

SMALLPOX IMMUNITY IN SAILORS

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SMALLPOX IMMUNITY IN SAILORS

[Following is the translation of an article by A. F. Yatsenko, L. I. Korobov and L. M. Shafran, Basin Sanitary Epidemiological Station of the Chernomorsko-Azovsk Waterways Public Health Division, Odessa, published in the Russian-language periodical Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Journal of Microbiology, Epidemiology and Immunobiology) No 9, 1965, pages 21-24. It was submitted on 30 Apr 1964. Translation performed by Sp/7 Charles T. Ostertag, Jr.]

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In recent years the interest of medical personnel in many countries has grown considerably in regards to smallpox. This has been conditioned by the fact that in the last 10 years the importation of this dangerous disease has been recorded in 13 countries of Europe, including the Soviet Union at the end of 1959. At the present time the primary means for the prophylaxis of smallpox is the mass revaccination of the population. For the personnel of the sanitary-antiepidemic and sanitary-quarantine service a study of the condition of anti-smallpox immunity in the appropriate collectives is very essential. Therefore we undertook the mission of studying the condition of antismallpox immunity in sailors of the USSR and comparing it with immunity in sailors of other countries of Europe, Asia and Africa. [In this article the word sailor refers to those making long voyages, as opposed to local fisherman]

The results of cutaneous inoculation reactions are the guides for judging the effectiveness of vaccination against smallpox and the nature of collective immunity. However, a number of facts are known which testify to the incomplete conformity between the intensity of antismallpox immunity and the results of the cutaneous inoculation reactions (Gamaleya, 1934; Ozol, 1936; Shustikov, 1946; and others). A study of the smallpox outbreak in Moscow confirmed that the results of cutaneous reactions often do not correspond with data which is obtained by means of setting up serological reactions, in particular the reaction of hemagglutination inhibition (Milner et al., 1961; Yeremyan et al., 1961). These authors, in viewing smallpox as a generalized infection, point out the leading role of the humoral factor in susceptibility to a given disease. Solovyev and Mastjukova (1956) consider that antihemagglutinins most reliably reflect the intensity of antismallpox immunity. Other investigators (Svet-Moldavskaya et al., 1964; Dzhavardov and Kyazimova, 1964) give preference to neutralizing antibodies.

Vasilyev et al. (1964) found a direct dependency between the level of antihemagglutinins and virus neutralizing antibodies.

Though the majority of the above named authors refer critically to the results of cutaneous inoculation reactions, almost all of them use this index

for evaluating antismallpox immunity, since each vaccinated person reacts to antigen stimulation in a specific manner. Besides this it is not always possible to check the effectiveness of vaccination in the inoculated contingents by means of serological methods. This is chiefly in respect to foreign sailors who sometimes are inoculated in our ports.

For the purpose of studying antismallpox immunity, we revaccinated 668 sailors from the USSR, 660 foreign sailors from the countries of Europe and 225 foreign sailors from the countries of Asia and Africa, all told 1583 men. The inoculations were carried out according to the instructions which were approved by the Ministry of Public Health of the USSR on Jan 1961. This is as follows. The skin of the upper arm was disinfected with 70% alcohol. Using an inoculation syringe (Jenner pen) the vaccine was placed in 3 places at a distance of no less than 2 cm from each other in the form of an equilateral triangle. Separate linear, non-bleeding incisions, 0.5 cm in length, were made through the drop, and the vaccine was mildly rubbed in; for purposes of drying, the skin was left uncovered for 10 minutes. Reading of the cutaneous reaction was performed on the 4--5th day following vaccination. Even if only one papule or vesicle was present the reaction was considered positive. The inoculations were performed with dry smallpox vaccine, prepared with sufficient provisions for the expiration date, having been stored in a refrigerator.

As a result of the investigations it was established that the percentage of persons reacting positively to the inoculation fluctuated depending on the number of revaccinations in the past, on the age of the person inoculated and the individual reactivity of the organism. Besides this, significant differences were detected between the number of positive reactions in the Soviet and foreign sailors (see table); among the Soviet sailors 26% reacted positively to the inoculation; among the foreign sailors of the European countries -- 73.2%, and among the sailors from the countries of Asia and Africa -- 61.9%. Here the percentage of persons reacting positively in the age group of 30--50 years was much higher (among Soviet sailors 17-35, among foreign around 60--70) than among those inoculated in the age group of 20--30 years. A large percentage of positive reactions was also observed among middle-aged persons.

It is apparent from the data that the percentage of positive cutaneous reactions in foreign sailors was approximately 3 times greater than in the sailors from the USSR. This may be explained primarily by the regularly conducted, compulsory annual revaccinations of all Soviet sailors. The foreign sailors are inoculated only once in 3 years, and, as established by WHO, sometimes even this period is not observed. The foreign sailors from the countries of Asia and Africa are subjected to inoculations against smallpox more regularly than the foreign sailors of the European countries. This is connected with the unsafe epidemic condition in a number of countries of Asia and Africa.

Our investigations again support the fact that the layer of smallpox immune persons among Soviet sailors was sufficiently high and comprised around 75% (based on the data of cutaneous reactions). The high immune

layer, and also the carrying out of a number of other prophylactic measures, guarantees the absence of cases on Soviet ships which are making trips to countries which are unsafe for this infection.

The cited data makes it possible to make an approximate judgment concerning the condition of antismallpox immunity in foreign sailors who visited the port of Odessa. Following revaccination, the percentage which reacted positively turned out to be quite high -- 80.

Moreover, from the experience of personnel of the sanitary-quarantine service for the port of Odessa, cases are known of the importation of sick persons with a suspicion of smallpox. Therefore, the personnel of the maritime sanitary-quarantine service should display increased alertness when dealing with crews from foreign vessels and with passengers arriving from abroad.

In particular it is necessary to exert strict control for the presence of international vaccination certificates, the correct performance of inoculations for persons who do not have the appropriate documents, and also when the period for revaccination has elapsed and based on epidemic indications.

We fully agree with the authors who point to the incomplete conformity between the state of antismallpox immunity and the data of cutaneous vaccination reactions. However, the proposed serological tests are not always practicable and expedient for judging the state of collective immunity. When carrying out the mass prophylactic vaccination of different groups of the population, we consider it expedient to read the cutaneous reactions.

Conclusions

1. When revaccinating Soviet sailors against smallpox, a positive inoculation reaction was noted in 26% of those inoculated; among revaccinated foreign sailors positive reactions comprised 60--75%.
2. In considering that the number of foreign sailors who reacted positively to smallpox vaccination was almost 3 times greater than that of Soviet sailors, the sanitary-quarantine service ~~must be very~~ alert in respect to the crews and passengers of foreign vessels, since they may serve as the source of the importation of smallpox into the USSR.

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Results of the revaccination against smallpox in Soviet and foreign sailors based on age groups/

Age group of inoculated persons (in years)	Soviet sailors			European sailors			Sailors of Asia and Africa		
	Number vaccinated	Number vaccinated who reacted positively		Number vaccinated	Number vaccinated who reacted positively		Number vaccinated	Number vaccinated who reacted positively	
		abs.	%		abs.	%		abs.	%
Up to 20	19	4	21	79	61	77.2	11	8	72.7
21--30	301	52	17.23	221	149	67.4	123	72	58.5
31--40	243	81	33.3	164	120	73.1	45	33	73.3
41--50	74	28	37.8	101	67	66.3	43	26	60.4
51--60	28	8	28.6	67	54	80.3	30	17	56.6
Over 60	3	1	33.3	28	22	78.6	3	2	66.7
Total	668	174	26	660	473	73.2	255	158	61.9