

Acute Myeloid Leukemia(AML)

About AML:

Acute Myeloid Leukemia is a type of cancer in which bone marrow forms large number of abnormal blood cells which are called Blasts, build up in the body. Leukemia may affect red blood cells, white blood cells, and platelets. The leukemia cells can spread outside the blood to other parts of the body, including the central nervous system (brain and spinal cord), skin, and gums. They can also form solid tumor named as myeloid sarcoma.

Most AML subtypes are based on how mature (developed) the cancer cells are at the time of diagnosis and how different they are from normal cells. Acute promyelocytic leukemia (APL) is a subtype of AML. It occurs due to genes switching in chromosomes and formation of new abnormal gene(PML-RARA) which sends a message that stops promyelocytes (a type of white blood cell) from maturing.

Certain risk factors can increase the chances of getting AML such as

- 1- Older age.
- 2- Smoking.
- 3- Having had treatment with chemotherapy or radiation therapy in the past.
- 4- Being exposed to radiation in the environment (such as nuclear radiation) or to the chemical benzene.
- 5- Having a personal history of a blood disorder such as myelodysplastic syndrome.
- 6- Having certain syndromes or inherited disorders.

The early signs and symptoms of AML may be like those caused by the flu or other common diseases such as Weakness, Fever, Infection, Paleness or loss of normal skin color and Bleeding. Less common signs or symptoms may be caused by clusters of leukemia cells in the central nervous system (CNS) or testicles, or a tumor of myeloid cells called a chloroma.

Diagnosis:

Tests that examine the blood and bone marrow are used to diagnose AML.

Some tests are

- 1- Complete Blood Count (CBC) – It gives the idea about number of red blood cells, white blood cells, platelets, the amount of hemoglobin (the protein that carries oxygen) in the red blood cells and portion of the sample made up of red blood cells.
- 2- Peripheral blood smear- A procedure in which a sample of blood is checked for blast cells, the number and kinds of white blood cells, the number of platelets, and changes in the shape of blood cells.
- 3- Flow cytometry: A laboratory test that measures the number of cells in a sample, the percentage of live cells in a sample, and certain characteristics of the cells, such as size, shape, and the presence of tumor (or other) markers on the cell surface. The sample can be taken from patient's blood, bone marrow, or other tissue.
- 4- Bone marrow aspiration and biopsy: The removal of bone marrow, blood, and a small piece of bone by inserting a hollow needle into the hipbone or breastbone. A

pathologist views the bone marrow, blood, and bone under a microscope to look for signs of cancer.

- 5- Cytogenetic analysis: A laboratory test in which the chromosomes of cells in a sample of blood or bone marrow are counted and checked for any changes, such as broken, missing, rearranged, or extra chromosomes. Changes in certain chromosomes may be a sign of cancer.
- 6- Molecular testing: A laboratory test to check for certain genes, proteins, or other molecules in a sample of blood or bone marrow. Molecular tests also check for certain changes in a gene or chromosome that may cause or affect the chance of developing AML.
- 7- Immunophenotyping: A laboratory test that uses antibodies to identify cancer cells based on the types of antigens or markers on the surface of the cells. This test is used to help diagnose specific types of leukemia.

Some other tests are also there such as Spinal Tap, Tumor biopsy and RT-PCR.

Treatment:

Because acute myeloid leukemia moves quickly, it's important to begin treatment right away. It will depend on several things, including what kind of AML patient has, how far it's spread, and overall health of the patient.

The treatment of AML usually has two phases.

Remission induction therapy: This is the first phase of treatment. The goal is to kill the leukemia cells in the blood and bone marrow. This puts the leukemia into remission.

Postremission therapy: This is the second phase of treatment. It begins after the leukemia is in remission. The goal of postremission therapy is to kill any remaining leukemia cells that may not be active but could begin to regrow and cause a relapse. This phase is also called remission continuation therapy.

Patient may receive one or more types of following treatments in either phase:

Chemotherapy: Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing. Patient might take these medicines by mouth, through an IV, or through a shot into another part of the body.

Radiation therapy: Radiation therapy is a cancer treatment that uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing. External radiation therapy uses a machine outside the body to send radiation toward the area of the body with cancer. Total-body irradiation sends radiation toward the whole body. It is a type of external radiation that may be used to prepare the body for a stem cell transplant when the leukemia has recurred.

Chemotherapy with stem cell transplant: Chemotherapy is given to kill cancer cells. Healthy cells, including blood-forming cells, are also destroyed by the cancer treatment. Stem cell transplant is a treatment to replace the blood-forming cells. Stem cells (immature blood cells) are removed from the blood or bone marrow of the patient or a donor and are frozen and stored. After the patient completes chemotherapy and/or total-body irradiation, the stored stem cells are thawed and given back to

the patient through an infusion. These reinfused stem cells grow into (and restore) the body's blood cells.

Targeted therapy: Targeted therapy is a type of treatment that uses drugs or other substances to identify and attack specific cancer cells. Targeted therapies usually cause less harm to normal cells than chemotherapy or radiation therapy do. There are different types of targeted therapy such as Monoclonal antibodies, Midostaurin and Gilteritinib etc.

Other medications: Drugs called arsenic trioxide (Trisenox) and all-trans retinoic acid (ATRA) target cancer cells in a type of AML called acute promyelocytic leukemia.

AML Data Sources:

1- Hospitals Treating AML:

Chains : Fortis Hospitals, Apollo Hospitals, Manipal Health

Private Healthcare Facilities: Kokilaben Dhirubhai Ambani Hospital (Mumbai), HCG, Global (Bangalore), Nanavati Hospital (Mumbai), Jaslok Hospital (Mumbai)

Government Facilities: AIIMS, RGCI (Delhi), NIMS (Hyderabad), PGIMS (Rohtak)

2- Diagnosis Centres (Pre-treatment Data or Data During treatment):

Chains: Vijaya Diagnostics, Abbott Diagnostics, Dr. Lal Pathlabs, SRL diagnostics.

Private Facilities based on location and hospitals.

Further data sources can be located based on treatment processes and their center's recommendations.