

Part I

Common Themes in Lymphoid Organ Development

The biological significance of peripheral lymphoid organ formation in higher vertebrates, including humans, is that at such sites with determined anatomical location the cells of innate and adaptive immunity may communicate and cooperate most efficiently for the elimination of external pathogens. Therefore, the presence of such highly specialized structures is crucial in establishing immunological protection against various infectious agents, contributing to the individual's (and also for the species') selection for survival. Importantly, this developmental process for most peripheral lymphoid tissues is independent not only from the exposure to external antigens (in a fashion similar to the antigen-independent formation of antigen-receptor bearing lymphocytes in primary lymphohemopoietic organs), but its initiation is also largely independent from the presence of mature T and B cells, as evidenced in mice with blocked lymphocyte development. Hence, the formation of anatomical sites committed to become secondary lymphoid organs actually predates both their reserve function for resting mature lymphocytes and also their role in focusing adaptive immune responses after birth.

Despite their macroscopic differences throughout the mammalian organisms, the tissue architecture of various peripheral lymphoid organs shows a remarkable preservation of building principles. Thus, they are strategically positioned to sample antigens from the body surfaces (regional lymph nodes), the blood circulation (spleen) and from the mucosal surface of the airways and intestinal tracts (mucosa-associated lymphoid tissues). Their tissue architectures also share notable similarities, such as separation into distinct, yet highly interchangeable, compartments with clear T or B cell dominance. The relatively stable anatomical location of these tissues paired with their similar cellular organization suggests that their formation in mammals (where the broadest variety of such organs is generated) involves similar mechanisms, although these developmental processes manifest in a discontinuous manner, both spatially and temporally.

The first sections of this book review those cells, molecules and interaction mechanisms that are necessary for the organogenesis of secondary lymphoid tissues, and the subsequent chapters discuss the tissue-specific developmental characteristics.