Inapparent Infections with Influenza Viruses.* (18560)

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Little information is available concerning the problem of inapparent laboratory infections due to influenza viruses. The ability of this group of viruses to stimulate the production of antibodies has been recognized and extensively studied for many years. This report concerns itself with the development of influenzal antibodies in a group of individuals exposed to several strains of influenza virus for a period of 3-4 months.

Materials and methods. The influenza viruses employed in this study were the strains PR 8, Lee and FM-1. The 3 strains were adapted laboratory preparations in either allantoic fluid or as mouse lung suspensions. The strains were stored in the frozen state, or at 4°C, during the course of the experiment. Sera were obtained from 65 students, composing the class of 1953 (State University of New York Medical School, Syracuse, N. Y.), on 3 different occasions. The first serum specimen was obtained approximately 2 months before the second specimen, the third blood sample was obtained approximately 5 weeks after the second. Eight of the 65 students were engaged in a problem involving the use of the 3 strains of virus (test group). The start of this problem coincided with the first blood specimen. The second blood sample was obtained several days before *all* the students became engaged in the inoculation, harvesting and titration (hemagglutination-inhibition tests) of these influenza strains in chick embryos and mice. These experiments were completed in a period of 3 days, for approximately 2 hours each day. The last blood sample was taken after a period involving no known virus contact. All sera were stored at −20°C until tested. Inactivation of the sera was accomplished by heating at 60°C for 3 minutes. Titrations of the three serum samples were made simultaneously by the hemagglutination-inhibition test.

Experimental. The results indicate that significant antibody increases developed in the group of students in contact with the viruses for the continued period of time. Six of the 8 students (test group) showed evidence of 4-fold or better increases in antibodies against the 3 strains. These results and representative titers of the control group are tabulated in Table I. None of these 8 students indicated at any time during this period any clinical syndrome resembling influenza. As indicated, there was no demonstration of antibody increases in the control group.

One observation, made on the control group, was the uniformly higher titers obtained against the Lee strain. In the majority of specimens examined, the titer for this virus was consistently higher than those obtained for the PR 8 and FM-1 strains.

Discussion. Subclinical or inapparent infections with influenza viruses have been reported: (a) during epidemics, (b) between epidemic periods, and (c) during epidemics due to influenza viruses of another type(1-3). However, little data are available regarding inapparent laboratory infections. The data reported here indicate that inapparent infections due to influenza viruses may occur. The data also suggest that a continued exposure to the virus is required.

The failure to develop clinical infection apparently is analogous to the situation described by Henle and coworkers(4). This group demonstrated that the inhalation of influenza viruses did not cause a febrile reaction. To this may be added the possibility that

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TABLE I. A Comparison of the Antibody Levels in Sera from Individuals Exposed to Influenza Virus for Several Months and a Few Days (Control Group).

Test group				Control group*			
Serum No.	PR 8	Lee	FM-1	Serum No.	PR 8	Lee	FM-1
			Final titer				
1A	160	640	40	9A	80	320	320
B	1280	5120	320	B	80	320	320
C	1280	2560	320	C	80	320	320
2A	80	160	160	10A	160	640	160
B	640	2560	1280	B	160	320	80
C	640	2560	1280	C	320	320	160
3A	160	160	160	11A	320	640	640
B	1280	640	640	B	320	640	640
C	1280	640	640	C	320	640	640
4A	320	160	160	12A	80	640	160
B	10240	1280	640	B	80	640	160
C	10240	5120	640	C	160	640	160
5A	640	640	640	13A	80	80	80
B	1280	1280	1280	B	40	80	80
C	2560	1280	1280	C	40	80	80
6A	320	160	2560	14A	320	640	160
B	2560	640	2560	B	160	640	80
C	5120	640	2560	C	160	320	160
7A	160	320	160	15A	80	320	80
B	2560	5120	5120	B	80	320	80
C	2560	5120	5120	C	80	320	80
8A	80	320	160	16A	320	1280	640
B	2560	2560	5120	B	320	1280	320
C	2560	2560	2560	C	640	1280	640

* Eight of 57 students.

these strains are unable to cause a typical clinical picture in man after several years of animal or chick embryo passage.

The reason for the high titers against the Lee strain is obscure. This observation, however, has been made previously(3,5). There are several possible explanations: (1) sporadic inapparent infections with Influenza B occurring in the population previous to this study, and (2) residual titers from a previous infection with this virus.

Summary. Data are presented which suggests that inapparent infections with influenza viruses may occur after continued exposure for relatively long periods of time.

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Distribution of Mumps Virus in the Experimentally Infected Monkey.* (18561)

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With the recent development of technics for the identification of mumps virus by serological tests(1), and for its propagation

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