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Opinion Article

Immune Response and Genetic Control

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DESCRIPTION

Immune responses to infectious disease agents are known to be a ffected by genetic and nongenetic factors in terms of amplitude a nd breadth. The function of the class II genes (Ir genes) is to regulate the immune response genetically. The interplay of T cells, B cells, and macrophages in the development of the humeral immune response is controlled by the class II genes, which also play a role in cellular immunity. Rapid innovations in immunology and molecular biology have paved the way for a better understanding of how disease resistance and immune responsiveness features are controlled genetically.

The Major Histocompatibility Gene Complex (MHC there are several hereditary immune system defects in people that are simply inherited. T cells, B cells, bone marrow stem cells, NK cells, thymus development, and other deficiencies are among them) appears to be involved in every aspect of immune function and disease resistance. The HLA complex has been found to be linked to diseases involving both humeral and cellular immunity. Because the HLA complex genes contain linkage disequilibrium (i.e., crossing-over is inhibited and they tend to be transmitted as a group). The immune response is a complex process that can be (genetically) implicated in carcinogenesis via two pathways: (1) changes in DNA (by point mutation, virus-induction, crossover, or deletion) that participate in the transfrmation of a cell from a normal to a cancerous one, or environmental (immunosuppressant) changes affecting protein synthesis (i.e., immunoglobulin) that result in an impaired surveillance mechanism and, thus, increasing the potential for an Experimental data tying certain genes to specific immune responses has been evaluated and linked to cytoplasmic mechanisms in immune protein production that function independently or in tandem with nuclear mechanisms. The action of phagocytic and cytotoxic cells, which are the major short-term means of protection against infection, is initiated by innate immunity, making a healthy innate immune system crucial to host defense. Innate, adaptive, and passive immunity are the three types of immunity that humans possess: Innate (or natural) immunity is a form of general protection that everyone is born with. The epidermis, for example, works as a barrier to keep viruses out of the body. In the absence of viruses or abnormal tissue, however, faulty start and termination of immune cell functional activity leads to a variety of chronic, auto-immune, and neoplastic disorders. As a result, careful control of immune effector functions is required to ensure a quick and robust response to challenge. Immune cells are diverse for a variety of reasons, including cytokine exposure and cell-cell contact. To avoid autoimmunity or chronic inflammatory conditions, immune cells must remain inactive in a naive state, but must respond quickly when activated, independent of their surroundings or cellular noise. Chromatin Structure can regulate transcription. Small-scale genomic features like nucleosome position and histone modification have also been linked to gene expression variability. Changes in Local Genome Structure and T Cell Activation also help in regulation of immune response. Changes in Genome Structure in Tissue-Resident Immune Cells are way to autoimmune diseases.

All three classes of MHC genes provide genetic control over immunological responsiveness. Individual genes affecting production qualities, on the other hand, have not been well defined. Some of the growth and reproduction genes can be intimately connected to the MHC but not MHC genes themselves, whereas others could be MHC genes with no known function.

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