Presence of A/Equi-2 Hemagglutinin and Neuraminidase Antibodies in Man (36245)

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Serologic evidence indicates that an influenza virus prevalent in human populations in the late nineteenth century is related to A2/Hong Kong/68 and A/Equi-2/63 viruses (1–6). Although the immunologic similarity between the hemagglutinins (H) of the human and equine viruses may account for the presence of A/Equi-2 antibody in man, the occurrence of specific or homologous antibody responses suggests that an equine-like virus did infect humans at some time in the remote past (7). It has recently been found that the neuraminidase (N) antigen associated with the A2/Hong Kong/68 virus is probably distinct from that of the A2/Hong Kong-like virus of the past (8). To study the antigenic characteristics of the A/Equi-2-like virus presumed to have infected man, we determined the relative frequencies of antibodies to each of the envelope proteins of equine-2 influenza virus in persons of various ages.

Materials and Methods. Serum specimens collected from individuals who did not experience infection or immunization with A2/Hong Kong/68 virus (9, 10) were tested at a 1:4 dilution for hemagglutinin antibody by the hemadsorption-inhibition neutralization test (11) using A/Equi-2/Miami/63 and for neuraminidase antibody by the enzyme-inhibition procedure (10) using the antigenic hybrid, A/Equi-1-[$_H$] A/Equi-2-[$_N$].

Results and Discussion. In Table I are presented the relative frequencies of antibody responses to each envelope antigen of A/Equi-2 virus according to the year of birth of persons tested. Most of the antibody reactions to both surface antigens occurred in persons born before 1900. The proportion of hemagglutinin responses in each of the age groups was only slightly less than that of neuraminidase responses ($x^2 = 1.0$, $p < .50$, 2 *df*). Furthermore, the data presented in Table II show that the responses to hemagglutinin and neuraminidase antigens of A/Equi-2 virus were strongly concordant ($x^2 = 81.4$, $p < .001$, 1 *df*). These data clearly indicate that man has experienced infections with an influenza virus immunologically similar to that isolated from horses in 1963. From present knowledge, it appears that A/Equi-2 virus is not naturally transmitted to man (12). At the present time there is, however, no clear-cut evidence against the possibility that the A/Equi-2 virus originated in the human host. The observation that an agent related to swine influenza had infected man during 1918 to 1919 (13, 14) and the recent isolation from swine of an influenza virus with hemagglutinin and neuraminidase anti-

TABLE I. Relative Frequencies of Serum Antibody Responses to Envelope Proteins of A/Equi-2 Virus According to Age of Individual.

Year of birth	No. of individuals	Serum antibody response: Hemagglutinin No.	Hemagglutinin %	Neuraminidase No.	Neuraminidase %
≤1900	57	45	79	45	79
1901–1917	31	7	23	10	32
1918–1932	23	1	4	2	9
1933–1946	27	0	0	1	4
1947–	18	0	0	0	0

TABLE II. A Comparison of Serum Antibody Responses to Envelope Antigens of A/Equi-2 Virus in Persons Without a Prior Exposure to A2/Hong Kong/68 Virus.

Antibody response to hemagglutinin antigen	Antibody response to neuraminidase antigen	
	Rise	No rise
Rise	46	7
No rise	12	91
Total	58	98

gens closely related or identical to A2/Hong Kong/68 virus (15) suggests that transmission from man to animals can occur.

Summary. Serum antibodies to envelope antigens of A/Equi-2 virus were determined in persons of various ages with no known exposure to human A2/Hong Kong/68 virus. Antibody to neuraminidase and hemagglutinin antigens was observed predominantly in persons born before 1900. These results raise the possibility that A/Equi-2 influenza virus originated in the human host.

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