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Brief Note
The Suppression of Contact Sensitivity Induction by Tape Stripping Treatment of Guinea Pig Skin at Various Times before and after Injection of Haptenated Epidermal Cells

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Key words : Contact sensitivity — Tolerance — Tape stripping treatment — DNCB — DNP-epidermal cells

It is known that ultraviolet light irradiation of animal skin results in a transient loss of ATPase-positive cells and Ia antigen-positive cells, presumably Langerhans cells (LC), from the epidermis.[1] Another method that has been reported to divest skin of epidermal LC is repeated stripping with cellophane tape.[2] In the course of experiments using the tape stripping method, we found that such treatment of guinea pig skin impaired the induction of contact sensitivity (CS) to 2,4-dinitrochlorobenzene (DNCB) with dinitrophenylated epidermal cells (DNP-EC) when the antigen was injected intradermally into skin treated with cellophane tape. The object of the experiment reported here is to determine the time before or after DNP-EC injection at which tape stripping treatment impaire efficiently the induction of CS.

JY1 strain guinea pigs were painted with 0.2 ml of 5% DNCB ethanol solution on ear skin and ears were obtained from the animals 3 hours after painting. Epidermal cell suspensions (DNP-EC) were prepared from the ear skin according to a technique described previously.[3] Dorsal and venteral surfaces of both sides of ears were stripped by repeated applications of cellophane tape (20 times). 5×10^6 DNP-EC were injected intradermally through normal or stripped ear skin of JY1 guinea pigs 7 or 3 days before or after stripping (-7d, -3d, +3d or +7d) or immediately after stripping (0d). Fourteen days after injection of the antigen, skin test was performed by applications of 0.01 ml of 0.1, 0.05 and 0.025% DNCB ethanol solutions on the shaved flank. The contact reactions were read 24 hours later and evaluated as described previously.[3] The induction of CS to DNCB was significantly impaired when DNP-EC was presented through the skin that was stripped with cellophane tape within 3 days before and after antigen presentation (Figure). By contrast, tape stripping treatment 7 days before and after DNP-EC application had not influence on development of the sensitivity.

To assess whether guinea pigs that had shown little hypersensitivity were tolerant to DNCB, the animals were resensitized by painting with a sensitizing dose of 5% DNCB ethanol solution (0.02 ml) on the shaved nape skin after testing. Seven days later, the other flank was challenged and contact reactions were read 24 hours afterward. As shown in Figure, the animals that had been pretreated with DNP-EC through the skin stripped immediately before or 3 days after DNP-EC injection were hyposensitive to a second application of DNCB on normal skin. However, pretreatment with DNP-EC through the skin stripped 3 days befoe had no effect on subsequent sensitization to DNCB.

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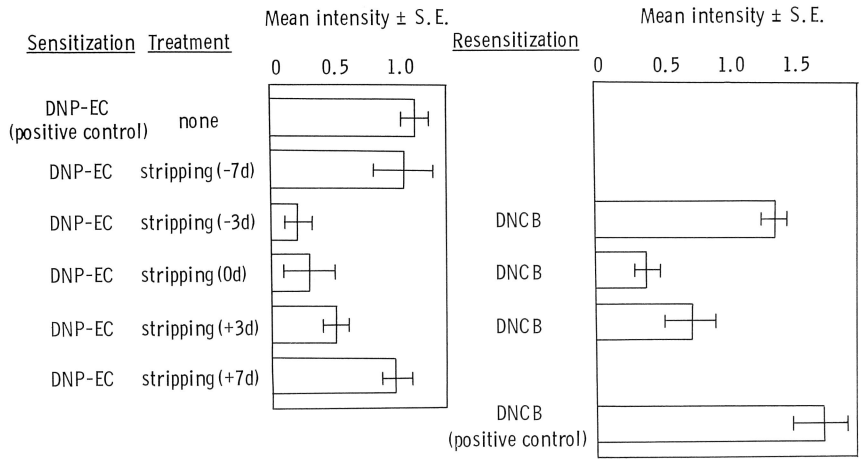

Figure. Effect of tape stripping treatment on the development of DNP-EC induced contact sensitivity and tolerance. DNP-EC were injected intradermally through the skin that was stripped with cellophane tape 7 or 3 days before or after antigen presentation or immediately before that (−7d, −3d, 0d, +3d and +7d). Fourteen days after sensitization, skin test was performed by the application of test doses of DNCB and contact reaction was read 24 hours later. To assess tolerance in hyposensitive animals (−3d, 0d and +3d), they were resensitized by painting with a sensitizing dose of DNCB to nape immediately after reading test reaction and challenged with DNCB 7 days later. Contact reactions are expressed as arithmetic mean value ± standard error.

It has been demonstrated that the ability to induce CS with DNP-EC returned to a normal state when normal peritoneal macrophages and Ia antigen-positive epidermal cells, presumably LC, were given together with DNP-EC into the stripped skin. This suggests that the immunological function of mononuclear phagocyte system in the dermis may be impaired when the epidermal surface is markedly disturbed by tape stripping treatment. Interestingly, the treatment even 3 days after exposure to antigen resulted in impairment of induction of CS to DNCB in our present experiment. It is likely that the function of mononuclear phagocyte system is required more than 3 days for induction of CS. Further studies must be done in this experimental area.

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