tests were done on 10,422 schoolchildren. The results for 1956-7 are given in Table III.

TABLE III.—*Vaccination Results for the School Year 1956-7*

	Mantoux 10 T.U.	Heaf Test
Number of B.C.G. vaccinations ..	6,917	4,867
.. validly tested for conversion ..	5,676	4,746
.. of positive reactors ..	5,471	4,647
.. of negative reactors ..	205	99
Conversion rate ..	96.4%	97.9%

Discussion

It is generally held that a conversion rate of 95% to a Mantoux 10 T.U. is adequate. The Medical Research Council's current tuberculosis vaccines clinical trial found that a conversion rate of 85.8% to a Mantoux 3 T.U. P.P.D. produced protection.¹ The Tuberculosis Research Office of the World Health Organization gives figures showing the correlation between the Mantoux 3 T.U. and 10 T.U. after vaccination. In a group of 262 vaccinated persons, 235 were positive (6 mm. and over) to a Mantoux 3 T.U.; all except one of the negative reactors were given a Mantoux 10 T.U., and a further 23 became positive.² This suggests that 10 T.U. will discover about 10% more positive reactors after vaccination than 3 T.U. If a conversion rate of 85.8% to 3 T.U. produces protection a conversion rate of 94.4% (85.8+10%) to 10 T.U. should theoretically be adequate. This line of reasoning is admittedly tenuous, but it does give some grounds for accepting 95% as the criterion of satisfactory conversion to a Mantoux 10 T.U.

As the conversion rate to a Mantoux 10 T.U. was 96.4% and to a Heaf test 97.9% using 40 different batches of vaccine, it was decided that the conversion testing of non-contact 13-year-old schoolchildren is unnecessary.

Summary

A trial was carried out in the local health authority areas of the Oxford Region to determine whether conversion-testing after B.C.G. vaccination of non-contact 13-year-old schoolchildren is necessary.

The conversion rate of 5,676 children to a Mantoux 10 T.U. P.P.D. was 96.4%.

The conversion rate of 4,746 children to a Heaf test P.P.D. was 97.9%.

Conversion - testing of non - contact 13 - year - old children is unnecessary.

I should like to thank the Medical Research Council for grants made to me, the Oxford Regional Hospital Board for the facilities they afforded me, and the Regional Records Department for coding and analysing the results.

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- ² Guld, J., *Bull. Wld Hlth Org.*, 1957, 17, 230.

POSTSCRIPT.—The conclusion reached by this trial was accepted by the Ministry and has been incorporated in Memo 322/BCG (Revised 1958). The introduction of Glaxo freeze-dried B.C.G. has created a new problem, as it is desirable that laboratory control should be supplemented by clinical control on a sample of each batch. The Ministry has therefore requested the personnel of this trial to form a B.C.G. Control Centre at Oxford for this purpose. The Control Centre will make clinical observations on the conversion rate and the local reactions to vaccination.

The United States Council on Library Resources has awarded a grant of \$73,800 to the National Library of Medicine, Washington, for the purpose of setting up and administering a research project on methods of improving bibliographical services through the use of mechanical equipment. The aim is to improve the efficiency of publication of comprehensive periodical indexes in broad subject fields. If successful, the methods will be used to produce the *Current List of Medical Literature*.

TUBERCULOUS MENINGITIS FOLLOWING B.C.G. VACCINATION

BY

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It is well recognized that B.C.G. vaccination may frequently be followed by complications due to the strain of organism in the vaccine. Such complications are usually limited to adenitis with or without supuration and ulceration (Ministry of Health, 1958). In a few instances of tuberculosis developing after B.C.G. vaccine administration, it is the resulting immune process that has been overwhelmed by subsequent infection with virulent strains of mycobacteria. Miliary and meningeal forms of tuberculosis following B.C.G. vaccination are thought to be rare. This report is concerned with the development of tuberculous meningitis in a baby nine months after B.C.G. vaccination.

Case History

The patient was a baby girl of 11 months whose parents were known to suffer from pulmonary tuberculosis. She did not react to tuberculin, and on June 29, 1956, was given B.C.G. vaccine. When retested eight weeks later the tuberculin reaction had converted, giving an area of induration of 9 mm. and erythema of 12 mm. with O.T. 1:1,000. On April 1, 1957, over nine months after receiving B.C.G. vaccine, the baby was admitted to the meningitis unit, King's Cross Hospital. She had become ill eight days previously with listlessness, anorexia, vomiting, and insomnia. Loss of weight had been noticed, and immediately prior to admission the baby had become rigid.

On examination she was pale, irritable, slightly dehydrated, and had a high-pitched meningeal cry. Abnormal clinical findings were confined to the central nervous system. Signs of meningeal irritation were present with a moderate degree of cervical rigidity and Kernig's sign. The baby when disturbed was extremely irritable. There was no motor or sensory loss and cranial nerves were intact. Examination of optic fundi showed no papilloedema, and choroidal tubercles were not seen. Cerebrospinal fluid: pressure increased; cells, 230 per c.mm. (polymorphs 40%, lymphocytes 60%); protein, 480 mg. per 100 ml.; sugar, 7 mg. per 100 ml.; microscopical examination of the spider-web clot showed scanty acid-fast bacilli. Lung fields were normal on x-ray examination. Mantoux reaction: positive with dilution of 1:10,000 O.T. Blood leucocyte count, 17,000 per c.mm. (polymorphs 80%).

Treatment and Progress

Streptomycin, 0.05 g., was given intrathecally daily for seven days and 0.5 g. intramuscularly daily for 28 days. Isoniazid, 0.1 g., and para-aminosalicylic acid (P.A.S.), 2.5 g., were given daily by the oral route for a period of six months. The child's condition improved steadily and her temperature fell to within normal limits after one week. Signs of meningeal irritation disappeared. The cerebrospinal fluid examinations indicated a gradual return to normal levels. After four months the cell count was fewer than 10 cells per c.mm., and after six months the protein was less than 40 mg. per 100 ml. and the sugar content more than 45 mg. per 100 ml. No complications developed, and the baby was discharged from hospital in February, 1958, 10 months after admission. At the time of discharge she appeared to have made a complete recovery and was attempting speech and almost walking unaided.

Epidemiology

Some years before, in another area, the mother was found to have pulmonary tuberculosis and had two 90-day courses of streptomycin and P.A.S. Later, in August, 1952, typical acid-fast bacilli were demonstrated in sputum specimens on two occasions, but no further specimens have yielded acid-fast bacilli. The sensitivity patterns of the strain are not known, since the organism was not grown on culture. The father also was found to have a pulmonary lesion believed to be inactive, though it was still being observed at three-monthly intervals. The only other member of the family in the home, a brother of 19 years, had a lung cavity demonstrated radiologically in 1956, but at no time have acid-fast bacilli been observed or isolated from sputum specimens. The appearance of this lesion is improving on combined streptomycin and isoniazid therapy.

The source of infection of the child is not known for certain. A possible sequence of events is that the brother may have been infected from the mother, and he, in turn, may have infected his sister, since he had probably the most active disease in the family at the time of the baby's infection. Until the patient became ill, the family of four resided in a caravan which, however commodious in itself, was a "single apartment." Since three members of the family had evidence of tuberculosis the ready transference of infection is understandable.

Bacteriology

Isolation.—Paired Löwenstein-Jensen slopes inoculated with spider-web clot and deposit from two specimens of cerebrospinal fluid yielded innumerable discrete colonies after 26 days' incubation. Although it was noted at the time that the colonies tended to appear less craggy and dry than the typical human variety, they were not considered to be bovine in origin.

Sensitivity Pattern.—The strain was sensitive to 10 µg. of streptomycin per ml., 0.2 µg. of P.A.S. per ml., and 0.2 µg. of isoniazid per ml.

Virulence: Catalase Test.—The method used differed from that recommended by Middlebrook *et al.* (1954) in that individual colonies were selected and transferred to tubes containing equal quantities of 20-volume H₂O₂ and 10% "tween 80" solution. Control tubes containing a comparable inoculum of the H₃₇Rv variety of *Mycobacterium tuberculosis* and a selection of recently isolated strains including atypical mycobacteria allowed of a comparison of the enzyme activity to be made. The time of appearance and the amount of oxygen liberated, shown by the bubbles at the surface with the strain under investigation, were similar to that of H₃₇Rv and recently isolated virulent strains.

Animal Inoculation.—Various weighed inocula, 0.1–0.5 mg. of the test strain, were injected intraperitoneally and intramuscularly into four guinea-pigs. Examination at necropsy six to eight weeks later showed progressive generalized tuberculosis. Typical acid-fast bacilli were demonstrated in the spleen, liver, and lung, and, in addition, after intramuscular inoculation caseous lymph nodes were observed in inguinal, lumbar, and tracheo-bronchial sites. Typical cultures were isolated from such lesions. Following intravenous injection the strain did not produce progressive tuberculosis in a rabbit.

Summary

A case of tuberculous meningitis is described occurring in an 11-months-old baby who had been given B.C.G. vaccine nine months previously. The infecting organism was shown to be a virulent strain of *Mycobacterium tuberculosis* of the human variety.

Our thanks are due to Dr. W. H. Findlay, area chest physician, Perth, for details of the medical history of the family.

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HYPOPROTEINAEMIA AFTER PARTIAL GASTRECTOMY CORRECTED BY GLUTEN-FREE DIET

BY

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The nutritional disturbances following partial (Polya) gastrectomy are usually produced by defective absorption of iron, fat, and the vitamin-B complex (Wollaeger, Comfort, and Weir, 1946; Welbourn, Hughes, and Wells, 1951; Wells and MacPhee, 1954), and although nitrogen absorption is sometimes impaired, this rarely produces hypoproteinaemia (Wollaeger *et al.*, 1946). The deficiency of iron and vitamins may be corrected by giving large doses of these substances either by mouth or parenterally, but in order to correct serious deficiency states the Polya may have to be converted to a Billroth I gastrectomy, in which the blind loop is undone (Bruce, 1955).

It has been established that in most cases of idiopathic steatorrhoea the defective fat absorption is induced by gluten, and that after removal of gluten from the diet fat absorption returns to normal (French, Hawkins, and Smith, 1957). In addition it has been shown that a gluten-free diet corrects the associated faulty absorption of vitamins, minerals (French *et al.*, 1957), and nitrogen (McIver, 1952; Forshaw, 1957). There would appear to be no reason to expect that gluten could be responsible for the malabsorption following partial gastrectomy, and there have been no reports of the trial of a gluten-free diet in such cases.

The purpose of the present report is to describe the beneficial effect of a gluten-free diet in a patient in whom a low plasma albumin level producing oedema followed a partial gastrectomy; and to emphasize that severe impairment of nitrogen absorption may rarely occur without any apparent disturbance of fat and iron absorption.

Case Report

A man aged 47 was admitted to hospital in October, 1957. He had had a Polya gastrectomy for a duodenal ulcer five years previously. Following the operation he developed attacks of sweating and flushing of the face immediately after food, but otherwise his condition had been satisfactory for four years; he then developed diarrhoea and continued to pass between four and eight pale loose motions daily. During the past three months his mouth and tongue had been sore, and three weeks before admission he developed swelling of both feet and legs and a rash on the legs and abdomen. He thought that he had lost a small amount of weight since the partial gastrectomy, but his weight at the time of operation had not been recorded. There was no history of any significant previous illnesses.

On examination severe glossitis, cheilosis, and angular stomatitis were present. Both feet and legs were moderately swollen, and there was a patchy excoriated erythematous rash on the legs and abdomen. There were no abnormal neurological signs. His weight was 7 st. 2 lb. (45.4 kg.).

Investigations.—Radiographs of the chest and long bones were normal. Radiological examination of the gastrointestinal tract showed that the stoma functioned normally and there was no evidence of stomal ulceration; there was no flocculation of barium in the small intestine, and the barium had been completely evacuated from the bowel