



Diseases of White Blood Cells, Lymph Nodes, Spleen, and Thymus

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The components of the hematopoietic system have been traditionally divided into the *myeloid tissues*, which include the bone marrow and the cells derived from it (e.g., red cells, platelets, granulocytes, and monocytes), and the *lymphoid tissues*, consisting of the thymus, lymph nodes, and spleen. It is important to recognize, however, that this subdivision is artificial with respect to both the normal physiology of hematopoietic cells and the diseases affecting them. For example, although bone marrow contains relatively few lymphocytes, it is the source of all lymphoid progenitors, and the home of long-lived plasma cells and memory lymphocytes. Similarly, neoplastic disorders of myeloid progenitor cells (myeloid leukemias) originate in the bone marrow but secondarily involve the spleen and (to a lesser degree) the lymph nodes. Some red cell disorders (e.g., immunohemolytic anemia, discussed in Chapter 14) result from the formation of autoantibodies, indicating a primary disorder of lymphocytes. Thus, it is not possible to draw neat lines between diseases involving the myeloid and lymphoid tissues.

Recognizing this difficulty, we somewhat arbitrarily divide diseases of the hematopoietic tissues into two chapters. In this chapter we discuss white cell diseases and disorders affecting the spleen and thymus. In Chapter 14

we consider diseases of red cells and those affecting hemostasis. Before delving into specific diseases, we will briefly discuss the origins of hematopoietic cells, since many disorders of white cells and red cells involve disturbances of their normal development and maturation.

Development and Maintenance of Hematopoietic Tissues

Blood cell progenitors first appear during the third week of embryonic development in the yolk sac. Cells derived from the yolk sac are the source of long-lived tissue macrophages, such as microglial cells in the brain and Kupffer cells in the liver (Chapter 3), but the contribution of the yolk sac to blood formation, mainly in the form of embryonic red blood cells, is only transient. Definitive *hematopoietic stem cells* (HSCs) arise several weeks later in the mesoderm of the intraembryonic aorta/gonad/mesonephros region. During the third month of embryogenesis, HSCs migrate to the liver, which becomes the chief site of blood cell formation until shortly before birth. HSCs also take up residence in the fetal placenta; this pool of HSCs is of uncertain physiologic relevance, but has taken on