liquid water between electrically charged plates, and we made a general statement that an electric field mechanism helps align the water molecules into ice-like clusters. Thus, our analysis does not involve the difference in energy between "ice" and "water" but is rather a comparison of the interaction energy of the polar substrate crystal with an ice nucleus (partially) proton-ordered along the hexagonal axis as against a nonpolar substrate with (completely) disordered ice nucleus.

Model calculations (Table 1) imply that unless polar ice is introduced at the nucleation stage, there is no advantage of D,L-alanine over the L form. With polar ice we have in effect increased the dielectric constant of the intercalated ice medium.

With regard to the last point raised by Wilen, our overall aim was to demonstrate the ice nucleating ability of polar crystals by unraveling the riddle of the difference in ice nucleating behavior of the racemic and chiral forms of α-amino acid crystals. In this way, we also hope to provide other approaches for understanding phenomena such as the ice nucleating ability of frost bacteria.

**REFERENCES**


23 October 1992; accepted 8 December 1992

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**HTLV-1 Provirus and Mycosis Fungoides**

Human T cell lymphotropic virus type-I (HTLV-I) is associated with a mature postthymic T cell malignancy, adult T cell leukemia/lymphoma (ATL), which often affects cutaneous tissues. ATL is clinically distinct from mycosis fungoides (MF), although in both conditions the neoplastic CD4+T cells are epidermotropic (1).

W. W. Hall et al. found a partially deleted HTLV-I provirus in a cell line established from one patient with MF (2). Defective HTLV-I provirus has also been found in some cases of ATL (3). The findings of Hall et al. and others (4) implicate HTLV-I or a related retrovirus in the pathogenesis of cutaneous T cell lymphoma in some patients.

To assess the frequency of this association, we analyzed genomic DNA from freshly isolated peripheral blood mononuclear cells and from lesional skin biopsies of 40 patients with MF (5). Under low stringency conditions, Southern (DNA) blot hybridization with a full-length HTLV-I probe (λ 23-3) revealed identical multiple bands in the 40 patients and in normal controls, which presumably indicates the presence of endogenous HTLV-I-like sequences within human genomic DNA (6). In contrast, at high stringency we found discrete bands in tissue DNA from only three (seronegative) Caucasian patients. The sizes of these bands were different from those characteristic of HTLV-I-associated ATL samples. Specifically, in one patient a truncated 8-kb Eco RI fragment was detected (Fig. 1), while the other two patients had an extra 3-kb Hind III fragment. We did not succeed in amplifying HTLV-I sequences from these latter two patients, but in the former patient amplification by polymerase chain reaction with primers flanking a conserved HTLV-I pol sequence yielded a 119-base pair fragment. Subcloning into bacteriophage M13 and single-strand DNA sequence analysis revealed a 119-base pair pol sequence which, with the exception of a single base substitution, was identical to that of HTLV-I (7).

These data indicate monoclonal integration of exogenous defective HTLV-I sequences, which agrees with the findings of Hall et al. However, our results indicate that defective HTLV-I sequences can be detected only in about 10% of patients with MF. Therefore, in our view, the role of these defective retroviruses in the pathogenesis of mycosis fungoides remains in question.

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**Fig. 1.** Southern DNA blot autoradiograph of Eco RI–digested DNA hybridized with a full-length HTLV-I probe (λ 23-3) under high stringency conditions. A restriction enzyme map of the HTLV-I provirus and the sizes of λ DNA fragments digested by Hind III (23.3, 9.4, 6.6, 4.4 kb) are shown. Positive controls are indicated by multiple bands in DNA from cell line MT2 (1) and a single 13 kb band in DNA from a patient with ATL (2). Single discrete Eco RI bands (3/8, 4/13.4, and 5/19.8 kb) are present in tissue DNA samples from three patients with MF, while negative results are seen in six other patients with MF (lanes 6 through 11). S, Sst I; P, Pat I; H, Hind III; B, Bam HI.

**REFERENCES**


28 February 1992; revised 8 June 1992; accepted 21 July 1992

Cutaneous T cell leukemias/lymphomas (CTCLs) are rare neoplasms that include mycosis fungoides (MF), its variant Sézary syndrome (SS) (considered to be the leukemic phase of MF), and adult T cell leukemia/lymphoma (ATL) (1). ATL, in its acute or chronic forms, is closely associated with HTLV-1 infection (2) and consequently has a marked geographic predominance, with a high incidence in Japan, the Caribbean, and parts of eastern Europe. The role played by HTLV-1 in MF and SS has been the subject of contradictory reports.

Hall et al. (3) report finding deleted HTLV-I provirus in cutaneous lesions of patients with MF. Polymerase chain reaction (PCR) analysis with HTLV-I gag, pol, env, pX, and long terminal repeat oligonucleotide primers, showed amplification of HTLV-I sequences in tissue samples from lesions of the five patients that they tested and in the blood of one of them. On this basis, they suggest that HTLV-I infection may be involved in at least certain cases of
HTLV-1 provirus and mycosis fungoides
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Science 259 (5100), 1470-1471.
DOI: 10.1126/science.8451646