because of difficulties encountered in maintaining adequate contact with patients over a period of 3 to 4 years. However, we feel that the cases reported have been sufficiently well controlled to indicate that the regular use of the concentrated solution of urea can be very useful in the prophylaxis of dental caries.

Summary. Solutions of urea and of synthetic detergents have been employed as dentifrices for approximately 2 years in a small group of patients suffering from severe dental caries. The use of these compounds, especially the urea, resulted in a marked decrease in the incidence of new lesions, and the urea solution also retarded the progress of caries in lesions already present.

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14477 P

Protective Effect of Vaccination Against Induced Influenza A.*

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During the past year from December, 1942, to May, 1943, rather extensive studies were conducted for the purpose of determining the value of subcutaneous vaccination with inactivated influenza virus against the natural disease in man. The anticipated outbreak of influenza did not occur but the opportunity to test the resistance of certain of the vaccinated individuals to induced infection presented itself.

The vaccine represented the allantoic fluid of fertile hen's eggs infected 48 hours previously with either the PR8 strain of influenza virus, Type A, or the Lee strain, Type B. The virus was concentrated by the procedure of Francis and Salk,[1] inactivated with formalin 1:2000, and bottled and tested for sterility by the approved procedures for biological products. Phenyl mercuric nitrate, 1:100,000 was added for bacteriostatic purposes. The final vaccine was of such strength that 1.0 cc represented 5.0 cc of the original Type A fluid and 5.0 cc of Type B fluid.

The subjects were 102 physically active male residents of one ward of the Ypsilanti State Hospital, Ypsilanti, Michigan. On December 21, 1942, 45 received 1.0 cc of the vaccine subcutaneously. On April 21, 1943, 17 of these men again received 1.0 cc of the vaccine as did 21 men not previously vaccinated. There remained 28 men who had been vaccinated 4 months earlier and 36 individuals who had not been vaccinated at any time.

On May 4, 1943, 13 days after the last administration of vaccine, the entire group received an intranasal spray of the Baum‡ strain of Type A virus in allantoic fluid. The material was sprayed into the nostrils from a nebulizer with such fineness that approximately 0.5 cc was delivered in 4 minutes. The subjects were then strictly segregated from the rest of the institution. Oral tempera-

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1 Francis, T., Jr., and Salk, J. E., *Science*, 1942, **96**, 499.

‡ The Baum strain was recovered from a patient during the outbreak of 1940-41. Although it is clearly a strain of Type A it is not antigenically identical with the PR8 strain used in the vaccine.

TABLE I.
Effect of Subcutaneous Vaccination upon Febrile Response of Human Subjects to Induced Infection with Influenza Virus, Type A.

Vaccination record	No. of subjects	Highest temperature <99 No.	<99 %	99+ No.	99+ %	100+ No.	100+ %	101+ No.	101+ %	102+ No.	102+ %
1. Unvaccinated	36	7	19	29	80	18	50	9	25	4	11
2. 4½ mos. before	28	8	28	20	71	9	32	3	10	1	3
3. 4½ mos. and 2 wks. before	17	6	35	11	64	3	17	0	0	0	0
4. 2 wks. before	21	7	33	14	66	3	14	0	0	0	0

tures had been taken 2 days before exposure and at least twice daily thereafter. Observations for signs and symptoms of infection were maintained. Materials for other clinical and serological studies were collected.

In a proportion of the subjects a clinical infection resembling a mild form of epidemic influenza occurred. The incubation period was generally not longer than 24 hours. The onset was accompanied by chills or chilliness, aches, prostration, and minor respiratory complaints. Fever as high as 103°F was noted, to a great extent paralleling the severity of symptoms. In most instances it did not persist longer than 48 hours.

When the responses to inhalation of virus of the different groups of subjects were analyzed it was found that distinct and significant differences obtained. This is clearly reflected in the febrile reactions presented in Table I. Temperatures of 100° or more were observed in 50% of the controls, in 32% of those vaccinated 4½ months before exposure, in 14.3% of those vaccinated 2 weeks before and in 17.6% of those vaccinated both 4½ months and 2 weeks before; the incidence of fever in the 2 groups, totalling 38 individuals, who thus had been vaccinated 2 weeks before infection, was 15.8%. Moreover, none of the latter had temperatures higher than 100.6° while 9 of the control group and 3 of the men vaccinated 4½ months earlier had fever of 101° or higher.

The results indicate that the vaccine employed induced a state of resistance, manifested in reduced febrile responses to intranasal infection with influenza virus, Type A. This effect was most evident in those vaccinated 2 weeks before exposure. After 4½ months the protective influence of vaccination had declined considerably, just as has been found to be the case 4 months after infection with influenza virus, Type B.[2] There was no indication that 2 inoculations 4 months apart had any additive effect. While the present evidence agrees with that of Henle, Henle, and Stokes[3] in showing that subcutaneous vaccination clearly exerts a beneficial influence against induced infection with influenza virus, Type A, it differs in demonstrating that the effective immunity so established was considerably reduced after an interval of 4 months. This difference may be related to the fact that, as indicated by the higher incidence rate in controls, the present test was more severe.

A detailed report will be published later.

2 Francis, T., Jr., Pearson, H. E., Salk, J. E., and Brown, Philip N., *Am. J. Pub. Health*, 1944 (April).

3 Henle, W., Henle, G., and Stokes, J., Jr., *J. Immunology*, 1943, **46**, 163.