



Multiple myeloma with Auer-rod-like inclusions

GIANLUIGI CASTOLDI, NADIA PIVA, PAOLO TOMASI

Hematology Section, Department of Biomedical Sciences, University of Ferrara, Italy

A 64 year old woman complaining of a long-lasting bone pain in the lumbar region was admitted to our Institute. Routine laboratory examination on admission disclosed: Hb 10.1 g/dL; RBC $3.35 \times 10^{12}/L$; WBC $5.9 \times 10^9/L$; PTL $20 \times 10^9/L$. Differential blood count showed occasional plasma cells with atypical features in the peripheral blood. Serum electrophoresis demonstrated a peak in the γ region (56%) compatible with a diagnosis of multiple myeloma. Quantitative evaluation of the immunoglobulins

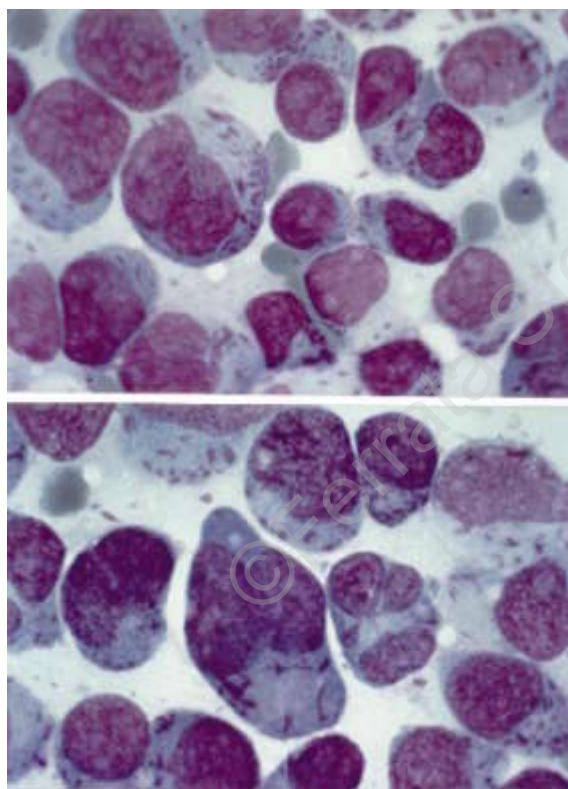


Figure 1. Bone marrow aspirate showing large atypical plasma cells. Their cytoplasm is filled with numerous spindle-shaped inclusions recalling Auer-rods.

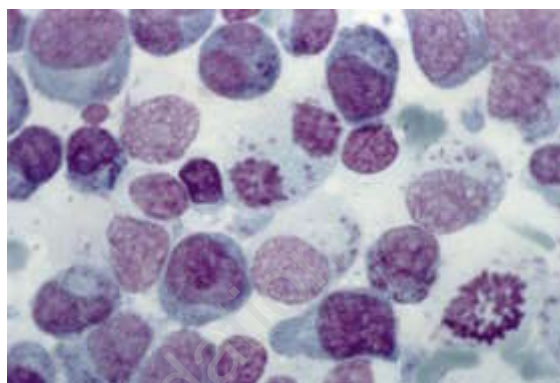


Figure 2. Several plasma cells are exhibiting mitotic activity.

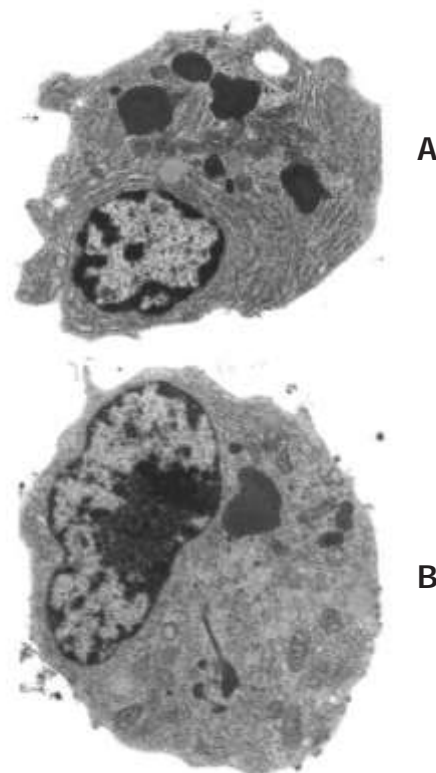


Figure 3. A. Electronmicroscopy of a plasma cell containing several crystalline-like inclusions in the cytoplasm. TEM x6,000. B. Some inclusions may demonstrate a rod-like appearance. TEM x8,000.

Correspondence: Prof. Gian Luigi Castoldi, Hematology Section, Department of Biomedical Sciences, University of Ferrara, Via Savonarola 9, 44100 Ferrara, Italy.

was IgG 6,770 mg/dL and κ chains 6,890 mg/dL.

X-ray examination showed multiple lytic lesions of the spinal column (in particular T9, T11 and L1). Bone marrow aspirate was characterized by marked infiltration of plasma cells of uneven size exhibiting numerous azurophilic spindle shape inclusions in the cytoplasm mimicking the occurrence of Auer rods (Figure 1, a and b). These structures did not stain with peroxidase and their electronmicroscopy suggested they had a crystalline nature although no periodic structure could be demonstrated (Figure 2, a and b). The inclusions failed to stain with fluoresceinated antiserum.

Similar inclusions have occasionally been described in the past in cases of multiple myeloma¹⁻⁵ in some lymphoproliferative disorders,⁶ such as prolymphocytic leukemia,⁷ or even in hypogammaglobulinemia.⁸

The fact that they are positive for β -glucuronidase in some instances strongly supports the contention of the lysosomal nature of these inclusions⁵ possibly associated with protein storage.

References

1. Steinmann B. Über azurophile stäbchenförmige Einschlüsse in den Zellen eines multiplen Myeloms. *Dt Arch Klin Med* 1940; 185:49-61.
2. Undritz E. Atlas of haematology. 2nd ed. Basel: Sandoz, 1973.
3. Di Guglielmo R, Milani A, Scolari L, Fausone Pellegrini S. Sulla natura dei cristalli endoplasmacellulari presenti in un caso di gammapatia biclonale apparentemente benigna. *Minerva Med* 1978; 69:1227-32.
4. Zucker Franklin D, Greaves M, Grossi C, Marmont AM. Atlas of Blood Cells. Function and Pathology. Edi-Ermes/Lippincott, Milan-Philadelphia, 1988. p. 504-18.
5. Mufti G, Flandrin G, Schaefer HE, Sandberg AA, Kanfer EY. An Atlas of Malignant Haematology, Cytology, Histology and Cytogenetics. London: Martin Dunitz, 1996. p. 313-4.
6. Lemez P. Auer-rod-like inclusions in cell of B-lymphocytic lineage. *Acta Haematol* 1988; 80:177-8.
7. Juneja HS, Rajaraman S, Alperin JB, Bainton DF. Auer-rod-like inclusions in prolymphocytic leukemia. *Acta Haematol* 1987; 77:115-9.
8. Nakamine H, Nishihara T, Saito K, Takenaka T, Maeda J. Needle-shaped inclusions in plasma cells in a patient with hypogammaglobulinemia. *Am J Clin Pathol* 1982; 78:549-55.