Studies on Human Skin Lymph Containing Langerhans Cells from Sodium Lauryl Sulphate Contact Dermatitis

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Immunologic processes in diseased human skin have been extensively investigated, but little is known about the effect of skin diseases on human afferent skin lymph. Starting in the papillary dermis, the skin lymphatics drain the adjacent tissue in a one-way flow toward the regional lymph nodes. The composition of the afferent lymph, therefore, reflects the immunologic inflammatory processes in the draining tissue. To obtain afferent lymph to investigate its content, we inserted a cannula, by means of microsurgery, into a superficial peripheral lymph vessel draining a defined skin area. By manipulating the drained skin area and subsequent examination of the lymph we established an in vivo system for investigating the kinetics of lymph changes during the course of skin reactions. In lymph derived from a mild sodium lauryl sulphate (SLS) – induced contact dermatitis we could demonstrate an increase of both flow and cells. In particular, the number of Langerhans cells (LC) increased enormously during the course of the skin reaction. It, therefore, seems that a large increase in the migration of LC from the skin to the regional lymph nodes is a major feature of SLS-induced contact dermatitis, suggesting that LC may play a major role in the irritant contact dermatitis reaction. J Invest Dermatol 99:109S–110S, 1992

The investigations performed by the authors and referred to in this review article were supported by a grant from the Swiss National Fund (23-7774.89).

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Abbreviations:
LC: Langerhans cells
SLS: sodium laurel sulphate

The lymphatic system and its vessels allow the clearance of protein and fluid from the tissue and provide the exit pathway from tissue for immune-competent cells. These functions play an important role in the regulation of cell hydration and osmosis, and in immunologic responses [1]. The organization of the skin lymphatics is similar to that of the vascular network with upper and lower dermal plexuses. Starting in the papillary dermis, the lymphatics drain the adjacent tissue in a one-way flow toward the regional lymph nodes, comprising the afferent skin lymph. Although immunologic processes in diseased human skin have been extensively investigated, the composition of afferent lymph derived from diseased skin is unknown. Because we must assume that the composition of the afferent lymph in all probability reflects the processes in the drained skin tissue, investigation of this lymph would provide valuable information for our understanding of the pathogenesis of skin disorders.

Of particular interest are cutaneous antigen-presenting cells, especially the Langerhans cells. It is generally accepted that they are the major antigen-presenting cells in the epidermis, capable of alloactivation [2] and presentation of bacterial [2], viral [3], fungal [4], and contact antigens [5] to T lymphocytes. LC also seem to be more potent than blood-derived adherent cells in inducing some antigen-specific T-cell responses [6]. Circulating as bone marrow – derived precursor cells, they leave the blood vessels, probably via dermal postcapillary venules, and migrate into the epidermis. Here they pick up foreign antigens and then migrate to the regional lymph node via the lymphatic vessels. The antigen presentation may occur in the epidermis and on the way to it, but probably takes place mainly in the lymph node. Evidence from studies in guinea pigs [7] and mice [8,9] indicates that the above suggested migration pathway of the LC may be correct.

To obtain skin-derived lymph, we microsurgically inserted a cannula in an epifascial peripheral lymph vessel on the lower leg where there are no anastomoses between the subfascial and epifascially draining lymphatic trunks, thus ensuring that the collected lymph derives exclusively from the drained skin area. The techniques used are difficult and we have had many failures, but in successful cases we have been able to collect lymph continuously for a period of 8 d. By manipulating the drained skin area and subsequent examination of the lymph, we have established an excellent in vivo system for investigating the kinetics of lymph changes during the course of skin reactions. Using this system we have investigated afferent lymph derived from a mild contact dermatitis induced by the application of 10% SLS 2 d after the cannulation. In parallel to the clinical symptoms of the contact dermatitis, the lymph flow and the output of cells increased and they were still elevated at the end of the study after 8 d when the clinical signs of contact dermatitis had completely disappeared [10]. A most interesting finding was an enormous increase in both the absolute and the relative number of LC in the lymph when the irritant contact dermatitis reaction faded.*

A previous study of the dynamic changes in the epidermal OKT6-positive cells in mild SLS-induced irritant contact dermatitis reactions demonstrated an increase 2 to 3 d after application of the SLS [11]. Together with our findings, this may indicate that there is an increased influx of LC into the skin and the epidermis during the

*Brand CHU, Hunziker Th, Braathen LR: Large increase of Langerhans cells in human skin derived lymph from irritant contact dermatitis (submitted).
first days of the SLS skin reaction and that, at the end of the reaction, when the skin recovers these cells leave the skin with the afferent lymph.

LC are important in the pathomechanism of allergic contact dermatitis. Our results demonstrate that a large increase in the migration of LC from the skin to the regional lymph nodes is a major feature of SLS-induced irritant contact dermatitis, suggesting that LC may also play an important role in irritant contact dermatitis reactions. Studies are under way to investigate other cell populations and to elucidate the role of cytokines in contact dermatitis reactions.

REFERENCES


