

## Brief Note

# Induction of Contact Sensitivity with Dinitrophenylated Epidermal Cells from Different Strains of Guinea Pigs

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**Key words :** Contact sensitivity — Epidermal cell — DNCB — Langerhans cell

The technic for inducing contact sensitivity (CS) to simple chemical allergens with *in vivo* or *in vitro* haptenated epidermal cells (EC) has been established. Dinitrophenylated (DNP) ECs are capable of producing CS to 2,4-dinitrochlorobenzene (DNCB) by intradermal injection in guinea pigs.<sup>1)</sup> Genetic restriction of the contact sensitivity induction with DNP-ECs was examined in the present experiments.

EC suspensions were prepared from normal JY-1, strain 2 or strain 13 guinea pigs by trypsinizing their ear skin and dinitrophenylated by incubating in 2,4-dinitrobenzene sulfonic acid sodium salt as described previously.<sup>2)</sup>  $5 \times 10^6$  DNP-ECs from JY-1 strains 2 or 13 were injected intradermally into ear skin of JY-1 and strain 13 guinea pigs. Fourteen days after the injection of DNP-ECs, a skin test was performed by the application of 0.01 ml 0.2%, 0.1%, 0.05% and 0.025% DNCB-ethanol solution to the flank. The contact reactions were evaluated 24 hours later according to the following scale: 0, no visible change; 0.5, slight or discrete erythema; 1, moderate erythema; 2, confluent erythema; 3, intense erythema and swelling. The degree of hypersensitivity was taken to be the total of all four readings in each animal. Student's t-test was used to assess differences in reactivity. A P value of less than 0.05 was considered to be significant.

$5 \times 10^6$  DNP-ECs from JY-1, strain 2 or strain 13 were intradermally injected into both sides of the ears of JY-1 or strain 13 guinea pigs, and skin testing with DNCB was carried out 14 days later. The DNP-ECs not only from syngeneic strains but also from different strains were capable of producing CS to DNCB (Table). However, the intensity of the challenge reactions to DNCB was significantly higher in syngeneic strain combination of donor cells and recipient animals than that in allogenic strain combination.

It has been postulated that Langerhans cells (LC) are essential for induction of CS to simple chemical allergens. This postulate was developed in part because a relationship existed between the density of epidermal LC and the capacity to promote the induction of CS. Although the precise role of LC in induction of CS has not been determined, recent reports have focused on the importance of epidermal LC with respect to antigen presentation to immunologically competent lymphocytes. Regarding the antigen presenting mechanism of LC to lymphocyte, it is possible to offer two explanations: (1) LCs process and present the hapten-conjugated antigens derived from other cells, (2) hapten bound LC directly stimulate lymphocyte. Several investigations which support

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TABLE. Induction of contact sensitivity to DNCB with DNP-ECs from different strains.

Sensitized with	Recipients		
	Experiment 1	Experiment 2	
	JY-1	JY-1	Strain 13
DNP-EC (JY1) $5 \times 10^6$	$1.4 \pm 0.2$ (7)	$1.4 \pm 0.2$ (5)	$1.7 \pm 0.1$ (5)
DNP-EC (Str. 13) $5 \times 10^6$	$0.9 \pm 0.1$ (7)	$0.5 \pm 0.2$ (5)	$2.3 \pm 0.2$ (5)
DNP-EC (Str. 2) $5 \times 10^6$	$0.7 \pm 0.1$ (7)	$0.8 \pm 0.3$ (5)	$1.7 \pm 0.3$ (5)

Recipients were injected intradermally with  $5 \times 10^6$  DNP-ECs from JY-1, strains 13 and 2 and challenged 14 days later. Reactions were evaluated 24 hours after challenge and expressed as mean degree of the group SE. The number of animals in a group is shown in parenthesis.

the latter possibility have been presented.<sup>3,4)</sup> One of the important questions raised here is whether the immunologically relevant hapten determinants are covalently coupled to the Ia antigens of LC or the hapten is coupled to different membrane antigens. We favor the latter possibility from our present observation and the previous data.<sup>2,5)</sup> Both JY-1 and strain 13 guinea pigs are shown to have common Ia guinea pig leukocyte antigens for efficient antigen presentation in CS to DNCB.<sup>1)</sup> If LC Ia antigens modified directly by DNP play an important role as antigen for CS, DNP-ECs from JY-1 and strain 13 guinea pigs should be effective to induce CS in the JY-1 guinea pigs with CS with equal extent, and *vice versa*. It seems plausible that lymphocyte recognizes the DNP-modified membrane antigens, which are only JY-1 or strain 13 specific, in association with unmodified Ia antigens of LC as a complex, resulting in induction of CS. Clement *et al.* also suggested that hapten specific immunogen which T lymphocytes recognize on guinea pig macrophages does not consist of directly haptenated Ia antigens.<sup>6,7)</sup> This indicates the need for a covalent linkage of hapten to other membrane proteins.

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