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*WHO ACUTE LEUKEMIA CLASSIFICATION - 2017

Acute myeloid leukemia (AML) and related neoplasms

AML with recurrent genetic abnormalities :

- AML with t(8;21)(q22;q22.1)
- AML with inv(16)(p13.1q22) or t(16;16)(p13.1;q22)
- APL with PML-RARA
- AML with t(9;11)(p21.3;q23.3)
- AML with t(6;9)(p23;q34.1)
- AML with inv(3)(q21.3q26.2) or t(3;3)(q21.3;q26.2)
- AML (megakaryoblastic) with t(1;22)(p13.3;q13.3);RBM15-MKL1
- AML with t(9;22)(q34.1;q11.2)
- AML with mutated NPM1
- AML with biallelic mutations of CEBPA
- AML with mutated RUNX1

AML with myelodysplasia-related changes

Therapy-related myeloid neoplasms

AML, NOS (with minimal differentiation, with / without maturation, acute myelomonocytic leukemia, acute monoblastic/monocytic leukemia, pure erythroid leukemia, acute megakaryoblastic leukemia, acute basophilic leukemia)

Myeloid proliferations related to Down syndrome

Acute leukemias of ambiguous lineage AML/ALL typing

B-lymphoblastic leukemia/lymphoma

B-lymphoblastic leukemia/lymphoma with recurrent genetic abnormalities:

- B-lymphoblastic leukemia/lymphoma with t(9;22)(q34.1;q11.2)
- B-lymphoblastic leukemia/lymphoma with t(v;11q23.3)
- B-lymphoblastic leukemia/lymphoma with t(12;21)(p13.2;q22.1)
- B-lymphoblastic leukemia/lymphoma with hyperdiploidy
- B-lymphoblastic leukemia/lymphoma with hypodiploidy
- B-lymphoblastic leukemia/lymphoma with t(5;14)(q31.1;q32.3)
- B-lymphoblastic leukemia/lymphoma with t(1;19)(q23;p13.3)
- B-lymphoblastic leukemia/lymphoma, BCR-ABL1–like
- B-lymphoblastic leukemia/lymphoma with RUNX1 iAMP21 amplification

T-lymphoblastic leukemia/lymphoma

Chimerism

1 STAGE OF ANALYSIS 2 3 4 5

1 Cytology | Cytochemistry	2 Immunophenotyping	3 Conventional cytogenetics: hematological karyotyping	4 Molecular cytogenetics: Fluorescent in situ Hybridization (FISH)	5 Molecular Biology including NGS panel	
Peripheral blood and/or bone marrow aspirate smears analysis	AML typing (panel ALOT, AML)	Bone marrow karyotyping Blood karyotyping if peripheral blastosis	RUNX1-RUNX1T1 CBFB-MYH11 PML-RARA MLL (KMT2A) DEK-NUP214 MECOM	Qualitative BCR-ABL Quantitative BCR-ABL (MRD (follow-up)) BCR-ABL mutation (Resistance to imatinib)	AML panel ASXL1, BRAF, CALR, CBL, CEBPA, CSF3R, DNMT3A, ETV6, EZH2, FLT3, HRAS, IDH1, IDH2, JAK2, KIT, KRAS, MPL, NPM1, NRAS, PTPN11, RUNX1, SETBP1, SF3B1, SRSF2, TET2, TP53, U2AF1, WT1, ZRSR2.
			BCR-ABL1		
			Myeloid panel: chromosomes 5, 7 and 8 status, EVI1 (MECOM), TP53, TEL (ETV6), 20q, MLL (KMT2A).		
	AML/ALL typing (panel ALOT, AML, ALL)		BCR-ABL1 / MLL (KMT2A)		
	ALL typing (panel ALOT, ALL)		BCR-ABL1 MLL (KMT2A) ETV6-RUNX1		
			IgH-DC TCF3-PBX1 PDGFRβ		
			BCR-ABL / MLL (KMT2A)		
			XX/XY		

Sample requirements

Sample must reach laboratory within 48 hours.

	Preanalytical			Temperature	Required informations	Test request form
	Blood	Bone marrow	Other			
Cytology / Cytochemistry	2 slides unfixed and unstained	≥4 slides unfixed and unstained		Room temperature Do not freeze	- Clinical data - FBC	B8-INTGB Malignant blood disorders + BW12-INTGB Fish request form for Malignant Hemopathies and Solid Tumors
Immunophenotyping	1 EDTA tube (or 1 heparin tube) 2 slides unfixed and unstained	2 ml in EDTA (or heparin) 2 slides unfixed and unstained		Room temperature Do not freeze	- Clinical data - FBC	
Conventional cytogenetics: Haematological karyotyping	5ml 1 lithium heparin tube	2-5ml 1 medullary puncture transferred to 1 lithium heparin tube	Biological fluid	Room temperature Do not freeze	- Clinical data - FBC - Bone marrow report - Immuno-phenotyping report	
Molecular cytogenetics : FISH	5ml 1 lithium heparin tube	2-5ml 1 medullary puncture transferred to 1 lithium heparin tube	FISH also available on: unstained slides (peripheral blood or bone marrow smear). No analysis from bone marrow biopsy	Room temperature Do not freeze		
Molecular biology Qualitative BCR-ABL	Whole blood 1 EDTA tube and 1 PaxGen tube	Bone marrow transferred to 1 EDTA tube		EDTA tube : Room temperature PaxGen tube : Freeze -20°c		
Molecular Biology Quantitative BCR-ABL	Whole blood 1 EDTA tube and 1 PaxGen tube			EDTA tube : Room temperature PaxGen tube : Freeze -20°c		
All others molecular biology tests	Whole blood 2 EDTA tubes	Bone marrow transferred to 1 EDTA tube		Room temperature Do not freeze		

All the preanalytical information and the gene list by NGS panel can be found on **www.eurofins-biomnis.com > Test Guide**

Acute leukemia - antibodies minimal panels

Minimal panel	Markers
Acute Myeloid Leukemia OrientationTest (ALOT)	CD45 cyMPO cyCD3/CD3 CD7 CD19 cyCD79a
Acute Myeloid Leukemia (AML)	CD45 CD11b CD13 CD14 CD15 CD33 CD117 CD34 CD38 HLA-DR
B-Acute Lymphoid Leukemia (B-ALL)	CD45 CD19 CD20 cyCD22 kappa/lambda cyIgM CD10 CD34 CD38 TdT and myeloid markers CD13 CD15 CD33 CD117
T-Acute Lymphoid Leukemia (T-ALL)	CD45 CD2 CD3 CD5 CD7 CD4 CD8 TCRab/gd CD1a TdT and myeloid markers CD13 CD15 CD33 CD117

References

**Swerdlow SH, Campo E, Harris NL, Jaffe ES, Pileri SA, Stein H, Thiele J. WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues (Revised 4th edition) IARC Lyon 2017*

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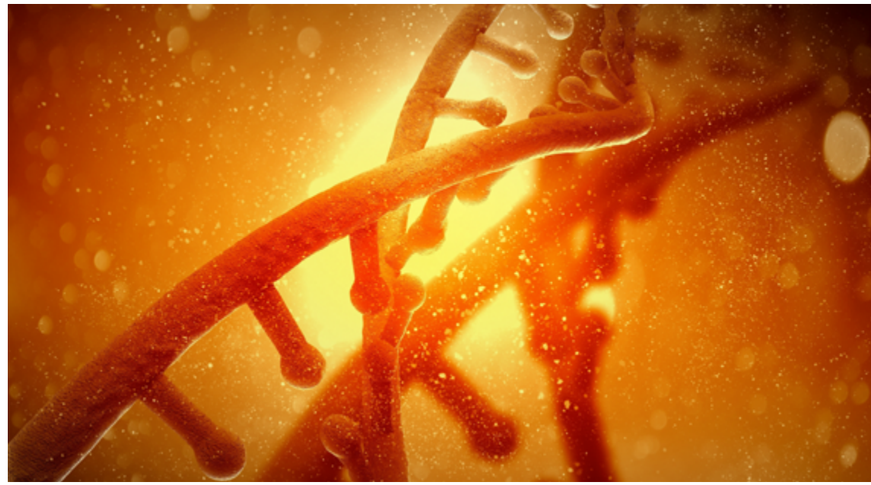

Pathological diagnosis and follow up of patients with

Acute Leukemia