndrome. The Atlanta Center (USA) and the World Health Organisation started registering its incidence.

The high incidence among the gay community is due to a variety of social and biological reasons. The point is that the rectum possesses a for flung network of tissue macrophages, the primary target of IDV, while the sperm, like blood is a medium where the virus is concentrated. So AIDS belongs to infections which are transmitted, under natural conditions, through sexual intercourse.

In Africa the incidence rate is about equal for men and women (homosexuality is not widespread there) urbanization and the "reverse side of the coin" prostitution play a significant part in spreading the infection.
Body have a resistance to the effects of a harmful agent, such as a pathogenic micro-organism. It is a complex system of tissues and organs that ensures the immunity of man and higher animals. Thus, the bone marrow produces white blood cells, the Leucocytes. The spleen is the principal organ where B. Lymphocytes ("bone marrow derived lymphocytes") are generated. Accordingly the thymus (a endocrine gland located at the base of neck) "grooms" T. Lymphocytes (i.e. "Thymus derived lymphocytes") for immune competence. The liver concentrates yet another white blood product, the macrophages; these are the bacteriocidal cells that attacks and digest foreign proteins, the antigens. The B. Lymphocytes are responsible for humoral immunity (i.e. formation of antibodies) and the T - Lymphocytes for cellular immunity.

Two groups of T - Lymphocytes play an important part in regulation of immune processes. These are the T - 4 Lymphocytes of T - helpers and the T - 8 Lymphocytes or T - suppressors. The helpers stimulate the organism’s immune reactions, while the suppressors inhibit them. Hormonious immunity is the result of these mutually contradictory influences.

HIV/IDV selectively attacks the T - helper. Their number drops, both in absolute and relative terms. Under normal conditions, the helper exceed the suppressors by half. Not with the AIDS patients the number of T - helpers declines dramatically and the T - suppressors come into predominance. As a result, immunity is inhibited and the vigorous system of the organism’s defense collapses.

The Origin of AIDS - Now that the disease has spread to ominous proportions in many parts of the world - is the subject of acute debates.
INFECTIONS

+ opportunistic infections

HIV belongs to retro-viruses

Usual direct syntheses

DNA → RNA → DNA → RNA

IDV of man
Subgroup of Retroviruses

Slow = Lenti - Viruses
Four Additional Genes

प्रतिलोम शोष / राजयक्ष्मा
Ojas described in Ayurveda in view of AIDS

AIDS is an infectious disease. Its causative agent belongs to the retro viruses a group of viruses that cause tumor processes and slow chronic infections in man and animals. These viruses have been designated as "retro" because instead of the usual "direct" DNA - RNA synthesis, a reverse ("retro") synthesis of RNA - DNA proceeds in them.

The immune deficiency virus of man (IDV) is in the subgroup of retroviruses which are designated as lentiviruses. The immuno - deficiency viruse (like other lentiviruses) has four additional genes including regulatory proteins. As per "Pratilom Shosh/Kshaya" a reversing disease, in which the immunity has losted upto peculiar point and prognosis is bad. Here immunity is suspected as "OJA" a extra-confirmed Dhatu; along with seven Dhatus, ie Ras, Rakta etc. And life is depend upon only the "OJA-dhatu". In other words, I can say that, "OJA" is the real essence of life.

A single infected Lymphocyte may cause the death of dozens of cells. Alongside the macrophages and T-4 Lymphocytes, IDV also proliferates in neurons and thus affects the central nervous system.

Such, in general, is the AIDS machanism. The clinical sympotoms of the disease are protracted fevers and pneumonias, Intestinal disorders and lesions of mucous membranes. The primary targets of the attack are the internal organs and tissues sensitive to Pathogenic bacterial, fungi and viruses under the overall name "Opportunist- Infections."

"Opportunist- Infections" in this kind of disease; physical status can interpretate with an Ayurvedic status "OJA-Kshay" (Low Power of Immunity), due to lack of OJA, there is effect upon every physiological processes of organisms by which organism losses the power of defense. So far any pathogenic micro- organism allows to reside in the body.