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Cryoglobulinemia as a cause of pseudoleukocytosis

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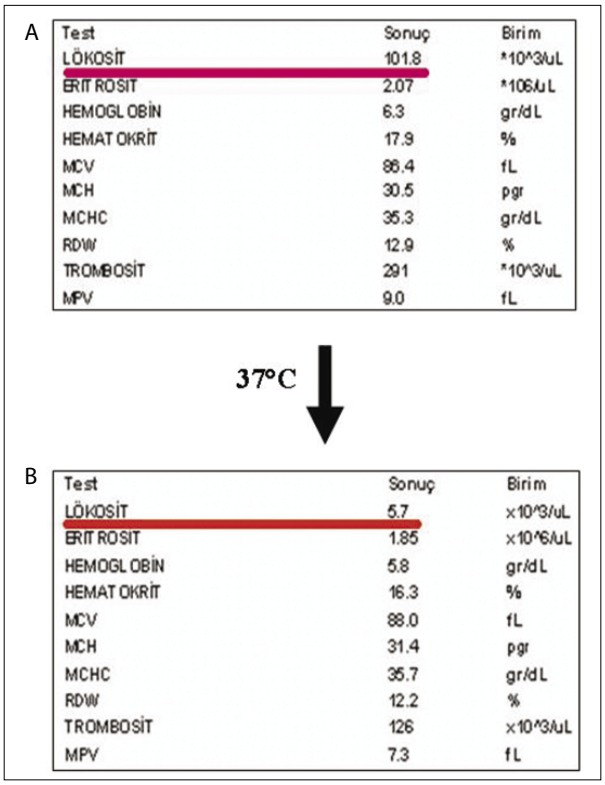

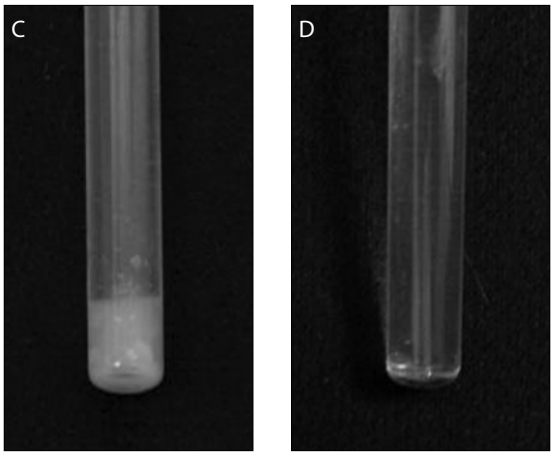

Figure: (A) Complete blood count with leukocytosis of 101800/mm^3. **(B)** Repeated complete blood count on prewarmed blood specimen at 37°C showing a normal leukocyte count. **(C)** Cryoglobulin precipitate formed at 4°C. **(D)** Disappearence of precipitate on heating to 37°C.

A 44-year-old man was admitted to our hospital with complaints of weakness, arthralgia and fever for three weeks. He had a two-year history of hypertension and was a hepatitis B carrier for four years. His physical examination revealed hepatomegaly 4 cm below the costal margin, pretibial edema and maculopapular eruptions, especially on his legs and abdomen, reported to have been present for five years. His TA was 190/100 mmHg. Biochemical tests showed a serum creatinine level of 4.3 mg/dl, blood urea nitrogen 42 mg/dl, uric acid 6.6 mg/dl, and albumin 2.2 g/dl with low complement 3 and 4 levels. Sedimentation rate was 143 mm/hr. He was bicytopenic with hemoglobin 7 g/dl, white blood cell count 2.4x10^9/L (55% polymorphonuclear leukocytes, 35% lymphocytes, 8% monocytes, 1% eosinophils and 1% basophils) and platelet

count $243x10^9$/L Bone marrow biopsy was hypocellular and skin biopsy was consistent with vasculitis. Pulse corticosteroid and cyclophosphamide therapy together with lamivudine was started with diagnosis of vasculitis syndrome. However, during his follow up, an "unexpectedly high" leukocyte count of $101.8x10^9$/L was observed (Figure A). On the other hand, simultaneous peripheral blood film examination was consistent with a leukocyte count of less than $5000/mm^3$. A complete blood count repeated on a pre-warmed blood specimen at 37°C showed a normal leukocyte count of $5.7x10^9$/L (Figure B). Blood sample of the patient was centrifuged at 37°C immediately after collecting and the serum was isolated and stored at 4°C for 7 days. Precipitate formed at 4°C (Figure C), and disappearance of the precipitate upon heating to 37°C (Figure D) was observed. Cryocrit was estimated after centrifugation at 4°C and 1400 rpm. Plasmapheresis was performed as an alternative therapy. Temperature-dependent protein precipitates are falsely interpreted as blood cells in automated counters. Cryoglobulinemia should thus be considered in the case of 'pseudo-leukocytosis'.