REGIONAL DISTRIBUTION OF LANGERHANS CELLS IN HUMAN EPIDERMIS

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Langerhans cell population of normal human epidermis was counted using ATPase staining. No significant difference in density of Langerhans cells in relation to age, sex and various regions of the body was noted.

Key words : Langerhans cell, ATPase staining.

Langerhans cells (LCs) constitute an immunologically active intraepidermal dendritic cell population. In sections stained with hematoxylin and cosin, they appear as high level clear cells. Histochemical methods for demonstrating adenosine triphosphatase (ATPase) activity are frequently used in light microscopic studies of LCs.[1,2] Keratinocytes and melanocytes do not possess ATPase reactivity, thus the method is quite specific for visualization of LCs.[3] Considerable variation in regional distribution of the other dendritic cell population of the epidermis, the melanocytes, is a well-known feature. In the present paper, using ATPase method, we have investigated the density of LCs in normal human epidermis from different regions of the body.

Materials and Methods

Skin biopsy specimens were taken from the normal skin of thirty five male and fourteen female subjects of age group 7-55 years. The area was infiltrated with 1 ml of 2% xylocaine. A piece of skin was obtained by superficial incisional biopsy, handling the tissue very gently. EDTA separation of epidermal sheet and ATPase staining was done as described by Juhlin and Shelley,[1] with modifications suggested by Robin and Brandon.[2] Counting of LC was done with an ocular grid.

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Results

The average number of LCs/mm^2 of the epidermis in various areas is shown in table I and the count in relation to the age is shown in table II. The differences in the counts were statistically not significant ($p>0.05$). Density of LCs was nearly similar in male (950.10 ± 125.40) and female (956.00 ± 134.50) subjects.

Table I. The average number of LCs/mm^2 of epidermis in various regions.

Site	Number of cases	LC count/mm^2 mean $\pm$ s.d.
Face	5	1028.6 ± 117.5
Neck	8	932.1 ± 81.2
Thorax	7	952.1 ± 103.2
Abdomen	9	986.6 ± 131.7
Back	6	921.5 ± 121.7
Forearm	8	890.3 ± 100.1
Thigh	6	968.2 ± 116.7

Table II. Langerhans cell count in relation to age.

Age group (years)	Number of cases	LC count/mm^3 mean $\pm$ s.d.
0—15	11	952.7 ± 145.2
16—30	22	952.9 ± 131.2
31—45	12	967.4 ± 112.1
45+	4	837.0 ± 105.5

Comments

Langerhans cells population in guinea pig epidermis is highly constant with a mean of 930 cells/mm^2. Except for the skin of ears and paws, it does not differ among individual regions.[4]

In man, however, the number of LCs have been reported to vary from 460-1000 cells/mm^2 with regional variations in their distribution.[5]

Zelickson and Mottaz,[6] using a different method, noted that the number of LCs was more in the lower back than the forearm. Our data differs from these reports. There was no significant difference in the density of LCs in the epidermis from face, neck, thorax, abdomen, back, forearm and thigh. LC count also did not vary with age and sex. This is in complete agreement with the observations of Lisi from Italy who also reported no significant difference in the number of LCs in normal human epidermis in relation to age, sex and various regions.[7]

LCs play a pivotal role in contact dermatitis and an optimum number of these cells is essential for the induction of contact allergic reaction.[8] It has been mentioned that allergic reactions on patch testing are most easily obtained on the upper back; whereas thighs and inner surface of the upper arms are unsuitable as test sites.[9] Reason for this variation does not appear due to difference in the LC density. Role of other local factors requires exploration.

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