Basic and Interferon-augmented Natural Killer (NK) Cell Activity in Psoriasis

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The natural killer (NK) cell activity of lymphocytes from 24 psoriatic patients was compared with that of 34 normal controls and 19 patients with non-psoriatic dermatoses. In the range of effector/target cell ratios used (6.25 to 100), the basal NK cell activity level was similar in the three groups. Moreover, both interferon alpha (IFN-α) and interferon gamma (IFN-γ) augmented the NK cell activity to the same extent in psoriasis as in the two control groups. We conclude that this important natural cancer surveillance mechanism is functioning properly in psoriatic patients. Key words: Psoriasis; NK cells; Interferon; Cancer immunity. (Received December 22, 1982.)

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Psoriasis is a chronically persisting disease needing prolonged treatment, often continuing for decades. Recently much attention has been paid to the possible carcinogenicity of psoriasis treatment modalities, and considerable effort is presently being expended on defining the inherent risks of different psoriasis treatments, such as phototherapy. There is, in parallel, an increasing awareness of the fact that host factors may be most important in determining the outcome of exposures to tumorigenic environmental factors. There is now ample evidence from animal experiments that immunological defence mechanisms may, in particular, determine the susceptibility to development of skin cancers (9).

Although host immune factors presumably play a similar role in the case of skin cancer development in man (10), the existence and strength of such immune mechanisms are difficult to evaluate. One exception is the recently characterized natural killer (NK) cell system, which is probably one of the major cancer surveillance systems in mammals, including man (5). This NK cell activity resides in a small subpopulation of spleen and peripheral blood lymphocytes, and is activated by the presence of interferon (IFN) (6).

To acquire a biological measure of the effectiveness of cancer surveillance mechanisms in psoriatic patients, we have assayed the NK cell activity level and its IFN augmentation in psoriatics and compared it with that of patients with other skin disorders and normal controls.

MATERIAL AND METHODS

Patients and controls

The study group consisted of 24 patients suffering from plaque-type psoriasis of long-standing duration (4-64 years, mean 18 years). The patients were neither receiving any systemic antipsoriatic remedies nor had they recently (≤3 months) undergone phototherapy or photochemotherapy. The ages of the patients varied from 18 to 73 years, mean 44.1 years. Of the 23 patients, 15 were male.

The normal controls consisted of 34 healthy volunteers from among the hospital and laboratory personnel. The ages of the normal controls, 15 of which were male, varied between 24 and 42 years, mean 31 years. In addition, a control group of 19 patients suffering from skin disorders unrelated to psoriasis was analysed. The control patients included 4 cases of photodermatoses, 3 cases each of leg
NORMAL controls

Psoriasis

Other dermatoses

Effector to target cell ratio

NK activity

Fig. 1. NK cell activity levels, expressed as a percentage of maximal lysis. Mean values and standard deviations shown for the three population groups, at five different effector/target ratios.

RESULTS

Basic NK cell activity

Fig. 1 gives the basic NK cell activities in the three study groups, at the five different effector-to-target (ET) cell ratios tested. In all study groups, the lytic response increased proportionally to the increase in effector cell concentration, indicating that the assay
system functioned properly. When the magnitude of the responses in the three study groups was compared, no significant differences were found.

Response to interferon
The effects of IFN-α and IFN-γ on the NK cell activities are recorded in Table I. In general, the NK cell activities in all study groups were augmented by interferon, although in a few individual cases non-responsiveness or slight inhibition was seen (data not shown). On the whole, the response in the three study groups were of equal magnitude (Table I), and IFN-alpha and IFN-gamma were equally effective. Although there was a slight trend for the IFN responses in psoriatic patients to run lower than those for the normal controls, this difference was not statistically significant.

DISCUSSION
Animal studies have implied that the NK cell system may function as an important ‘first line’ cancer defence mechanism by detecting and destroying early clones of mutated cells (5). By showing that a normal level of basic NK cell activity is found in the peripheral blood of psoriatics, our study implies that this cancer surveillance system does operate properly in psoriasis sufferers. This finding is in agreement with data recently presented by Hunyadi et al (7). In that study, as well as in ours, K-562 erythroblastoid target cells were used. In our study, however, five different effector/target cell ratios were used, ranging from 6.25 to 100, in contrast to the three ratios of 10 to 40 used by Hunyadi et al. (7).

Our study was extended to measure the augmentation of the NK cell activity by interferon, using both IFN-alpha (leukocyte IFN) and IFN-gamma (immune IFN). The IFN-induced augmentation is considered to depend on both a recruitment of active NK cells from inactive precursor cells, and a direct augmenting effect on the lytic activity of the mature NK cells (11). We found that this activation capacity was of the same magnitude in psoriatics as in the controls, which adds further support to the concept of an intact NK cell system in psoriasis.

The cellular IFN responsiveness in psoriasis may also be regarded in a larger biological context, since interferons are known to be potent inhibitors of cell proliferation (3), acting through specific cell surface receptors (4). Theoretically, interferon responsiveness might be altered, e.g. in rapidly proliferating psoriatic epidermal cells. Interestingly, IFN-α did not influence the DNA synthesis rate of human psoriatic skin explants cultured in intraperitoneal diffusion chambers in mice (8). While our present study includes no data on epidermal cells, the normal IFN responsiveness of the lymphocytic cells may be interpreted as evidence against any general impairment in IFN response mechanisms in psoriasis.

Table I. Augmentation of NK cell activities by interferon-alpha (IFN-α, 1000 U/ml) and interferon-gamma (IFN-γ, 100 U/ml)
Results are expressed as augmentation indices ± standard deviation at an effector/target cell ratio 25:1. Figures in parentheses indicate numbers of persons tested

<table>
<thead>
<tr>
<th>Population</th>
<th>IFN-α</th>
<th>IFN-γ</th>
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<tbody>
<tr>
<td>Normal controls</td>
<td>1.50±0.50 (34)</td>
<td>1.46±0.39 (20)</td>
</tr>
<tr>
<td>Psoriatics</td>
<td>1.43±0.44 (24)</td>
<td>1.32±0.33 (15)</td>
</tr>
<tr>
<td>Other patients</td>
<td>1.46±0.31 (19)</td>
<td>1.37±0.32 (13)</td>
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REFERENCES


