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Acute Monocytic Leukemia

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Acute monocytic leukemia is a subtype of acute myeloid leukemia (AML) and is denoted as AML-5 or M5.

This subtype of AML has distinct clinical and biological characteristics and is associated with hyperleukocytosis, coagulation abnormalities, and extramedullary involvement.

AML-M5 accounts for 18% of pediatric AML cases and about 45% of AML cases in young children.

This disease is often associated with key chromosomal translocations including t(8;16)(p11;p13) and MLL locus translocations at 11q23 such as t(10;11)(p13;q23), t(9;11)(p22;q23), and t(11;19)(q23;p13).

AML may develop following chemotherapy, especially with treatments involving anthracyclines and epipodophyllotoxins.

Classification of AML M5

AML M5 is further classified into M5a and M5b.

AML M5a

AML M5a accounts for 5-8% of AML and is usually seen in children and young adults.

In this subtype, the hypercellular marrow contains a high number of large monoblasts, which have highly basophilic cytoplasm and delicate azurophilic granules but very few or no Auer rods.

The monoblasts also have round nuclei, vacuoles, and lacy chromatin with multiple nucleoli.

A bone marrow biopsy in patients with this type of AML shows the marrow partially or completely replaced by monoblasts.

About 75% of M5a patients have cytogenetic abnormalities and about 7% have FLT3 mutations.

Diagnosis criteria: >80% of monocyte lineage cells should be monoblasts (hence the name "acute monoblastic leukemia").

AML M5b

AML M5b accounts for 3-6% of AML and is seen in people of all ages.

Leukemic cells in this subtype are often promonocytes having less basophilic cytoplasm and more of azurophilic granules. These cells have folded nuclei which contains fine chromatin, and erythrophagocytosis is often present.

Electron microscopy images of promonocytes show cytoplasm with several tiny cisternae of endoplasmic reticulum and a few dense granules. Nucleus is seen with multiple lobes and marginated chromatin.

About 30% of patients with this subtype have cytogenetic abnormalities and nearly 30% have FLT3 mutations.

AML M5b treatment may often lead to tumor lysis syndrome and false elevated platelet counts.

Diagnosis criteria: peripheral blood is predominated by mature monocytes or promonocytes with <20% monoblasts.

Treatment of AML 5

As with many rare diseases, AML is a difficult cancer to treat. The treatment regimen involves:

Aggressive, multidrug chemotherapy: usually 4 to 6 courses at intervals of 3 to 4 weeks. Key drugs used in AML chemotherapy include various dosages of anthracyclines, cytarabine, and etoposide.

Bone marrow suppression is a common symptom of chemotherapy, which might lead to anemia, neutropenia, and thrombocytopenia.

Patients are also at risk of fatal opportunistic infections and mucositis. Hence, supportive measures are very crucial in patients with AML during and after treatment.

Prognosis of AML M5

Prognosis of the M5 subtype is found to be poor when compared to other AML subtypes, probably due to over-expression of the nm23 protein (the differentiation inhibitory factor).

AML M5 patients tend to have Flt3 gene mutations than those with other subtypes, reflecting the often unfavorable prognosis for patients with this subtype.

Mutations present themselves in the form of either point mutations in the second tyrosine kinase domain or internal tandem duplications of the juxtamembrane region.

While only 26.4% of patients with other AML subtypes have this mutation, about 40% of AML M5 patients are reported to have this critical mutation, which explains the increased chances of unfavorable outcome in patients suffering AML M5.

Reviewed by Brandon May

References

- http://www.cancer.gov/types/leukemia/hp/adult-aml-treatment-pdq
- http://jco.ascopubs.org/content/22/7/1276.full.pdf
- http://www.pathologyoutlines.com/topic/leukemiaacutemonocyticleukemia.html
- https://www.orpha.net/data/patho/GB/uk-AMLM5.pdf
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Further Reading

- What is Leukemia?
- Leukemia Causes
- Leukemia Treatments
- Leukemia Symptoms

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