

Blasts – myeloid

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| Myeloblast Size μm 12–16 Nucleus shape round/oval Cytoplasm basophilic, no granulation, (POX+, esterase \emptyset) Incidence* physiologic, AML, MDS, CML | Granulated blast Size μm 12–16 Nucleus shape round/oval Cytoplasm reddish granules, Golgi zone \emptyset , (POX+, esterase \emptyset) Incidence* AML, RAEB | Abnormal promyelocyte Size μm 16–20 Nucleus shape oval Cytoplasm dense, coarse, purple-red granulation, (POX++, esterase \emptyset) Incidence* AML-M3 | Blasts, POX-positive Blasts with brown dye precipitates of varied density. Remark: All neutrophils from the promyelocyte stage on are POX+. |
| Blast with Auer rods Size μm 14–16 Nucleus shape round/oval Cytoplasm needle-shaped red inclusions (Auer rods), (POX+, esterase \emptyset) Incidence* AML-M1, -M2, -M3, -M6, RAEB-2 | Blast with Auer rods and Auer bodies Size μm 14–16 Nucleus shape round/oval Cytoplasm spherical red inclusions (Auer bodies), additionally Auer rods, (POX+, esterase \emptyset) Incidence* AML-M1, -M2, -M6 | Faggot cell (M3) Size μm 14–18 Nucleus shape round/oval/lobulated Cytoplasm bundles of Auer rods, (POX+, esterase \emptyset) Incidence* AML-M3 and -M3V, t(15;17) | Lobulated Blast (M3V) Size μm 16–20 Nucleus shape (bi-)lobulated Cytoplasm often fine reddish granulation, bundles of Auer rods +/-, (POX+, esterase \emptyset) Incidence* AML-M3V, t(15;17) |
| Monoblast Size μm 14–18 Nucleus shape round/oval, nucleoli +/- Cytoplasm abundant cytoplasm, fine granules +/-, pseudopodia +/-, (POX \emptyset , esterase +) Incidence* AML-M5A and -B, -M4, CMML | Monoblast (1), promonocyte (2) Monoblast description: see to the left Promonocyte description: see to the right | Promonocyte Size μm 14–18 Nucleus shape lobed, intermediate chromatin Cytoplasm abundant cytoplasm, granulation +/-, often vacuoles, haemophagocytosis +/-, (POX \emptyset , esterase +) Incidence* AML-M5A and -B, -M4, CMML | Blast, esterase positive Blast with precipitates of brown dye; diagnostic for monoblastic AML only in case of diffuse and strong staining. |
| Monocytoid blast (M4) Size μm 16–18 Nucleus shape monocytoid Cytoplasm abundant cytoplasm, granulation +/-, often vacuoles, (POX \emptyset , esterase +) Incidence* AML-M5A and -B, -M4, CMML | Monocytoid blast (M5B) Size μm 16–18 Nucleus shape monocytoid Cytoplasm abundant cytoplasm, granulation +/-, often vacuoles, (POX \emptyset , esterase +) Incidence* AML-M5A and -B, -M4, CMML Platelet phagocytosis | Abnormal eosinophil (M4 Eo) Size μm 14–16 Nucleus shape round/oval intermediate chromatin Cytoplasm coarse, round, eosinophilic and blue-purple granules, (chloroacetate esterase +) Incidence* AML-M4 Eo, inv(16), t(16;16) | Cup-like blast Size μm 14–16 Nucleus shape Nucleus with invaginated cytoplasm** Cytoplasm Granulated cytoplasm. Crucial is the nucleus: fingerprint-like indentation; POX + Incidence* AML with NPM1- and FLT3- mutations |
| Abnormal proerythroblast (M6) Size μm 14–16 Nucleus shape round/oval Cytoplasm deep basophilic, flaky Golgi zone, (POX \emptyset , esterase \emptyset) Incidence* AML-M6 | Abnormal Megakaryoblast (M7) Size μm 12–18 Nucleus shape round/oval Cytoplasm undifferentiated blast, no granulation, cytoplasmic blebbing or pseudopodia, (POX \emptyset , esterase \emptyset) Incidence* AML-M7 | Basophilic blast Size μm 14–16 Nucleus shape often blurred Cytoplasm blue-purple granulation, often vacuoles, (toluidine blue +) Incidence* acute basophilic leukaemia | Mast cell blast Size μm 14–16 Nucleus shape often blurred Cytoplasm basophilic granules +/-, (toluidine blue +) Incidence* mast cell leukaemia |

* For pragmatic reasons, the abbreviations of FAB classification diagnoses have been used. The WHO classification equivalents are as follows: M0 – AML with minimal differentiation; M1 – AML without maturation; M2 – AML with maturation; M3 – acute promyelocytic leukaemia; M4 – acute myelomonocytic leukaemia; M5 – acute monoblastic and monocytic leukaemia; M6 – acute erythroid leukaemia/proerythroblastic leukaemia; M7 – acute megakaryoblastic leukaemia.
 ** Invagination of the POX+ cytoplasm into the nucleus. Definition of the cup-like blast population: indentation zone $\geq 25\%$ of the nuclear surface, $\geq 10\%$ of blasts show goblet-shaped, usually light indentations. If cup-like blasts are identified, mutation analysis of NPM1 and FLT3 should be performed.

Common cytologic features

Nucleus

- Shape: round/oval
- Nuclear-cytoplasmic ratio: 70–90%
- Chromatin: predominantly regularly distributed, not clumped, not condensed
- Varying numbers of nucleoli; may be hidden by chromatin

Cytoplasm

- Basophilic
- Reddish granulation +/-
- Auer rods +/-; when +, evident for: AML, if blasts $\geq 20\%$ RAEB-2, if blasts $< 20\%$

Quantification of blasts

- $< 1\%$ in PB and $< 5\%$ in BM: in MDS: RA, RCMD +/- ring sideroblasts
- $< 5\%$ in PB and 5–9% in BM: RAEB-1
- 5–19% in PB and 10–19% in BM: RAEB-2
- $\geq 20\%$ in PB and/or BM: acute leukaemia