

COMPARATIVE STUDY OF THE VIRUS NEUTRALISING  
ANTIBODY LEVELS AND TYPES OF SKIN REACTION IN SMALLPOX  
REVACCINATED PERSONS

By

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INTRODUCTION

The evaluations of the skin reaction to revaccination and different serological reactions are used at the present time as methods of determination of intensity of smallpox immunity.

The titer of virus neutralising antibody is considered to be the most convincing index of immunity. (Downie, 1951; Downie & McCarthy, 1958; Downie et al, 1961; Cutchins et al, 1960).

As the evaluation of the skin reactions to revaccination is practically more easy to perform it is important to know the correlation between titers of virus neutralising antibodies and different skin reactions.

This was the subject of the present paper.

MATERIAL AND METHODS

The vaccine of the Moscow Scientific Research Institute of Virus Preparations was used for revaccination. Three incisions each 1 cm long were made.

The method of vaccination secured equal dose of detritis on each of the incisions and per each subject. The skin reactions were thoroughly recorded on the 2nd, 4th and 7th day after revaccination and these records were the basis for the evaluation of the reaction type.

The blood samples for serological investigation were collected before and 4 weeks after revaccination. The paired sera were tested for virus neutralising capacity in chick embryos (Boulter, 1957).

The data were analysed statistically according to Holt's method (1955).

## RESULTS

Two main types of skin reactions were observed among the revaccinated persons:

1) accelerated

and

2) immediate.

The immediate type included a considerable number of vesiculated reactions, which were separated in a special group designated "immediate reaction with vesiculation" on the basis of their early appearance (within the first 48 hours) and subsequent serological analysis.

As for accelerated reactions, we observed in most cases their early appearance (between 48 and 72 hours) in contrast to literary reports.

The slide\* presents the number of sera with different titers of virus neutralising antibodies according to different types of skin reactions.

The statistical analysis of these data summerized in the table shows that despite significant variations in the titers of antibodies reflecting individual variations of immunological reactivity, there is a certain correlation between the magnitude of the geometric mean titer of antibodies and the type of skin reaction.

The lowest mean pre-revaccination antibody titer was observed in subjects with accelerated reactions. These subjects also showed the greatest rise of antibody titers after revaccination.

Subgroups with immediate reactions both with and without vesiculation showed higher pre-revaccination antibody titer and insignificant rise of titers after revaccination.

The significance of negative skin reactions was investigated in separate group of revaccinated persons. The negative reactions were observed in 10 of 650 revaccinated subjects. Repeated vaccination on the 5th day resulted in positive reactions of different types.

### CONCLUSION

The investigations reported above showed a certain correspondence of the magnitude of mean antibody titers to the different types of skin reaction following revaccination.

Despite the relativity of such criteria of smallpox immunity as skin reactions and serological data, the above evidence permits to consider immediate reactions including those with vesiculation to be more characteristic for immune populations.

The negative skin reactions should be considered as technical failure as a rule.

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Small pox/AF/25

TABLE

Type of skin reaction	No. of sera tested	Pre-revacc. antibody titers	Geometric mean titer	Standard deviation	Confidence limits (95%)	Post-revaccination antibody titers	Geometric mean	Standard deviation	-fold increase in antibody titers
Accelerated	330	5-640	24.5	0.5	21.8-27.5	5-5120	265.5	0.5	11 fold
Immediate Vesiculated	204	5-1280	61.6	0.5	57.7-70.8	10-2560	173.8	0.4	3 fold
Immediate	33	5-1280	61.6	0.6	40.7-93.3	20-1280	234.4	0.4	4 fold