Acute Lymphoblastic Leukemia (ALL)

Acute lymphoblastic leukemia (ALL) is a neoplasm of immature B and T cells (pre B and pre T cells), which are referred to as lymphoblasts. About 85% of ALLs are B cell tumors and typically manifest in children less than 15 years of age. The less common T cell ALLs tend to present in adolescents as a thymic lymphoma in the mediastinum. In these cancers, the bone marrow is typically hypercellular and packed with lymphoblasts, which replace the normal elements within the bone marrow. Therefore, common symptoms include fatigue due to anemia and bleeding due to thrombocytopenia. Neoplastic infiltration of bone marrow can also cause bone pain from marrow expansion and infiltration of the subperiosteum. Immunostaining for terminal deoxynucleotidyl transferase (TdT), a specialized DNA polymerase that is expressed only in pre B and pre T lymphoblasts is positive in more than 95% of cases. Majority of these B-cell tumors also express the common acute lymphoblastic leukemia antigen (CALLA). Approximately 90% of ALLs demonstrate chromosomal changes, most commonly hyperploidy of chromosomes. These chromosomal aberrations are thought to cause the dysregulation of the expression and function of transcription factors that are required for normal B and T cell development. A fraction of B cell tumors contain a translocation of genes 12;21 involving the genes TEL and AML1, two genes required in very early hematopoiesis. This translocation is associated with better prognosis. This tumor is known to spread to the CNS and testes. With aggressive chemotherapy, about 95% of children with ALL obtain complete remission.

PLAY PICMONIC

Ages 15

Quinceanera

About 85% of ALLs are B cell tumors and typically manifest in children less than 15 years of age. ALLs are the most common cancer of children.

May Present with Bone Marrow Involvement in Children

Child with bone marrow arrow

Children typically are affected by B cell ALLs with bone marrow involvement. In these cancers, the bone marrow is typically hypercellular and packed with lymphoblasts, which replace the normal elements within the bone marrow. Therefore, common symptoms include fatigue due to anemia and bleeding due to thrombocytopenia. Neoplastic infiltration of bone marrow can also cause bone pain from marrow expansion and infiltration of the subperiosteum.

Mediastinal Mass in Adolescents

Hit in the mediastinum

The less common T-cell ALLs tend to present in adolescents as a thymic lymphoma in the mediastinum, and can lead to a large, widening mediastinal mass.

TdT Positive

TNT-dynamite

Immunostaining for terminal deoxynucleotidyl transferase (TdT) a specialized DNA polymerase that is expressed only in pre B and pre T lymphoblasts is positive in more than 95% of cases.

CALLA Positive

Collar

Most B-cell acute lymphoblastic leukemias express the common acute lymphoblastic leukemia antigen (CALLA) which is an integral membrane protein.

t(12;21) Better Prognosis

(12) Wand Tutu mirror image (21) Tutu Wand with Thumbs-up sign

A fraction of B cell tumors contain a translocation of genes 12;21 involving the genes TEL and AML1, two genes required in very early hematopoiesis. This translocation is associated with better prognosis.

Spread to CNS and Testes

Brain and testes

ALLs are known to spread to the CNS and testes. CNS manifestations include headache, vomiting, and nerve palsies and involvement of the testes can cause testicular enlargement.

Most Responsive to Chemotherapy

Chemotherapy head-wrap

These tumors are highly responsive to chemotherapy. With aggressive chemotherapy, about 95% of children with ALL obtain complete remission.