"Protector can become a "Killer"

When we talk of immune mechanisms of our body, we start wondering how our body is being protected against the foreign invaders. But it is being understood not since long that the side-effects of protective mechanisms of our body could be lethal and sometimes the protective mechanism can turn against the 'self' itself and start destroying the tissues of 'self'.

The protective mechanisms of our body depend mainly upon the cellular and the humoral components. The cells involved are mainly the lymphocytes, wandering macrophages and the phagocytic cells of the reticuloendothelial system, which by means of the surface receptors, phagocyte the molecules of antibody attached with antigens. The lymphocytes have been recognised as the B-cells and T-cells. The B-cells carry the surface immunoglobulins and recognise the antigen with the help of this surface antibody and can proliferate and generate the plasma cells and memory cells with the stimulus obtained from T-cells. The T-cells can recognise the 'self' and 'not self', are involved in graft rejection phenomenon and proliferate on exposure to antigen and provide stimulus to B-cells. Whether the T-cells carry any surface immunoglobulins or not is still controversial. Thus the T-cells are involved
mainly with the cell-mediated immunity and provide the protection against the fungi, viruses, and more slowly growing bacteria. The T-cells develop tolerance more quickly and it lasts longer. This is a protective mechanism provided to protect the body against self-destruction.

These different mechanisms of self protection can go wrong and produce the disease states. These may be in the form of excessive and persistent production of immunoglobulins in response to certain antigens and deposition of the immune complexes in different sites causing damage or breakdown of mechanism of 'self tolerance' producing the condition called as auto-immunity.

Von Pirquet, as long ago as 1905, knew that the circulating immune-complexes could cause the disease state, and serum sickness was the first one to be recognised as caused by immune-complexes. The features of serum sickness like fever, rash, arthralgia, lymphadenopathy and albuminuria could be attributed to the immune complexes and these features occur during the time when immune-complexes are present in the circulation. The human diseases like S.L.E., polyarteritis nodosa and glomerulonephritis are caused largely by the deposition of the immune-complexes in the vessels of different organs in the body. Techniques to study the immunoglobulins like immunofluorescence have shown the deposition of the immune-complexes in the skin and kidney in the disease like S.L.E. and circulating complexes have been detected. The erythema nodosum leprosum in leprosy and early stages of sarcoidosis with arthralgia and erythema nodosum are associated with the deposition of the immune-complexes. The Henoch–Schonlein purpura and vasculitis of rhematoid arthritis also are associated with the deposition of immune-complexes. Some of the features of bacterial endocarditis like skin and kidney lesions and arthralgia and the skin rashes and arthralgia of viral hepatitis also can be attributed to the deposition of immune-complexes. In many varieties of glomerulonephritis including the poststreptococcal one, there is evidence of immune-complexes in the basement membrane of glomeruli. In all the diseases associated with the deposition of immune-complexes, the severity of the disease depends upon the extent of deposition of these complexes.

Considerable amount of knowledge has accumulated about the mechanism of the damage produced as a result of immune-complex deposition. The immune complex deposition in the capillaries leads to severe inflammatory reaction. The interaction of these complexes with the platelets leads to the release of vasoactive substances like histamine and serotonin, both of which increase the capillary permeability and lead to further deposition of the immune-complexes. When the immune-complexes interact with the complement, C₉a and
C₃α are released which are strongly chemotactic. The immune complexes also help release of lysosomal enzymes from phagocytic cells which adds further to tissue destruction.

In what is called as the auto-immune disease, the story is quite different. In normal states of health, an equilibrium exists amongst the different components like T-cells, B-cells and the different tissues of body. The T-cells are tolerant to the tissues of ‘self’ but not all B-cells are tolerant. It has been found that small number of peripheral lymphocytes (about 1:10000) are capable of producing antibody against the human thyroglobulin buy they cannot do so in normal circumstances because of the presence of T-cells. But sometimes these tolerant T-cells can be by-passed and the process of auto-immunity starts. There have been some suggestions that the lipopolysaccharides of E. coli can act as stimulus to B-cells and if it is so, then at least in some forms of auto-immune diseases of liver this could trigger the whole process. Another trigger could be the viral infections. The virus can gain its envelope from the nuclear and plasma membrane of the host cells and thus provide a new antigen to the lymphocytes. The acute encephalomyelitis following vaccination against small-pox, measles, rabies, etc seem to have this origin.

In Goodpasture’s syndrome, which is an excellent example of auto-immune disease with antibodies directed against the glomerular basement membrane, there has been some evidence of a viral infection acting as the initiating factor.

In other auto-immune diseases like hypothyroidism, hypoparathyroidism, and hypoadrenalism, the antibodies against the corresponding organs have been demonstrated. In human ulcerative colitis also, cytotoxic lymphocytes have been found which produce cytotoxic effects to the foetal and adult colon cells in tissue culture.

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