

## INFLUENZA C IN JAPAN

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The name "influenza C" has first been given by Francis and his colleagues to a case of influenza in Ann Arbor, Michigan, in 1950, from which they isolated an influenza-like virus strain JJ, different, however, antigenically from any known type of influenza virus.<sup>1)</sup> The Ann Arbor workers are, however, not the first discoverers of this type of virus. In 1947, Taylor<sup>2)</sup> isolated a strain of virus called 1233 which was found identical with the JJ strain later by Ann Arbor workers.

Taylor did not conclude that this virus might have any importance in public health problem. Hirst also suggested that it might have no relation to any known members of the group of hemagglutinating respiratory viruses, according to his experiment of receptor gradient analysis of these viruses each other.<sup>3)</sup> But, Francis and his colleagues suggested the possibility of the importance of this virus in the field of public health because of the wide distribution of antibodies in the human population, as well as of its serological and immunological characteristics, and proposed to call it as influenza C virus.

In Japan, there occurred an influenza epidemic in Yonago City, Tottori Prefecture, in the winter of 1949-1950<sup>4)</sup> and two of the authors (A. T., and K. T.) isolated several strains of influenza virus by means of mouse lung passage, not of amniotic inoculation of developing hen's eggs, which were forwarded to the Influenza Center of Japan, N. I. H., to be determined of their type.

The strains of influenza virus subjected to type-determination were

Tomiyoshi,

Matsuda,

and Otani,

all of which were, as mentioned above, isolated in Yonago City through

mouse passage technic. After the Influenza Center of Japan received them, they were inoculated amniotically into developing hen's eggs and serially passaged. Those strains are all found very difficult to be adapted to grow in allantoic cavity; they certainly grow in amniotic cavity quite well but often fail to grow in allantoic cavity even after many serial passages through eggs. Hemagglutination inhibition reaction only was utilized throughout for type determination.

According to the experimental results, all three strains in question turned out to be identical each other antigenically and have no antigenic relationship to influenza A, A prime or B virus. But they are identical to the JJ strain of influenza C virus.\*

The epidemic of influenza, during which the strains had been isolated, were supposed to be due to influenza B by two of the authors (K. T., and A. T.) on the basis of serodiagnosis. The sera in acute and convalescent stages of both of the patients from whom the strains Tomiyoshi and Matsuda were isolated, showed 4 times rise of antibody titer after convalescence against influenza B, but none against A. Unfortunately, these sera were not available at the critical time when they were needed to be used for serodiagnosis against influenza C. Any serum of the patient from whom the strain Otani was isolated was not available for serodiagnosis at all.

No strains of influenza B or A, was found during this influenza epidemic other than the strains of C virus mentioned above, but some cases of the epidemic showed 16 or 32 times rise of antibody titer against influenza B.

There was an epidemic of influenza A prime almost all over Japan in the winter of 1950-51, but in some outbreaks, there were no cases which showed any antibody rise in their convalescent sera against either A prime or other types. The sera of those cases were examined of their serological behaviour against influenza C in vain. However, authors<sup>5)</sup> concluded, on the basis of the presence of antibodies against influenza C in normal human population in a certain amount, that in Japan influenza C virus must have been distributed widely.

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\* The JJ strain was made available by the courtesy of Dr. Thomas Francis, Jr.

## CONCLUSIONS

Influenza C virus is supposed to have produced influenza-like epidemic in a certain part of Japan.

## REFERENCES

- (1) Francis, T. Jr., Juilligan, J.J. Jr., and Minuse, E.: Identification of another epidemic respiratory disease, *Science*, *112*, 495-497, 1950.
- (2) Taylor, R. M.: Studies on survival of influenza virus between epidemics and antigenic variants of the virus. *Am. J. Pub. Health*, *39*, 171-178, 1949.
- (3) Hirst, G. K.: The relationship of the receptors of a new strain of virus to those of the mumps-NDV-influenza group. *J. exp. Med.*, *91*, 177-184, 1950.
- (4) Tanaka, K., and Hoi, T.: Serological investigation of influenza epidemic in Yonago district in December, 1949. *Yonago Igaku Zasshi*, *3*, 41-43, 1951 (in Japanese).
- (5) Fukumi, H., Yamamoto, S., Nishikawa, F., Kitayama, T., Sunakawa, S., and Nakano, A.: Influenza epidemic during 1950-1951 winter. *Japanese Medical Journal*, In press.