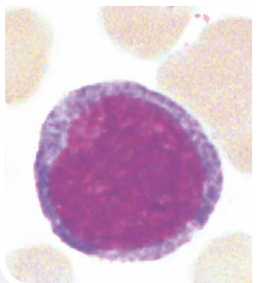
Blasts – myeloid

Myeloblast



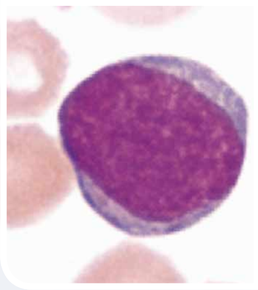
Size *µm*
12–16

Nucleus shape
round/oval

Cytoplasm
basophilic, no granulation, (POX+, esterase Ø)

Incidence*
physiologic, AML, MDS, CML

Granulated blast



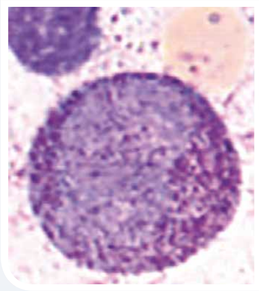
Size *µm*
12–16

Nucleus shape
round/oval

Cytoplasm
reddish granules, Golgi zone Ø, (POX+, esterase Ø)

Incidence*
AML, RAEB

Abnormal promyelocyte



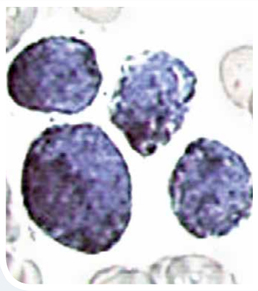
Size *µm*
16–20

Nucleus shape
oval

Cytoplasm
dense, coarse, purple-red granulation, (POX++, esterase Ø)

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

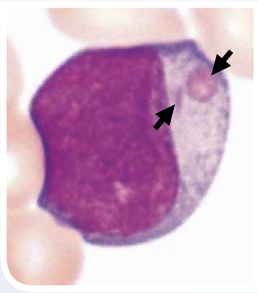
Size *µm*
14–16

Nucleus shape
round/oval

Cytoplasm
needle-shaped red inclusions (Auer rods), (POX+, esterase Ø)

Incidence*
AML-M1, -M2, -M3, -M6, RAEB-2

Blast with Auer rods and Auer bodies



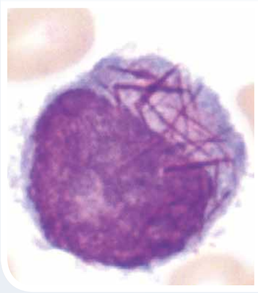
Size *µm*
14–16

Nucleus shape
round/oval

Cytoplasm
spherical red inclusions (Auer bodies), additionally Auer rods, (POX+, esterase Ø)

Incidence*
AML-M1, -M2, -M6

Faggot cell (M3)



Size *µm*
14–18

Nucleus shape
round/oval/lobulated

Cytoplasm
bundles of Auer rods, (POX+, esterase Ø)

Incidence*
AML-M3 and -M3V, t(15;17)

Lobulated Blast (M3V)

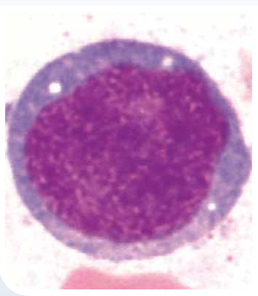
Size *µm*
16–20

Nucleus shape
(bi-)lobulated

Cytoplasm
often fine reddish granulation, bundles of Auer rods+/–, (POX+, esterase Ø)

Incidence*
AML-M3V, t(15;17)

Monoblast



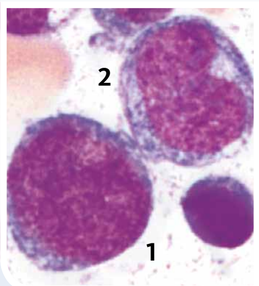
Size *µm*
14–18

Nucleus shape
round/oval, nucleoli+/–

Cytoplasm
abundant cytoplasm, fine granules+/–, pseudopodia+/–, (POX Ø, esterase +)

Incidence*
AML-M5A and -B, -M4, CMML

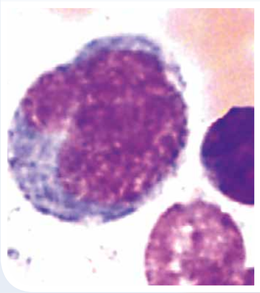
Monoblast (1), promonocyte (2)



Monoblast
description: see to the left

Promonocyte
description: see to the right

Promonocyte



Size *µm*
14–18

Nucleus shape
lobed, intermediate chromatin

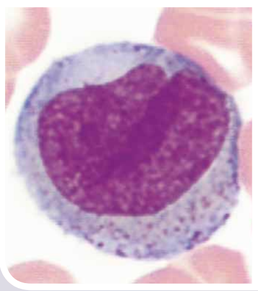
Cytoplasm
abundant cytoplasm, granulation+/–, often vacuoles, haemophagocytosis+/–, (POX Ø, esterase +)

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)



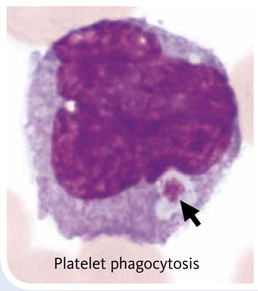
Size *µm*
16–18

Nucleus shape
monocytoid

Cytoplasm
abundant cytoplasm, granulation+/–, often vacuoles, (POX Ø, esterase+)

Incidence*
AML-M5A and -B, -M4, CMML

Monocytoid blast (M5B)



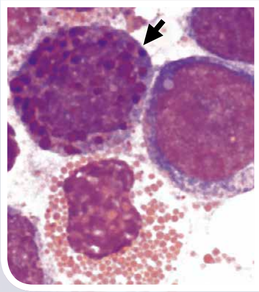
Size *µm*
16–18

Nucleus shape
monocytoid

Cytoplasm
abundant cytoplasm, granulation+/–, often vacuoles, (POX Ø, esterase+)

Incidence*
AML-M5A and -B, -M4, CMML

Abnormal eosinophil (M4 Eo)



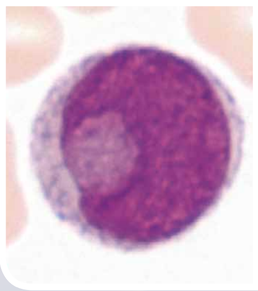
Size *µm*
14–16

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



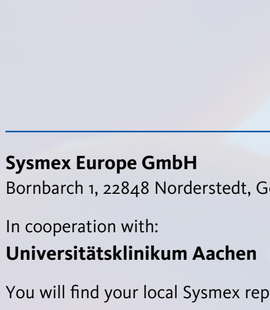
Size *µm*
14–16

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)



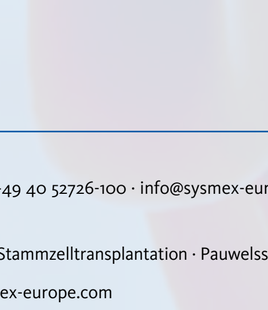
Size *µm*
14–16

Nucleus shape
round/oval

Cytoplasm
deep basophilic, flaky Golgi zone, (POX Ø, esterase Ø)

Incidence*
AML-M6

Abnormal Megakaryoblast (M7)



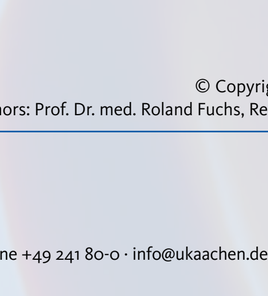
Size *µm*
12–18

Nucleus shape
round/oval

Cytoplasm
undifferentiated blast, no granulation, cytoplasmic blebbing or pseudopodia, (POX Ø, esterase Ø)

Incidence*
AML-M7

Basophilic blast



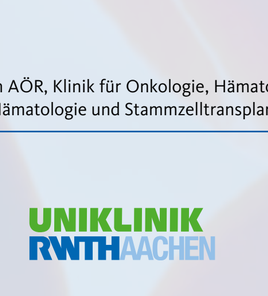
Size *µm*
14–16

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 ≥25% of the nuclear surface, ≥10% of blasts show goblet-shaped, usually light indentations. If cup-like blasts are identified, mutation analysis of NMP1 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 ≥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
- ≥20% in PB and/or BM: acute leukaemia

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