

IMMUNOLOGY OF SKIN DISEASES

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CHAPTER ONE

BASIC CONCEPTS

One of the appealing features of the practice of dermatology is the fact that the diagnosis can be made on the basis of clinically visible data. Nowhere is this more true than in dermatimmunology; in this field the diagnosis may be confirmed by the skin reaction, for example, in allergic contact dermatitis patch testing. Jenner's brilliant use of cowpox vaccine to prevent smallpox also illustrates the importance of skin reactions and the combination of dermatology and immunology. For many years, a pustular reaction in the skin was used to indicate the effectiveness of the vaccination. Prausnitz and Küstner discovered that IgE antibody was transferable from person to person by detecting an urticarial wheal in the skin. Examination of the naked skin by an experienced eye remains one of the most critical and revealing of all tests available in medicine.

The development and refinement of new techniques and the discovery of drugs and vaccines over the last 50 years have enabled us to manipulate the immune system. Only 25 years ago the lymphocyte seemed to be an uncomplicated cell without evidence of migration or development in the thymus. Our knowledge of the types and characteristics of this cell has expanded greatly since then. It seemed for a while that the bursa-derived (B) and thymus-derived (T) lymphocytes had evolved distinct features and roles that did not include involvement with each other after leaving their common origin in the yolk sac and liver of the fetus or bone marrow of the child and adult. B and T cells do interact in some instances, especially in the manufacture of immunoglobulin M (IgM) antibodies. Helper T cells sometimes participate in the IgG response. B and T cells are compared in Table 1.1.

Beutner et al. described the important role of antibodies in bullous diseases in 1965. Their discovery led to improved treatment of these potentially fatal skin diseases with corticosteroids and immunosuppressants, which resulted in a dramatic decline in mortality from these diseases.

Allergic eczematous contact dermatitis, typified by poison ivy, is initiated by a T-cell response to urushiol, the active ingredient of the plant. Molecules of haptens traverse the epidermis, where they combine with skin proteins.

The immune system in man has evolved from that in lower animals and

TABLE 1.1. Some Functions and Characteristics of B and T Lymphocytes

Feature	B lymphocytes	T lymphocytes
Origin	Bone marrow in child and adult	Yolk sac and liver in fetus
Educator organ	Bursa equivalent (Peyer's patches, gastrointestinal tract)	Thymus
Body distribution	Peripheral blood Lymph node follicles Spleen, follicles	Peripheral blood Lymph node paracortex Spleen, periarteriolar area
Key laboratory test	Surface immunoglobulin fluorescence	Rosette with sheep erythrocytes
Helpful roles	Combat bacterial and other infections	Cancer destruction Combat viruses and other infections Help or suppress B-cell functions
Harmful roles	Autoimmune diseases Drug allergies (anaphylaxis)	Autoimmune diseases Drug allergies (contact dermatitis)

advanced beyond the “nonspecific” immune systems of invertebrates. It serves as a defense against a particular antigen at a particular time, largely via B and T lymphocytes. As noted later, the characteristics of the antigen are as important as those of the B and T lymphocytes in the immune reaction.

This book is an outgrowth of a series of lectures on the contributions of immunology to our understanding of skin diseases. The basic science required to understand and to treat skin diseases and the practical applications of this information are presented. The immune system is also uniquely involved in malignant melanoma, hereditary angioneurotic edema, lichen planus and lichen nitidus, allergic vasculitis, drug reactions, leprosy, and amyloidosis; all these disorders are also considered. This knowledge will perhaps translate basic science into clinical application in the form of a good treatment that is not really yet available.

MAJOR FEATURES OF IMMUNOLOGY

The core phenomena of immunology are memory, specificity, and recognition.

1. *Memory:* The rapid increase in specific antibody to a second challenge of antigen, called the secondary response, is an example of immunological memory. It has been found that this “memory” can be altered to induce tolerance to a useful but occasionally allergenic drug (e.g., penicillin). This has been accomplished in animals by Chiorazzi and his group (see Chapter 11).

2. *Specificity:* We have known since 1965 that pemphigus involves antibody localized to the intercellular spaces of epidermis, that is, to cell surface