



Psychoimmunology: Implications for Future Research

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THE CONCEPT of an inter-relationship between immune status and psychologic states can be traced to ancient history. Basic writings of Indian medicine that date back two millennia contain concepts of natural and acquired immunity. These writings tell of approaching treatment by "restoration of a balance of life forces and by an integrated relationship to the environment."¹ Around AD 200, Galen wrote that melancholy women are more susceptible to breast cancer than sanguine women.² In 1951, George Day, the British pathologist, cited unhappiness as a cause of lowered resistance in patients with chronic active pulmonary tuberculosis.³ Over the past two decades increasing evidence has supported the hypothesis that psychologic factors play a role in health and the development of illness. Stress, bereavement, affective disorders, and schizophrenia have all been reported to be associated with immune alterations.

OVERVIEW OF THE IMMUNE SYSTEM

The bodily immune system is a complex surveillance apparatus that functions to determine "self" from "nonself."⁴ An immune reaction is activated in response to exposure to foreign antigens in an effort to maintain the body's homeostasis. Immune responses are categorized as non-specific (phagocytosis and inflammatory reactions) or specific (humoral and cell-mediated immunity).⁵ Nonspecific immune functions are attributed to phagocytic cells such as neutrophils, monocytes, macrophages, and the complement system. In terms of specific immune responses, humoral immunity refers to antigen-antibody interactions, and cell-mediated immunity consists of direct lymphocyte action on invading antigens (Fig 1).

The origins of the cellular constituents of the immune system are the pluripotential hematopoietic stem cells located within the bone marrow, liver, and yolk sac of the fetus. The primary lymphoid organ is the bone marrow, which produces stem cells of both lymphoid and nonlymphoid (phagocytic) cell lines.⁶ Other lymphoid organs include the thymus, bursa-equivalent tissue, tonsils, and appendix.

Lymphocytes comprise two cell lines of immunocompetent cells, one concerned with cellular immunity (T lymphocytes or T cells) and the other with humoral immunity (B lymphocytes or B cells). T-lymphocytes mature in the thymus and further differentiate under the control of mediators called thymosins into the major functional subsets of helper T cells and suppressor T cells.⁶ B lymphocytes mature and differentiate in the mammalian equivalent of the avian bursa of Fabricius—the bone marrow.

HUMORAL IMMUNITY

Antigen-antibody interactions are a product of humoral immunity. Once activated, B lymphocytes differentiate into two cell lines. One cell line

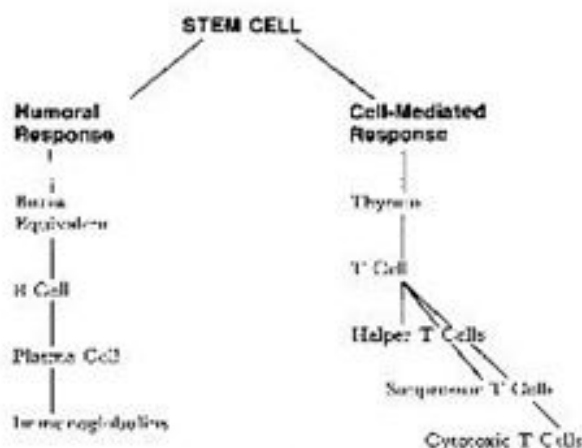


FIGURE 1. Overview of immune apparatus.

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