section if there were no association between the state of the tongue and the particular symptom or sign in question. It will be seen that only in sections A, E, and F is the proportion of total cases with tongue furred (whole or back) greater than the "expected" proportion, which might indicate a positive association between the symptom or sign and a furred tongue.

Statistical analysis, using the formula for determining the standard error in a binomial probability distribution, shows that as regards E and F the difference in proportions is not significant, and may be due to chances of sampling. In the case of A it appears that the probability of the difference in proportions being due to chance is only 2%. It must be remembered, however, that this relationship is selected from eight possible relationships as the one with the lowest probability of being due to chance. Thus the difference in the proportions cannot be looked on as the value of a standard normal variate, but must be considered as the largest member of a set of eight standard variates. Under these circumstances the probability level is not 2% but about 14% to 15%. It follows that the difference may be due to chance, and the figures do not indicate any association between a furred tongue and the presence of large red tonsils.

It therefore seems that there is no connexion between the presence or absence of fur on the tongue and the state of the tonsils, the nasal airway, the presence of cervical glands, the presence of carious teeth, the appetite, or the state of the bowels.

The second part of this investigation attempts to link the state of the tongue with the various medical or surgical conditions which were the original reason for the children's attendance at the clinic. As stated above, the children were not acutely ill, and a considerable number of normal children, seen in infant welfare clinics, are included (under section 3).

The various diagnoses are grouped under 11 headings (Table II):

- 1A. History of upper respiratory tract infection.
- 1B. History of lower respiratory tract infection (follow-up of primary tuberculosis, pertussis, and pneumonia; stridor).
2. Digestive system (constipation, herniae, "tongue-tie," feeding errors, healthy infants, worms).
3. Emotional (tics, nightmares, sleeplessness, anxiety, behaviour problems, stutter, cyclical syndrome).
4. Skeletal (knock-knee, bow-legs, pigeon chest, postural defects, obesity, "growing pains").
5. Cardiovascular (follow-up of rheumatic hearts, exocardial murmurs, congenital hearts).
6. Blood disorders (follow-up of anaemia, erythroblastosis, haemophilia).
7. Skin (warts, naevi, urticaria, dirty umbilicus, alopecia, moles).
8. Nervous system (epilepsy, history of convulsions, nervous headaches, spastics, follow-up of birth injury).
9. Genito-urinary (enuresis, phimosis, hypospadias, hydroceles).
10. Trauma (cephalhaematoma, sterno-mastoid tumour, post-concussional state, bruises).
11. Congenital (mongols, cranial and other bone dystrophies, syndactyly, talipes).

Again the figures in brackets represent the number of children with a particular state of the tongue or a particular symptom which would be expected to be found if there were no more than a chance association between that state or symptom and the particular diagnosis for which the child was seen.

The possibility of a positive association between a furred tongue and a given diagnosis arises only in sections 1A, 3, 5, and 7. Using the formula for standard error in a binomial probability distribution, it appears that, contrary to general belief, there is merely a chance association between a furred tongue and a history of upper respiratory tract infection. Also, as common sense would suggest, any association between a furred tongue and emotional upsets, heart murmurs, and skin lesions is purely accidental.

Summary

A deep-rooted belief exists in both lay and medical minds that a dirty tongue, in a child not suffering from an acute illness, is of significance.

Statistical analysis of the state of the tongue in 750 children shows that there is no connexion between a furred tongue and the state of the tonsils, the teeth, the presence of a free nasal airway, the presence of cervical glands, a poor appetite, or the action of the bowels.

Similarly, no association can be demonstrated between the state of the tongue and a variety of abnormalities ranging from tongue-tie to tics and from murmurs to mongolism.

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RESPONSE TO SCHICK TOXIN IN NATURALLY IMMUNIZED INDIAN CHILDREN

BY

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Sensitization to the stimulus of antigen is an important property of active immunity. The degree of this sensitization in active antidiphtheritic immunity may in some cases be so high that even such a small quantity of antigen as is contained in one Schick test dose of toxin may stimulate production of antitoxin (Bousfield, 1945). In India, natural antidiphtheritic immunity seems to be highly prevalent (Lahiri, 1953). How far this immunity was associated with antigenic sensitization has been worked out in a small-scale field trial. In this small group of Indian children, increase of circulating antitoxin and the Schick conversion rate, two weeks after their first Schick test, have been shown to be so high that it was thought worth while reporting these results.

Materials and Methods

The Schick test toxin was a sterile dilution of a mature crude diphtheria toxin. The parent toxin was prepared in veal-infusion-proteose-peptone broth, and then stored for over four years in the cold. The toxin contained approximately 40 Lf per ml. and 15 LD₅₀ per Lf. Dilutions of this toxin were made in sterile buffered saline of pH 7.6. The Schick test dose, administered in 0.2-ml. volume, contained 1/50 LD₅₀ and 1/750 Lf.

The Schick test was read in a slightly different way. The subjects were all dark-skinned; hence development of an indurated area, at least 10 mm. in diameter, was the only criterion available for positive reaction. There was desquamation of epidermis over the indurated area a few days after the test. The heated control was also used as usual, but allergic reactions were rare.

Antitoxin titrations were done in rabbits following Jensen's (1933) technique. The human sera were tested against Lf/100 dose of the test toxin. The levels of antitoxin titre, at which the sera were tested, were 1/100, 1/20, 1/5, 1/2, 1, and 2.

Field Trial

Forty-seven boys and girls aged between 5 and 12 years completed all the tests. They had never received any artificial diphtheritic antigens before. They had been living in crowded houses in not quite hygienic surroundings. Just before their first Schick test a sample of blood was drawn. The second sample of blood was drawn and the second Schick test was done two weeks after the first Schick test. The results are shown in Table I.

TABLE I.—*Response of Naturally Immunized Indian Children to the Stimulus of Schick Toxin*

Preliminary Immunity			Rise 2 Weeks after the First Schick Test		
No. of Subjects at Indicated Level	Antitoxin Titre (I.U.)	Schick Test Results	No. of Subjects at Indicated Level	Antitoxin Titre (I.U.)	Schick Test Results
32	< 0.01	Positive	14	< 0.01	Positive
9	0.01*	Negative	17	0.01*	Negative
4	0.05*	"	10	0.05*	"
2	0.2*	"	3	0.2*	"
			2	1.0*	"
			1	> 2.0	"

* These figures mean that the titre is higher than the expressed figure but lower than the next higher figure.

Thus, over 50% of the Schick positives of the first test were converted to negative reactors merely with the stimulus of the Schick toxin. The rise of antitoxin titre was also considerable. An analysis of this rise in individual cases indicated that the lowest and the highest preliminary titres showed much less average increase than that shown by those at the middle of the range. The trend of this relative increase is shown in Table II.

TABLE II.—*Increase of Antitoxin Titre Relative to the Titre Prevailing Before Administration of the Toxin*

Groups	No. of Subjects at Indicated Level	Titre Prior to Schick Test (I.U.)	Titre 2 Weeks after Schick Test (I.U.)	Approximate Average Rise (Times)
I	14 15 3	< 0.01	< 0.01 0.01 0.05	4
II	2 5 1 1		0.01 0.05 1.0 > 2.0	
III	2 1 1 1		0.05 0.2 1.0	
IV	2	0.2	0.2	Nil

Discussion

When such a small quantity of antigen as 1/750 Lf of diphtheria toxin, administered intracutaneously, could produce so remarkable a response as indicated above, there is nothing very much more to gain by immunizing them with large doses, such as 25 Lf, of a very potent toxoid. Perhaps, in highly sensitized subjects like these, a potent toxoid and a weak toxoid, administered in large doses, would produce similar results. Field trials of diphtheria prophylactics in Indian children, with a view to determining their comparative potency, would therefore be very much influenced by the prevailing natural immunity associated with a high degree of sensitization.

How such an intense sensitization to diphtheritic antigen was produced in these children is difficult to guess. Of course, they lived in an environment conducive to frequent exposures to infection. However, the incidence of clinical diphtheria appears to be small, and the available carrier-rate figures do not suggest any formidable source of infection. Is this sensitization then due to certain tissue characteristics peculiar to the Indian race, or is it just an active immunity produced by frequent latent infections from unexplored sources?

Summary

The state of sensitization to the stimulus of diphtheritic antigen was determined in a group of 47 naturally immunized Indian children. The Schick test toxin was the source of the stimulus. The response to this was measured by the increase of circulating antitoxin and by the Schick conversion rate. There was a large increase of antitoxin, and over 50% of the Schick positives of the first test became Schick negatives in the second test, two weeks after administration of the Schick-test toxin. Those who had just the protective quantity of antitoxin in their circulation responded most.

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Medical Memoranda

A Case of Scurvy Simulating a Gastric Neoplasm

The few recent papers on scurvy deal with the malady in adults, particularly the elderly male patient. Such a survey of "bachelor" scurvy was carried out by McMillan and Inglis (1944). In this review of 53 cases they concluded that the three predisposing factors were dietary ignorance, apathy, and poverty, in that order of importance. The following case, of a similar nature, occurred in an apathetic old man and presented certain features of interest. It demonstrates a hitherto unrecorded aspect of scurvy, in that the clinical and radiological features of the case closely simulated those of a gastric neoplasm.

CASE REPORT

A man aged 72, who had previously been living alone, was admitted on June 3, 1952. For the past year he had complained of increasing anorexia, epigastric discomfort unrelated to meals, and non-radiating precordial pain. During this period he had become increasingly weak, and was easily fatigued, and had lost 2 stone (12.7 kg.) in weight. After a sudden attack of severe substernal pain he developed a cough and dyspnoea; similar episodes had occurred six and two weeks before admission. One month previously he had had a small haematemesis and had noted bright-red blood in his stools for two weeks thereafter. His diet during the past year had consisted chiefly of bread and milk together with various soups. For an indeterminate period his skin had bruised very easily. His past health had been good, except for occasional "black-outs," preceded by an aura of abdominal discomfort which began about two years before. His daughter says that the black-outs were actually fits involving loss of consciousness, spasmodic twitching of the limbs, and incontinence.

Examination revealed a thin depressed, lethargic man with a rather muddy complexion and numerous petechiae over the arms, legs, and trunk. An ecchymosis 6 in. (15 cm.) in diameter was seen over the left thigh, and there was a shallow sacral bedsore. No clinical evidence of anaemia was observed; the edentulous mouth was foul with sores, and the palate was ulcerated. The gums did not bleed; Hess's armlet test was negative. Cardiovascular system: apex beat $3\frac{1}{2}$ in. (9 cm.) from midline; B.P. 140/80; pulse 68; no bruit heard; both dorsalis pedis arteries palpable. There was a moderate degree of clubbing of the fingers and toes. Chest expansion was less than $\frac{1}{2}$ in. (1.3 cm.); an impaired percussion note was heard at the right base posteriorly, together with medium crepitations with patchy pectoriloquy. Apart from ulcerated thrombosed haemorrhoids, no other abdominal abnormalities were noted. The central nervous system appeared normal.