

Failure of Thymectomy in New-born Guinea-pigs to influence Contact Sensitization

RECENT evidence indicates that thymectomy in new-born laboratory animals of some species may result in immunological deficiencies. These may become manifest as compromised capacity to form circulating antibodies¹, as delayed homograft rejection^{2,3}, as diminished capacity to develop tuberculin-type sensitivities¹, and as lowered resistance to infection¹. These deficiencies may be related to a reduction in the number of circulating lymphocytes and a failure of germinal centre development, as observed in neonatally thymectomized mice².

There is evidence in favour of an important part played by mononuclear cells in allergic contact sensitivity. The dermal infiltrate and blister fluid generally contain significant numbers of these cells⁴. Allergic contact sensitivity has been passively transferred in guinea-pigs by means of leucocytes⁵. However, the results of attempts at such transfer in man have been conflicting^{6,7}. The importance of the regional lymph nodes in the sensitization process also has been demonstrated⁸.

Decreased sensitizability to dinitrofluorobenzene has been shown in some cases of ataxia telangiectasia associated with thymic aplasia⁹, and in a case of lymphopenic ('Swiss') agammaglobulinaemia associated with thymic aplasia¹⁰. On the other hand, agammaglobulinaemias without lymphopenia or decreased thymic tissue showed normal responses to dinitrofluorobenzene¹⁰.

The purpose of the present experiment was to test the effect of thymectomy in new-born guinea-pigs on the subsequent development of contact sensitivity to 2,4-dinitrochlorobenzene (DNCB) and to ascertain whether any observed changes correlated with any changes in blood leucocyte counts.

New-born offspring of Hartley strain albino guinea-pigs were divided into a thymectomized group, a sham-operated control group and a non-operated control group. Operations were performed under 'Nembutal' anaesthesia usually within 32 h and no later than 56 h after birth. Thymectomy, with certain minor modifications, was carried out by the method described by Park¹¹. Sham-operated animals were treated similarly but without excision of the thymus. The non-operated controls were anaesthetized with 'Nembutal' but were otherwise not manipulated.

Sensitization was attempted in all animals when one month old by dropping 0.05 ml. of 2 per cent DNCB in alcohol on the clipped nuchal areas and gently spreading with a glass rod on five successive days. The degree of induced sensitivity was assayed one month later by contact skin-testing with 0.2 per cent, 0.09 per cent and 0.05 per cent dilutions of dinitrochlorobenzene in olive oil and with olive oil alone. Reactions were rated from 0 to 4, depending on the degree of erythema.

The majority of animals were killed with an overdose of 'Nembutal' when 4 months old. White blood cell counts and differential counts were carried out on blood specimens, usually obtained by cardiac puncture just before death.

No consistent differences were noted in the susceptibility of neonatally thymectomized guinea-pigs to become sensitized to dinitrochlorobenzene as compared with sham-operated or non-operated control guinea-pigs

(Table 1). The total mononuclear and polymorphonuclear cell counts tended to be lower in the thymectomized animals compared with the controls. However, the differences were not always statistically significant. The wasting described by other authors in neonatally thymectomized animals of other species was not observed in the guinea-pigs.

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Respiratory Changes during Electrical Stimulation of Rhinencephalic Structures in the Foetal Guinea-pig

THE rhinencephalon regulates a number of vegetative and somatic functions such as the respiration, blood pressure, reflexes and tonus of musculature, and movements of the intestine¹⁻³. The most important role of the rhinencephalon seems to lie in the higher organization and integration of somatic and vegetative regulative functions.

As regards the different parts of the rhinencephalon, those which have the most distinct influence on the respiration are the gyrus cinguli and insulo-orbito-temporal cortex. During electrical stimulation of these areas in adult animals, there have been observed both activation and inhibition of the respiration, dependent on the parameters and localization of the stimulus, and the condition of the animal².

No attention has been focused on the functional role of these rhinencephalic areas during foetal life. The present work is concerned with the influence of electrical stimulation of the rhinencephalon on the respiration pattern in foetal, young and adult guinea-pigs.

Sixteen guinea-pig litters were used with an average of two to three fetuses, four young (weight 120-370 g) and five adult (weight 640-1,000 g) guinea-pigs. The fetuses were measured and their weights were ascertained for estimation of their age in accordance with Draper's length and weight curve⁴. Fetuses were aged between 28 and 64 days (the full term is 65 days). The dams were narcotized with 'Thiogenal' (methyl-thiogenyl-2¹-pentylthio-barbituric acid sodium, Merck, 100 mg/kg). Only light narcosis was applied. After sectioning of the abdomen and the uterus, the fetuses were exposed without the umbilical cord being touched. The temperature of fetuses was maintained at a constant height (37°C) by covering the foetus with warm paraffin oil. The animals were tracheostomized, and the brains exposed for electrical stimulation. Monopolar stimulation with monophasic square wave pulses was used. The stimulus parameters were: frequency 1-150 c/s, duration 1-10 msec, amplitude 1-8 V, average current 0.002-24 m.amp, with the stimulation lasting 3-5 sec. The structures corresponding to the precallosal area, the Sylvian fissure and orbito-temporal cortex of the rhinencephalon, were selected for investigation in pursuance of the results obtained by Kaada, who,

Table 1. DEGREE OF SENSITIVITY TO DNCB ONE MONTH AFTER SENSITIZATION IN FIFTY-SEVEN NEONATALLY SENSITIZED GUINEA-PIGS*

Type of treatment	Thymectomized (23 animals)			Sham-operated (18 animals)			Non-operated (16 animals)		
Percentage of DNCB in olive oil	0.2	0.09	0.05	0.2	0.09	0.05	0.2	0.09	0.05
Average sensitivity ratings in arbitrary units	2.3	1.1	0.5	2.0	1.1	0.6	2.0	1.4	0.7

* In 7 thymectomized, 5 sham-operated and 5 non-operated animals a second course of sensitizing exposures was given after they failed to become sensitized after the first course.