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

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

**NO**

Diagnostic criteria met for acute myeloid leukemia (AML)

**YES**

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

**NO**

Genetic testing for prognostic and therapeutic purposes

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

Order one of the following genetic tests on all AML cases:
- FLT / FLT3 Mutation Analysis, Varies
- IDHO/IDH1(R132) and IDH2 (R140 and R172) Quantitative Detection, Droplet Digital PCR, 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

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)
    - AMLAF / Acute Myeloid Leukemia (AML), FISH, Adult, Varies
  - Pediatric (≤30 years)
    - AMLPF / Acute Myeloid Leukemia (AML), FISH, Pediatric, 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:
- NPM1: order NPM1Q / Nucleophosmin (NPM1) Mutation Analysis, Varies
- 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

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