

b. Diseases with an immune component

The immune disorders encompass arthritis, psoriasis, inflammatory bowel disease (Crohn's disease and ulcerative colitis), systemic lupus erythematosus (SLE), chronic obstructive pulmonary disease (COPD), asthma, allergies, and atopic dermatitis.

Insulin-dependent diabetes mellitus (Type 1 diabetes), atherosclerosis, and cancer also have an immune component. Type 1 diabetes arises from the destruction of beta cells of the pancreas by white blood cells (17). In atherosclerosis, the infiltration of macrophages (immune cells) in the coronary artery results in atherosclerotic plaques (18).

A distinguishing feature of cancer, on the other hand, is absence of an immune response, where this absence results from the fact that antigens of tumor cells are identical to, or have structures very similar to, antigens of normal host cells.

Immune disorders such as multiple sclerosis and rheumatoid arthritis are classified as *autoimmune diseases* because pathological lesions result from immune attack against the host's own antigens. Other immune disorders, such as asthma and allergies, are merely classed as *inflammatory disorders*, because the pathology does not involve attack against specific host antigens. Inflammatory disorders also encompass collateral damage to the liver from an overly active immune system during immune response against hepatitis C virus.

c. Messengers in the immune system

Cytokines are small proteins that are used as messengers by cells of the immune system, as well as by other cells such as epithelial cells. Cytokines are like peptide hormones, in that they are messengers, consist of a polypeptide chain, and bind to receptors. These receptors are membrane-bound proteins. When used in signaling, a first cell expresses and secretes a cytokine into the extracellular fluid, followed by binding of the cytokine to a second cell, and the transmission of a message to the second cell. In noting that cytokines require a receptor, it should be added that cytokines are classed according to the structure of their receptors. Four classes of cytokine receptors have been recognized, that is, Type I, Type II, Type III, and Type IV (19). Some of the cytokines that fall into these four classes are disclosed below.

- **Type I.** Interleukin-2 (IL-2), IL-4, IL-5, IL-12.
- **Type II.** The interferons (20) e.g. interferon-alpha (IFN-alpha), interferon-gamma (IFN-gamma).
- **Type III.** Tumor necrosis factor (TNF).
- **Type IV.** Interleukin-1 (IL-1).

Interferon-gamma is distinguished in that it is a Th1-type cytokine, and that it induces aggressive immune response against infections and cancers. Interferon-beta1

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