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The Effect of Tape Stripping on the Fate of Intradermally Injected Dinitrophenylated Isogeneic Epidermal Cells and Allogeneic Epidermal Cells in Guinea Pigs

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ABSTRACT. DNP-iso ECs or allo ECs were injected intradermally into normal or tape stripped ear skin of inbred JY-1 strain guinea pigs. The fate of the injected cells was histologically examined. The cells proliferated in the dermis, formed EC nests with central keratinization and then elicited a reject reaction associated with necrosis of the epidermal structures in both normal and stripped skin. The suppressive effect of the tape stripping treatment on the reaction was not observed. The significance of the findings is discussed.

One of the methods that has been reported to divest epidermal Langerhans cells (LC) is repeated stripping of skin surface with cellophane tape. In the course of experiments using the tape stripping method, we found that the treatment not only depletes epidermal LC but also affects the dermal function of a certain cell type of the macrophage lineage.[1] The effect of the treatment on the fate of intradermally injected haptenated isogeneic (iso) epidermal cells (ECs) and allogeneic (allo) ECs of guinea pigs was examined in the present experiment.

MATERIALS AND METHODS

Animals : Male inbred JY-1 strain and strain 13 guinea pigs, weighing 300-400 g, were used.

Treatment of animals and preparation of specimens : Dorsal and ventral surface of both sides of ears of JY-1 were stripped by repeated applications (20 times) of cellophane tape. EC suspensions were prepared from JY-1 and strain 13 by trypsinizing their ear skin as described previously.[2] ECs from JY-1 were dinitrophenylated by incubating in 2, 4-dinitrobenzene sulfonic acid sodium salt.[2] 5×10^6 DNP-iso ECs or allo ECs were injected intradermally through normal (control animal) or stripped (experimental animal) ear skin of JY-1. Skin specimens were obtained with a 5 mm biopsy punch from injected site 3, 5 and 7 days after injection. The lesions were fixed in 10% buffered-formalin and amounted in paraffin. Serial sections were made and stained with

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hematoxylin and eosin.

RESULTS

DNP-iso ECs were injected intradermally into JY-1. Five days after injection, the nests of ECs were seen in the dermis (Fig. 1). ECs represented the different stage in the gradual evolution of the basal cells into cornified cells. They were often seen forming centrally small cysts. The ECs elicited a moderate cellular infiltrate composed of lymphocytes, histiocytes and neutrophils. By 7 days after injection, the inflammatory reaction associated with necrosis of EC nests and a more extensive cell infiltrate had occurred (Fig. 2). The overall microscopic findings were the same regardless of treating the skin with cellophane tape (Table).

A large mass consisting of proliferated ECs was seen in the dermis 3 days after injection of allo ECs (Fig. 3). Five days after injection, intense reject reaction to injected ECs was found in the dermis of both control and experimental animals (Fig. 4). There was no difference in the fate of implanted ECs between both animal groups (Table).

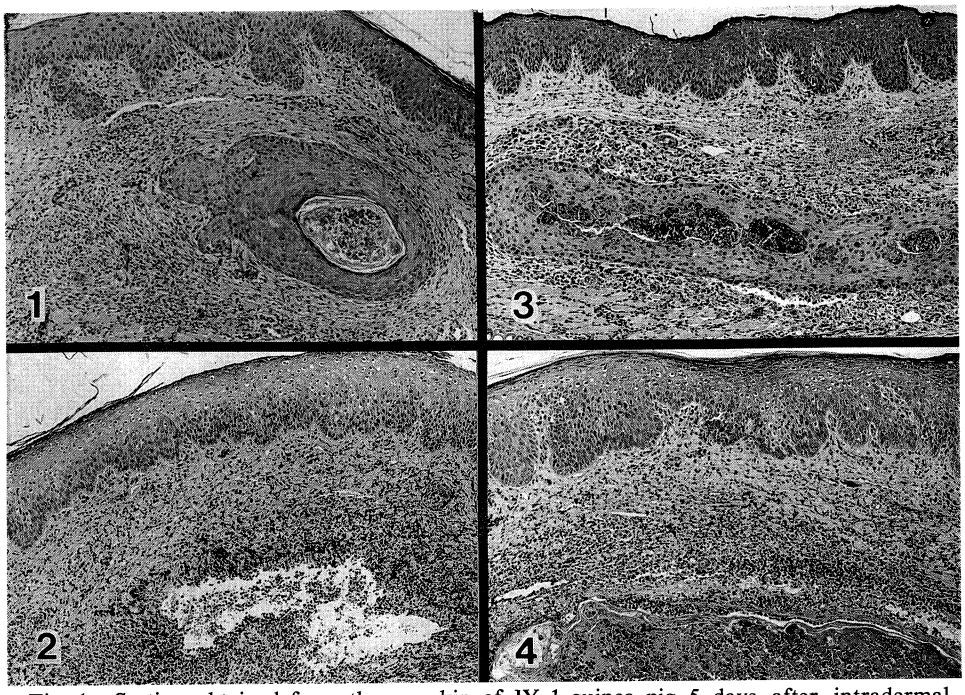

Fig. 1. Section obtained from the ear skin of JY-1 guinea pig 5 days after intradermal injection of DNP-iso ECs. Note the proliferation of implanted ECs with central keratin cyst in the dermis. ×200.

Fig. 2. Seven-day lesion from the ear skin injected intradermally with DNP-iso ECs. Inflammatory reaction associated with either necrosis of EC nest or extensive mono- and polymorphonuclear cell infiltrates had occurred. ×200.

Fig. 3. Section excised 3 days after allogeneic EC implantation into the ear skin of JY-1. A large mass consisting of proliferated ECs was seen in the dermis. ×200.

Fig. 4. Five-day lesion of allogeneic EC implantation. The EC structure had been rejected. ×200.

TABLE. Survival of ECs injected intradermally in JY-1 guinea pigs

Donor cells	Treatment of recipient	Days after injection		
		3	5	7
DNP-iso ECs	Stripping		3*/3	1/3
	none		3/3	1/3
Allo ECs	Stripping	3/3	0/3	
	none	3/3	0/3	

*Number of animals that show acceptance of injected ECs.

DISCUSSION

The technic for inducing contact sensitivity (CS) to simple chemical allergens with *in vivo* or *in vitro* haptenated ECs has been established. DNP-ECs are capable of producing CS to 2,4-dinitrochlorobenzene (DNCB) by intradermal injection in guinea pigs.[1] When the site of DNP-EC-induced CS was pretreated by tape stripping, the rate and intensity of the challenge reactions to DNCB were diminished. The ability of DNP-ECs to induce CS returned to normal when peritoneal macrophages and Ia-positive epidermal cells (presumably LC) together with DNP-ECs were administered into the stripped skin. These results suggest that the tape stripping treatment affects the dermal function of a certain cell type of the macrophage lineage.

Cytotoxic reaction in CS to DNCB and reject reaction in skin allograft have been demonstrated by examining histologically the fate of intradermally injected DNP-iso ECs and allo ECs.[3,4] DNP-iso ECs and allo ECs proliferated actively in the dermis and formed EC nests with central keratinization. The cytotoxic and reject reactions associated with necrosis of the epidermal structures occurred in due time. In the present experiment there was no difference in the fate of the intradermally injected DNP-iso and allo ECs between the normal control animals and stripped experimental animals. The suppressive effect of the treatment on the cytotoxic and reject reactions to intradermally injected DNP-iso ECs and allo ECs was not obtained. These results indicate that the reactions can be introduced without the contribution of dermal macrophages. It is suggested that LCs contained in the DNP-iso ECs and allo ECs play an important role to produce the sensitivities when injected intradermally through stripped skin.

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