

# INFLUENZA VIRUS VACCINE

## THREE YEARS EXPERIENCE IN THE U. S. ARMY

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It is a pleasure and privilege to be able to meet with the United States-Mexico Border Public Health Association. Rapid transportation has increased the need for cooperative action in the field of national and international health. The vectors and agents of disease do not respect international boundaries or treaties.

I have always been impressed by the amicable international relationship between doctors, other scientific men and especially public health personnel. The results of this friendly and cooperative attitude have been most beneficial to mankind.

For the three year period 1945 to 1948, the U. S. Army required the inoculation of all troops with influenza virus vaccine. The vaccine contained 50% Type B (Lee), 25% Type A PR8, and 25% A Prime (Weiss or FM1) strains. The decision to vaccinate was based largely upon the significant results obtained in evaluation studies of influenza virus vaccine during 1943 and 1945<sup>1, 2, 3</sup>. Since 1945, evaluation studies conducted by the Commission on Influenza of the Army Epidemiological Board and other investigators have not been in satisfactory agreement as to results which would determine the advisability of its use<sup>4, 5, 6, 7</sup>. In 1946-1947 and again in 1947-1948, reports show that the influenza vaccine which was given afforded no protection against the type of in-

<sup>1</sup> Francis, Thomas; Jonas Salk; and William M. Brace: The Protective Effect of Vaccination Against Epidemic Influenza B, *Jour. Am. Med. Assn.*, Vol. 131, No. 4 May 25, 1946, pp. 275-278.

<sup>2</sup> Hirst, G. K.; Antonio Vilches; Oville Rogers; and Clarence Robbins: The Effect of Vaccination on the Incidence of Influenza B, *Am. Jour. Hyg.*, Vol. 45, No. 1, 96-101, January 1947.

<sup>3</sup> Salk, Jonas; and Thomas Francis: Immunization Against Influenza, *Ann. Int. Med.*, Vol. 25, No. 3, September 1946.

<sup>4</sup> Van Ravenswaay, Arie C.: Prophylactic Use of Influenza Virus Vaccine, *Jour. Am. Med. Assn.*, Vol. 136, No. 7, February 14, 1948.

<sup>5</sup> Sigel, M. M.; F. W. Shaffer; M. Wiener Kirber; A. B. Light; and W. Henle: Influenza A in a Vaccinated Population, *Jour. Am. Med. Assn.*, Vol. 136, No. 7, February 14, 1948.

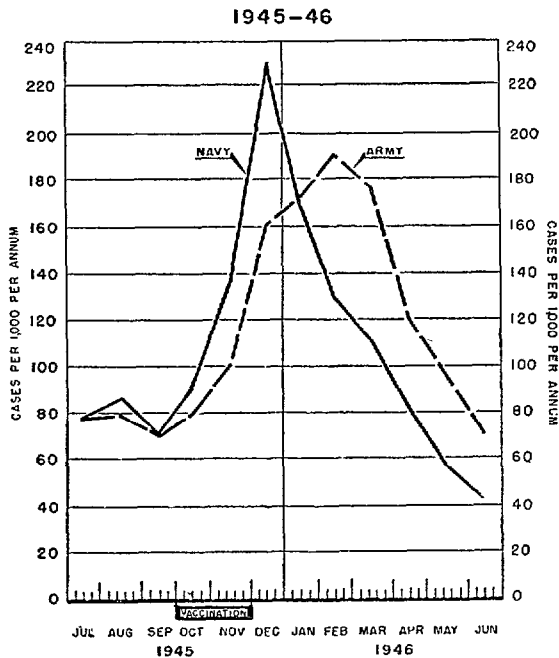
<sup>6</sup> Francis, Thomas; Jonas Salk; and J. J. Quilligan, Jr.: Experience with Vaccination Against Influenza in the Spring of 1947, *Am. Jour. Pub. Health*, Vol. 37, No. 8, August 1947, pp. 1013-1016.

<sup>7</sup> Fowle, Lester P.; and Joseph Weightman: Report of Effectiveness of Influenza Virus Vaccine A and B at Bucknell University, 1946-47, *Lancet*, October 1947, pp. 388-389.

fluenza currently present. This was due in part to the fact that there was insufficient antigenic crossing between strains of virus in the vaccine and strains responsible for the outbreaks. In 1947, the outbreak in February and March was due to an A-prime strain not then present in the vaccine. One of these (FM1) was added to the vaccine used in the fall of 1947, yet no significant protective effect was shown in the outbreak which occurred in February 1948.

In spite of the usually mild nature of influenza since World War I, it is a cause of many days lost from duty. Occurring in sudden widespread outbreaks, it can materially slow down the machinery of training and other Army activities. A mutation of one of the known strains or the occurrence of an extremely virulent one can cause another pandemic as occurred during 1917-1918. Because of this and the need to continue to search for strains of broad immunizing potency, it was felt that reorientation of the influenza immunizing program toward selected vaccination and critical studies of the results were necessary.

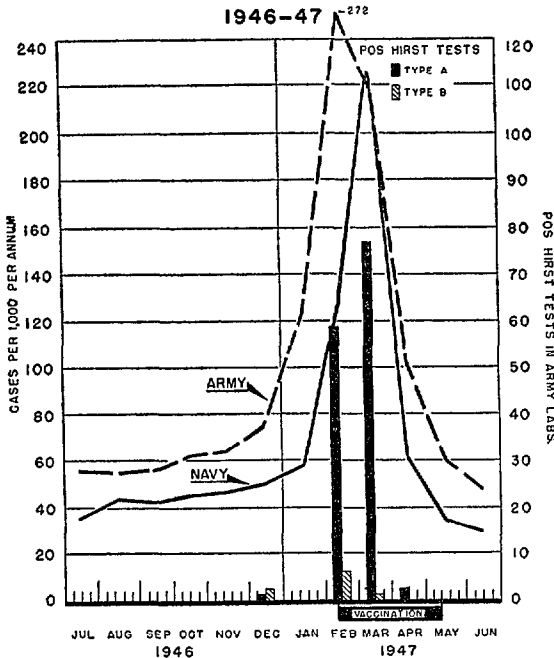
CHART 1  
COMMON RESPIRATORY DISEASE INCLUDING INFLUENZA  
CONTINENTAL U. S.



At a meeting of the Commission on Influenza held with certain members of the Army Epidemiological Board and members of the Army Medical Department in March 1948, it was the opinion of nearly all

present that influenza virus vaccine needed further evaluation. This was especially true as to the strains which should be used in the vaccine. As a result of findings of those present and by work of others previously mentioned, the Army did not use influenza virus vaccine as a routine immunization during the past season (1948-1949). It was also agreed to continue to use monovalent vaccines in selected groups and to aid in the search for new strains which might produce a better vaccine.

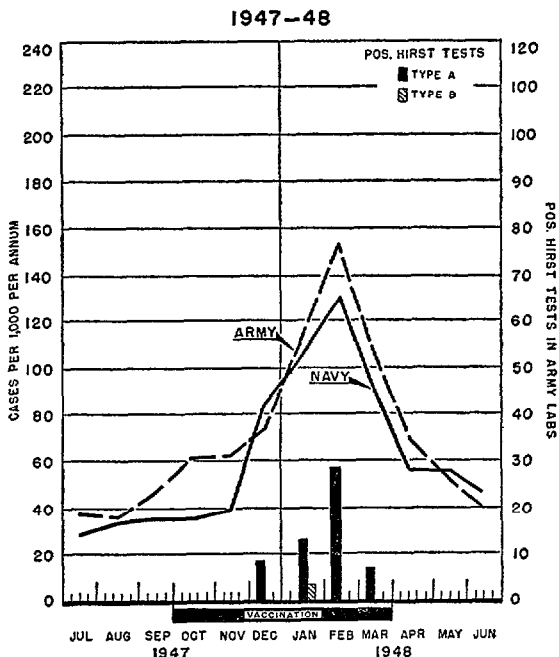
CHART 2  
COMMON RESPIRATORY DISEASE INCLUDING INFLUENZA  
CONTINENTAL U. S.



It is difficult to evaluate the effectiveness of an immunizing agent when administered to all personnel. However, a summary has been made of the common respiratory disease incidence, including influenza, for troops in the continental United States for the past three years and this incidence compared with the incidence in the U. S. Navy for the same period. In each of the three years, the Army vaccinated all personnel in the continental United States while the Navy did not vaccinate. In comparing the Navy rates with the Army, it should be noted that the Navy data do not include pharyngitis, laryngitis, and bronchitis which are embodied in the Army figures. Thus the Navy rates are less in magnitude by an immeasurable degree; however, this factor will not necessarily affect the general shape of the curve of incidence.

(Chart 1). The first season in which Army influenza watch stations and vaccine were widely used was that of 1945-1946. Influenza vaccinations were accomplished in October and November. The Army respiratory incidence curve was lower and broader than that of the Navy where vaccinations were not practiced. In this season when influenza B was continuously present with no explosive outbreaks, the Army peak incidence of respiratory infection was delayed until February in contrast with the Navy peak which occurred in December. On the other hand, the duration of increased infection rates was prolonged in the Army. An outbreak of scarlet fever occurred during February and March at a few Army camps but had little influence on the total respiratory disease rates.

CHART 3  
**COMMON RESPIRATORY DISEASE INCLUDING INFLUENZA  
 CONTINENTAL U. S.**



(Chart 2). In the 1946-47 season, a true outbreak of influenza A occurred in February, after a relatively quiet and stable period in December and January. Influenza vaccination was accomplished in February just prior to the peak of the epidemic, but apparently it was too late to be able to influence the epidemic. The fact that the Army month of peak incidence was February in comparison to March for the Navy may be explained by presumptive evidence that the infection was

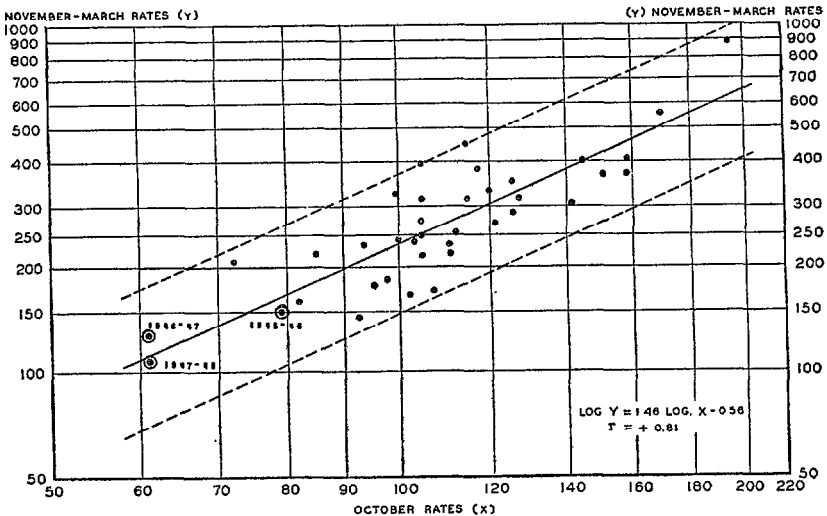
introduced into this country from Japan by Army personnel. It is to be noted that sporadic Type B virus infection occurred throughout the season.

(Chart 3). Vaccinations were begun in the 1947-48 season in October, but the majority of Army personnel in the United States were not immunized until late December. Both virus types A and B infection were identified, Type A being predominant. In this instance, vaccinations were apparently completed early enough in the season to exert any effect in February, the month of peak incidence.

CHART 4

*From Health of the Army, October, 1946*

RELATION BETWEEN COMMON RESPIRATORY & INFLUENZA RATES FOR OCT. AND THE AVERAGE RATE FOR THE FOLLOWING NOV.- MAR. PERIOD



The 1945-46 rate has been circled for emphasis and the rates for 1946-47 and 1947-48 added.

(Chart 4). A statistical relationship has been established between the October respiratory disease rate and the average incidence ratio for the period November through March immediately following. This has been based on a 23 year period, in 22 of which influenza vaccination was not used. In the three seasons when vaccination was used, the relationship was not disturbed as one would expect if generalized vaccination were effective. The relationship for 1946-47 might be disregarded since immunization occurred late. In the preceding and following seasons, however, a statistical difference in the relationship of the October rate to the ensuing November-March rate did not occur.

## CONCLUSIONS

Large scale influenza vaccination of Army personnel, even when given early, has not significantly changed the incidence of common respiratory disease including influenza among troops.

Immunization of all troops has been without value in evaluation of influenza virus vaccine.

Sporadic Type B influenza infections occur throughout the winter months.

The strains of influenza virus used in the presently available vaccine do not have the broad immunizing potency necessary to afford protection against the numerous closely related strains which have recently been isolated.

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VACUNA DE VIRUS CONTRA LA INFLUENZA (*Sumario*)

La vacunación contra la influenza, realizada en gran escala entre el personal del Ejército, a pesar de haber sido administrada en época temprana, no ha modificado de manera significativa la incidencia de enfermedades respiratorias comunes, incluso la influenza, entre las tropas.

La inmunización de todas las tropas ha carecido de valor en la evaluación de la vacuna de virus contra la influenza.

Las infecciones de influenza esporádica tipo B, ocurren en los meses de invierno.

Las cepas de virus de influenza utilizadas en la vacuna actualmente disponible, no poseen la potencia inmunizante necesaria para dar protección contra las numerosas cepas estrechamente relacionadas, aisladas recientemente.