Commentary

Case II suffered from a severe attack of typhus fever, the diagnosis of which appears obvious in retrospect but was rendered difficult at the time by the presence of the septic thumb, which dominated the clinical picture. The continued pyrexia was originally attributed to a septicaemia secondary to the septic focus together with a possible concomitant attack of malaria. That death occurred in this man, who was 44 years of age, confirms the recognized fact that the mortality rate from typhus fever increases with the age of the patient (Mackenzie, 1941).

Cases I and III had fairly mild but typical attacks of typhus fever, although at no period of their illness was the toxæmia profound. These cases also differ from the classical description of typhus fever in that delirium was not pronounced and certainly was not of the dissociation or occupational type.

Case IV presents several interesting features: (a) The first sign of the disease developed 27 days after thorough disinfectionation—i.e., 4 days longer than the recognized limit of the incubation period for this disease (Memo. on Louse-borne Typhus Fever, No. 252, 1941). As already stated, this patient was a fairly close contact of Case I throughout his illness. That Case IV was a secondary infection from Case I is the obvious explanation, but no other secondary cases have occurred either among other patients in the same ward or among the nursing or medical staff. There have been no secondary cases from Cases II and III, which were nursed in different wards from Case I. (b) The attack of typhus fever was of the abortive type, in that the total duration of the illness was only 5 days and in that the classical signs of the disease did not develop as in the other cases. Positive Weil-Felix reactions also occur in undulant fever in titres of 1 in 50 to 1 in 240, but the progressive rise in titre does not (Findlay, 1941). The Weil-Felix reaction in this patient showed a diagnostic rise in titre from 1 in 50 on the 2nd day of the illness to 1 in 1,000 four days later. (c) The early appearance of the positive Weil-Felix reaction on the 2nd day of the illness is uncommon (Felix, 1941). The patient was questioned as to the possibility of previous immunization against typhus fever. The last prophylactic injections he received were in July, 1942, but he is ignorant of their character, and it is impossible to determine this most important point. In the light of this case it is clearly of diagnostic importance to perform a serological examination at the earliest opportunity in any patient suspected of typhus fever. It is recognized that a titre of 1 in 80 to 1 in 100 is necessary before a clinical diagnosis can be confirmed.

Rash.—The typical exanthem occurred in three of these patients and appeared on the 4th, 6th, and 9th days of their illness. It showed the typical distribution of that of typhus fever in that, while absent on the face, it was profuse on the body and limbs, particularly in Cases II and III. The rash was definitely petechial in character, the size of each petechia varying between 1 and 2 mm. in diameter. The colour, originally a bright pink, changed to a dark bluish-red. It did not appear in crops, and persisted distinctly for 3 days in Case III before fading, when it was replaced by a brownish staining which gradually disappeared. The subcuticular mottling described in this disease was widespread on the trunk and limbs in Cases II and III, but this element of the rash faded more quickly than did the petechiae in Case III. Accompanying the rash there was conjunctival suffusion, which was well marked in the first three cases.

Type of Pyrexia.—As can be seen from reference to the accompanying temperature charts, the type of pyrexia is similar in all four cases. The temperature shows a well-marked intermittent and remittent character—a feature which is even more pronounced in the four-hourly charts. Disproportionate bradycardia, as is said to occur in some cases of typhus fever, was not observed in this small series of cases.

Penicillin Therapy.—Penicillin was administered to these patients for prophylaxis against the possible development of the secondary infections which are likely to occur during the course of this disease. Such conditions as bronchopneumonia, septic parotitis, and septic conditions of the skin have been common in the epidemics of typhus fever in Europe (Megaw, 1942). Penicillin was given by three-hourly intramuscular injections of 15,000 units to all four patients, but, as can be seen from the

temperature charts, it was begun at different stages in these cases. In Case I penicillin therapy was started on the 13th day of the disease, when the temperature and pulse rate were already falling by lysis. In Case II the first dose of penicillin was given about 72 hours before death, when the patient was profoundly

Temperature charts of the four cases of typhus fever. The arrows indicate the beginning of penicillin therapy.

toxæmic. Case III received the first injection of penicillin on the 11th day of illness, and in Case IV it was first given on the 2nd day. No attempt is made in such a small series of cases to draw any conclusions on the effect of penicillin on this disease.

Summary

Four cases of typhus fever imported into England by repatriated prisoners of war are described and the important clinical features of each case are briefly reviewed. One patient died, and a note on the post-mortem examination is included. Another of these patients had an abortive attack, the interesting features of which are described in some detail.

We wish to thank Drs. Weiner and Yang for the use of their clinical notes, and Drs. Kellett and Gartside for the various pathological examinations and reports.

REFERENCES

- Agnew, A. P., and Kyles, W. B. (1944). *British Medical Journal*, 1, 10.
 Felix, A. (1941). *Proc. roy. Soc. Med.*, 35, 160.
 Findlay, G. M. (1941). *Ibid.*, 35, 157.
 Mackenzie, M. D. (1941). *Ibid.*, 35, 141.
 Megaw, J. W. D. (1942). *British Medical Journal*, 2, 401, 433.
 Memorandum on Louse-borne Typhus Fever, No. 252, Med., 1941, H.M.S.O., London.

SORE FINGER-TIPS IN INDUSTRY

PROTECTION BY HYDROGEN PEROXIDE

BY

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This is a record of an accidental discovery of a promising method for preventing injury to the skin of the finger-tips by constant friction against a rough surface.

Medway Paper Sacks Ltd., an associated company of Albert E. Reed and Co., paper makers, Aylesford, Kent, is engaged in making large sacks from strong brown paper (kraft). This paper has a rough surface, and the sacks are finished by passing either one end or both ends through a wire-stitching machine. The paper passes through this machine with a rapid jerky motion, and is guided by the operator's fingers. During the whole of an eight-hour day her fingers are rubbing over the rough dry surface of the paper. This amount of friction causes damage to the skin of the finger-tips, and until recently two-thirds of the women working on the stitching machines visited the surgery about once a fortnight for treatment. The remaining one-third were unaffected, although many of them had been on the same work for years. The reason for this has not been discovered; there is no difference in the method of handling the paper.

Treatment consisted in applying half-inch, zinc oxide plaster so as to cover the finger-tip completely. This relieved the pain, and enabled the work to be continued. The adhesive plaster was kept on day and night, and was renewed every few days until the finger had healed. There is no evidence to show that this treatment slowed up production, but time was wasted in surgery attendances, and a good deal of discomfort was suffered. The lesion-produced by so much friction on the finger-tips is shown in the photograph reproduced here.

Photograph of the right hand of Mrs. N. G.

The striking feature about the affected finger-tips was the absence of the horny layer of the skin. This is not well shown in the photograph, but the drops of blood exuding from the tips of the middle and ring fingers can be clearly seen. These two fingers were the ones usually most severely affected. The thumb nearly always escaped. There was often a general hypertrophy of the skin of the finger-tips, producing a bulbous appearance, which is seen in the photograph on the ring and little fingers.

Various measures had been tried to prevent this trouble. Industrial rubber gloves were useless, as the worker lost her sense of touch. Thick rubber finger-stalls were unsatisfactory for the same reason, and output was slowed up. Thin rubber finger-stalls wore out in a few hours. Trials were made of a hard-setting rubber solution painted on the finger-tips before starting work. This was satisfactory, but was discarded because the solution had to be reapplied every two or three hours.

Method

At this stage one of the workers volunteered the information that three weeks previously she had accidentally splashed a finger with 20-vol. hydrogen peroxide while dressing her child's hand. She noticed during the next few days on the machine that this finger-tip did not get sore like the others. She therefore tried applying peroxide to all her finger-tips. For the first week she did this at night and during the dinner hour. Her fingers were so much better that during the second week she applied the peroxide at night only. The number of applications was still further reduced to three or four during the third week. To her surprise she had had no sore finger-tips since using peroxide. For four years she had been working on stitching machines, and had often attended the surgery for treatment.

It was clear that this remedy was worth investigating. Six of the worst sufferers volunteered for a trial, and the result was so promising that arrangements were made to issue peroxide to all the workers (21 in number) who had been troubled with sore finger-tips. These 21 women were given 1-oz. wide-neck bottles three parts filled with 20-vol. hydrogen peroxide. These bottles had a bakelite screw cap and were labelled with the worker's name and clock number, and the date of issue. The women kept them in their handbags. Instructions were given to dip each finger-tip into the peroxide and to wave the hands in the air till the liquid dried. This was to be done three times a day—at night, on starting work in the morning, and during the dinner hour. Within a few weeks it was quite clear that this

routine was producing a notable improvement in the fingers of all the women. By subsequent inspection it was found that in many cases the fingers could be fully protected by reducing the number of applications to three or four weekly.

The effect of the treatment is indicated in the table below, which compares over two periods of six months the surgery attendances of 12 of the 21 women who had been working under identical conditions both before and after treatment. No comparison has been made in the attendances of the remainder, whose work during the two periods is not exactly comparable. They had been doing other work at intervals, had been working with different sorts of paper, or had left during the period of the test.

Table showing Surgery Attendances for 12 Workers for the Treatment of Sore Finger-tips

Worker's Initials	Number of Visits to Surgery	
	During Six Months Before Using Peroxide	During Six Months After Using Peroxide
E. D.	17	2
C. F.	34	2
K. B.	24	5
B. T.	12	1
O. J.	19	3
G. T.	10	1
V. K.	11	2
E. H.	9	1
J. H.	14	1
K. B.	14	0
N. G.*	24	3
R. C.	4	0
Total visits . . .	192	21

* See illustration.

Commentary

It is realized that this is by no means an ideal control, but an adequate control series would have required some interruption of the treatment after it had been begun, and the benefit to the workers was so clear that this course seemed unjustified. There is, however, no reason to suggest that the two periods are not comparable: the output per worker was approximately the same, the amount of absenteeism from all causes in the group was actually greater in the six months prior to the introduction of the peroxide (233 as against 147 days lost), and "surgery attendance" indicates a lesion of about equivalent severity in each period. The women themselves are in no doubt that the treatment has been beneficial, and it has been simple to administer. Their bottles of peroxide require filling every four to six weeks, and they come regularly to the surgery for this purpose.

In order to determine the deterioration in the strength of the peroxide after five weeks' use, analyses were carried out in the chemical laboratory of Albert E. Reed and Co. The stock bottle of 20-vol. H_2O_2 was found to contain 20.4 volumes of hydrogen peroxide. Samples were taken from the 1-oz. bottles of six workers at random after they had been in use about five weeks. These samples were analysed, and they showed practically no deterioration. The weakest was 19.5-vol. H_2O_2 . This test was done in hot weather, and of course the stoppers of the bottles were frequently removed by the users.

Efforts have been made to find out exactly why peroxide should prevent sore finger-tips, but without success. Peroxide in this strength produces some coagulation the surface proteins in the skin, which appears usually as a number of small white pin-points. There is no reason to assume that there is any particular chemical substance in the paper against which peroxide is giving protection, and its action is presumably due to the effect of coagulation on increasing the resistance of the skin to friction. No ill effects have been caused by the use of 20-vol. hydrogen peroxide in the way described above.

Summary

An accidental observation by a wire-stitching machine operator in a paper-bag factory has led to the discovery of a method which largely protects the skin of the finger-tips from damage by the constant friction in this work. The operator is supplied with a small quantity of 20-vol. hydrogen peroxide, into which each finger is dipped. The necessary number of applications varies from three times a week to four times a day. All the workers have noted the considerable protection which this treatment affords. In a group of 12 women working under strictly comparable conditions for a

period of six months before and after treatment, the number of attendances at the surgery for the treatment of sore and bleeding finger-tips fell from 192 to 21. The result of this small series would appear to make further trials on a larger scale worth while.

My thanks are due to the management and staff of the Aylesford Paper Mills and Medway Paper Sacks Ltd. for their help in carrying out this investigation, and for their permission to publish this paper

A THERAPEUTIC TRIAL OF CHOLINE CHLORIDE IN INFECTIVE HEPATITIS

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Choline is a powerful lipotropic agent (Best and Huntsman, 1932), and in experimental animals has been shown to have the effect of reducing the cirrhosis which follows the infiltration of the liver with fat after taking a high-fat diet (Daft, Sebrell, and Lillie, 1942; György and Goldblatt, 1942). It is considered to exert its lipotropic effect by promotion of lecithin (phospholipid) synthesis in the liver, as phospholipids are actively concerned with the transport of fat and cell structure.

The action of choline in preventing cirrhosis is different when methods other than dietetic are used for the production of fatty livers (McHenry and Patterson, 1944). It has no effect in preventing the accumulation of cholesterol esters in "cholesterol" fatty livers, and while in curative experiments it causes a rapid decrease in glycerides, the reduction of cholesterol esters is slow. The fatty liver produced by the ketogenic fraction of the anterior pituitary is not prevented by choline, and large doses are required to prevent damage in carbon tetrachloride poisoning or to increase the disappearance of fat from the liver in the recovery period of phosphorus poisoning.

Himsworth and Glynn (1944) have distinguished two distinct types of liver injury due to diet. One follows long-continued fatty infiltration of the liver due either to excessive intake of fat or to deficiency of lipotropic factors such as choline, and the second results from lack of amino-acids in sufficient amounts in the diet. The injury resulting from the amino-acid deficiency is characterized by necrosis, and against this choline has no beneficial effect—in fact, Himsworth and Glynn suggest that it tends to aggravate the hepatic necrosis by reducing the high fat content of the liver. It will be seen, therefore, that though choline prevents fatty infiltration and the consequent cirrhosis that results from the intake of an excessive amount of fat, there are various experimental conditions in which it is unlikely to have a beneficial effect on the liver.

The work that is recorded here was started at about the same time as Higgins and his associates began their investigations into the therapeutic effect of methionine in infective hepatitis at Oxford (Higgins *et al.*, 1945). There was, however, a distinct difference in the circumstances under which the trials were undertaken, as 21 of our cases were patients in a general hospital over-seas, and thus it was not possible to carry out the detailed biochemical study to which reference is made in their paper.

The Trial

No attempt was made to select cases so as to get those of comparable severity, but alternate patients were given choline chloride 1.5 g. a day for the first eight days following admission. All the patients were serving soldiers between 20 and 50 years of age, and their diets were similar except for the plentiful supply of fresh fruit for drinks that was available for those treated in Algeria. Both the treated and the control series received vitamins A and D (and K in 21 cases) as an addition to a low-fat high-carbohydrate diet. The amount of protein in the diet was left largely to the patient's preference, and under the conditions of the experiment it was not possible to determine the quantities each patient consumed.

Considerable care was taken to exclude liver disease from other cause and the presence of any intercurrent infection—a very important precaution in a hot climate. Special attention was paid to the possibility of men having received an organic arsenical for any reason, and no case in which there was any doubt was included. The patients were treated in bed. The decision as to when they should get up was recorded, as well as the length of stay in hospital, as a substantial reduction in either would be a very practical way of demonstrating therapeutic efficiency. The day on which their appetite returned was noted for a similar reason, but the date of disappearance of jaundice was not, as discoloration of the conjunctivae persisted in several cases after the patient was considered fit to leave hospital. The only biochemical investigations that were undertaken were repeated estimations of the serum bilirubin and examination of the urine for the presence of bile pigments.

Results

The level of the serum bilirubin was estimated on admission. This, coupled with the number of cases that had a rising serum bilirubin while under observation, was used as a means of assessing the comparability of the treated and control series. The number of days of malaise and the length of icteric period before admission are shown for a similar reason in Table I.

TABLE I

	Subjects	
	Treated 16	Control 16
Duration of illness before admission, in days ..	8.3 (3-29)	8.1 (2-21)
Icteric period before admission, in days ..	1.4 (1-5)	1.7 (1-7)
Serum bilirubin on admission (mg./100 c.cm.) ..	4.7 (1.0-12.2)	6.1 (1.25-14)
Number of cases with rising serum bilirubin ..	5	6

The average number of days and the levels of serum bilirubin in milligrammes re shown—the variations are in brackets.

In such a small series, when much larger numbers would be required to be statistically significant, the importance of finding means of showing that the cases were of comparable severity is obvious. It is thought that Table I shows this to be so, although it will be noted that the level of the serum bilirubin on admission was lower in the treated than in the control cases.

The results of giving choline chloride can be seen in Table II, and it may be mentioned here that they were closely similar in cases treated at home and those treated over-seas.

TABLE II

	Subjects	
	Treated 16	Control 16
Maximum serum bilirubin (mg./100 c.cm.) ..	6.0 (1.5-15)	7.9 (2.0-14.0)
First day of fall of bilirubin to 0.6 mg./100 c.cm. ..	25.1 (11-50)	30.1 (10-55)
First day urine bile-free ..	20 (10-29)	22.2 (10-42)
First day of return of appetite ..	15 (2-33)	14.4 (4-33)
First day allowed up ..	30 (13-54)	28.8 (13-46)
Duration of stay in hospital ..	35 (13-79)	40.7 (27-56)
Number of relapses known ..	4	5

Discussion

We were fortunate in getting our cases early on, in the period of the disease that was accompanied by jaundice. The average number of days that the urine was dark before admission to hospital was 1.4 in our cases, compared with 4.4 in the methionine-treated cases reported by Wilson, Pollock, and Harris (1945). The dose of choline chloride that we gave—1.5 g. daily—is approximately one-third of that of methionine used by the Oxford and Cambridge workers. This gives comparable dosage as regards methyl equivalents, and is probably adequate.

The figures shown in Table II for the first day on which the serum bilirubin fell to 0.6 mg. per 100 c.cm. and for the duration of stay in hospital are a little lower for the treated than for the untreated cases. It is thought, however, that these results, as a whole, must be taken to show that choline chloride, under the conditions of the experiment, had no therapeutic value.

Summary

Alternate cases of infective hepatitis were given 1.5 g. of choline chloride as a supplement to a low-fat high-carbohydrate diet with the addition of vitamins. Sixteen cases were so treated, and no significant benefit over 16 control cases was noted.