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Morphological and Cytochemical Features of Adult T-Cell Lymphoma-Leukaemia

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A. Introduction

T-cell malignancies may be recognised in several distinctive forms: T-lymphoblastic leukaemia and lymphoblastic lymphoma which are proliferations of immature T cells, and a heterogeneous group of proliferative disorders with a mature T-cell phenotype, T-chronic lymphocytic leukaemia, T-prolymphocytic leukaemia and the cutaneous T-cell lymphomas [1]. Within this spectrum of diseases, a distinctive T-cell leukaemia-lymphoma affecting black adults of West Indian/Caribbean origin has been recognised by our group [2] and designated adult T-cell leukaemia-lymphoma (ATLL). The salient features of the disease include its occurrence in black West Indians, the presence of high titres of antibody against the p 24 structural core protein of human T-cell leukaemia-lymphoma virus (HTLV), severe hypercalcaemia without bone lesions, lymphadenopathy, high WBC and short survival. Immunologically the malignant cells are of mature post-thymic phenotype (E+, TdT−, OKT3+, OKT6−), and in those cases tested with OKT4 and OKT8 monoclonal antibodies, of helper/inducer phenotype (OKT4+, OKT8−).

In this communication we describe the light (LM) and electron microscopic (EM) morphological and cytochemical features of the malignant T cells in this condition.

B. Materials and Methods

Peripheral blood (PB) and/or bone marrow (BM) films from six adult T-cell lymphoma-leukaemia patients were stained with May-Grünwald Giemsa and examined under LM. For EM analysis, PB and BM cells were fixed in 3% glutaraldehyde and embedded in Araldite. Ultrathin sections stained with uranyl acetate and lead citrate were then viewed through a Zeiss 10 electron microscope. The following cytochemical reactions: acid phosphatase, α-naphthyl acetate esterase (ANAE), β-glucuronidase, β-glucosaminidase and periodic acid schiff (PAS) were performed on PB and BM films, as described previously [3].

C. Results

I. LM Morphology

Atypical lymphoid cells from PB and BM displayed marked variation in size, maturity and nuclear outline. A high nuclear/cytoplasmic ratio was a consistent finding in the neoplastic cells irrespective of size, which varied from that of a small lymphocyte to that of a large blast. Most cells appeared mature (chromatin condensed), although small populations of cells of blastic appearance (prominent nucleoli) were also identified. A characteristic feature of the malignant cells was that of nuclear irregularity (Fig. 1). Folded, notched or lobulated nuclei, similar in some instances to those of Sezary cells, were also observed.

II. EM Morphology

The most striking features of the malignant cells in this condition were the irregularities

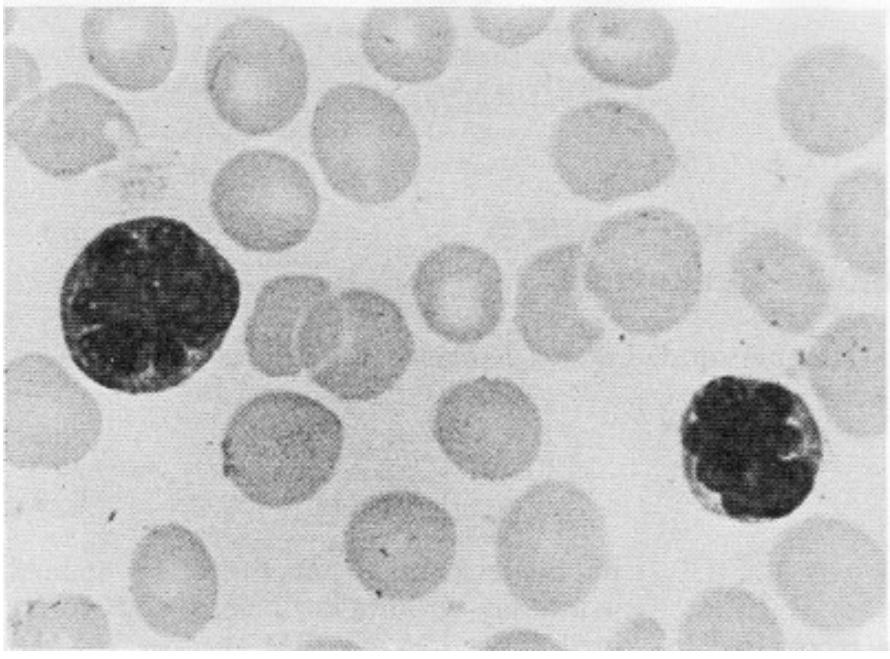

Fig. 1. LM morphology of atypical lymphoid cells

of nuclear outline (Fig. 2). These ranged from notchings or indentations of the nucleus to complex convoluted or lobulated profiles, in some instances resembling the 'cerebriform' nuclei of Sezary cells. Nuclear chromatin was peripherally condensed in the majority of cells, although blast-like cells with little heterochromatin and large nucleoli were present in small numbers in most cases and were predominant in one patient. Active Golgi zones, presence of electron-dense granules (often clustered) and bundles of fibrils (in two patients) were notable cytoplastic features.

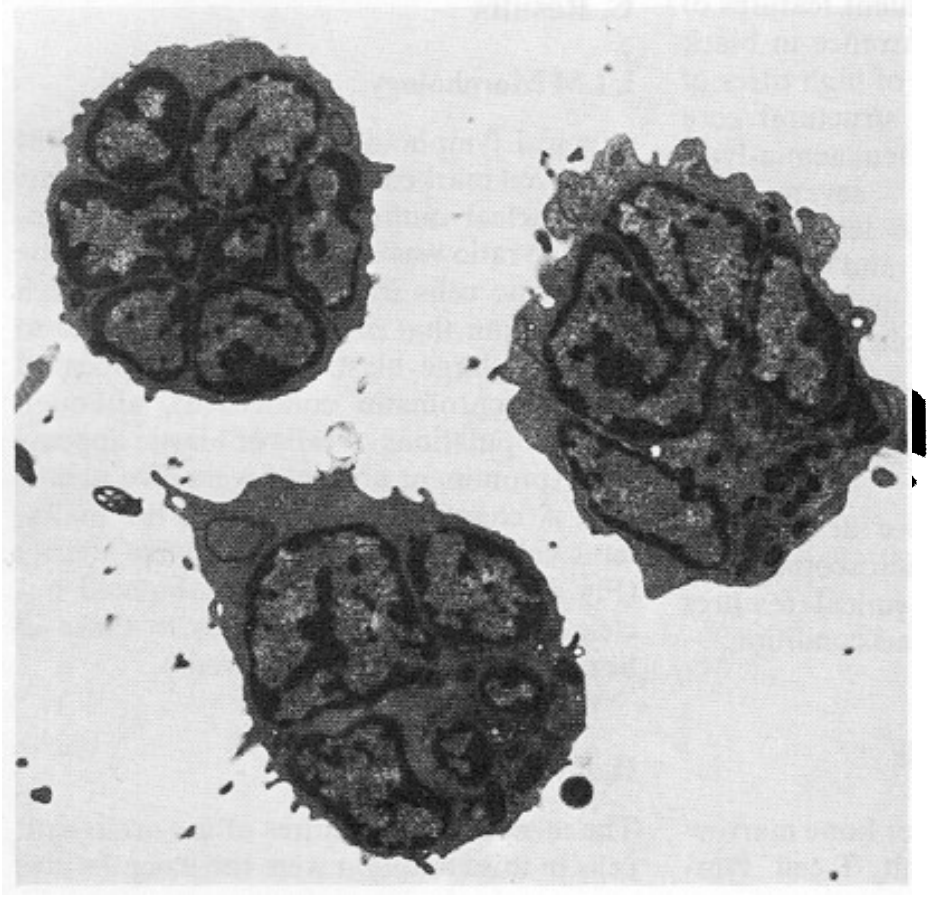

Fig. 2. EM morphology of atypical lymphoid cells. ×5500

III. Cytochemistry

The majority of atypical lymphoid cells displayed positive acid hydrolase reactivity. Although acid phosphatase reactions were positive (tartrate sensitive) in the majority of cells (>70%) in all cases, the intensity and nature of the reaction product was variable. This ranged from weak diffuse positivity in one case to strong multigranular reactivity in another (Fig. 3). Positive ANAE reactions were observed in most (>80%) malignant cells. The reaction pattern was dot-like (single or several discrete granules of reaction product) in the vast majority of cells; occasional cells with weak scattered granular positivity were also noted. β-Glucuronidase reactions were similar to those of acid phosphatase, most cells displaying moderately strong granular positivity. The strongest cytochemical reactions were observed for β-glucosaminidase. Virtually all (>95%) ATLL cells displayed strong multigranular positivity (Fig. 4). Cells from three cases were stained with PAS; in two cases all atypical lymphoid cells were negative; in the remaining case granules or blocks of intensely stained material were observed in >80% of cells.

Table 1. Cytochemical features of ATLL cells

Acid phosphatase	ANAE	β-glucuronidase	β-glucosaminidase	PAS
±/+	±/+	±/+	+	−/+

Reaction intensity: − negative; ± weak; + strong

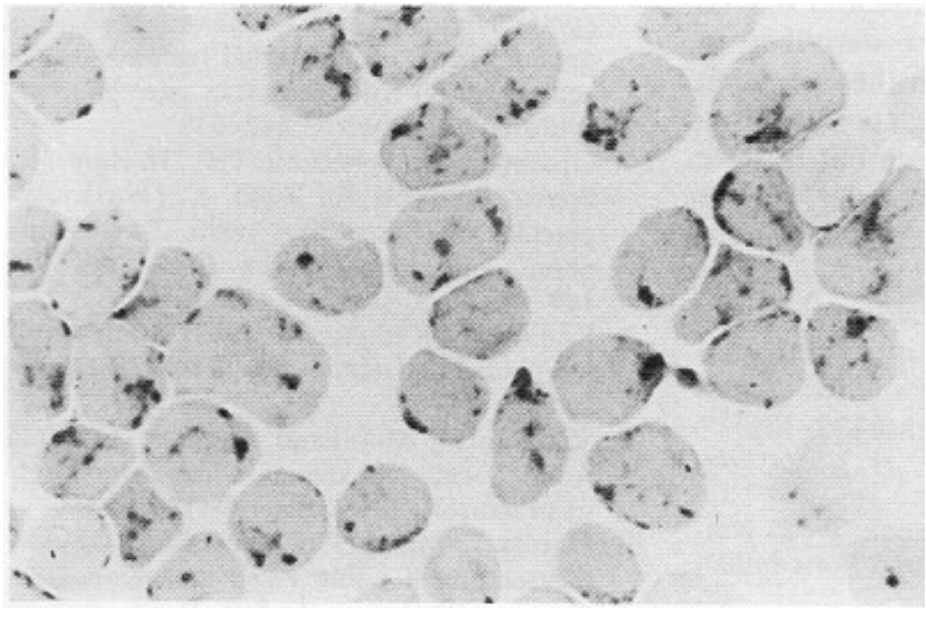

Fig. 3. Acid phosphatase reaction in ATLL cells (cytocentrifuge preparation)

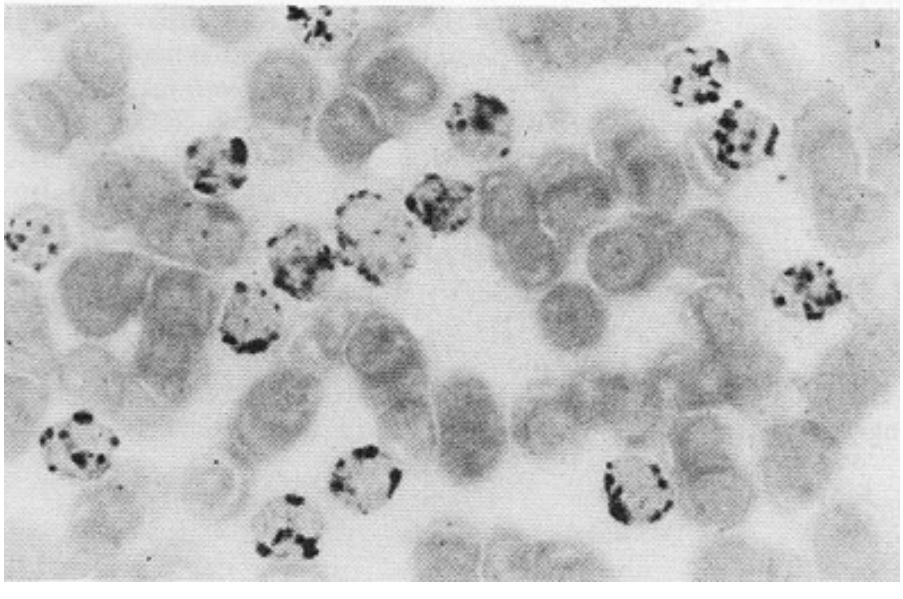

Fig. 4. β-glucosaminidase reaction in ATLL cells

A cytochemical reaction profile of the atypical lymphoid cells in ATLL is shown in Table 1.

D. Discussion

ATLL first described in Japanese patients [4, 5] has more recently been identified in several different racial groups [2, 6–8]. The LM and EM morphological features of the atypical lymphoid cells from PB, BM and lymph nodes in our six West Indian/Caribbean patients bear a close resemblance to those of the Japanese cases [9, 10]: pleomorphic cells with marked nuclear irregularities and condensed heterochromatin, and clustered electron-dense granules. The cytochemical profile of the malignant cells in our patients is consistent with that of a T-lymphoproliferative disorder [3]. The acid phosphatase and ANAE reactions are similar to those described in the Japanese cases [11], with the exception that the acid phosphatase reaction was tartrate sensitive in all our cases but tartrate resistant in the series of Usui et al. [11].

The close similarity in clinical, immunological, morphological and cytochemical features of ATLL as described in different racial groups (Table 2) is intriguing and may be significant in view of the association of HTLV with this disease [12, 13].

Table 2. Similarities between adult T-cell lymphoma-leukaemia in Japanese and West Indian blacks

Morphology Membrane phenotype	} of the neoplastic T cells
Lymph node histology	
High incidence of hypercalcaemia	
Poor prognosis (< 1 year)	
Geographical clustering (Southern Japan, Caribbean basin)	

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