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17/sci03/007

Bch314 assignment

Question 1 : from previous class , it is clear that the immune response is very diverse more especially the (hyper) variable region of antibodies (immunoglobulin) Discuss the genetic basics of antibody diversity

Answer :

The human immune system is capable of producing a vast number of different antibody molecules, each with its own antigenic specificity this vast diversity is possible because immunoglobulins genes undergo an unusual type of interaction Embryonic DNA contains a great many genes for the variable regions of the H and L chains

A process of somatic recombination (DNA rearrangement and deletion), followed by RNA splicing, results in a large variety of B cell lines that encode different H chains and L chains . A fairly high

rate of somatic mutation in κ , λ , and H chains further adds to the diversity

Genes linked to immunoglobulins and T-cell receptors, involved in antigen recognition, are inherently variable and susceptible to recombination. This attribute enables the immune system to respond to a wide variety of harmful pathogens, and as a result may give rise to lymphocytes capable of self- immunity.

Also In terms of the following:

Exons and introns:As in other genes, coding sequences (exons) in the DNA code for the amino acid sequences in immunoglobulin molecules

- 1.The exons are separated by intervening noncoding nucleotide sequences (introns)
2. Both exons and introns are transcribed into RNA, but RNA splicing then removes introns, leaving the exons joined together

Gene rearrangement

1. The exons that code for variable domains are split up into smaller segments of DNA along the chromosome
- 2 . Making proper exons from these segments requires rearranging and rejoining the segments to form immunoglobulin gene sequences

Question 2 : one of the hallmark of the immune response the ability to distinguish between self and non _self . Discuss the immune response with respect to tumor and organ transplantation

Answer :

The immune system in a normal individual should be able to distinguish between foreign and self-antigens, that is, they are should be tolerant to self-antigens. The

adaptive immune response is able to respond to tumor and organ transplantation because this immune response is able to differentiate between self and non-self. To give expression to this acquired form of immunity it is necessary that the antigens of the invading microorganism come into contact with cells of the immune system (macrophages and lymphocytes) and thereby initiate an immune response specific for the foreign material. The cells that respond are pre-committed, because of their surface receptors to respond to a particular epitope on the antigen. Tumors and organ transplantation at young stage are affected more effectively by immune response, because the mechanisms regulating cell growth are still very much preserved, since they are more differentiated. As tumor or cancer cells age, they become less differentiated and growth becomes less regulated. Hence tumor cells response to chemical agents or chemotherapy is low the adaptive immune response reacts to tumors and organ transplantation by using hypersensitive reactions.

