

HAEMATOLOGY IMAGES **OPEN ACCESS**

Rod-Like Cytoplasmic Inclusions in the Peripheral Blood Smear of a Patient with Chronic Lymphocytic Leukemia

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1 | Case

A 58-year-old man with a significant medical history of alcohol use disorder, cirrhosis, mild cognitive impairment, and iron deficiency anemia was brought to the emergency department in a heavily intoxicated state. A complete blood count on admission revealed lymphocytic leukocytosis ($12.4 \times 10^9/L$ with 69% lymphocytes), mild normocytic anemia (hemoglobin, 12.2 g/dL), and thrombocytopenia ($119 \times 10^9/L$). The peripheral blood smear demonstrated atypical lymphocytes with clumped chromatin, small amounts of cytoplasm, and occasional rod- or crystal-like inclusions (Figure 1A–C, 1000× magnification, Wright-Giemsa). Other leukocytes showed unremarkable morphology.

Computed tomography of the abdomen and pelvis demonstrated nonspecific mediastinal and abdominal lymphadenopathy. Flow cytometric analysis of the peripheral blood identified a lambda-restricted B-cell population (46%), which was CD5(+), CD19(+), CD20(partial dim+), CD23(+), and lambda(dim+) (Figure 1D). A corresponding cytogenetic analysis demonstrated an abnormal male karyotype: 46, XY, add(3)(p21), add(16)(p11.2)[5]/46, XY[15]. In addition, the CLL fluorescence in situ hybridization (FISH) analysis was negative for trisomy 12, del(13q), monosomy 13, *ATM*(11q22.3), *TP53*(17p13.1), and t(11;14). IgH somatic hypermutation analysis showed an unmutated status. A diagnosis of chronic lymphocytic leukemia (CLL) was established.

Intracellular inclusions in hematologic disorders can occur in various forms, such as Auer rods in acute promyelocytic leukemia and Russell or Dutcher bodies in lymphomas and plasma cell neoplasms. In contrast, cytoplasmic inclusions in CLL lymphocytes are uncommon, with reports rarely describing their presence

[1]. When identified, these inclusions may appear as vacuoles, crystals, or pseudocrystals on routine light microscopy [2].

Electron microscopy studies have shown that these inclusions frequently localize within the dilated cisternae of the rough endoplasmic reticulum (RER) [3]. This distribution suggests an abnormal immunoglobulin synthesis, most commonly involving IgM lambda [4]. Consistent with this, several prior reports have proposed that excess lambda light chain may precipitate within the cytoplasm, leading to the formation of these morphologic structures [5].

Although rare, cytoplasmic inclusions in CLL lymphocytes can provide valuable diagnostic insights. Their recognition may prompt target evaluation for B-cell lymphoproliferative disorders and can, in some cases, help predict light-chain restriction, typically lambda. Importantly, the current evidence does not indicate a clear prognostic significance for these inclusions; rather, their principal value appears to lie in their diagnostic and phenotypic implications [2, 4, 6].

Author Contributions

Abhishek Prasad, Tran B. Nguyen, and Luis F. Carrillo. Writing – review and editing. **Luis F. Carrillo:** Figure.

Ethics Statement

The information presented in this manuscript is de-identified, and there is minimal risk to the patient's privacy or confidentiality. No material from other sources is included in this manuscript.

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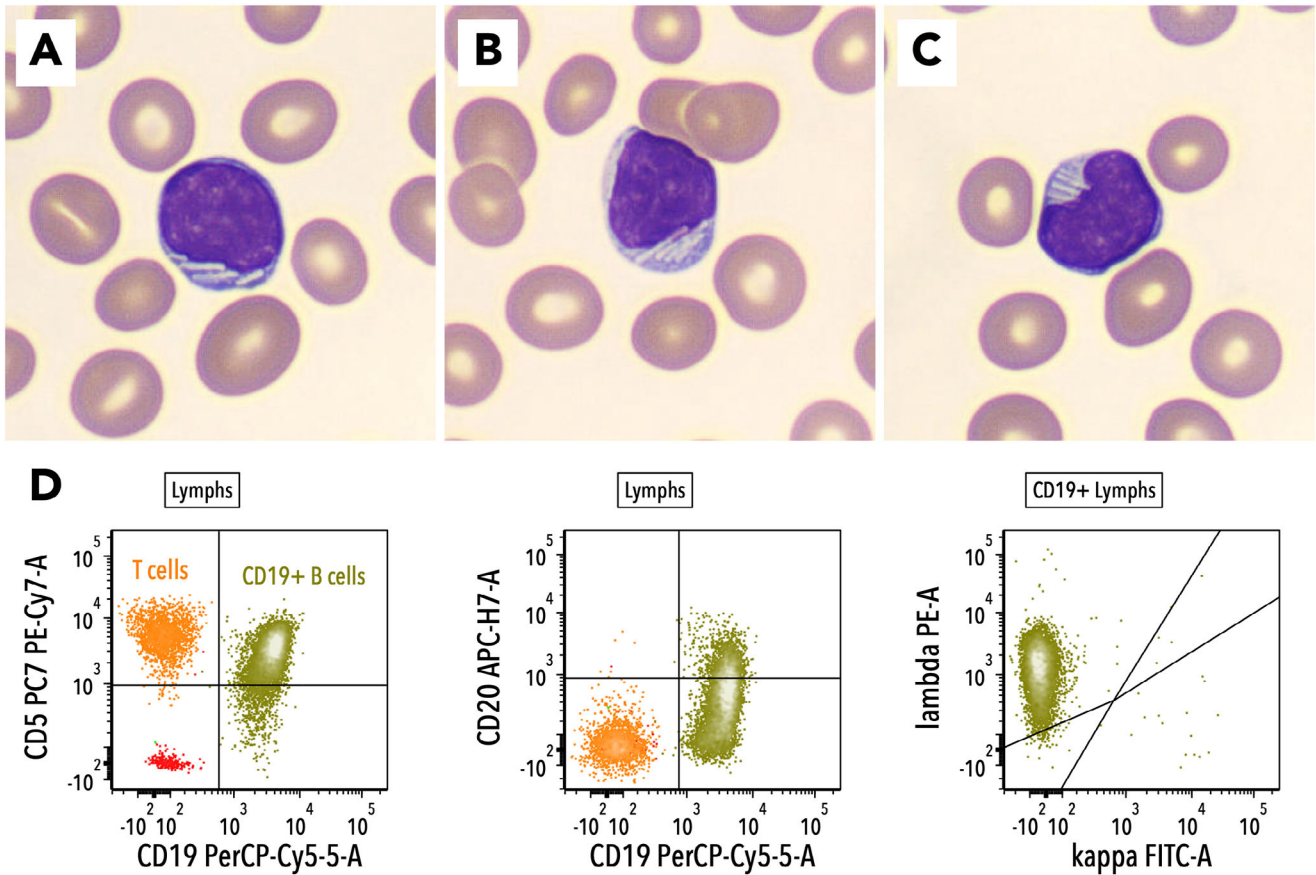


FIGURE 1 | (A–C) Peripheral blood smear revealed small-sized abnormal lymphocytes with irregular nuclei and small amounts of cytoplasm, containing white tubular “rod-like” cytoplasmic inclusions. (D) Peripheral blood flow cytometric analysis shows an abnormal B-cell population (green, 46%) that is CD5(+), CD19(+), CD20(partial dim+), and lambda(dim+). Abnormal B cells; green; T cells, orange; NK cells, red.

Conflicts of Interest

The authors declare no conflicts of interest.

Funding

The authors have nothing to report.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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