4.1 Precursor B-Cell Lymphoblastic Leukemia\(^1\)/Lymphoblastic Lymphoma\(^2\) (ICD-O: 9835/3\(^1\); 9728/3\(^2\))

About 80% of lymphoblastic (LB) lymphomas/acute lymphoblastic leukemia are of B-cell origin, 20% of T-cell origin. The distinction between lymphoma and leukemia is arbitrary. A leukemic blood picture and/or a bone marrow involvement of more than 20% leads clinically to the term acute lymphoblastic leukemia, whereas a predominant nodal involvement leads to the term lymphoblastic lymphoma (Bernard et al. 1981). The different manifestations seem to be more related to different age groups and type of precursor cell development than to other biologically relevant phenomena. The prognosis of the T-cell type seems to be a bit less favorable than the B-cell type.

**Synonyms**
- Kiel: Lymphoblastic lymphoma of B-cell type
- REAL: Precursor B-lymphoblastic leukemia/lymphoma
- WHO: Precursor B-lymphoblastic leukemia/lymphoma

**Definition**
B-lymphoblastic lymphoma/leukemia is derived from committed precursor cells of peripheral B-lymphocytes. The neoplasm consist chiefly of medium-sized “blast cells” with scanty, more or less basophilic cytoplasm. The nucleus of these cells shows fine chromatin and is usually round, but sometimes gyrate or “convoluted”. The infiltrate is diffuse and appears quite monotonous. Primary-tissue-based lymphoblastic lymphoma and a leukemic acute lymphoblastic leukemia can not be distinguished by morphology. Cytogenetics should be included into the final differentiation as the extent of polyploidy is of prognostic importance.

**Morphology**
The lymph node is infiltrated by a very monotonous-looking population of medium-sized lymphoblasts (9–11 µm; see Fig. 4.1). The nuclei are round, oval, and in some cells indented or gyrate (“convoluted”) (Fig. 4.2). They have very fine chromatin and one to three small or medium-sized, slightly basophilic nucleoli. The cytoplasm is scanty and stains grayish-blue or blue with Giemsa. Mitotic figures are plentiful (approximately 10/high-power field). Occasionally, there is a starry-sky cellular pattern, but it is not very pronounced. The trabeculae and capsule, especially in the leukemic variant, are sometimes heavily infiltrated, but still clearly distinguishable from the sinuses.

**Cytology.** In imprints or smears, the nuclei show only little variation in their shape and size, thus appearing quite monotonous. In a few cases the cells show slightly larger and more variable nuclei (Fig. 4.3). Whereas the more monotonous-appearing lymphoblasts correspond to the L1 morphology of the FAB classification, the latter group have a L2 morphology. The slightly to moderately basophilic, scanty cytoplasm of lymphoblasts is easier to recognize in imprints.

**Immunohistochemistry**
CD79a is the earliest detectable cytoplasmic antigen in the B-cell lineage. All B-lymphoblastic lymphomas express the B-cell-associated antigen CD19; they coexpress HLA-DR and usually terminal deoxynucleotide transferase (TdT) (Bollum 1979; Kung et al. 1978). Approximately 90% simultaneously show CD22. Usu-
ally, in the absence of CD22, surface immunoglobulin s (sIg) is also not detectable. Similar to CD22, CD20 is found in more than 90% of cases. About 80% of the lymphoblastic lymphomas of B type express common acute lymphoblastic leukemia (ALL) antigen (CD10). The proportion of proliferating cells lies between 60 and 80%. Follicular dendritic cells (FDC) cannot be detected.

The earliest detectable B-cell phenotype is thus a coexpression of HLA-DR, CD79α, CD34, and TdT. Following the line of phenotypic B-cell differentiation CD19 and next CD10 are subsequently expressed. This is followed by cytoplasmic IgM expression without light-chain. These steps of differentiation can be designated as progenitor B-cell, pre-pre-B-cell, pre-B-cell and immature B-cell. Most cells in the B-cell lineage are