Acute leukemia

Acute leukemia is a group of hematopoietic cancers that result from malignant transformation of a hematopoietic (hematopoietic) stem cell.

Tumor change can affect a number of **myeloid** or **lymphoid**, based on which we distinguish two types of acute leukemia:

- Acute myeloid leukemia;
- Acute lymphoid leukemia.

Acute myeloid leukemia

Acute myeloid leukemia (AML) is a disease caused by malignant transformation of hematopoietic stem cells that differentiate into myeloid or myelomonocytic precursor cells (blasts), more rarely erythroid or megakaryocyte blasts. The autoregulatory processes fail, the cells do not differentiate, but have preserved their ability to proliferate.

Etiology

The cause of the disease is unknown, some of the risk factors are known to include exposure to radiation or to certain viruses. Patients with severe congenital abnormalities (Down syndrome, Klineferter syndrome etc.) are at higher risk for developing AML. The mutation of the gene coding for the receptor tyrosine kinase is present in many cases and results in the transformation of *normal* hematopoiesis to *leukemic* (or *leukemogenesis*). The resulting overgrowth of pathological leukocytes gradually completely suppresses healthy blood elements in the peripheral blood.

Symptoms (clinical manifestation)

- resulting from anemia - paleness, fatigue, exhaustion, dyspnoea and more...;
- resulting from thrombocytopenia - **bleeding** (petechiae, ecchymosis, epistaxis);
- resulting from neutropenia - **infections** (oral cavit, upper respiratory tract and others);
- skin infiltrates and neurological symptoms of CNS damage.

Treatment

Patients that develop leukostasis (also symptomatic hyperleukocytosis) are treated with a series of leukodepletic procedures in order to reduce the number of leukocytes to less than 50,000 × 109/l, which is shown to reduce the risk of developing tumor lysis syndrome.

Curative treatment aims to achieve complete remision (CR). First is induction chemotherapy that combines antracykline a cytarabine. After achieving remission (normal blood count in peripheral blood and number of blasts in bone marrow is under <5 %), consolidation therapy is initiated and its composition varies according to the patients' prognosis. High-risk patients are directed to allogeneic hematopoietic stem cell transplantation after the consolidation treatment is ended.

Paliative care is initiated in patients whose general condition, age, comorbidities or personal preferences do not allow them to choose curative treatment. The patient is administered low doses of cytarabine, cytoreductive treatment with hydroxyurea and complex supportive care.

Treatment of relapse requires high-dose chemotherapy and allogeneic transplantation (https://www.cancer.gov/publications/dictionaries/cancer-terms/def/allogeneic-stem-cell-transplant). However, not everyone can tolerate such intensive therapy, so the risks must be considered individually.

More on this page Acute myeloid leukemia.

Acute lymphoblastic leukemia

Acute lymphoblastic leukemia (ALL) is a disease of the group of malignant lymphoproliferative disorders arising from the transformation of a hematopoetic stem cell of a lymphoid lineage. These cells lose their ability to differentiate, but retain their ability to proliferate beyond physiological regulation. It is the most common malignancy of childhood with an incidence of 7.7 / 100,000 in the age group 1–5 years, in adolescence the incidence decreases with another gradual increase in senior age. In total, in the age group over 18 years, the annual incidence in the Czech Republic is 1 / 100,000 inhabitants. The incidence is higher in patients with Down syndrome.

A related disease is lymphoblastic lymphoma (LBL), whose cells morphologically and immunophenotypically correspond to ALL cells. It often affects the mediastinum and is usually based on the T-line. The difference compared to ALL is in no or only minimal bone marrow infiltration and the absence of peripheral blood blasts. It is also a very aggressive malignancy, similar treatment regimens are used as in ALL.

Both of these diseases, ALL and LBL, can be derived from B or T cell precursors , with about 3/4 of the cases being B-line.

Etiology

The change from one of the cells to a tumor cell is usually due to chromosomal disorders or mutations in its genetic information . These disorders cause the cell to divide uncontrollably and cease to respond to the regulatory action of the organism. The reason for the mutation is not always known exactly. This may be due to exposure to certain factors such as chemicals and radioactive radiation . Undoubtedly, the presence of an inherited genetic predisposition to oncological diseases is also important . However, the greatest influence will be a simple coincidence and the escape of a malignant cell from the body's immune surveillance.

Symptoms

The symptoms are very non-specific at first and may resemble other diseases. Common are the so-called **B-symptoms**, which include **weight loss** of at least 10% in 6 months, **sub- to febrile fever** of non-infectious origin and night or day **heavy sweating**. In addition, **symptoms of anemia** (fatigue, inefficiency, dyspnoea, in extreme cases myocardial infarction or brain hypoxia), **infections** due to leukocytopenia (most often respiratory, unresponsive to conventional ATB treatment) and **bleeding** due to thrombocytopenia (petechiae, epistaxis, or even more severe bleeding). **Bone pain** is a common and relatively typical symptom of all. Variousneurological symptoms may be associated with CNS infiltration. In about half of the cases, lymphadenopathy is present in various locations, sometimes **hepatomegaly** or **splenomegaly** .

Treatment

ALL treatment takes place in specialized hematooncology centers for patients of childhood or adulthood. Combination regimens consisting of chemotherapy, immunotherapy, tyrosine kinase inhibitors, corticoids, radiotherapy, and hematopoietic stem cell transplantation are used.

More on this page Acute lymphoblastic leukemia.

Links

Related articles

- Hematopoiesis
- Stem cells
- Acute myeloid leukemia
- Acute lymphoid leukemia
- Chronic myeloid leukemia
- Chronic lymphocytic leukemia

References

-
- BÜCHLER, Tomáš. *Speciální onkologie*. 2. vydání. Praha: Maxdorf, [2020]. Jessenius. ISBN 978-80-7345-651-1.
- DOUBEK, Michael, MAYER, Jiří (Eds.). Léčebné postupy v hematologii 2020. Doporučení České hematologické společnosti České lékařské společnosti Jana Evangelisty Purkyně. 1. vyd. 2020. ISBN 978-80-270-8240-7.
- 'Acute myeloid leukemia: a comprehensive review and 2016 update'
- Diagnosis and management of AML in adults: 2017 ELN recommendations from an international expert panel
- The 2016 revision to the World Health Organization classification of myeloid neoplasms and acute leukemia
- https://www.sciencedirect.com/science/article/pii/S0268960X12000045?via=ihub
- Acute lymphoblastic leukemia
- Acute myeloid leukemia#cite note-.C4.8Ce.C5.A1ka-1

Blood disease	
Myeloproliferative syndromes and diseases	AML • CML • Esencial trombocytemia • Myelodysplastic syndrome • Polycythaemia vera rubra • Primary myelofibrosis • Systémová mastocytóza
Lymphoproliferative syndromes and diseases	Leukemiea: ALL • CLL Lymfomys: Hodgkin's lymphoma • NHL Lymphoproliferative diseases of plasma bb.: Multiple myeloma • Heavy chain diseases • Primary amyloidosis • Waldenström's macroglobulinemia
Aplastic anemia	Blackfan Diamond Anemia • Aplastic Anemia • Fanconih anemia • Idiopathic anemia • Myelopthysis
Anemia	Anemia from increased erythrocyte loss: Extracorporeal hemolytic anemia • Corpuscular hemolytic anemia • Posthemorrhagic anemia Anemia from decreased erythrocyte production: Erythropoietin deficiency anemia • Folic acid and vitamin B12 deficiency anemia • Iron deficiency anemia • Congenital dyserythropoietic anemia • Sideroblastic anemia
Polycytemia	Ectopic erythropoietin production • Genetic polycythemia • Relative polycythemia • Tissue hypoxia
Granulocytopenia	Decreased granulocyte formation • Altered granulocyte distribution • Increased granulocyte loss
Disorders of granulocyte function	Disorders of granulocyte adhesion • Disorders of destruction of phagocytic material • Disorders of granulocyte chemotaxis • Acquired disorders of granulocytes
Blood clotting disorders	Disorders of primary hemostasis: Thrombocytopathy • Thrombocytopenia • Vaskulopatie Disorders of secondary hemostasis - coagulopathy: Congenital coagulation disorders • Acquired coagulation disorders Hypercoagulation states: Congenital thrombophilia • Acquired thrombophilia
Portal: Hematology	

Category: Internal medicine Category: Hematology Category: Oncology