MAYO CLINIC LABORATORIES

# Acute Myeloid Leukemia: Testing Algorithm

Clinical suspicion for acute leukemia (peripheral blood vs bone marrow)

**YES**

Order standard testing:
- LCMS / Leukemia/Lymphoma Immunophenotyping, Flow Cytometry, Varies (triage, acute panel)
- CHRBM / Chromosome Analysis, Hematologic Disorders, Bone Marrow
- Cytochemical stains as determined by reviewing pathologist

*If a complete flow cytometric analysis has been performed on peripheral blood (≥20% blasts), repeat only if protocol requirement or immunophenotype is unclear

Diagnostic criteria met for acute myeloid leukemia (AML)

**YES**

Possible acute promyelocytic leukemia (APL), follow:
- Acute Promyelocytic Leukemia: Guideline to Diagnosis and Follow-up

Acute myeloid leukemia, NOT APL, perform:
- Genetic testing for prognostic and therapeutic purposes.

**NO**

Acute leukemia, NOT AML, consider:
- B-cell acute lymphoblastic leukemia (ALL)
- T-cell ALL
- Blastic plasmacytoid dendritic cell neoplasm

Question acute leukemia ambiguous lineage
- Follow Acute Leukemias of Ambiguous Lineage Testing Algorithm

**NO**

Follow the World Health Organization/International Consensus Classification for further evaluation and subclassification.

Order one of the following genetic tests on all AML cases:
- FLT / *FLT3* Mutation Analysis, Varies
- IDHQ / IDH1(R132) and IDH2 (R140 and R172) Quantitative Detection, Droplet Digital PCR, Varies
- NPM1Q / Nucleophosmin (NPM1) Mutation Analysis, Varies
- NGSHM / MayoComplete Myeloid Neoplasms, Comprehensive OncoHeme Next-Generation Sequencing, Varies (including: *CEBPA, NPM1, IDH1, IDH2*, etc) or
- NGAML / MayoComplete Acute Myeloid Leukemia, 11-Gene Panel, Varies or
- NGAMT / MayoComplete Acute Myeloid Leukemia, Therapeutic Gene Mutation Panel *(FLT3, IDH1, IDH2, TP53)*, Next-Generation Sequencing, Varies
- EXHR / Hematologic Disorders, DNA and RNA extract and Hold, Varies

Reflexive testing performed based on initial pathologic and genetic findings:
- In the event of an unsuccessful/ambiguous cytogenetic result the appropriate AML fluorescence in situ hybridization (FISH) is performed based on patient age:

Adult (≥31 years)
- AMLFA / Adult Acute Myeloid Leukemia panel, FISH, Varies

Pediatric (≤30 years )
- AMLFP / Pediatric Acute Myeloid Leukemia panel, FISH, Varies

- Monocytic differentiation: Specify FISH probes for *KMT2A* (11q23) and inv(16), order AMLMF / Acute Myeloid Leukemia (AML), Specified FISH, Varies
- Morphologic suspicion of abnormal eosinophils: Specify FISH probes for inv(16) MYH11(R)/CBFB(G), order AMLMF
- For core-binding factor AML: Specify FISH probes for t(8;21) or inv(16), order AMLMF. Also order NGAML if NGSHM was not performed

Consider obtaining a baseline quantitative level by molecular measurable residual disease (MRD) testing for the following targets, if applicable:
- *RUNX1-RUNX1T1*: order T821Q / *RUNX1-RUNX1T1* Translocation (8;21), Minimal Residual Disease Monitoring Quantitative, Varies
- *CBFB-MYH11*: order IN16Q / *CBFB-MYH11* Inversion(16),Quantitative Detection and Minimal Residual Disease Monitoring, qRT-PCR, Varies

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