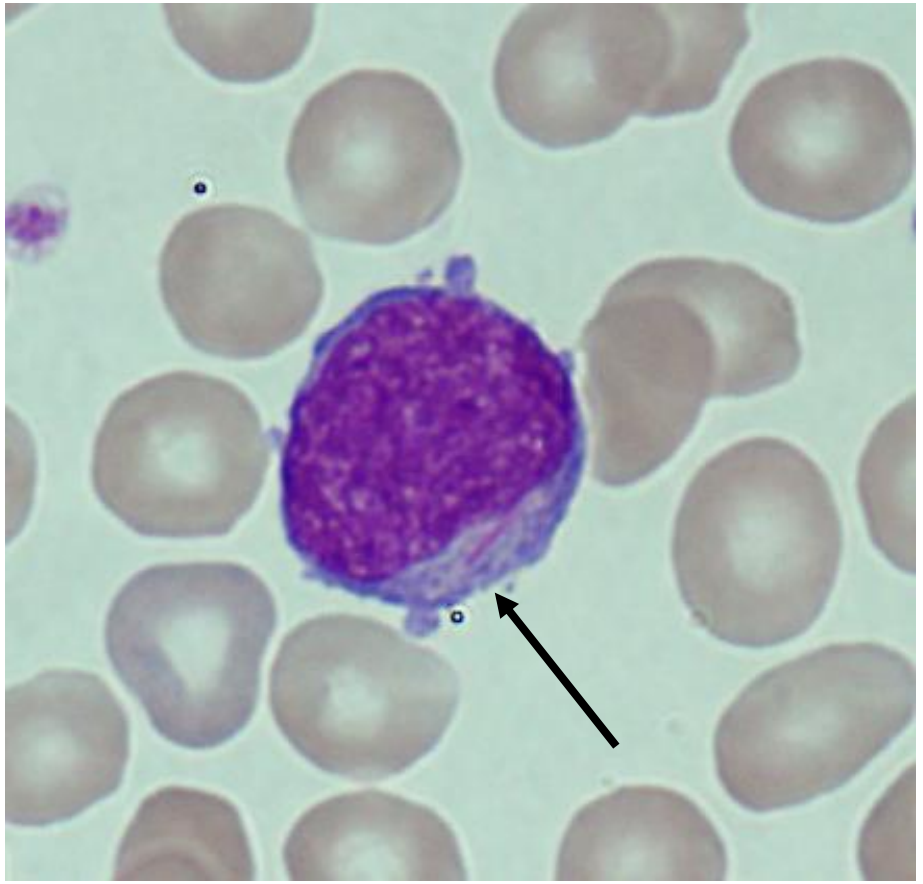
Auer rods

What are they, what do they look like, and what do they mean?

- Thin, rod-shaped
- Azurophilic
- Derived from primary granules (lysosymes) of myeloid cells

- Named after John Auer (1875-1948) who described them in 1906, but incorrectly identified the cells in which they were seen!



SOME HITHERTO UNDESCRIBED STRUCTURES FOUND IN THE LARGE LYMPHOCYTES OF A CASE OF ACUTE LEUKÆMIA.

By John Auer, M.D.,

FORMER HOUSE OFFICER OF THE JOHNS HOPKINS HOSPITAL; FELLOW OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH.

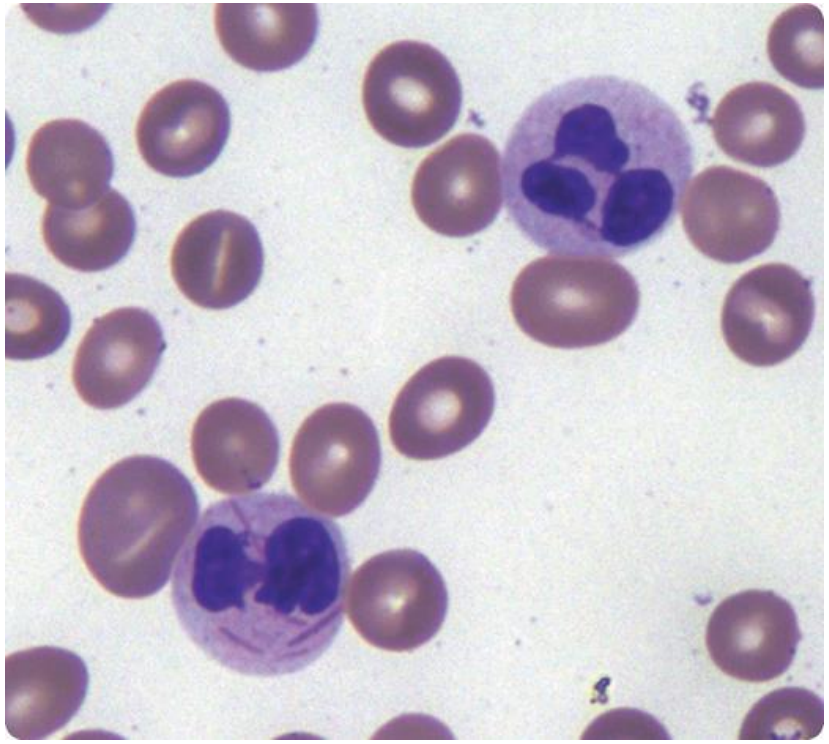
Am J Med Sci 1906; 131(6): 1002

- Never present in benign conditions

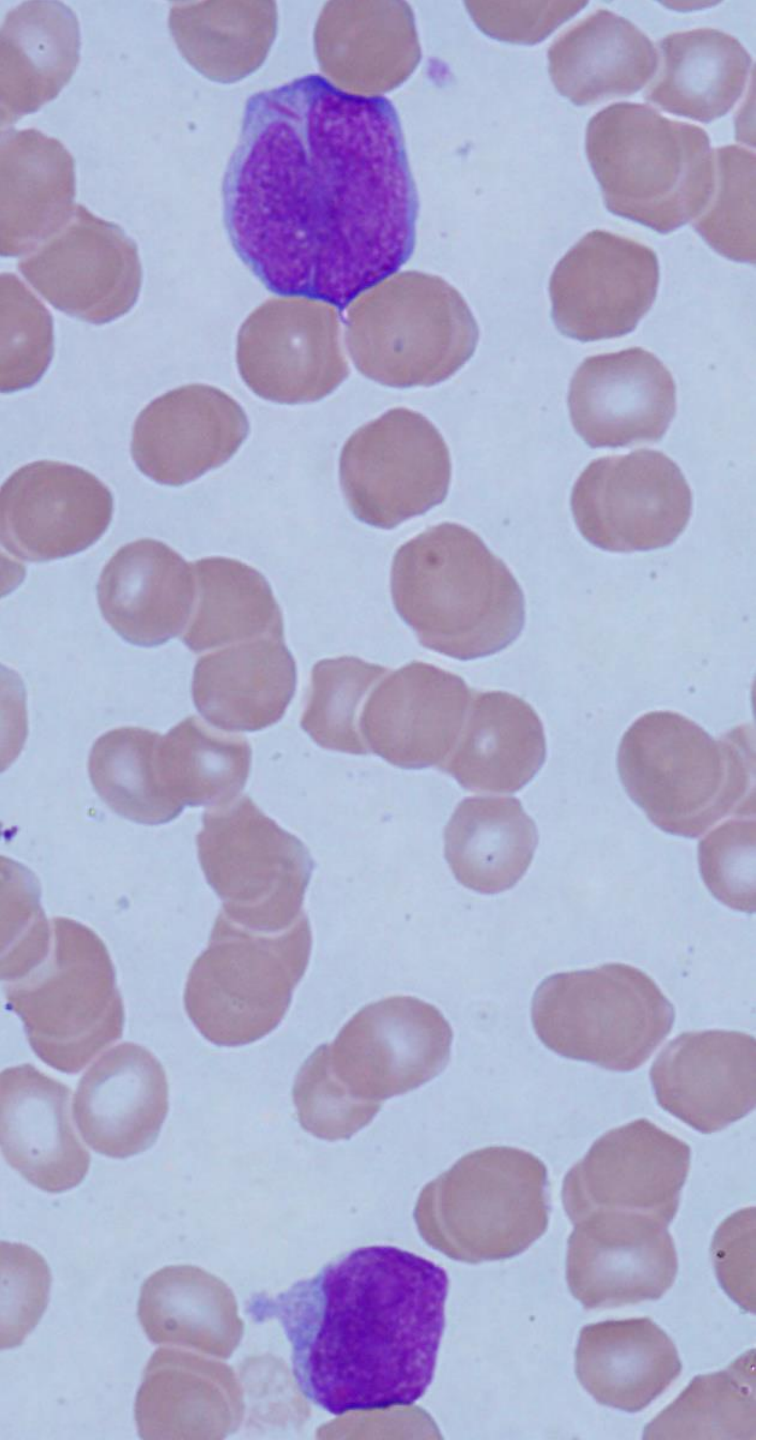
- Always in myeloid neoplasms
  - Blasts
    - Acute myeloid leukaemia
    - Rarely in Myelodysplasia (high-grade, “excess blasts” only): MDS – EB2
  - Very very rarely seen in neutrophils in patients with AML

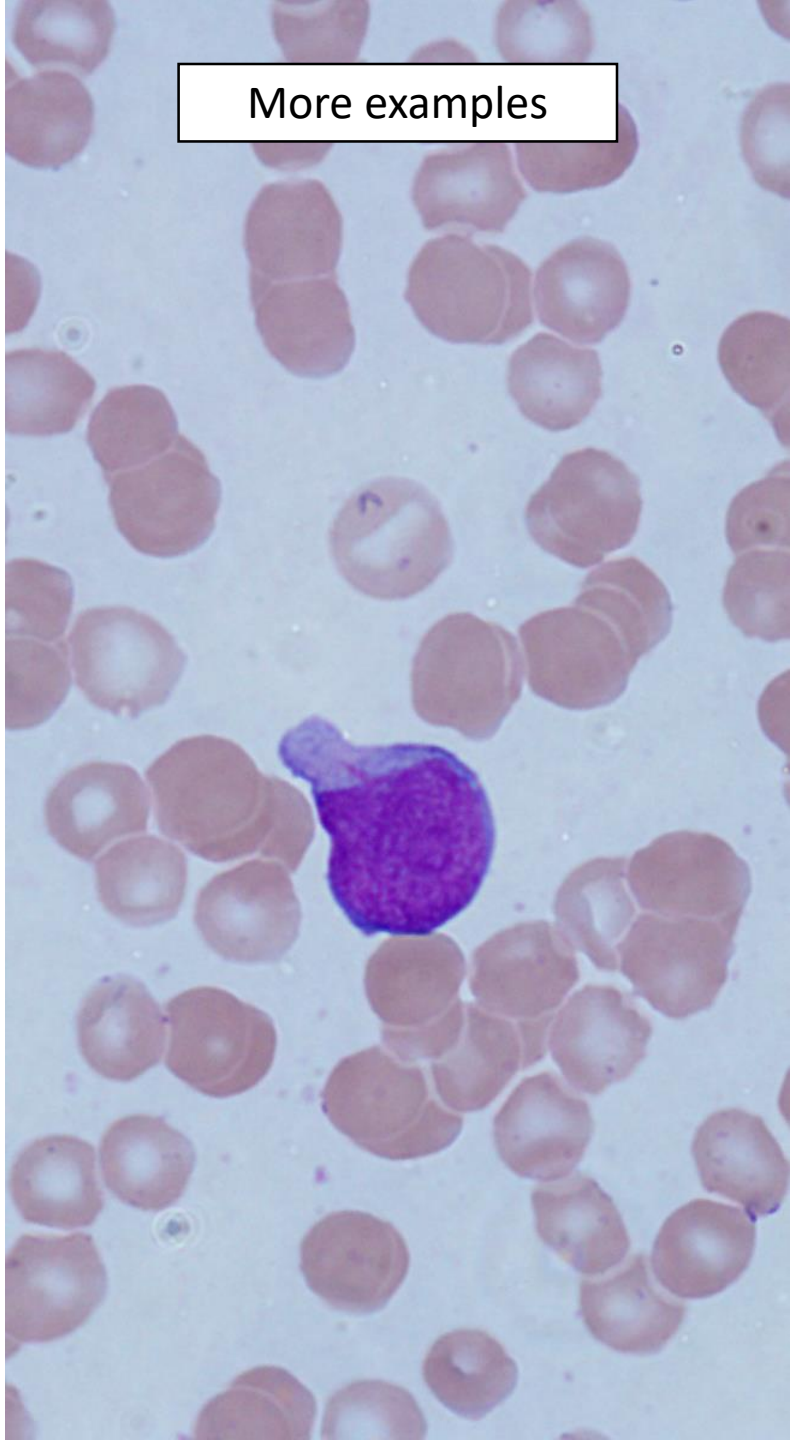
- Never in acute lymphoblastic leukaemia

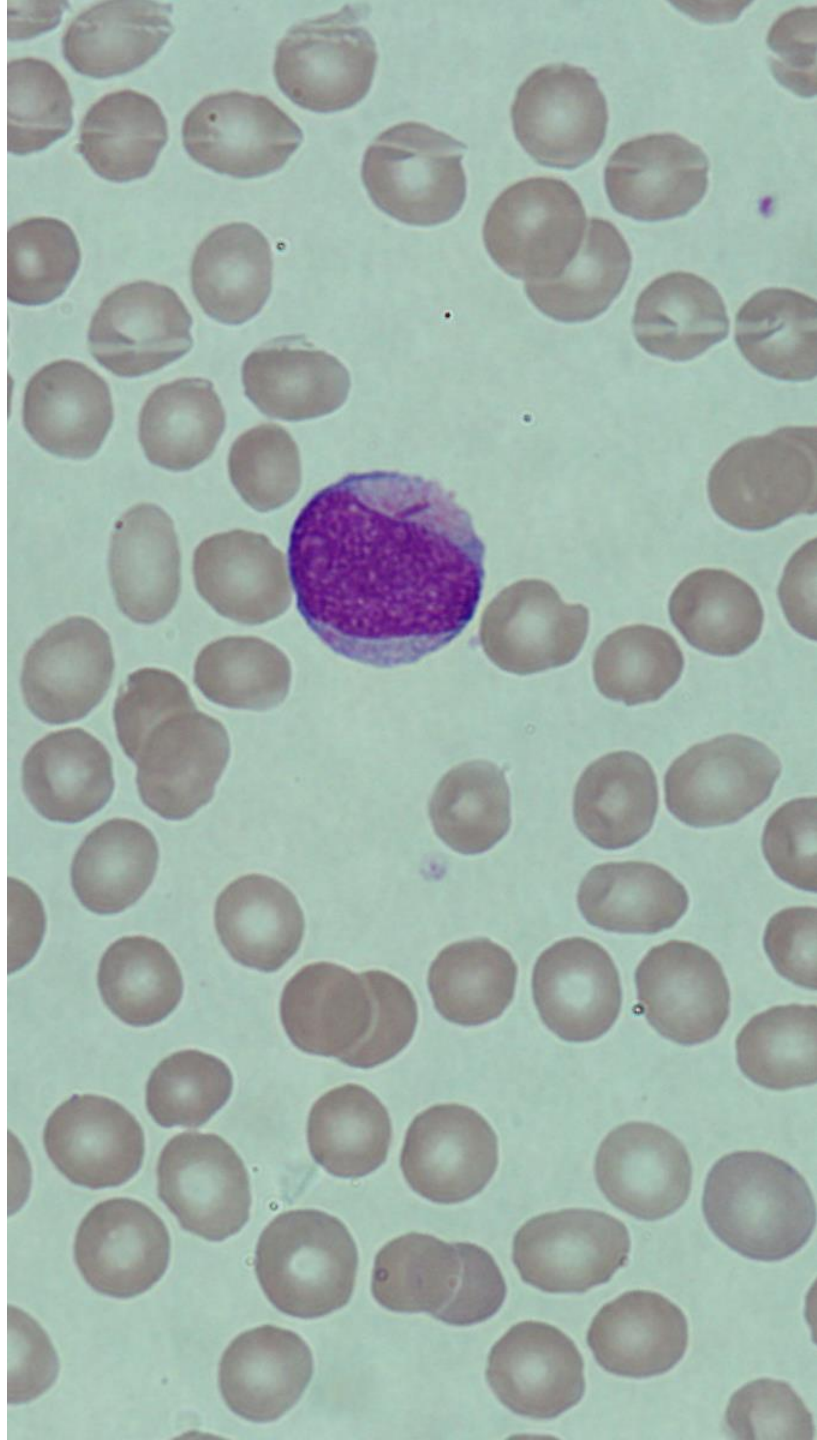
- Seen in blood and bone marrow blasts



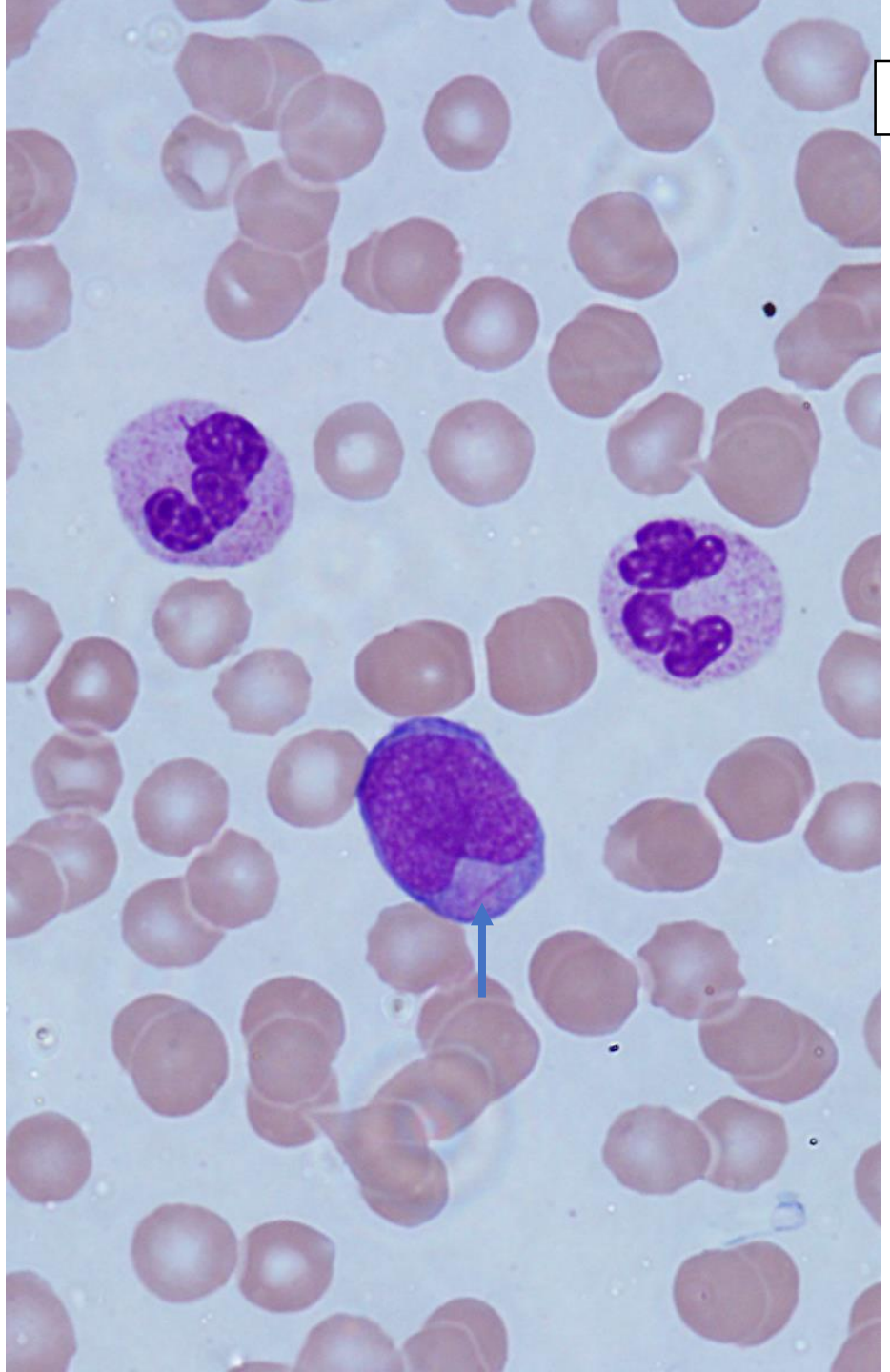
Auer rods in APML neutrophils post treatment with ATRA

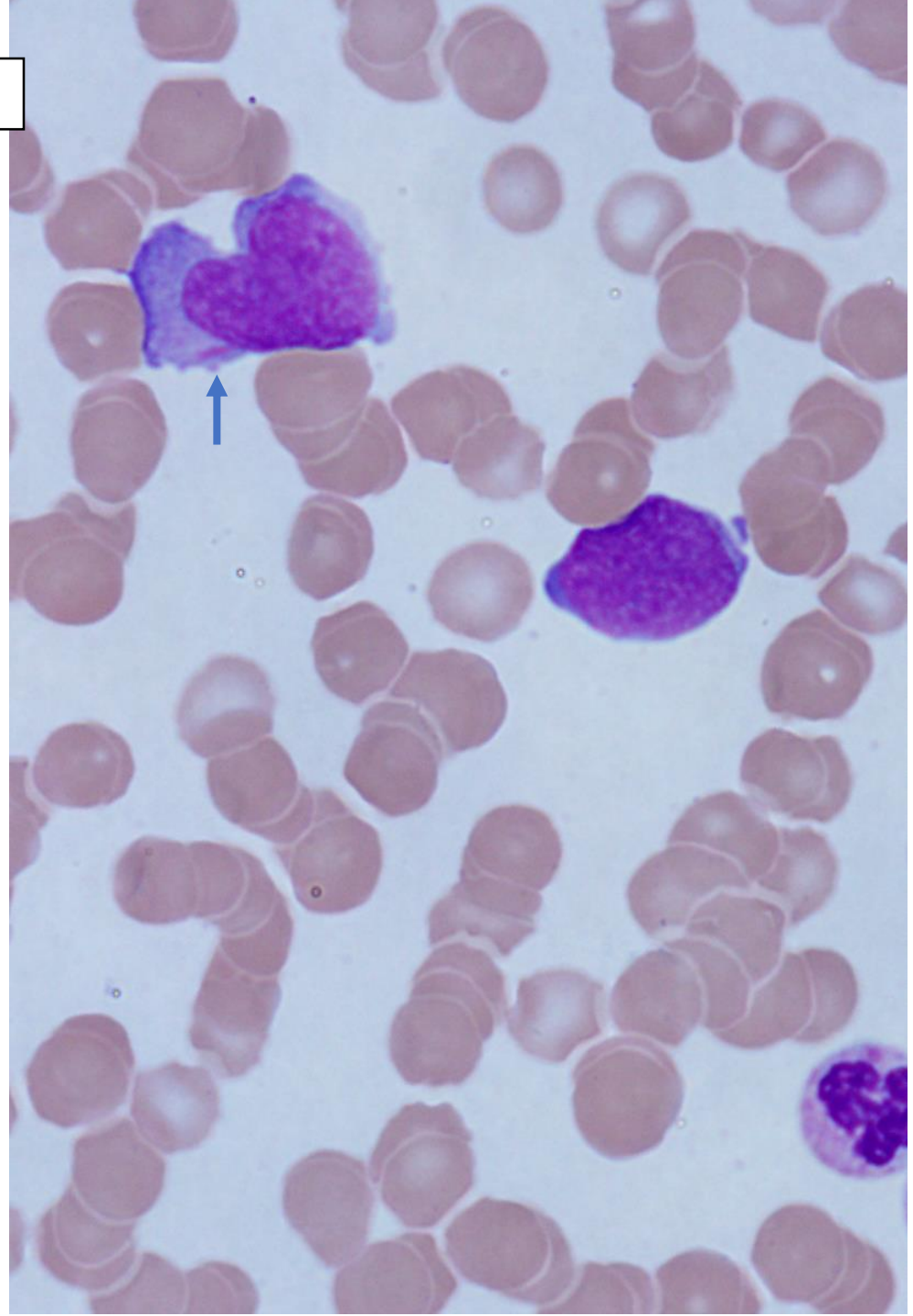


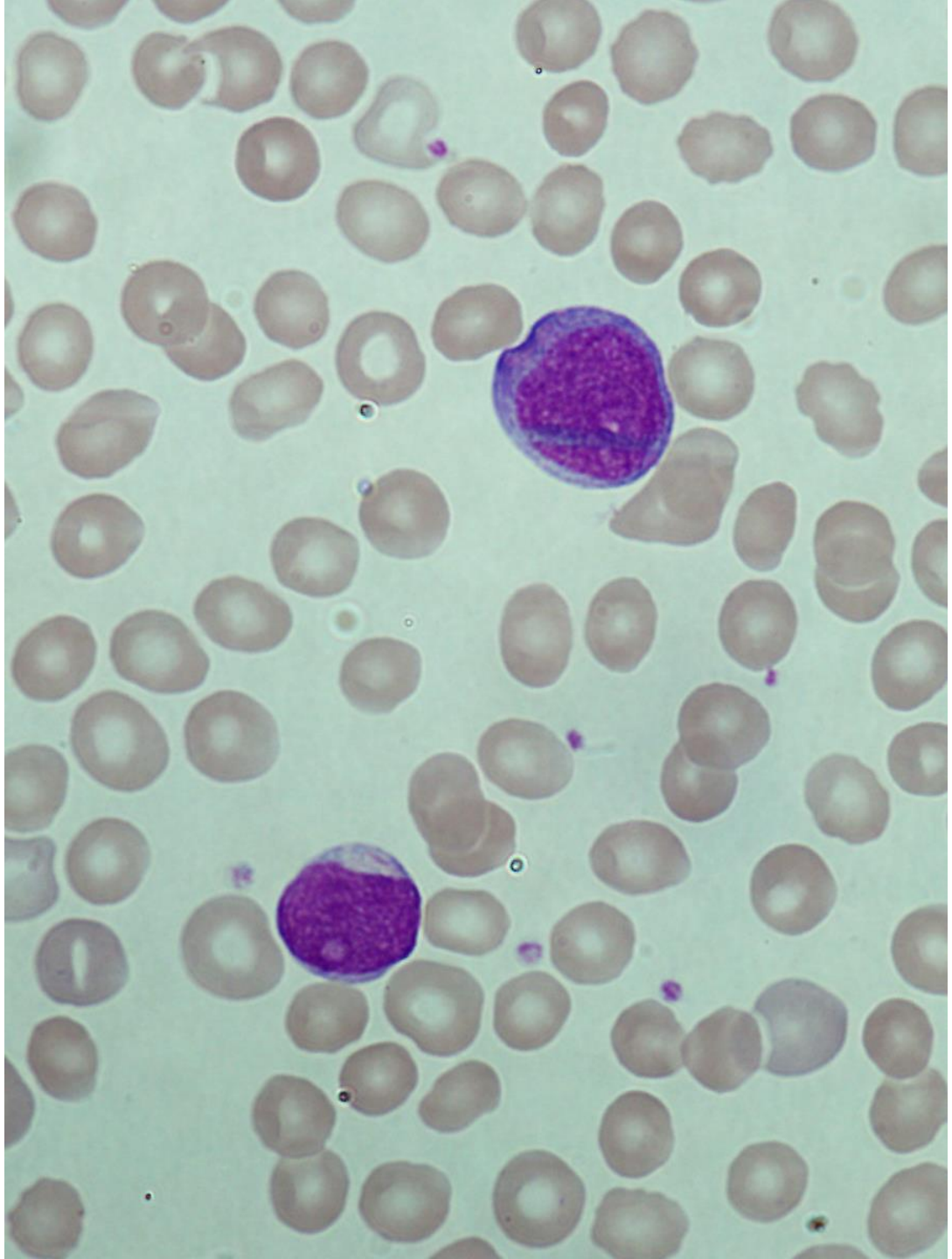

More examples



More examples







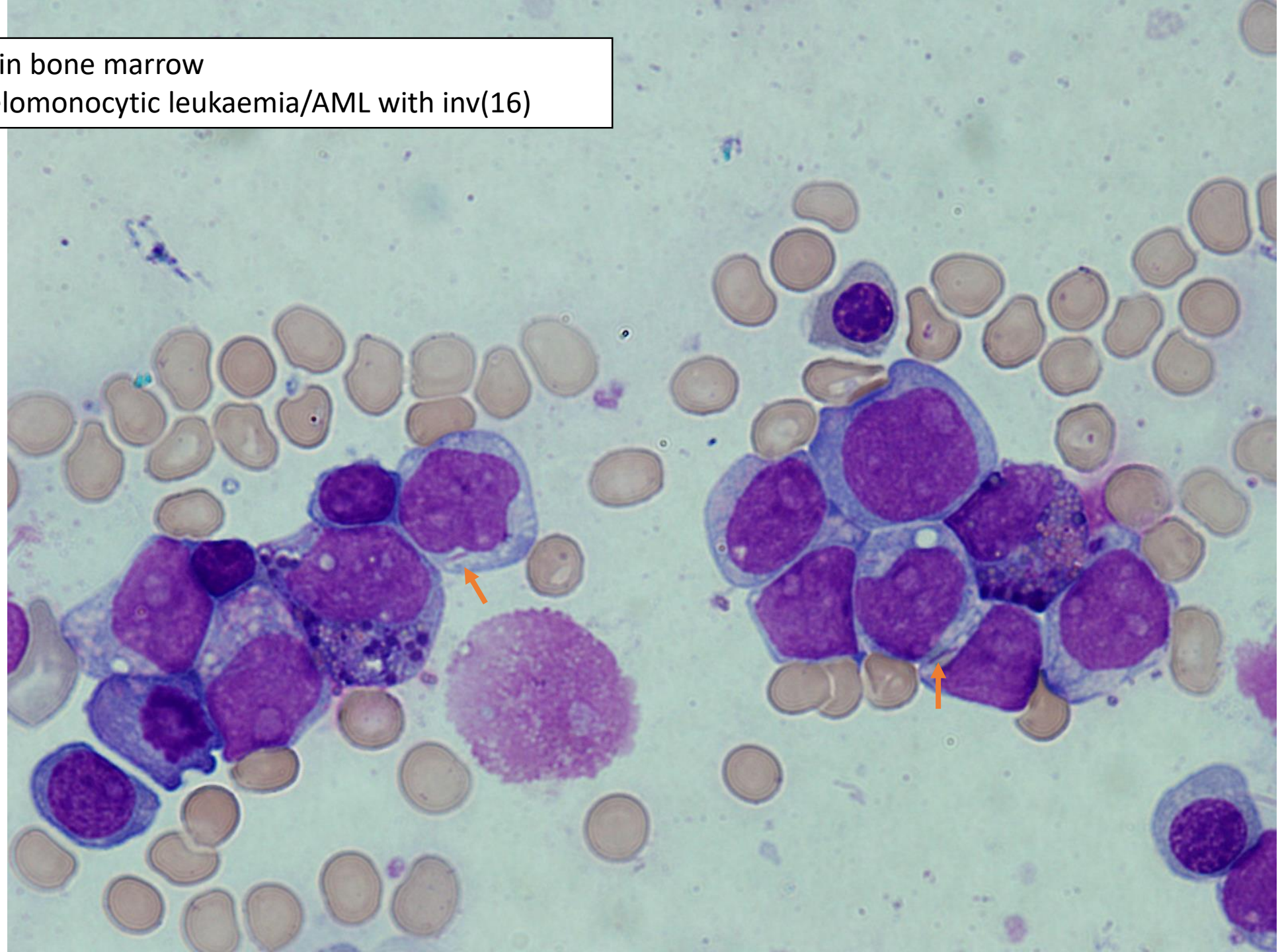
Azurophilic material in cytoplasm. Right colour, wrong structure

Definite Auer rod

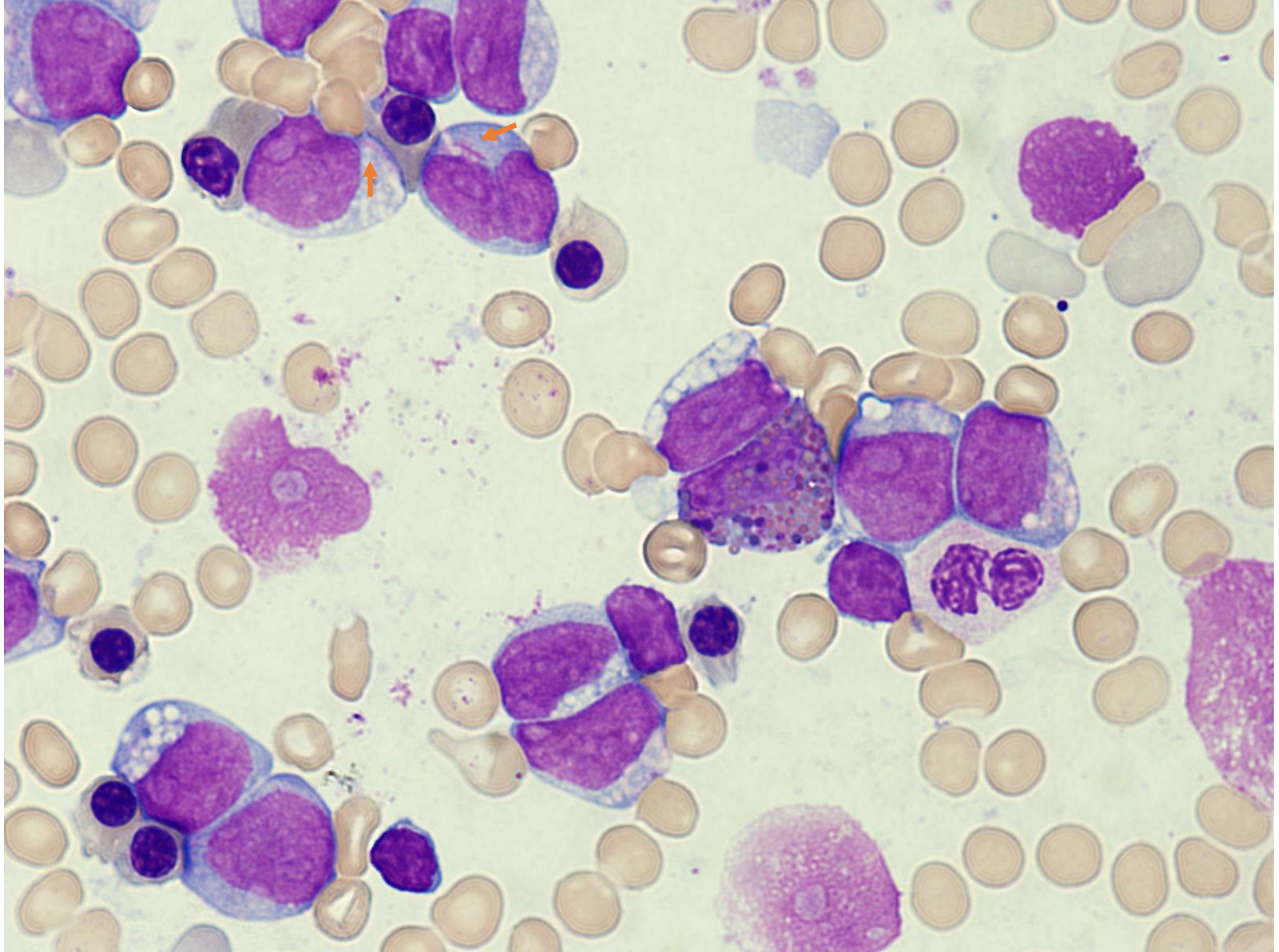
When do you see Auer rods in AML?

- Not all blasts in an individual patient are positive
- Not all types of AML have Auer rods
- AML types with frequent Auer rods
  - Acute promyelocytic leukaemia
  - AML with t(8;21)
  - AML with maturation
  - Acute myelomonocytic leukaemia (including inv(16) AML)

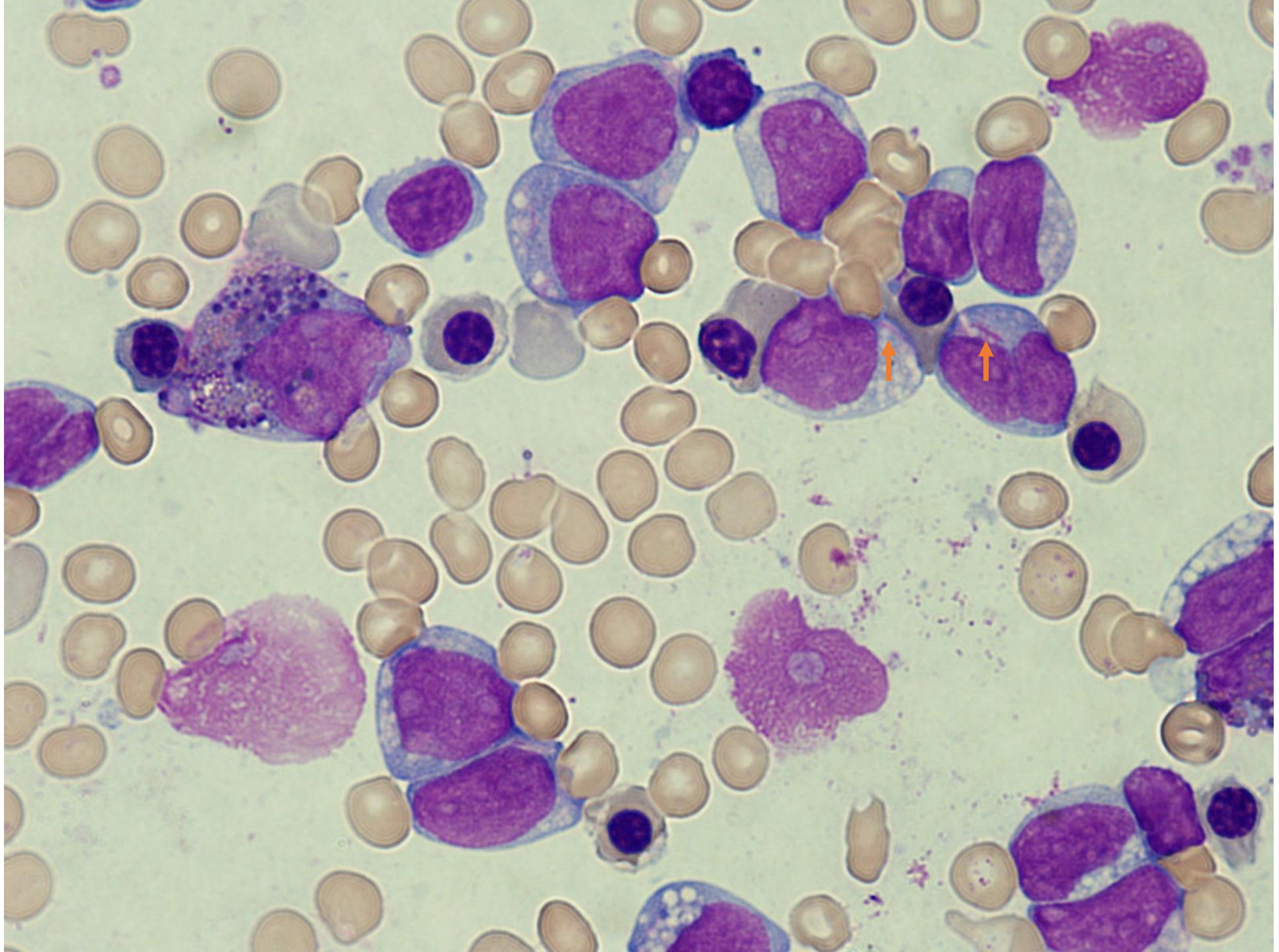
Auer rods in bone marrow
Acute myelomonocytic leukaemia/AML with inv(16)

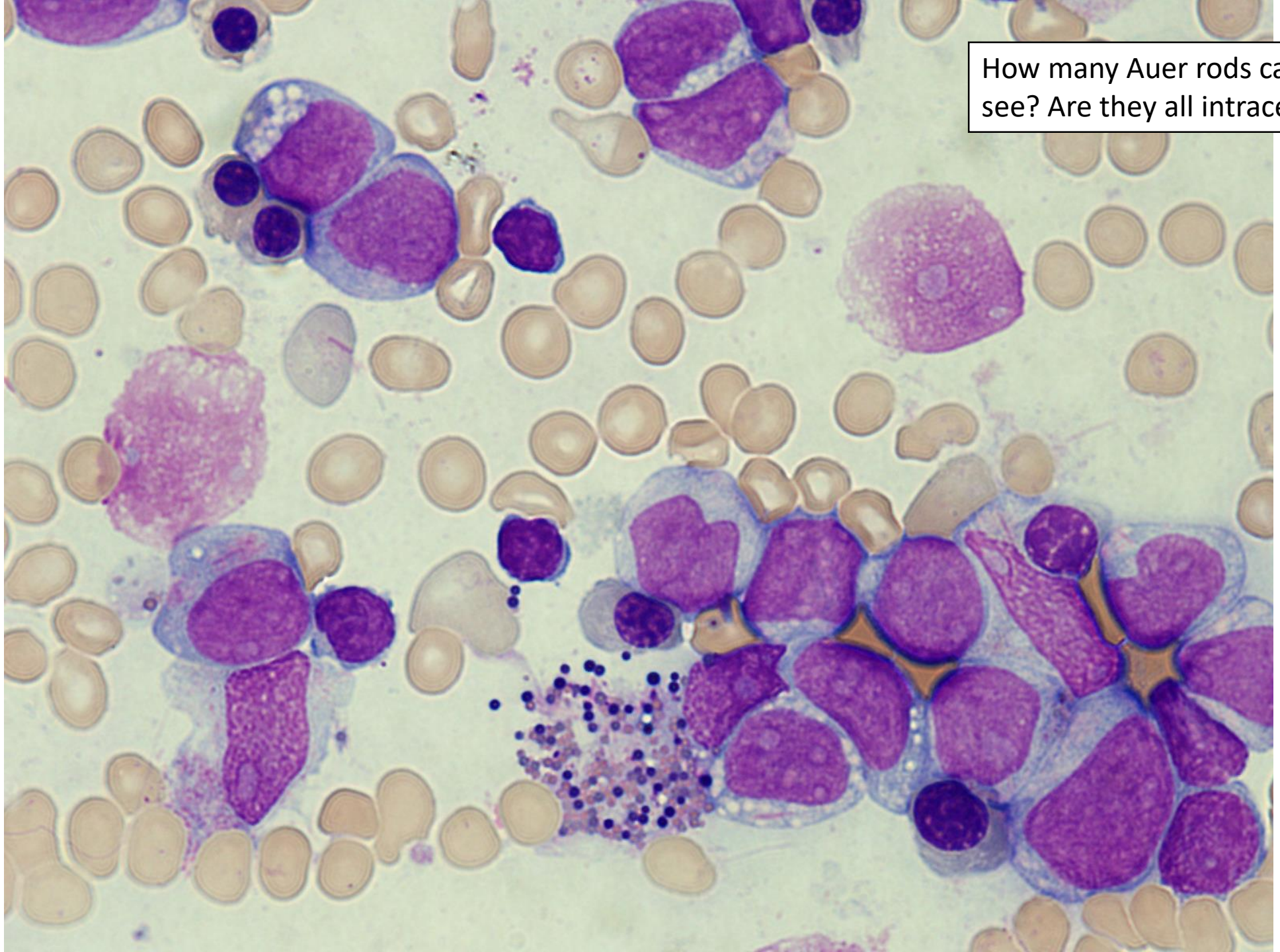


More Auer rods in same patient



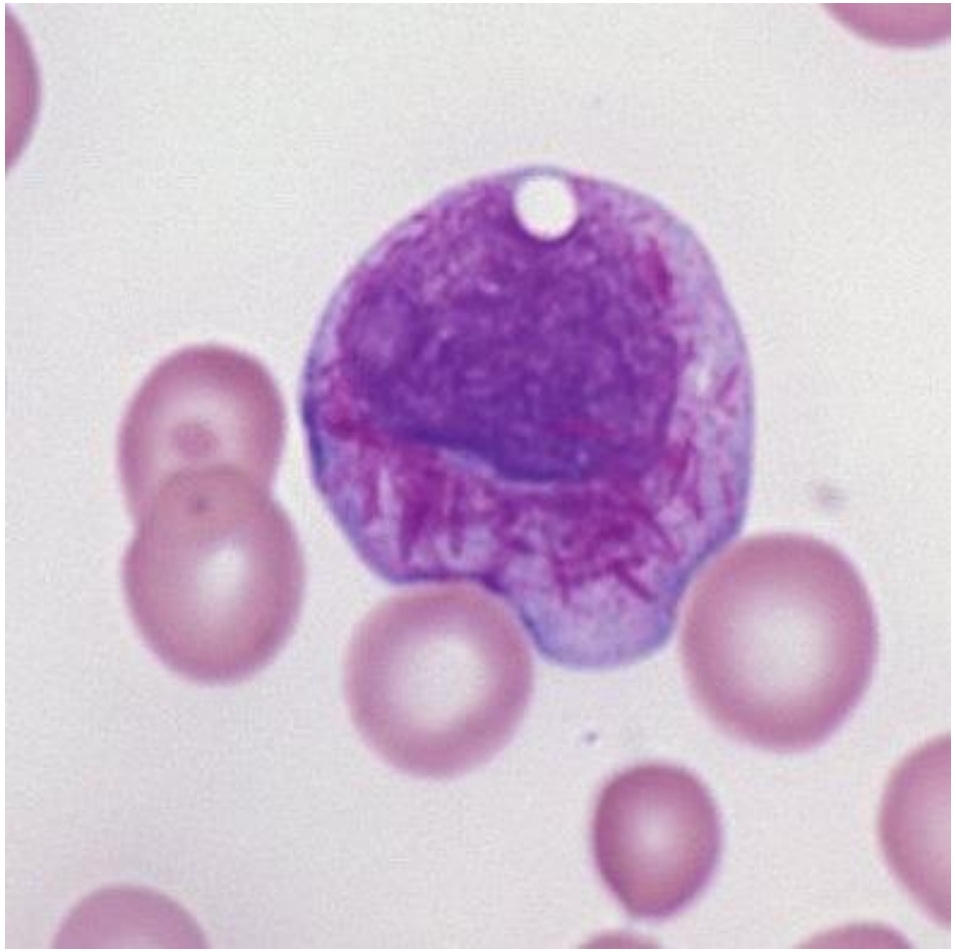
More Auer rods in same patient




How many Auer rods can you see? Are they all intracellular?

Auer rods in acute promyelocytic leukaemia (APML)

- Characterised by multiple Auer rods in the same cell
- A ‘faggot’ (term for a bundle of logs collected as firewood) cell



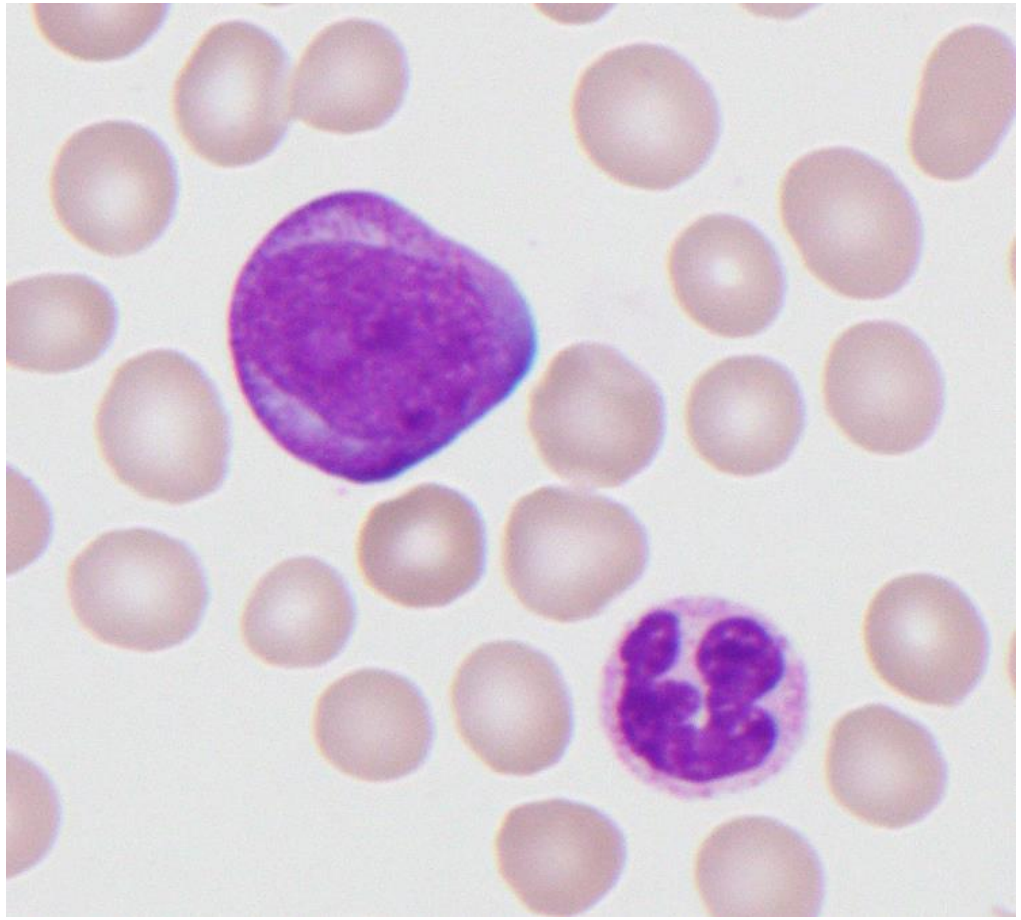
Heavily granulated blasts with one Auer rod in a case of acute promyelocytic leukaemia

AML with t(8;21)

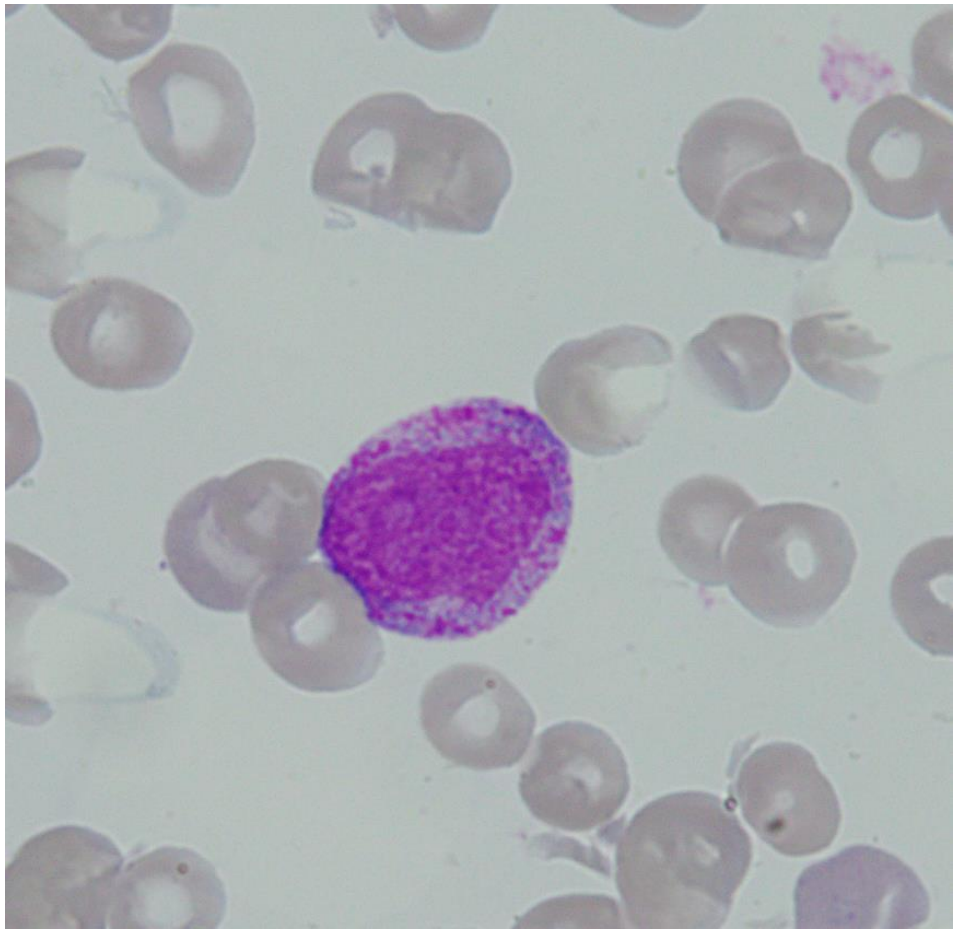
Unusually long, needle-like Auer rods

Good prognosis AML

What might be confused with Auer rods?

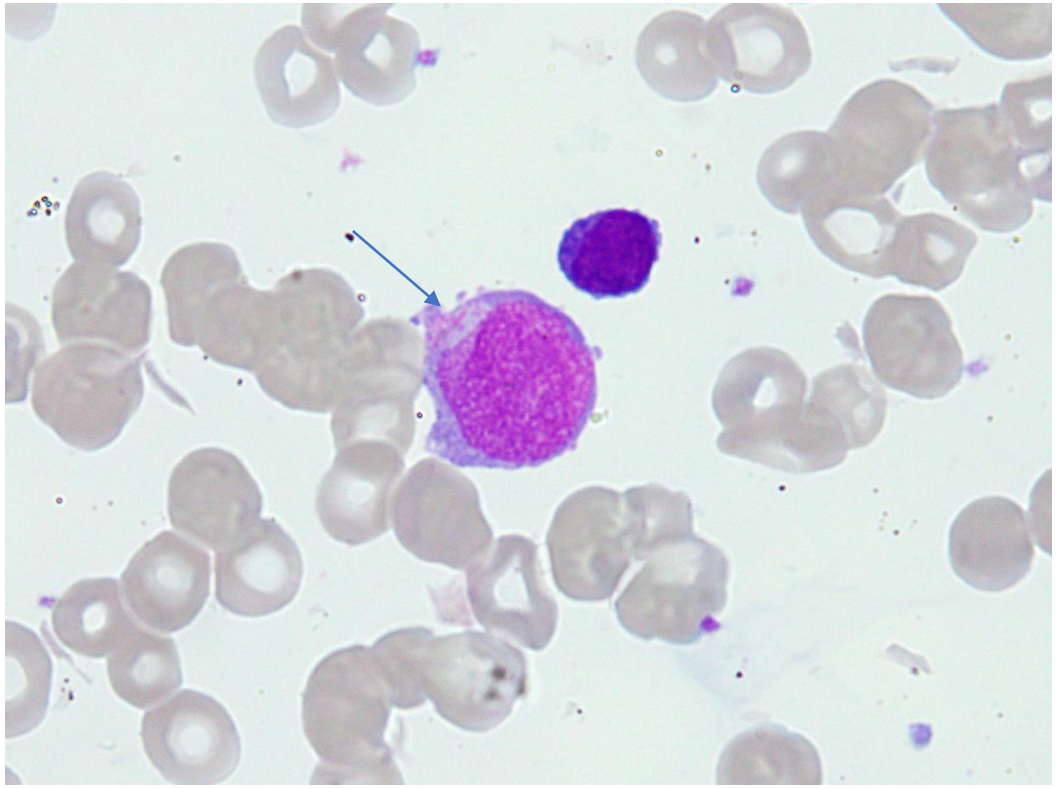


Granules in blast: microgranular variant of APML

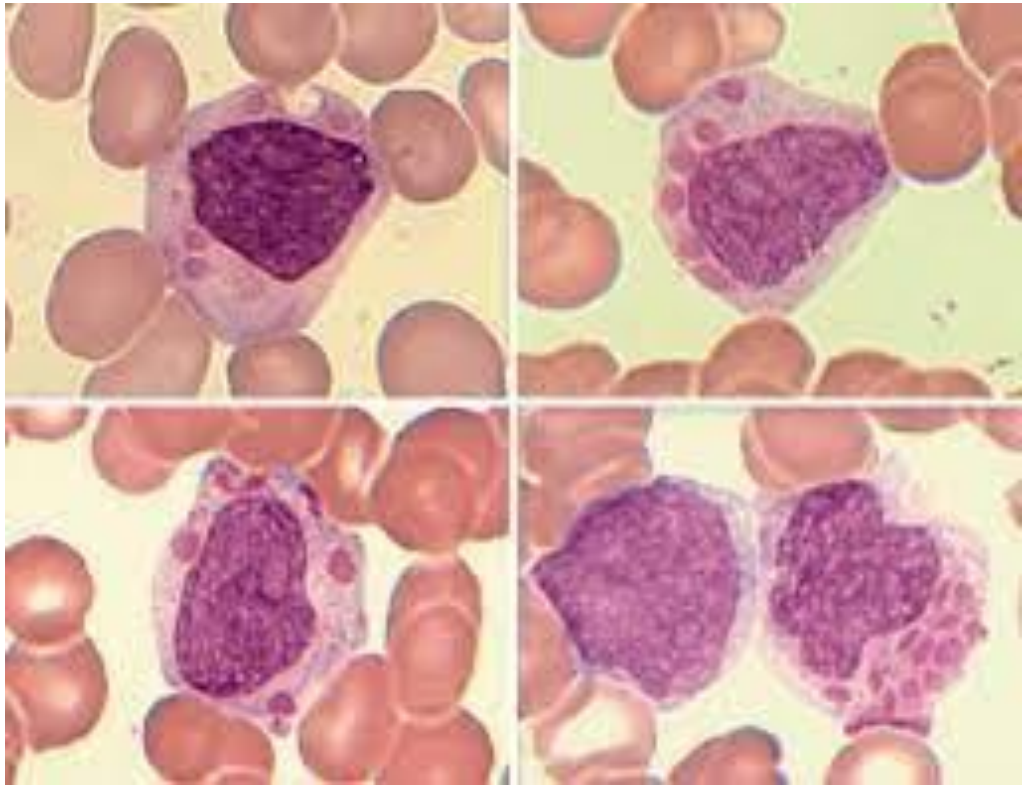


Granules in blast: AML

What else might be confused with Auer rods?

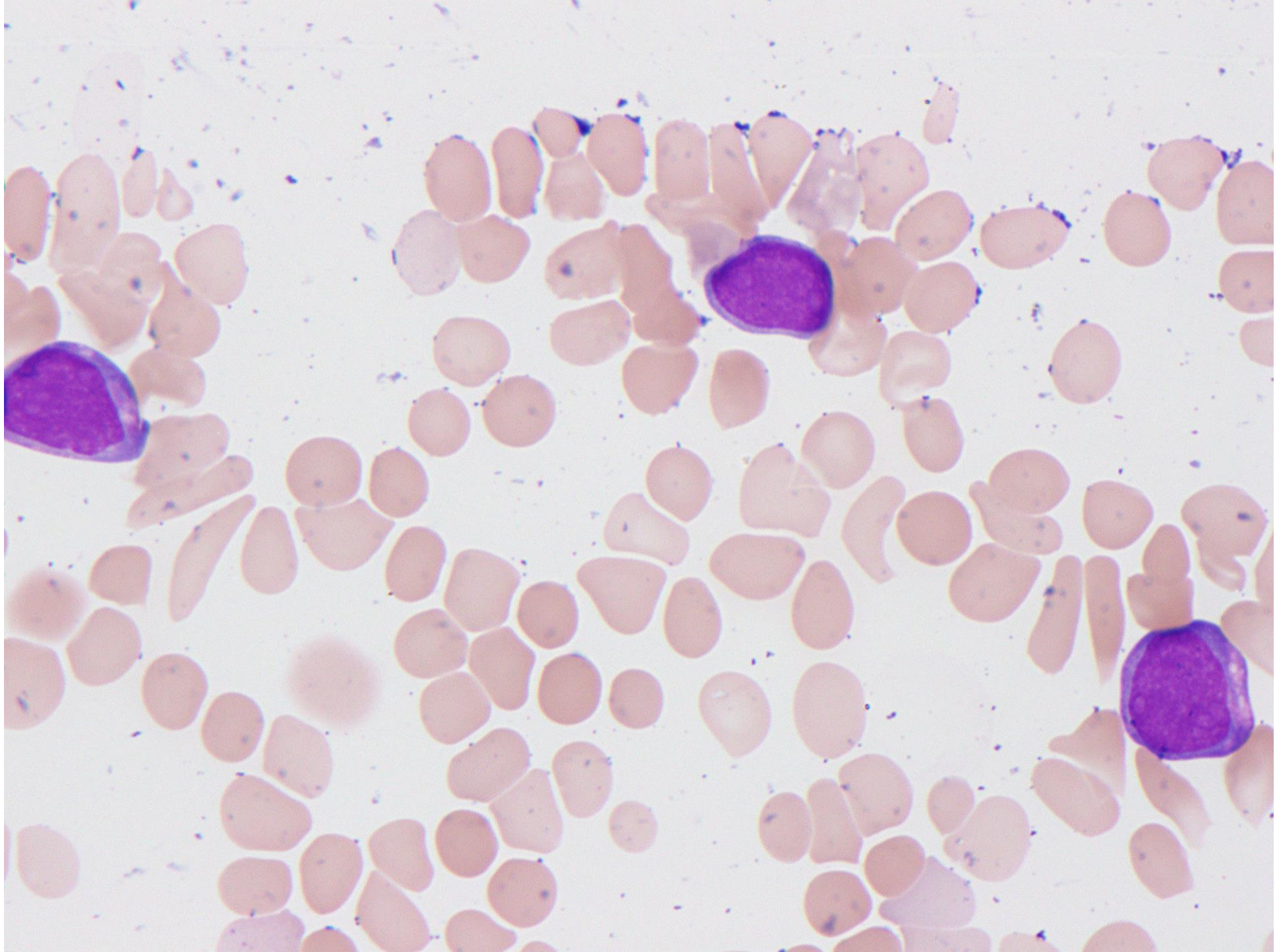


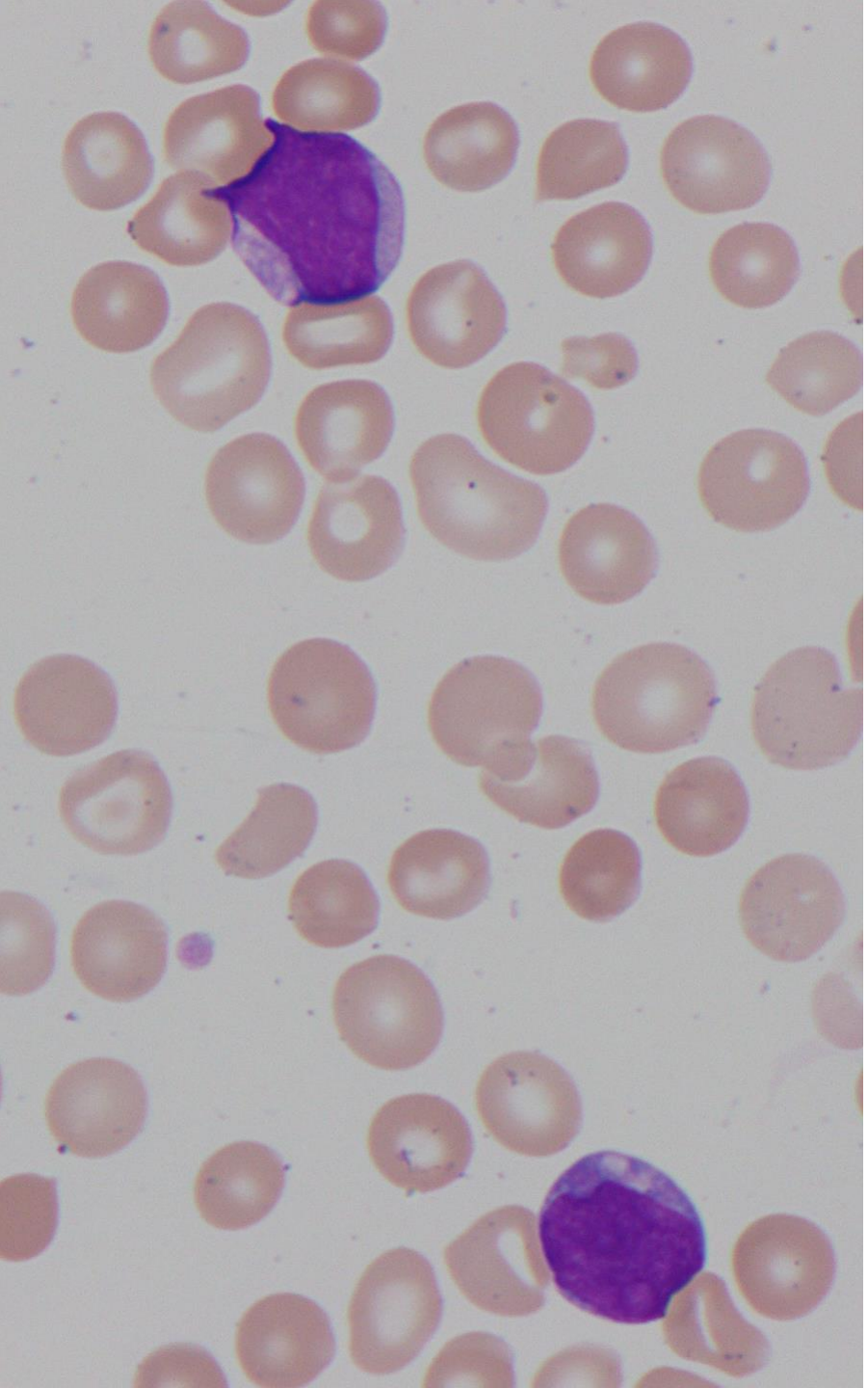
A line of granules mimicking an Auer rod



“pseudo Chediak-Higashi granules” – large azurophilic granules seen in t(8;21) AML that resemble the abnormal granules of the rare genetic disorder Chediak-Higashi syndrome

A recent difficult case





Multiple blasts with granules, vacuoles and eosinophilic material in cytoplasm

No true Auer rods