

## SOME OBSERVATIONS ON ACCIDENTAL VACCINATIONS ON THE HANDS OF WORKERS IN A VACCINE LYMPH INSTITUTE

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It is well known that accidental vaccinal infections on the hands of workers engaged in vaccine lymph manufacture are not uncommon but the types of such lesions and their relation to the individual's previous immunity to vaccinia virus appear to have received little attention.

The observations recorded in Table 1 may therefore be of some interest in this connexion.

been slight fever (99.5–100° F.) and feeling of malaise for a day or two.

The vesicle in most cases reaches a maximum between the 5th and 7th days, and thereafter rapidly dries up as a thin scab which falls off about the 11th or 12th day. In brief the reactions usually correspond to the vaccinoid type of revaccination.

Case 1 is of interest, as the course of the lesions

Table 1. *Showing previous vaccinal immunity and types of accidental lesions in workers engaged in the manufacture of vaccine lymph*

No.	Age	Date of vaccination	Take of vaccination	Date of last re-vaccination	Type of reaction	Date of infection on hand	Type of reaction
1	31	Childhood	3 scars	Oct. 1939	Immunity reaction	Nov. 1939	Vaccinia
				Nov. 1940	Immunity reaction	Dec. 1940	Vaccinia
				Oct. 1941	Immunity reaction	Jan. 1941	Vaccinia
2	26	10 years old	3 scars	Jan. 1942	Immunity reaction	Aug. 1942	Vaccinia
3	55	13 years old	3 scars	Sept. 1940	Vaccinoid	Nov. 1940	Vaccinoid
				Oct. 1941	Immunity reaction	Dec. 1941	Vaccinoid
4	35	Childhood	3 scars	July 1941	Vaccinoid	Nov. 1941	Vaccinoid
				Aug. 1942	Immunity reaction	Sept. 1942	Vaccinoid
5	40	Childhood	2 scars	Oct. 1941	Vaccinoid	Dec. 1941	Vaccinoid
				Aug. 1942	Immunity reaction	Sept. 1942	Vaccinoid
6	16	Childhood	2 scars	Aug. 1942	Vaccinoid	Sept. 1942	Vaccinoid
7	25	Childhood	2 scars	Oct. 1941	Vaccinoid	Nov. 1941	Vaccinoid
8	34	Childhood	2 scars	Oct. 1941	Vaccinoid	Nov. 1941	Vaccinoid
				Aug. 1942	Immunity reaction	Sept. 1942	Vaccinoid
9	34	Childhood	3 scars	Oct. 1941	Vaccinoid	Sept. 1942	Vaccinoid

Vaccine lymph is prepared in these Laboratories during the cool season from November to February or March. During this season it is not uncommon to come across infections on the hands of members of the staff handling the vaccinated animals. The majority of such lesions run a regular course; they commence as a small itchy papule surrounded by a zone of erythema usually situated on the dorsum of the hand or fingers with a predilection for the knuckles or bases of the nails. In two or three days the papule becomes a vesicle containing clear or slightly turbid serous fluid which microscopically shows numerous polymorphs. At this stage there is generally definite enlargement of the epitrochlear and axillary glands, and in several cases there has

in each reinfection resembled a revaccination of the vaccinia type; the vesicles reached a maximum about the 9th or 10th day, drying up was complete about the 13th, and the scabs fell off about the 20th day. In case 2 the infection on the hand was also of the vaccinia type. Before the crusts had dried up completely they were removed, ground up with saline, and the suspension rubbed on to the scarified belly of a rabbit. A few vesicles of vaccinia developed on the 5th day.

It will be noted that all cases showed well-marked scars from vaccination in infancy, and in addition all were vaccinated at the commencement of each season with vaccine lymph of high potency. The revaccinations were of the immediate or immunity

type indicating complete or a high degree of immunity. Yet the course of the accidental infections, as has just been remarked, resembled vaccinoid or vaccinia types of revaccination. In case 1 revaccination was carried out less than 3 months previously, yet it did not prevent the development of a typical lesion. Several of these cases resembled closely the photographs illustrating a recent article in *The Lancet* (Davies, Jones and Downie, 1938) on 'Cowpox infection in English farmworkers'.

Ledingham (1935) has remarked that 'Jenner, in his original *Enquiry* made public the fact that milkers in association with cow pox were liable to repeated attacks of the disease. His contemporary Pearson promptly took up this statement of Jenner and concluded...that certainly the local skin affection of cow pox might occur in the same person more than once but he made the shrewd remark that it had still to be settled whether second attacks were accompanied by constitutional symptoms.' The frequent recurrence of cowpox infections\* in milkers has often been noted since Jenner's time, but the problem is complicated by the occurrence also of milker's warts or *Melkermoten*. Although the aetiology of this clinical condition is at present in a very confused state, it seems to be generally agreed that some at least of the cases are due to infection with cowpox. There appears also to be general agreement that little protection is conferred by a recent vaccination, and conversely that the lesions confer little immunity against subsequent vaccination. The problem has been more fully discussed and recent literature cited by Davies *et al.*

There is therefore a considerable degree of similarity between (1) the recurrence of vaccinal lesions on the hands of workers in a lymph institute as above, (2) natural cowpox infections in milkers and farm hands, and (3) 'milker's warts' in the same classes.

It is easy to see how the hands are the most likely site of infection in those handling infected animals, but it is much more difficult to understand why the

\* In accordance with recent work cowpox is accepted as a disease *sui generis* but intimately related immunologically to vaccinia (Downie, 1939).

resulting accidental vaccination should be so often of the vaccinia or vaccinoid types. It is true that in the usual description of human cowpox or 'milker's warts' the data concerning the degree of the subject's previous vaccinal immunity are rarely as accurate and complete as one would wish. In the above series, however, this criticism does not apply and the question remains: Why does an individual with strong or complete immunity—as judged by an immunity reaction following revaccination—exhibit a considerable degree of susceptibility to an accidental vaccinal infection, the strain of virus being the same throughout?

We confess that we are unable to suggest any plausible explanation of the phenomenon and are obliged to conclude this communication on a note of interrogation.

In reply to the possible criticism that the above infections may not necessarily have been due in every case to vaccinia virus but that some natural animal infection may have been acquired, the following points are noted: (1) From the one case examined (no. 2) vaccinia virus was isolated. (2) No members of the staff of either the Stack Laboratories or Veterinary Research Laboratories, other than those handling vaccinia, have ever developed similar lesions. In this connexion it may be noted that natural cowpox has never been recorded in the Sudan. (3) The lesions occur at the commencement of the season of vaccine production.

#### SUMMARY

1. A series of cases of repeated accidental vaccinal infections of vaccinia and vaccinoid types in subjects possessing strong or complete vaccinal immunity, is presented.
2. It is suggested that there is a similarity between such cases and the repeated infections on the hands of farm workers and milkers handling cows naturally infected with cowpox.
3. It is difficult to fit satisfactorily such facts into the framework of the modern theory of vaccinal immunity, but no explanation of the apparent discrepancy can be suggested.

#### REFERENCES

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