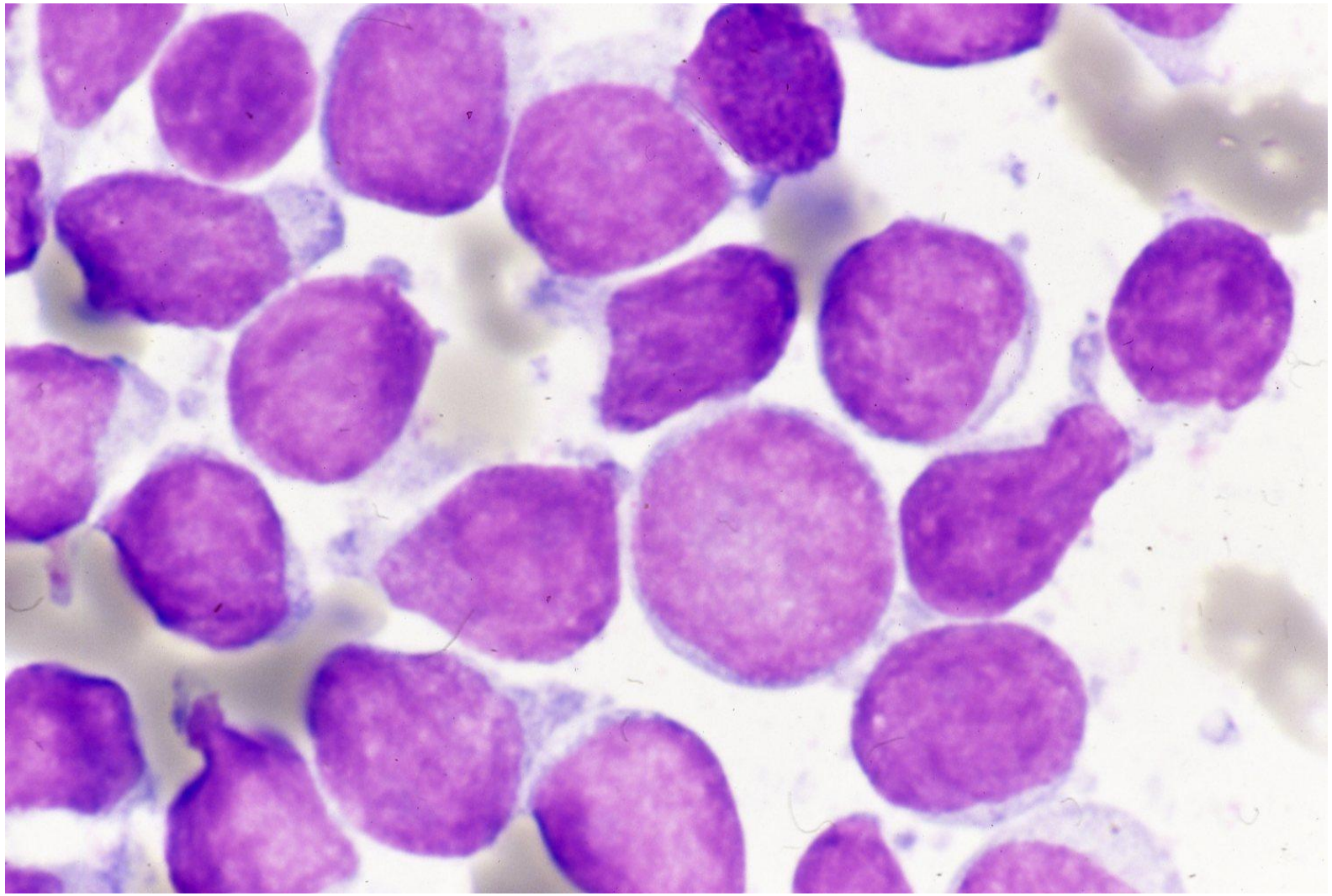
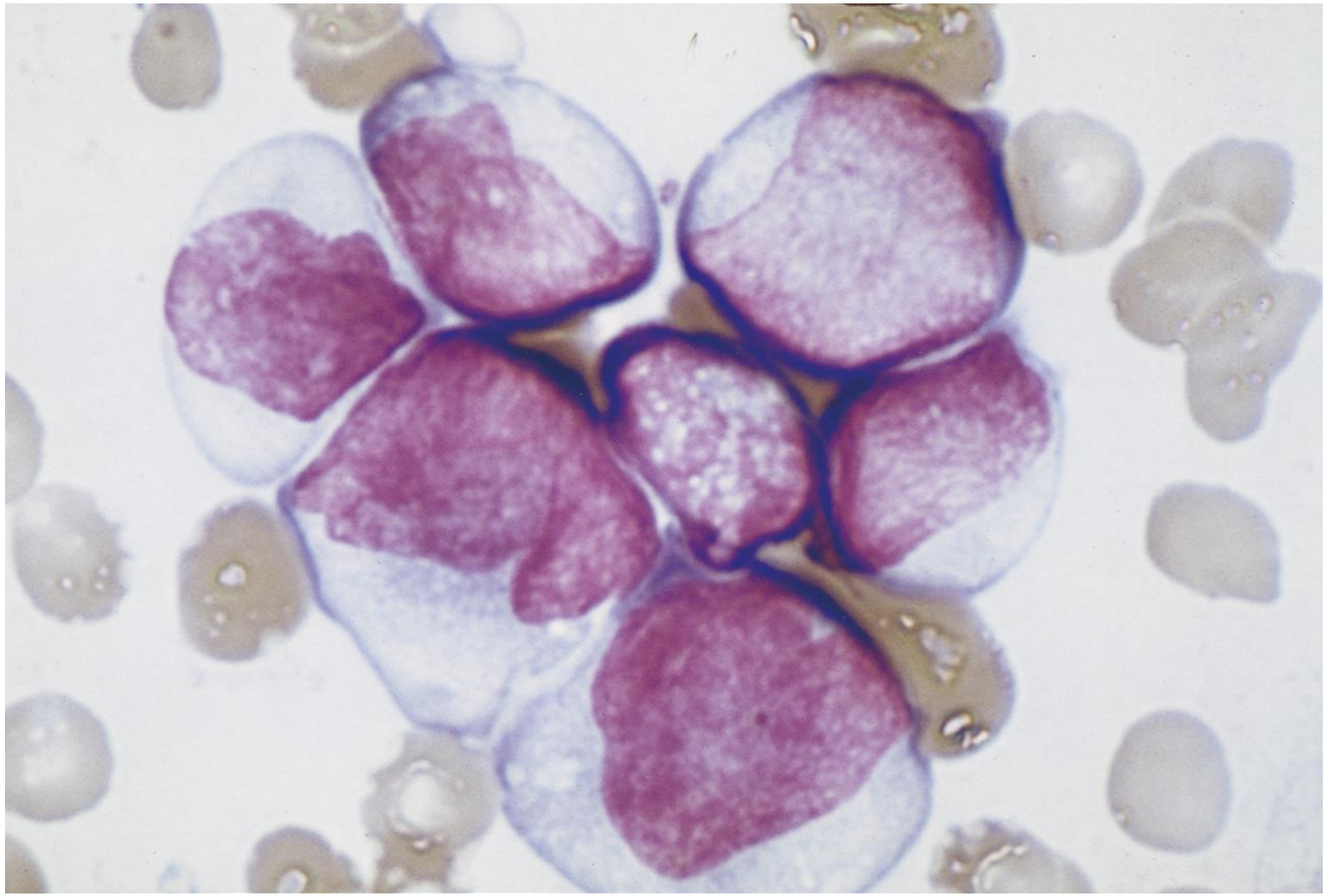
Acute myeloid leukemias in May-Giemsa smears

May-Giemsa-stained cytological appearance of acute myeloid leukemia (AML: M0-M7 and myelodysplastic syndrome) is shown. Cytochemical identification of peroxidase activity, nonspecific esterase and PAS assists at making the diagnosis of acute myeloid leukemia.

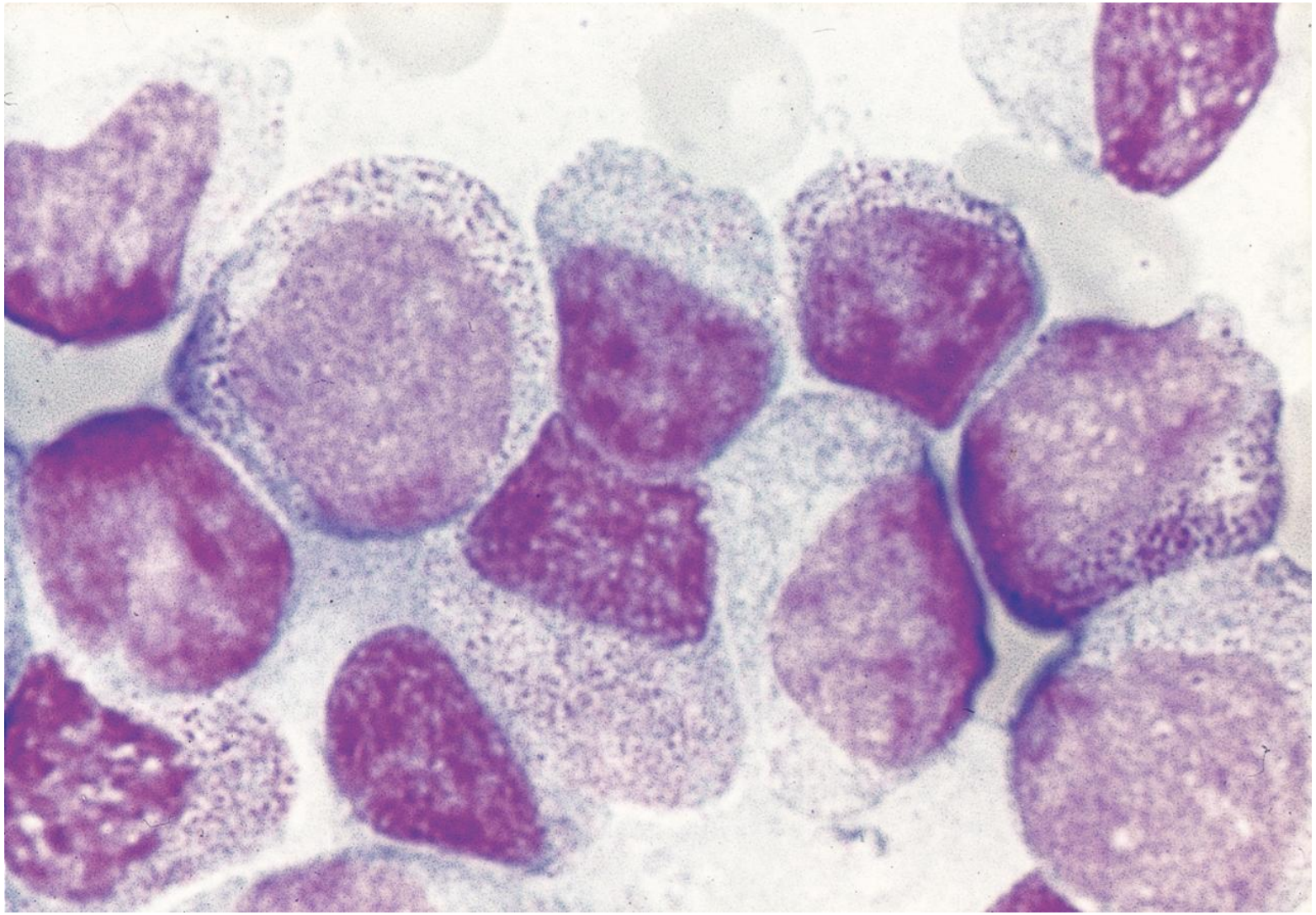
Ref.: Shimony S, et al. Acute myeloid leukemia: 2023 update on diagnosis, risk-stratification, and management. Am J Hematol 2023; 98(3): 502-526. doi: 10.1002/ajh.26822



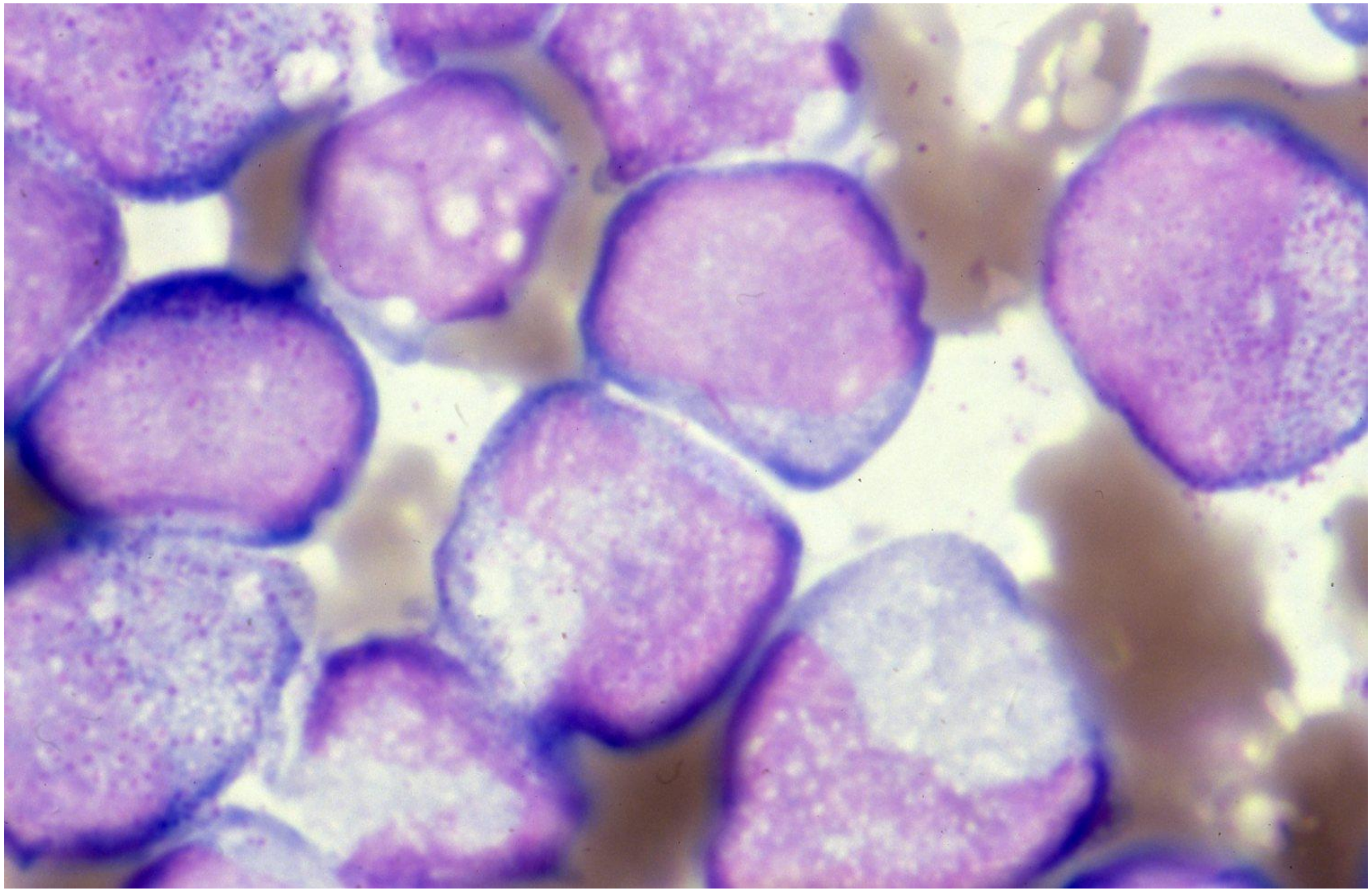
AML, M0. Agranular immature blasts possess a scanty cytoplasm. The chromatin network is fine. Peroxidase activity is negative at the light microscopic level, but is positive in the perinuclear space at ultrastructural level. Expression of CD13 and CD33 may assist at the diagnosis. May-Giemsa



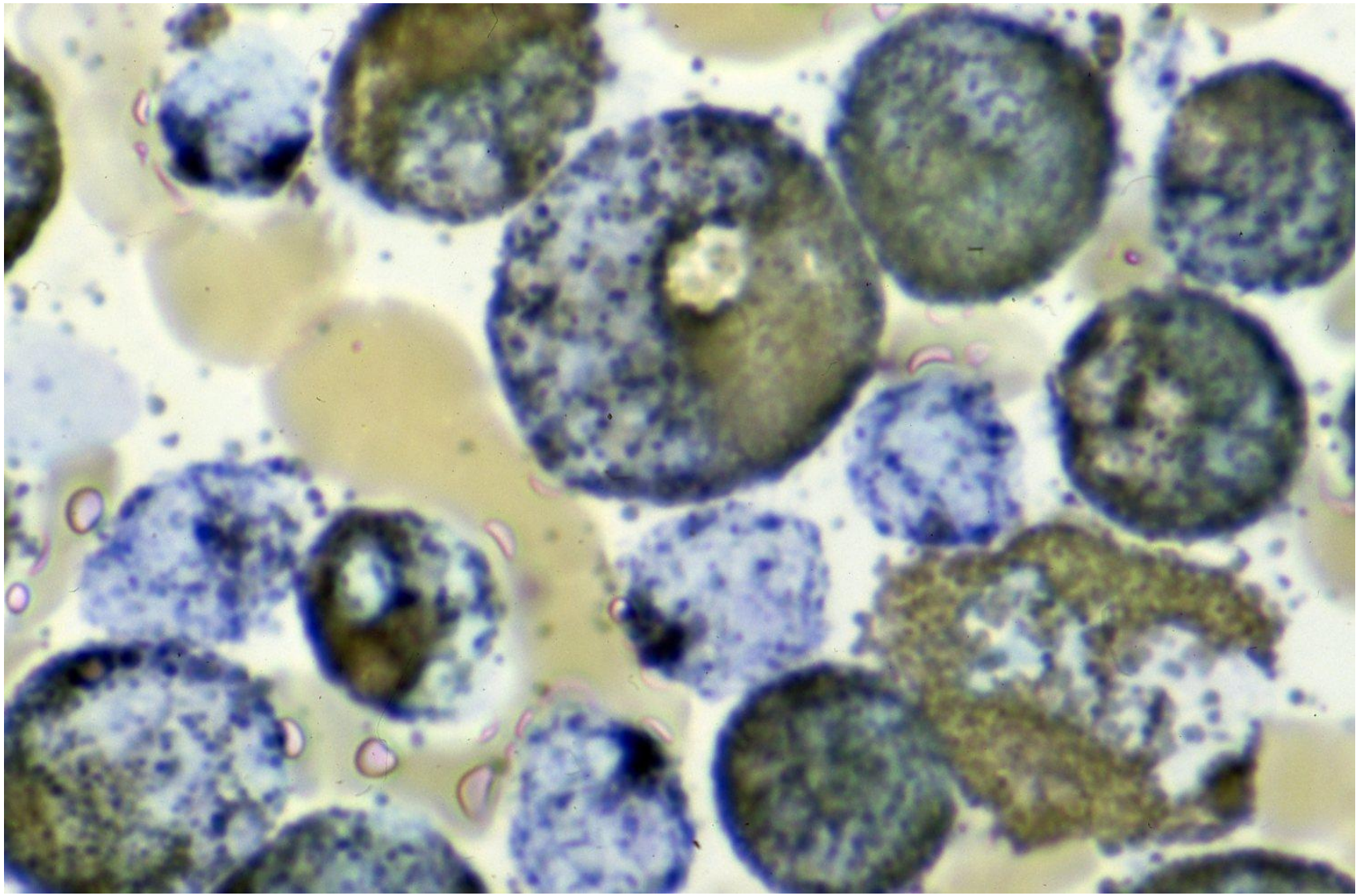
AML, M1. Agranular immature blasts possess a relatively wide cytoplasm. The chromatin network is fine. Positive peroxidase activity confirms the diagnosis of AML, M1. May-Giemsa



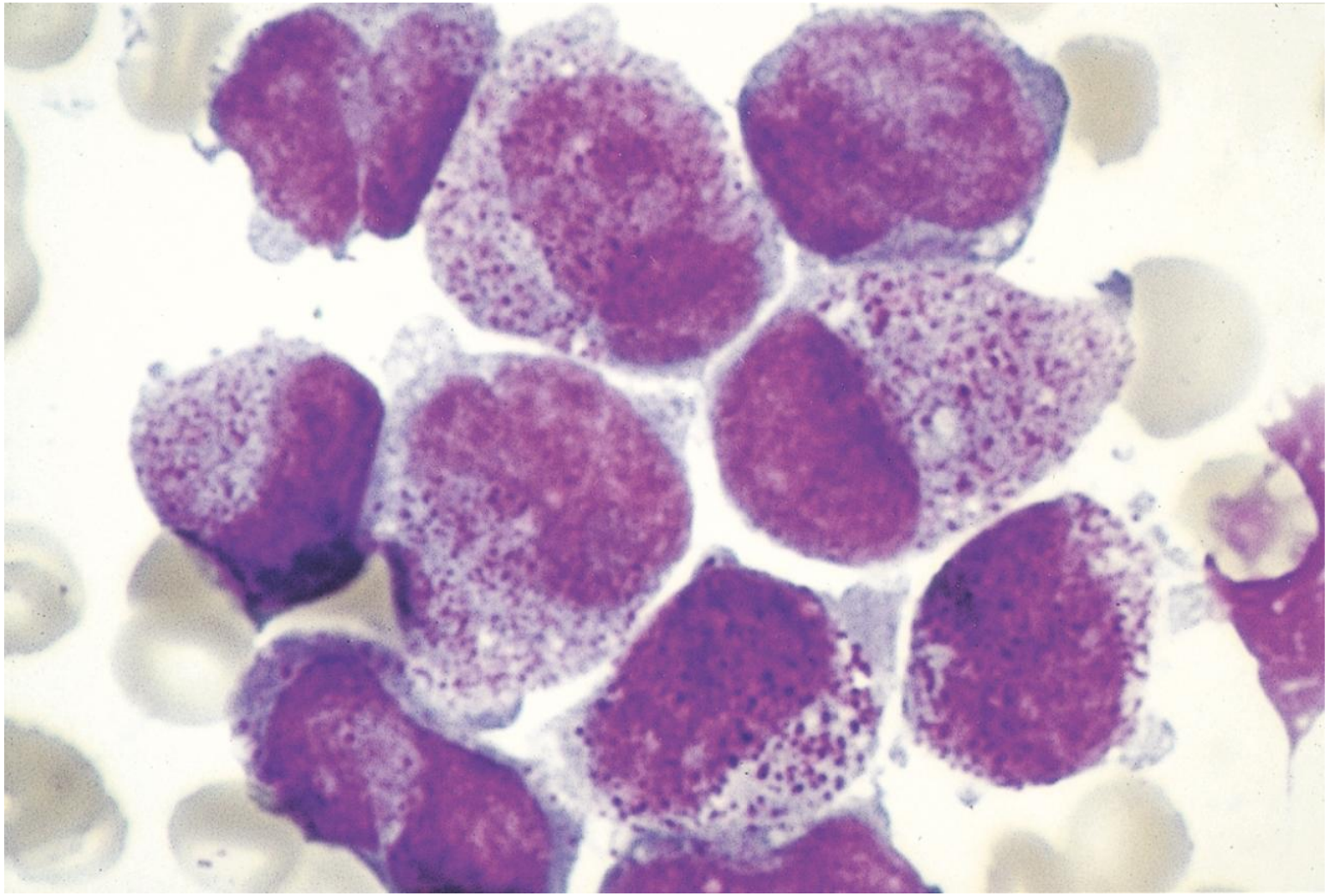
AML, M2. Immature blasts possess fine azurophilic granules in a relatively wide cytoplasm. The chromatin network is fine. Peroxidase activity is positive. As surface markers, CD13, CD33, CD34, CD56 and CD117 (c-kit) are expressed. May-Giemsa



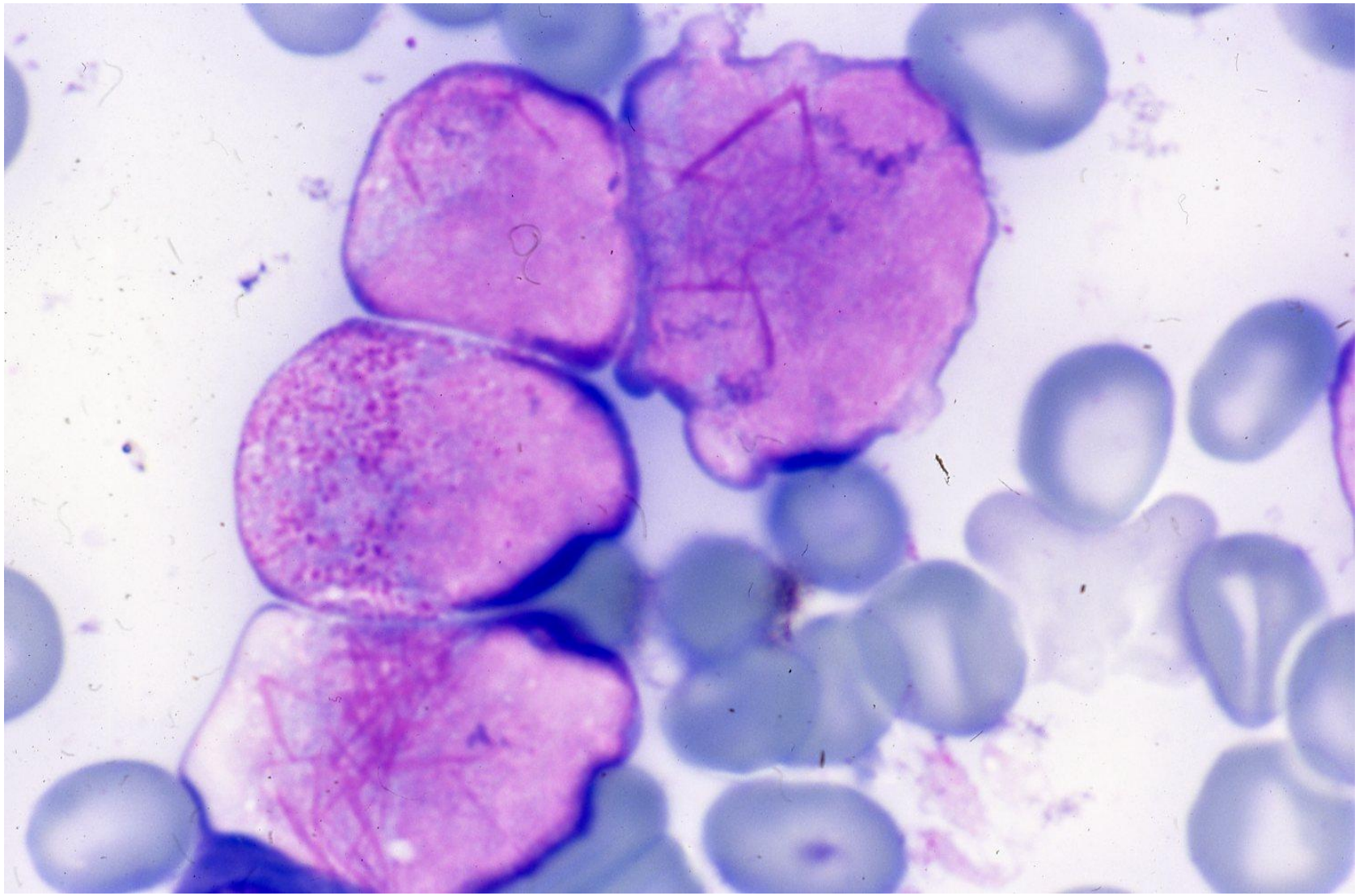
AML, M2. Immature blasts possess fine azurophilic granules in a relatively wide cytoplasm. Auer body is focally observed. The chromatin network is fine. May-Giemsa



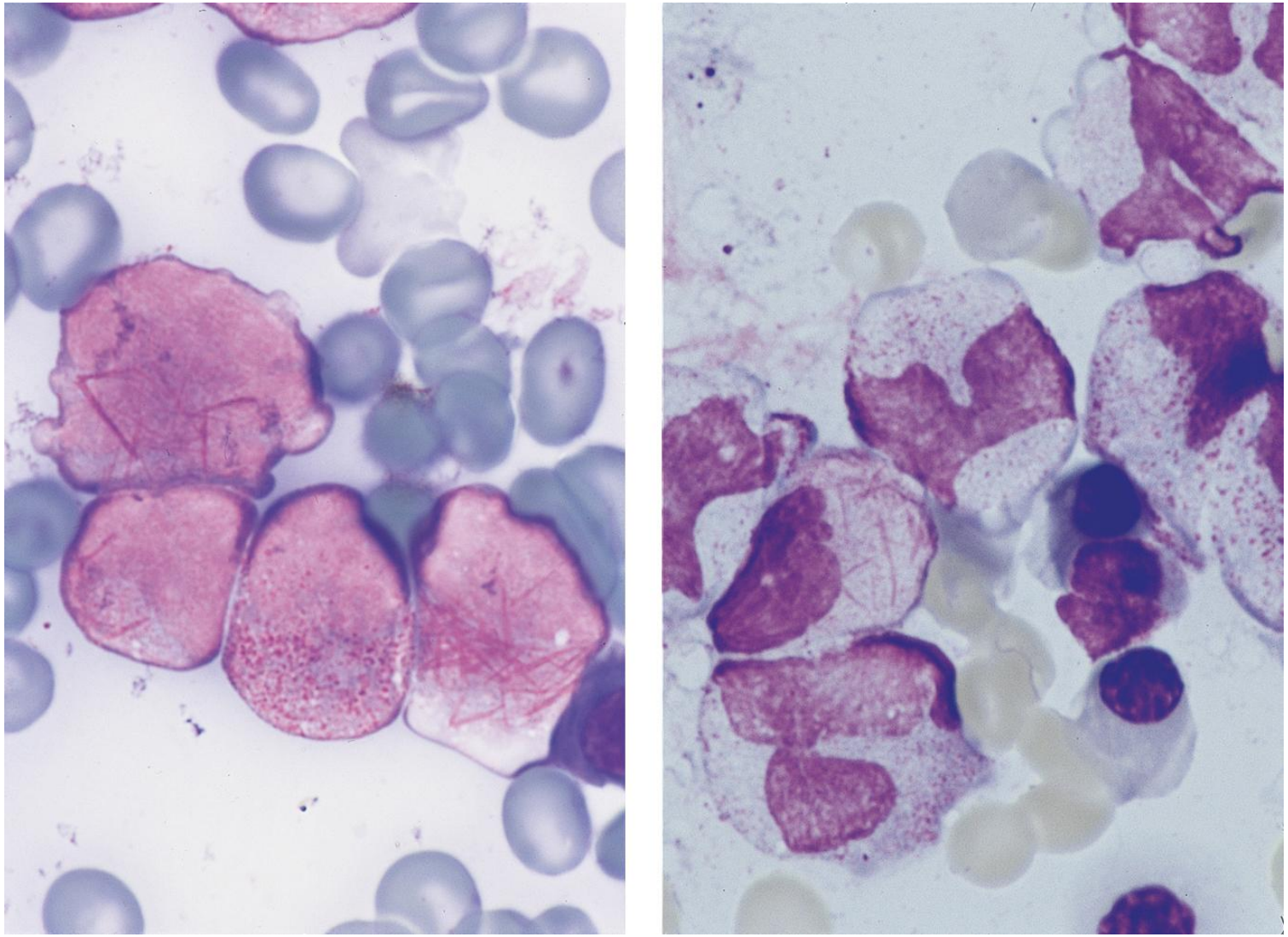
AML, M2. Immature blasts with azurophilic granules are strongly positive for peroxidase activity. Peroxidase activity



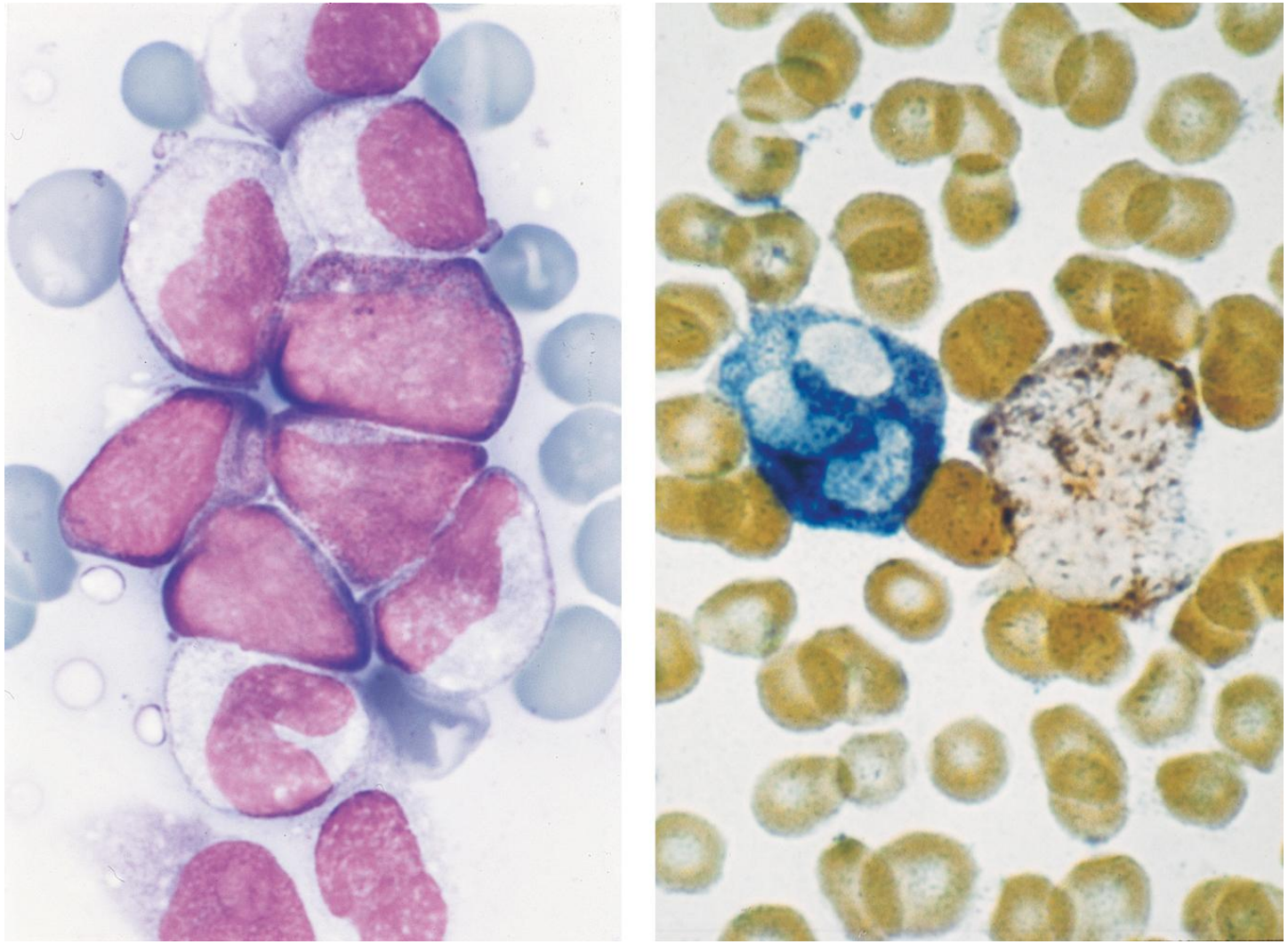
AML, M3 (acute promyelocytic leukemia). Immature blasts possess coarse basophilic granules in a relatively wide cytoplasm. The chromatin network is fine. Peroxidase activity is strongly positive. No Auer bodies are seen herein. May-Giemsa



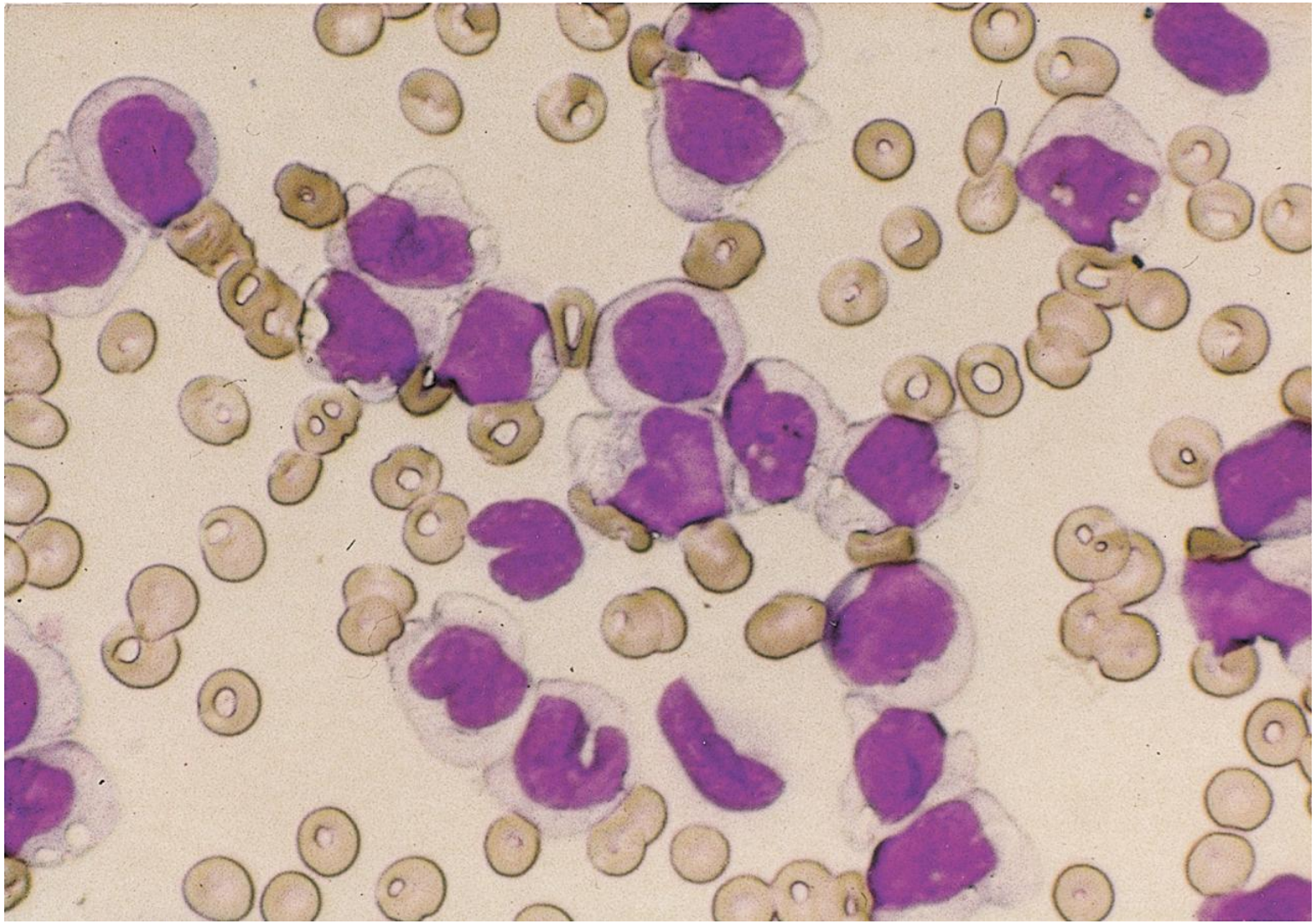
AML, M3 (acute promyelocytic leukamia). Immature blasts possess coarse granules in a relatively wide cytoplasm. Auer bodies are clustered in the cytoplasm. They are called faggot cells. The chromatin network is fine. May-Giemsa



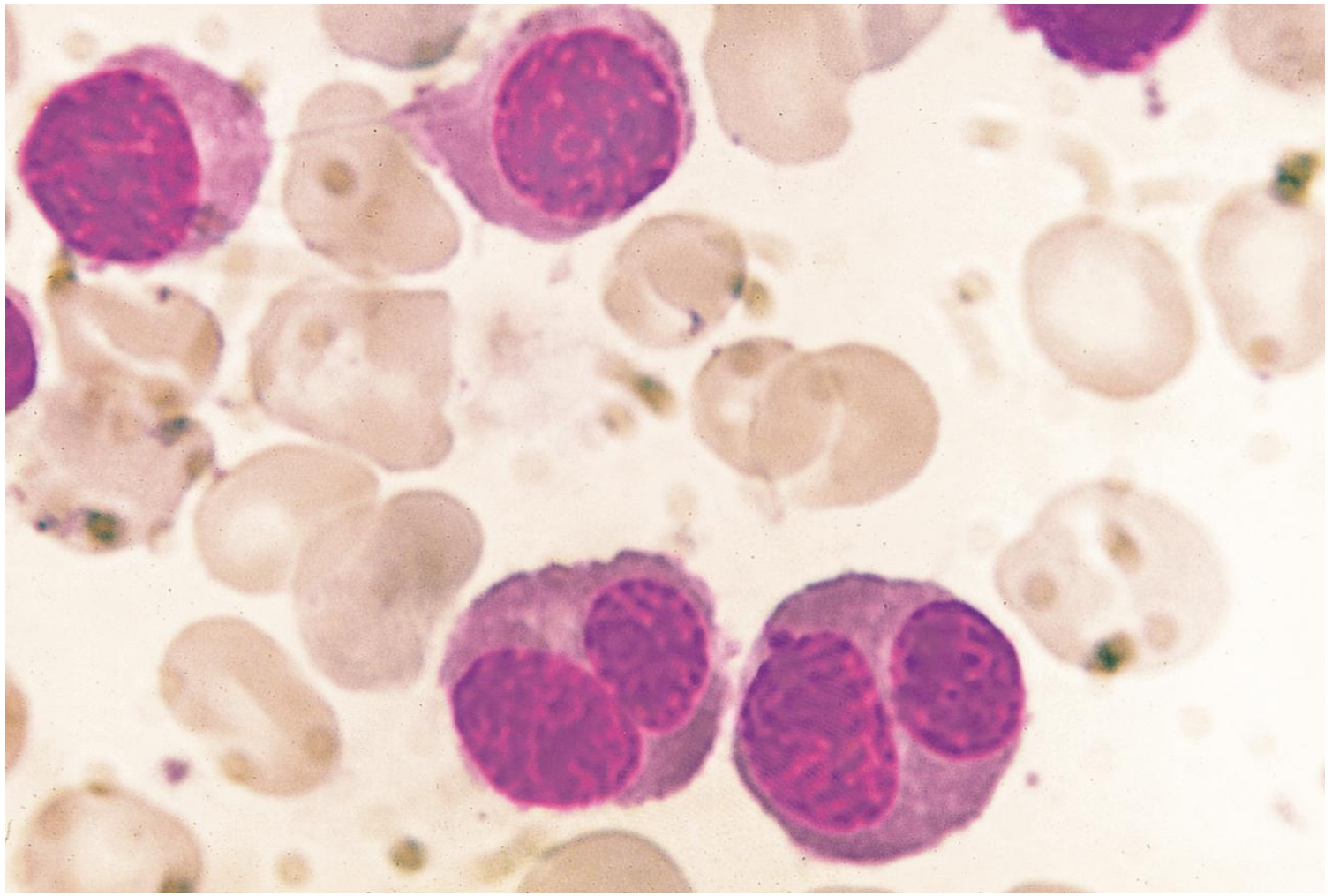
Effect of ATRA (all-trans retinoic acid) therapy on AML, M3 (40-year-old man), left: before therapy, right: 24 days after oral intake of ATRA. Faggot cells are seen in neoplastic promyelocytes (left). After ATRA therapy, differentiation of the leukemia cells was induced, and Auer bodies remain in a differentiated myelocyte (right). May-Giemsa



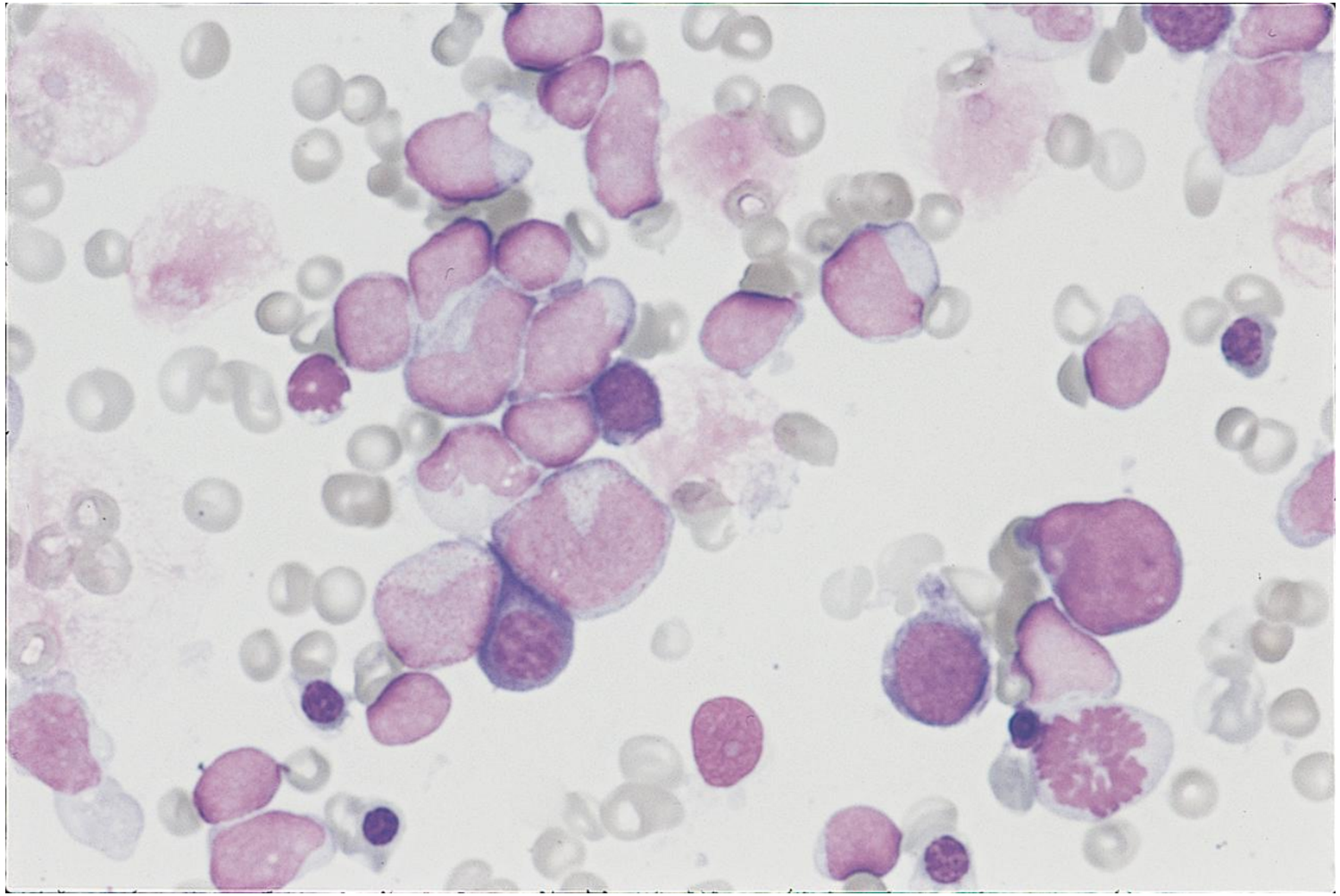
AML, M4 (myelomonocytic leukemia). Both myeloblastic cells and monocytic leukemia cells are seen in the bone marrow (left: May-Giemsa). Double esterase staining in the peripheral blood (right). The left-sided neutrophil reveal naphthol ASD chloroacetate esterase activity (stained blue). The right-sided blasts reveal both α-naphthyl butyrate esterase (stained red brown) and naphthol ASD chloroacetate esterase (stained blue) activities in the same cell. α-naphthyl butyrate esterase activity is sodium fluoride-sensitive.



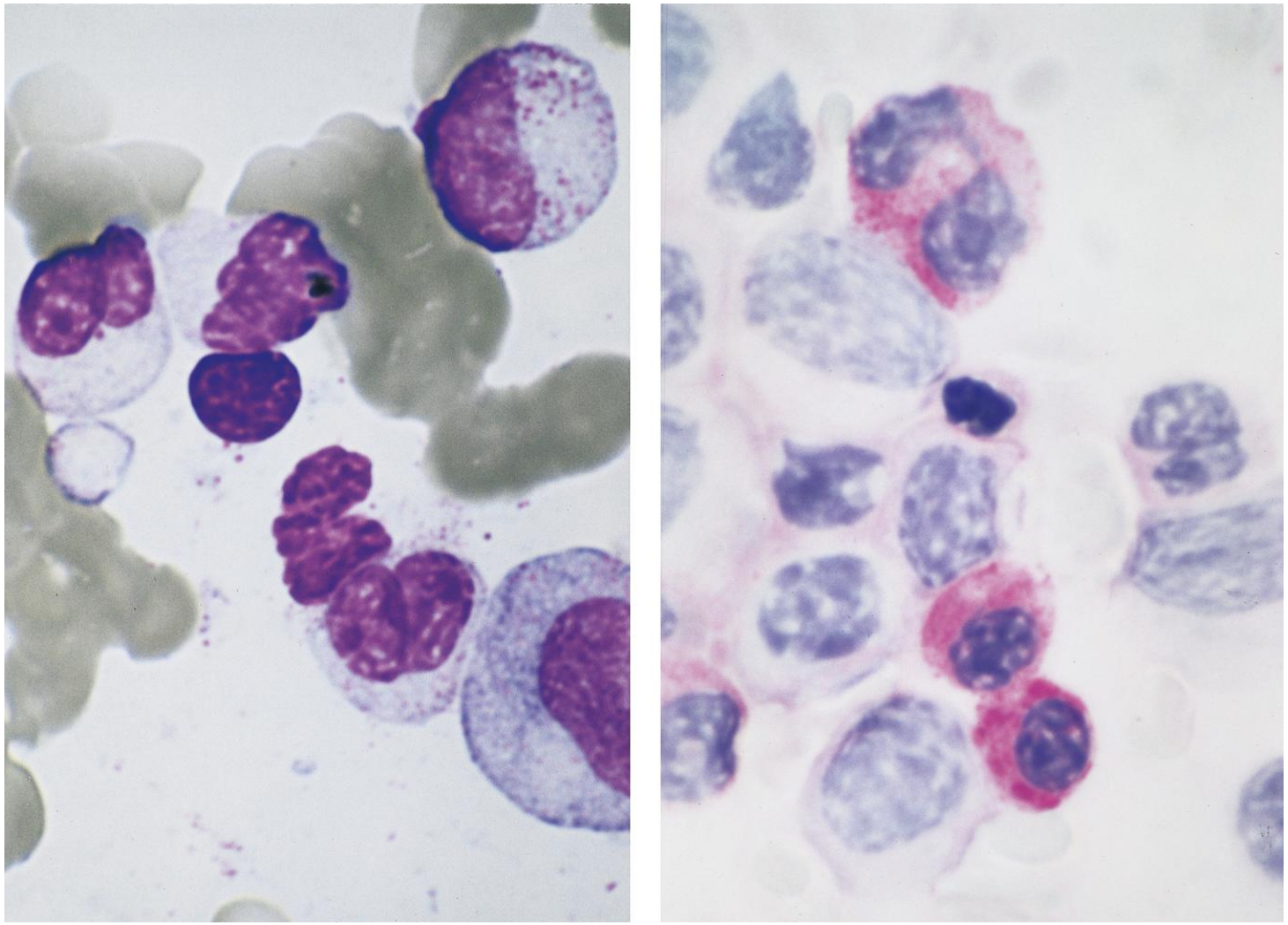
AML, M5 (acute monocytic leukemia). Peripheral blood smear (WBC 100,800/mL, leukemia cells 98%) reveals monomorphic monoblastic leukemia cells. Activities of α-naphthyl butyrate esterase or α-naphthyl acetate esterase are positive. May-Giemsa



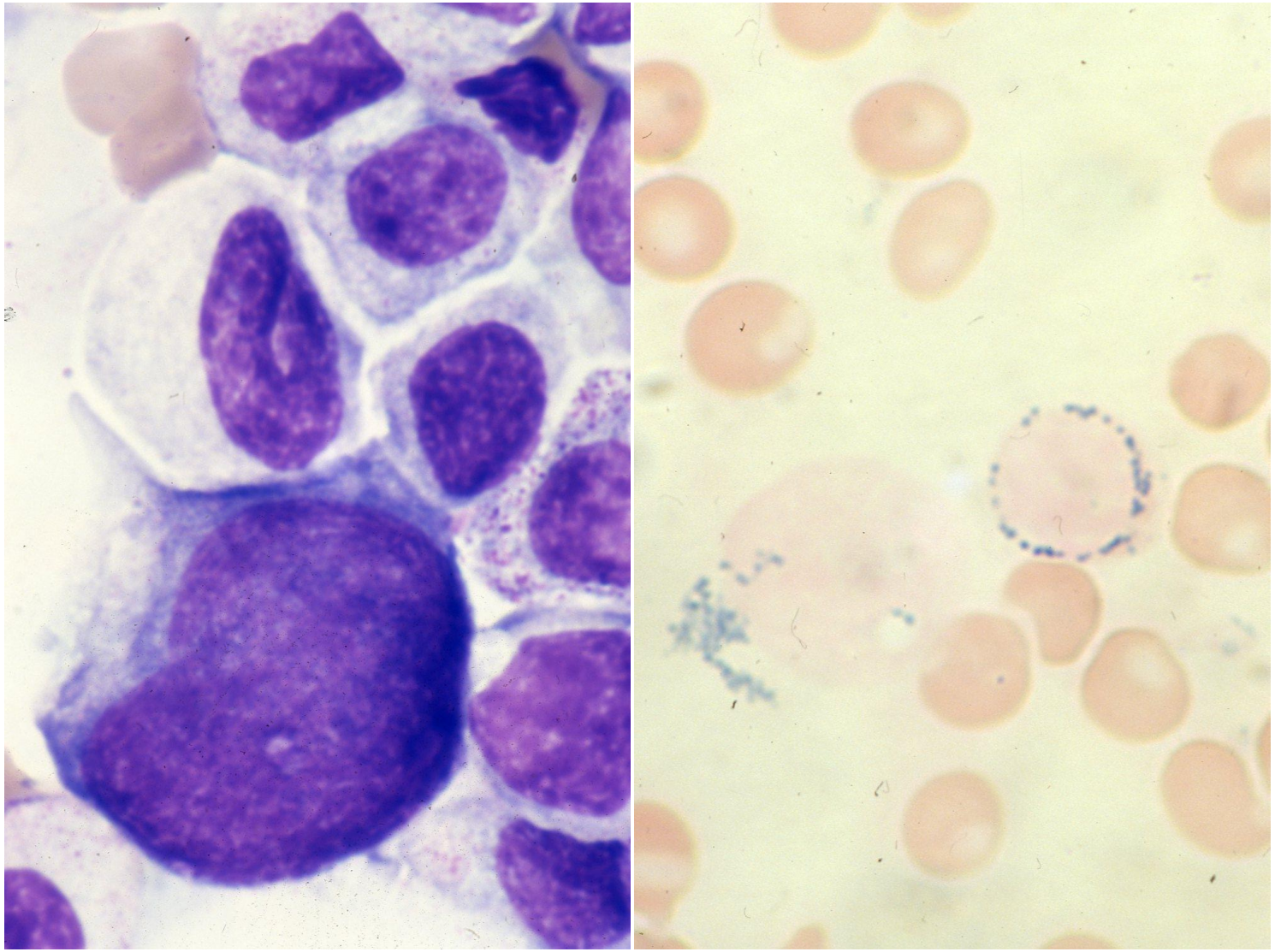
AML, M6 (erythroleukemia). A 68-year-old man manifested with pancytopenia: RBC 1,250,000/μL, WBC 2,200/μL (with 8% erythroblasts), and platelets 38,000/μL. The bone marrow is occupied by erythroblasts (65%) with myeloblasts (10%). The erythroblasts (often binucleated) somewhat resemble plasma cells. The differential diagnosis include myelodysplastic syndrome (MDS). When the percentage of myeloblasts is low, the diagnosis should be MDS. May-Giemsa



AML, M7 (megakaryoblastic leukemia). A 50-year-old woman manifested with pancytopenia: RBC 2,200,000/μL, WBC 7,000/μL (leukemia cells 55%), and platelets 30,000/μL. The blasts are negative for peroxidase activity, and express CD41, CD42b and CD63 on the surface. When myelofibrosis is associated, the bone marrow can not be aspirated (dry tap). May-Giemsa



Myelodysplastic syndrome (MDS). A 65-year-old man manifested with pancytopenia: RBC 3,300,000/μL, WBC 8,800/μL (with myelocytes 5%, metamyelocytes 9% and band form 30%), and platelets 110,000/μL. Pseudo-Pelger nuclear anomaly (eyeglass-like binucleation) (left; May-Giemsa) and PAS-positive erythroblasts (right, PAS reaction) are demonstrated.



Other features of myelodysplastic syndrome. Megaloblastoid cells (left, May-Giemsa) and ringed sideroblasts (right: Berlin blue stain) may be seen in MDS. When myelofibrosis is associated, the bone marrow is dry-tapped.