

AN ALLERGIC REACTION FOLLOWING TYPHUS-FEVER VACCINE AND YELLOW-FEVER VACCINE DUE TO EGG YOLK SENSITIVITY

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WITH the increased use of virus and rickettsial vaccines prepared from infected chick embryo and chick egg yolk sac, we can expect to see various allergic manifestations due to egg and chicken sensitivity.

Swartz¹ reported a systemic allergic reaction induced by yellow-fever vaccine in an allergic individual who was sensitive to egg white and chicken meat. Sulzberger and Asher² reported three cases of urticaria and erythema multiforme-like eruptions appearing thirty-six or more hours after yellow-fever vaccine inoculations. Accompanying the skin manifestations were general malaise, joint pains, headache, fever, pruritus, nausea, and vomiting. According to Sulzberger, the clinical picture, the incubation period, and the course of the manifestations suggest a sensitization or an allergic mechanism identical with mild serum sickness, rather than an infectious or direct virus effect.

Berge and Hargett³ have produced anaphylaxis in guinea pigs following sensitization with chick-embryo yellow-fever vaccine and normal chick embryo. They also showed that, when doses of comparable nitrogen content are employed, chick-embryo extract from ten-day (or younger) embryos is found to be weakly anaphylactogenic, while that from fourteen-day embryos is highly so.

This report is that of a soldier who developed angioneurotic edema, blocking of the nose, and tightness in the chest shortly after receiving typhus-fever and yellow-fever vaccines. The interesting finding in this case is that an allergic individual gives a history of egg yolk sensitivity which was definitely corroborated by various tests, as will be shown later.

From the available literature, there is not a similar report of a case in which the individual was only sensitive to egg yolk and not also sensitive to egg white. Tuft⁴ states that, of the various parts of the egg, sensitization is most usual to egg white or its component parts; however, sensitization to egg yolk has been reported, but its actual existence is doubtful. Walzer⁵ states that it is doubtful that sensitivity to egg yolk occurs independently of allergy to egg white. In Feinberg's⁶ book, he reports: "The egg white is the main source of the egg allergy. Although we do not deny the possibility of allergy to the yolk, we have never seen an authentic case nor do we know of one reported. We have never seen an instance in which egg yolk preparations caused a reaction better than (or equal to) egg white."

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CASE REPORT

A 19-year-old soldier was admitted to the hospital with a diagnosis of angioneurotic edema. His chief complaints were painless swelling of the eyelids, bridge of nose, and both cheeks, blocking of the nose, and pain in the chest. These symptoms came on about one and one-half hours after receiving inoculations of typhus-fever and yellow-fever vaccines. The pain in the chest lasted about five minutes and was not aggravated by deep breathing. The swelling of the face persisted for two days.

The past history of this patient is very significant. He has had spring and fall hay fever for eight years; however, there is no history of asthma. He has been sensitive to eggs since childhood and has not eaten whole eggs since infancy because they caused him to vomit. He can eat the white of a hard-boiled egg without any trouble.

His family history is essentially negative except that his father has hay fever.

Physical examination was essentially negative except for the angioneurotic swelling of eyelids, bridge of nose, and both cheeks. There were no physical findings in the cardiac and respiratory systems to account for the pain in his chest. The blood pressure was 120/80.

Cutaneous testing revealed the following reactions: chicken feathers, 0; chicken meat, 0; egg yolk, + + + +; and egg white, 0.

Intracutaneous testing with freshly prepared antigens from egg gave the following reactions: egg white 1:1,000, $\pm$; egg white 1:10, $\pm$; and egg yolk 1:1,000, + + + +.

Results of retesting at a later date are recorded in Table I.

TABLE I

	DIRECT TESTING	PASSIVE TRANSFER	
		SENSITIZED SITES	CONTROL
Egg white	$\pm$	0	0
Egg yolk	+ + + +	+ + +	0
Chicken meat	0	0	0
Sterile salt solution	0	$\pm$	$\pm$
Yellow-fever vaccine dilution 1:100	++	+	$\pm$
Triple typhoid vaccine dilution 1:100	0	$\pm$	$\pm$
Typhus vaccine dilution 1:100	+ + + +	+	$\pm$

COMMENT

We feel that we have definitely established the fact that this soldier is sensitive to egg yolk and that his allergic manifestations were due to the inoculations of typhus-fever and yellow-fever vaccines. The yellow-fever vaccine is prepared from infected chick embryos while the typhus vaccine is prepared from infected yolk sacs. Plotz⁷ states that experiments have shown that the typhus vaccine contains some egg yolk and egg ovalbumin and that it has been shown that egg sensitive individuals react either locally or with general symptoms when given egg vaccines.

Here again, we wish to stress the fact that individuals who are sensitive to egg or chicken, or both, may develop allergic manifestations from virus vaccines that are prepared from egg yolk or chick embryo. We further believe that this occurs more often than present reports indicate. Nevertheless, it is not the purpose of this paper to decry the efficacious use of these important prophylactic agents. Instead, we merely wish to report that allergic manifestations do exist in egg and chicken sensitive patients and that, once this fact has been established, it necessitates the cautious administration of the vaccine, by giving it in small increasing doses and by having epinephrine and a tourniquet on hand.

SUMMARY

1. Egg yolk sensitivity alone may exist without concomitant egg white sensitivity.

2. Individuals sensitive to egg or chicken may develop allergic manifestations from virus or rickettsial vaccines which are grown on egg yolk sacs or chick embryos.

3. The attention of the medical profession is invited to the allergic potentialities of these vaccines so that necessary precautions can be taken in their administration.

REFERENCES

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4. Tuft, L.: *Clinical Allergy*, Philadelphia, 1938, W. B. Saunders Co.
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ADDENDUM

Subsequent to the writing of this paper a manuscript was received by this author from the Division of Virus and Rickettsial Diseases, Army Medical School, Washington, D. C., entitled "Allergenic and Anaphylactogenic Properties of Vaccines Prepared From Embryonic Tissues of Developing Chicks." This work is a complete and detailed study of this subject.

In this study Coulson and Stevens have unequivocally demonstrated experimentally that, although egg yolk and egg white contain antigens common to both, they also have antigens that are different and characteristic of only the yolk or the white, respectively.

Included in this paper, Stull presents further evidence that the presence of egg white and yolk antigens in egg embryo vaccine are of such quantity and specificity that they might produce dangerous systemic reactions upon injection in egg-sensitive individuals.