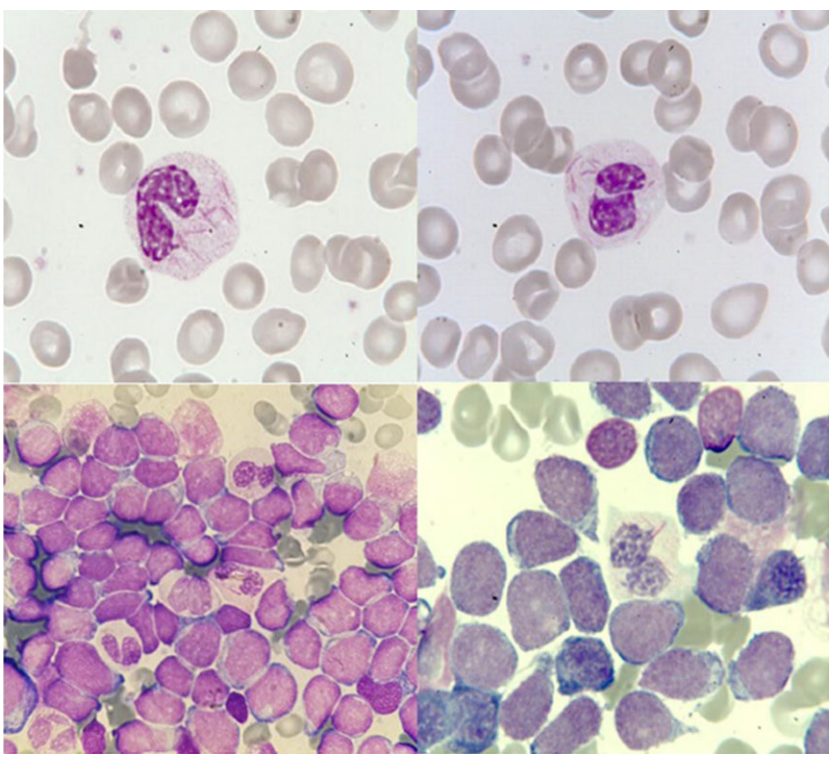
Auer rods in neutrophils in bone marrow and peripheral blood in mixed phenotype acute leukaemia in a child



An 11-year-old boy was admitted to the emergency department with persistent circumoral impetigo. Clinical examination revealed skin pallor, multiple enlarged lymph nodes and hepatosplenomegaly. Blood tests showed white blood cell count 32·5 × 10^9/l, haemoglobin concentration 90 g/l and platelet count 220 × 10^9/l, with 73% circulating blasts. The bone marrow was infiltrated by 93% homogeneous blast cells with a high nucleo-cytoplasmic ratio, large nucleoli and no azurophilic granules or Auer rods. Surprisingly, Auer rods were present in mature neutrophils in both the peripheral blood (top images) and bone marrow (bottom images).

Immunophenotypic characterization of the blastic population was as follows: 90% CD45weak, CD34+ and HLA-DR+ with expression of myeloid markers CD13, CD117 and myeloperoxidase. Blasts also expressed T-cell markers: CD2, CD99 and cytoplasmic CD3. CD4 and CD8 expression were absent. The karyotype was normal but *TP53* mutation and *WT1* overexpression were present. This pattern of antigen expression in a patient with a normal karyotype indicated a diagnosis of mixed phenotype acute leukaemia T/myeloid, not otherwise specified, according to the 2016 World Health Organization classification.

Auer rods are more generally found in blasts than in maturing cells. However, Auer rods in neutrophils have been described in acute promyelocytic leukaemia following all-*trans*-retinoic acid therapy, acute myeloid leukaemia (AML) with t(8;21), AML with maturation and in at least two cases of mixed phenotype acute leukaemia. However, in these cases the Auer rods were usually seen in bone marrow films only. In the case reported here, almost 25% of peripheral neutrophils contained Auer rods.

Samia Kabbage, Roberto Cupaiolo, Laurence Rozen and Anne Demulder

Haematology Laboratory, CHU Brugmann, Brussels, Belgium. E-mail: samiakabbage@gmail.com

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