et al. as believing that barrier creams may facilitate penetration of the skin by noxious substances.

From these considerations it follows that the use of soap-based barrier creams, so far from preventing industrial dermatitis, may substantially increase the risk. The substitution of ethanolamine soaps may reduce alkalinity, but their effect in potentiating other industrial irritants remains problematical. Until more evidence is available it would certainly seem best to avoid any type of soap in a barrier cream.

Summary

Though soap has a considerable antiseptic activity, its action in washing bacteria off the skin surface is probably more important, particularly as regards recent contamination.

The power of the skin surface to sterilize itself may be impaired by washing with soap.

The normal acidity of the skin surface is changed towards alkaline by exposure to soap; the consequences of this are difficult to assess.

The irritant effect of soap on the skin tends to be overestimated. Such as it is, it depends upon primary irritancy of fatty acids and also upon the power which soap has to penetrate into the skin.

The inclusion of any soap in barrier creams is inadvisable.

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NEW STICK TEST FOR P.A.S. IN URINE REPORT ON USE OF "PHENISTIX" AND PROBLEMS OF LONG-TERM CHEMOTHERAPY FOR TUBERCULOSIS

BY

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Since para-aminosalicylic acid (P.A.S.) became generally available in the British Isles in the spring of 1948, streptomycin a year later, and the introduction of isoniazid in the treatment of tuberculosis in 1952, there has been an increasing weight of evidence of the value of effective long-term chemotherapy in the management of pulmonary tuberculosis.

The low toxicity in therapeutic dosage, ease and convenience of administration, together with potency, make P.A.S. and isoniazid the most satisfactory chemotherapeutic combination for tuberculous patients who have completed their hospital treatment and continue to have antibacterial drugs whilst living at home and working. Many such patients continue their ambulant combined therapy for two to three years.

Several methods have been described for determining the presence of P.A.S. in urine, depending on the colour produced with Ehrlich's reagent (Venkataraman *et al.*, 1948; Herold, 1951; Penman and Wraith, 1956; Ruiz, 1957), hypochlorite (Simpson, 1956), or ferric chloride (Simpson, 1956; Penman and Wraith, 1956; Dixon *et al.*, 1957). Though existing tests are reliable and sensitive when carefully applied in the laboratory or out-patient department, none have the simplicity of "clintix" for glucose (Luntz, 1957) or "albutix" for proteinuria (Macgregor, 1958; Baron and Newman, 1958; Frazer, 1958).

In view of the comparable simplicity of "phenistix" reagent strips (primarily designed for the detection of phenylketonuria), and because it is based on the same principle as the ferric-chloride test, it was decided to examine in detail the suitability of this new test for the detection of P.A.S. in urine. With phenylpyruvic acid the reagent strip changes to a green colour (Rupe and Free, 1958; Baird, 1958; Nellhaus, 1959; Gibbs and Woolf, 1959), whereas with P.A.S. it turns a pink or purple, according to the amount present.

Material and Methods

Phenistix Test

This new test for P.A.S. in the urine employs impregnated paper sticks (phenistix reagent strips), which remain yellow when dipped in normal urine but become purple if the urine contains P.A.S. The test is based on the colour reaction which occurs with ferric ions and phenylpyruvic acid. Phenistix is impregnated with a mixture containing ferric and magnesium salts plus cyclohexyl sulphaminic acid.

Before embarking on clinical trials of phenistix in hospital wards, on chest clinic out-patients, and by patients themselves it was necessary to examine the sensitivity and specificity of phenistix in some detail.

The test was first compared with the two ferric-chloride tests—namely, that described by Simpson (1956) and the modified test used by Dixon *et al.* (1957).

Sensitivity of Phenistix in Comparison with Dixon's and Simpson's Ferric-chloride Tests

Known quantities of P.A.S. in a twofold range from 200 mg. per 100 ml. down to 0.8 mg. were added to nine specimens of normal urine and the three tests were applied to each specimen. Simpson's test (10% ferric chloride) is the most sensitive, giving a detectable colour change with as little as 1 mg. of P.A.S. per 100 ml. of urine. Dixon's test (3% ferric chloride) does not give a positive unless the concentration of P.A.S. in urine is at least 50 mg. per 100 ml. Phenistix gives a colour change with a P.A.S. content of about 12 mg. per 100 ml. Phenistix is thus slightly more sensitive than the Dixon test and slightly less sensitive than the Simpson test. A similar conclusion was reached by analysis of urines from patients taking P.A.S.

In all the subsequent studies phenistix was compared with Dixon's test, because this is the simplest test reported thus far.

Effect of a Single Dose of 5 g. P.A.S. (Sodium Salt) on Urinary P.A.S.

A single dose of 5 g. of P.A.S. (sodium salt) was given at 6 a.m. to 10 patients. Urines were collected two-hourly and tested by the Dixon and phenistix methods. Up to six hours all specimens were positive by both methods. From 12 hours onwards, negative results were obtained by the Dixon method. With phenistix all were still positive at 10 hours and all became negative by 18 hours.

Micro-analysis was undertaken in a urine giving a weak positive reaction to phenistix at 14 hours, and this specimen of urine contained about 25 mg. of P.A.S. per 100 ml. in the non-conjugated form. In another specimen which gave a weak positive phenistix reaction at 16 hours, analysis showed a P.A.S. content of 17 mg. per 100 ml.

Comparison of Sodium and Calcium B-P.A.S.

It has been suggested (Lauener and Friedrich, 1958) that calcium B-P.A.S. is not always detected by Dixon's method. This is not used as a routine in Birmingham, but its effect on phenistix was compared with the effect of the sodium salt. Four patients were given a single dose of 5 g. in cachet form, and four other patients received a single dose of 3.5 g. in powder form. As a control four patients were given a single dose of 5 g. of P.A.S. (sodium salt) in liquid form. Urine specimens were collected at two-hourly intervals for the next 16 hours and again at 24 hours. All specimens were tested by the Dixon test and by phenistix. The results showed no essential difference whether calcium B-P.A.S. or the sodium salt had been taken, though a positive colour with phenistix appeared a little earlier and lasted longer than with Dixon's test. It was found, however, that calcium B-P.A.S. could be detected in the urine for a slightly longer period than sodium P.A.S.

Specificity of Phenistix for P.A.S.

In addition to detecting phenylpyruvic acid (Rupe and Free, 1958; Nellhaus, 1959; Gibbs and Woolf, 1959) and P.A.S., phenistix reacts to the excretory products of other salicylates, including aspirin and phenothiazine compounds (Rupe and Free, 1958; Nellhaus, 1959).

Aspirin is probably consumed in larger quantities than any other therapeutic substance, as it is very widely marketed, prominently proclaimed, and popularized in

periodicals, newspapers, and commercial television as an analgesic agent. Therefore a field study was organized, using phenistix for detecting substances other than P.A.S. in urine.

All new untreated patients referred to the Birmingham Chest Clinic for a consultant's opinion had a fresh specimen of urine collected, and these were tested with phenistix and the results recorded as "positive" or "negative" by the nursing staff. Patients with positive tests were asked what drugs, if any, they were taking.

A total of 1,370 consecutive new patients were examined in this way between May and October, 1959, and no patients on P.A.S. therapy were included in this study. The total number of patients with positive results was 91 (7%), and 69 of these were taking aspirin only and 17 were taking compounds containing aspirin. In five patients it was not possible to find out what drug had been taken. None of the patients with positive tests admitted taking drugs prescribed by their doctors which could be traced to chlorpromazine or related compounds. Therefore the effect of these drugs was not studied experimentally.

To study further the effects of salicylates on these urine tests a hospital trial was carried out. The effect of a single dose of 10 gr. (0.65 g.) of soluble aspirin was investigated in four patients. With the Dixon test a positive result was obtained in three out of four patients up to 10 hours after the aspirin had been taken. All were negative at 16 hours. With phenistix all four were positive up to 14 hours, and one remained positive for as long as 26 hours.

The effect of a fairly large dose of aspirin (40 gr. (2.6 g.) in one day) was also investigated on four patients. As might be expected positive results were obtained for a much longer time. At 24 hours three out of four were positive by the Dixon method and all four with phenistix.

Since in practice the percentage of patients taking aspirin is small, a positive phenistix result in a patient for whom P.A.S. has been prescribed indicates that he is likely to be taking his antituberculous drugs. A negative test is good evidence that a patient has not taken his P.A.S. for at least 12 hours.

Studies of Hospital Population, Using Phenistix

Previous studies have been confined to out-patients on long-term chemotherapy, and, though it is generally assumed that it is virtually impossible for hospital in-patients to omit taking prescribed drugs, we felt that this should be investigated nevertheless.

To assess whether P.A.S. was being taken as prescribed by hospital in-patients, repeated spot checks of the hospital population were made at unexpected times, using the phenistix urine test. At Romsley Hill Hospital complete population studies were done on three occasions, the first spot check being carried out on a Tuesday at 2 p.m., the second on a Sunday at 5 p.m. after visiting hours, and the third on a Friday at 8 a.m. At Yardley Green Hospital unexpected visits were paid to five tuberculous wards. Urine specimens were collected from all the patients on each occasion, and a total of 444 phenistix tests were carried out.

Of 444 tests on patients receiving P.A.S. in hospital, 436 (98%) gave a positive phenistix result and 8 (2%) a negative. Considering the results at the hospital where three successive checks were made, the first check showed one negative phenistix result in 105 patients. This one negative result was in a man aged 54 for whom

cachets had been prescribed. Four female patients (aged 16, 20, 28, and 59) gave a negative phenistix reaction in the second spot check, and one of these (the woman aged 59) also gave a negative result in the third spot check.

Results of Urine Tests with Phenistix on Chest Clinic Out-patients

Simpson (1956) examined the urines of 100 patients for whom P.A.S. had been prescribed, and found that 76 gave positive reactions with the hypochlorite test and the ferric-chloride test (10% solution). Thus 24% were "defaulters." Dixon *et al.* (1957) reported that 76 out of 151 patients (50%) on P.A.S. therapy were found, as a result of a simple urine test using 3% ferric chloride, to have defaulted in taking their prescribed P.A.S. Wynn-Williams and Arris (1958) followed a group of 153 out-patients and found that, despite special efforts to ensure the regular taking of drugs by their patients, 78 were "regular takers" and 75 (49%) "defaulters."

The object of this study was to check the frequency with which defaulters could be detected in a busy out-patient department, using the extremely simple phenistix test. A fresh specimen of urine was obtained from each patient attending the Birmingham Chest Clinic and the out-patient departments of Yardley Green and West Heath Hospitals for whom P.A.S. had been prescribed. Nursing staff were responsible for testing the urines of patients. This was usually done in the interval between the taking of the chest radiograph and the clinical examination, so that the test was completed and recorded as "positive" or "negative" before the patient was seen by the physician.

During a period of two months 705 tuberculous patients for whom P.A.S. had been prescribed were examined at the three out-patient centres in Birmingham. Of the 705 patients, 467 gave a positive phenistix result, and the remaining 238 (34%) were "defaulters." Table I

TABLE I.—Result of Urine Test for P.A.S. by Phenistix in 705 Out-patients, According to Sex and Age

Age Group (Years)	Male			Female		
	Total Tested	Negative		Total Tested	Negative	
		No.	%		No.	%
15-24	46	17	37	71	36	51
25-34	75	21	28	91	35	38
35-44	102	22	22	58	25	43
45-54	93	29	31	39	6	15
55-64	78	29	37	13	4	31
65+	26	10	38	13	4	31
Total ..	420	128	30	285	110	39

sets out the results of the urine tests for P.A.S. by phenistix, according to sex and age. Of 285 women, 110 (39%) gave negative results, a higher figure than the 128 (30%) of 420 men. The default rate was highest (51%) in young women aged 15-24.

The length of time that patients had been taking antituberculous drugs had a significant effect on the results, as can be seen from Table II. This is contrary to the findings of previous workers (Dixon *et al.*, 1957; Wynn-Williams and Arris, 1958), who did not find such a relationship in the small groups they studied. Where the duration of chemotherapy was less than one year, only 18% gave negative tests. The failure rate steadily increased with the length of time that patients had been receiving chemotherapy, and where drugs had been given for more than four years the default rate was 66%.

TABLE II.—Results of Urine Tests for P.A.S. by Phenistix in Out-patients, According to Duration of Chemotherapy

Months after Starting Chemotherapy	Total Tested	Negative	
		No.	%
1-12	204	36	18
13-24	281	103	37
25-36	131	52	40
37-48	68	33	49
Over 48	21	14	66
Total ..	705	238	34

TABLE III.—Results of Urine Tests for P.A.S. by Phenistix in Out-patients, According to Length of Time Discharged from Hospital

Months after Discharge from Hospital	Total Tested	Negative	
		No.	%
1-12	358	89	25
13-24	157	71	45
25-36	47	23	49
Over 36	18	8	44
Domiciliary chemotherapy with previous hospitalization ..	580	191	33
Domiciliary chemotherapy without previous hospitalization ..	125	47	38
Total ..	705	238	34

The correlation between the time elapsed since leaving hospital and the taking of P.A.S. as an out-patient was also significant. Of the 705 patients, 580 (82%) had begun their chemotherapy in hospital, and Table III shows the results of the urine tests for P.A.S. by phenistix related to months after discharge from hospital. Only 25% of the patients showed negative tests in the first year after discharge from hospital, but the percentage rose to 45 in the second year, and remained about this level thereafter.

The average for all 580 patients was 33% with negative tests, compared with 38% for the 125 patients who had received domiciliary chemotherapy only.

Of this group of 125 patients, 11% of 36 patients gave negative results during the first 12 months after starting antituberculous drugs; 39% of 36 in the second year; 45% of 31 in the third year; 65% of 17 in the fourth year; and 100% of 5 patients when the chemotherapy was continued more than four years.

Use of Phenistix by Patients

The object of this study was to see whether there was any advantage in the patient carrying out his own tests and so demonstrating the regularity or irregularity of his drug-taking habits. Self-testing could be of value only as long as the patient did not associate his chemotherapy-taking with the result of his urine tests.

Twenty patients chosen as likely to be co-operative were each given a bottle containing 50 phenistix and asked to test their own urines last thing at night for 50 days. None of them knew that the test was for P.A.S., and some of them believed that a drive for the detection of diabetes was being made. They were shown typical positive and negative colours, and it was made clear to them that they could expect either positive or negative results, which were recorded on a sheet each night as "purple," "no change," or "test not done." The results of the patients' self-testing with phenistix are shown in Table IV. None of the patients had any difficulty in carrying out the tests, and the results revealed some significant and salient sidelights on patients'

TABLE IV.—Results of Phenistix Self-testing in 20 Patients over 50 Days, with Reasons Given for Negative Tests

Patient	Form of P.A.S.	Phenistix Tests			Remarks
		Pos.	Neg.	Not Done	
1	Cachets	46	4	0	P.A.S. taken late at night after urine test on four occasions, so that there was more than 12 hours between doses
2	"	48	0	2	P.A.S. not taken during week-ends and for a week
3	"	30	20	0	
4	"	42	8	0	
5	"	48	2	0	P.A.S. not taken on 7 Sundays and insufficient P.A.S. on one day
6	"	50	0	0	Did not take P.A.S. on one day with negative result. Therefore repeated this "experiment" on another day and discovered the relationship
7	Tablets	48	0	2	
8	Cachets	50	0	0	Insufficient P.A.S. for a week over Whitsun
9	Granules	46	0	4	
10	Liquid	43	7	0	
11	Tablets	50	0	0	Frank confession to not taking drugs since discharge from hospital
12	"	0	50	0	
13	Cachets	50	0	0	Missed taking P.A.S. for 3 days through insufficient medicine
14	Granules	50	0	0	
15	Liquid	47	3	0	
16	Cachets	50	0	0	Forgot to take his drugs on 8 days and had 6 very late nights, on which occasions he did not do the tests
17	"	36	8	6	
18	Granules	49	0	1	
19	"	50	0	0	
20	Cachets	50	0	0	
Total ..		883	102	15	

drug-taking habits. One patient always omitted his drugs during week-ends, and another had a rest day on Sundays. Three patients failed to take their drugs for one, three, and seven days through not having a sufficient supply.

Twelve patients had taken their chemotherapy regularly throughout the test period, and only one patient had taken no drugs at all. This patient had given no indication that he was a defaulter at his routine examinations at the follow-up clinic prior to the start of urine-testing. The other seven patients gave negative tests on 2, 3, 4, 7, 8, 8, and 20 occasions respectively during the 50-day test period. The reasons are explained in Table IV. In four patients the negative tests occurred sporadically as isolated incidents, and in three they occurred as runs.

Discussion

The most practical way of checking whether a tuberculous patient is taking his P.A.S. regularly is to test the urine. The advantages of phenistix over the conventional tests for P.A.S. in urine are many. The new test does not require any laboratory equipment or stock solutions which may be caustic and staining. The test is quickly carried out by either physician or nurse and is extremely simple and sensitive: it consists in merely dipping the impregnated end of the paper stick into the urine. The presence of P.A.S. causes a change of colour from yellow to purple, the depth of which depends upon the concentration of P.A.S. No attempt was made to relate the depth of the colour reaction with the P.A.S. content of the urine, though it was noted that the depth of colour varied from time to time.

A negative urine test is evidence that no appreciable amount of P.A.S. is present in the urine and that no P.A.S. has been taken for a number of hours (Simpson, 1956; Dixon *et al.*, 1957; Wynn-Williams and Arris,

1958; Fox, 1958). The exact number of hours depends principally on the sensitivity of the test employed. With the Dixon test a negative result indicates that no P.A.S. has been taken for 10 to 12 hours, whilst a negative phenistix test indicates that no P.A.S. has been taken for 12 to 18 hours.

Like the ferric-chloride tests, phenistix gave positive results to aspirin. Though 7% of a group of unselected patients were taking aspirin prior to having their urine tested, we do not feel that this invalidates the use of phenistix in view of the importance of detecting patients who are not taking P.A.S. It must be remembered that the interference of salicylates is important only in those patients who are omitting their P.A.S., as the physician may be misled by a "false" positive. Only a small proportion of the patients failing to take their P.A.S. regularly are likely to be taking aspirin at any given time.

It is of interest that unexpected checks on hospital in-patients having continuous chemotherapy revealed that 8 (2%) of 444 tuberculous patients had omitted to take their P.A.S. This is frequent enough to draw attention to the fact that not all patients can be relied on to take their medicines even in hospital unless the nurse makes sure that the liquid, tablets, cachets, granules, or powders are actually swallowed by the patient. In these cases it was ascertained that the nurses had not waited to watch their patients swallow the cachets as they invariably do with liquid P.A.S. given in a medicine glass.

The use of phenistix for the estimation of urinary P.A.S. in 705 out-patients furnished further satisfactory evidence of its usefulness. One-third of the patients gave negative results and there was a slight difference between the sexes, 30% of the men and 39% of the women giving negative results. Similar sex difference has been reported in Indian out-patients (Tuberculosis Chemotherapy Centre, Madras, 1959), more irregularity in self-administration being found among female than among male patients.

The fundamental problem of continued drug therapy in the treatment of any chronic disease is the regularity with which patients will administer the prescribed preparations to themselves, whether it be for months or years. This was discussed by Fox (1958) with particular reference to pulmonary tuberculosis.

The Tuberculosis Society of Scotland (1958) has been carrying out a controlled trial of patients with tuberculous lesions of doubtful activity picked up on mass radiography. One group was kept under observation only, and the other was given chemotherapy with P.A.S. and isoniazid for a minimum of six months. Over a two-year follow-up period there was a breakdown rate of approximately 17% in those undergoing observation only, compared with 8% in the group receiving treatment. All the definite breakdowns in the so-called treated group were in patients who had failed to take their chemotherapy as advised. This finding emphasizes the great difficulty in ensuring that all patients on out-patient treatment take their chemotherapy as directed.

The diseases requiring self-administration of drugs by patients for long periods may be considered under two broad headings. Firstly, there are disorders where the patient is reminded that he must take his drugs regularly by the fact that omitting them can cause unpleasant symptoms in a short time. Examples are the long-term treatment of coronary thrombosis with anticoagulants, of epilepsy with anticonvulsants, of peptic ulceration

with antacids, of auricular fibrillation with digitalis, and of rheumatoid arthritis with corticosteroids. Secondly, there are conditions where the effects of omitting the drugs are often not apparent to the patient for some considerable time. In these cases there is a greater likelihood for irregularity in the taking of drugs. Pulmonary tuberculosis under long-term chemotherapy and rheumatic fever treated prophylactically fall into this category and are considered below.

In addition to the examples quoted by Fox (1958), there are other conditions for which patients cannot be depended upon entirely to take their medicine as prescribed regularly. For example, not all patients with a hypochromic anaemia take their iron preparation by mouth consistently (Hawkins *et al.*, 1950), while failure to keep to a gluten-free diet was the commonest cause of relapse in idiopathic steatorrhoea (French *et al.*, 1957). In the oral treatment of pernicious anaemia, Wilkinson (1949) found that 15 out of 441 patients who neglected to continue with their treatment relapsed. Irregular and inconsistent treatment has also been reported in diabetes (Cosnett, 1959; Campbell and McNeill, 1959).

A close parallel may be drawn between regular prophylaxis in rheumatic fever and continuous anti-tuberculous therapy in pulmonary tuberculosis. The Rheumatic Fever Committee of the Royal College of Physicians (1957) recommended that the prophylactic regime for the rheumatic child should consist in taking chemotherapy for at least five years. A W.H.O. Expert Committee on Rheumatic Diseases (1957) stated that it was unlikely that prophylaxis could be continued successfully if the physicians did not accept and assume continuous responsibility.

Similarly in pulmonary tuberculosis, we feel that one of the most important causes of failure to take prescribed drugs is the lack of continuity of supervision by one experienced physician. The value of this supervision was very apparent in pre-chemotherapy days when the best results in therapeutic pneumothorax were obtained where the induction, refills, and supervision were all carried out by one doctor. At the present time if the physician in charge is prepared to take immense trouble to impress on his patients regularity in taking drugs as well as the consequences of neglecting treatment, the patient is much more likely to take his chemotherapy conscientiously.

Tactful questioning of some of the patients with a negative phenistix test indicated that there are many reasons for irregularity in taking P.A.S. by patients on domiciliary treatment.

1. P.A.S. has the disadvantage of being somewhat bulky and unpleasant to take and may act as a gastrointestinal irritant, so that with long-continued use most patients experience transient disturbances in the alimentary tract. Patients who suffer anorexia, nausea, vomiting, abdominal discomfort, or diarrhoea often have to discontinue the drug for one or more days at a time, thereby accounting for a proportion of those who give a negative phenistix test on any given day. One patient instituted his own system of a relief period by omitting the drugs every Sunday, and another omitted his drugs over week-ends (Table IV).

2. Simple forgetfulness plays a part in some patients. The patient with quiescent disease feels well generally, leads a fairly normal life while working, and on occasion forgets to take his drugs, particularly when away from home or out late at night.

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3. Patients sometimes run out of their supply of medicine. This was found in 3 of the 20 patients who tested their own urine with phenistix for 50 days (Table IV).

4. The urine may stain underclothing or bed-linen, and make the P.A.S. unpopular with some patients. This objection to P.A.S. is not encountered often, because of reticence on the part of patients.

5. After a long period on chemotherapy there is a tendency for the patient to be less regular with his drugs or to discontinue them altogether, except in obsessional patients. There was a distinct correlation between the length of time that patients had been having drugs and the default rate: the longer they had been taking the drugs the less reliable they became (Table II). A similar correlation was found with the length of time that patients had been discharged from hospital (Table III). The quiescent patient is tempted to think that he is cured, sees no need for medication, and therefore stops taking his drugs. The problem to be settled is for how long antituberculous drugs need be given if patients are to recover fully without risk of relapse in the years following. Follow-up studies of patients treated with prolonged chemotherapy have not extended long enough for an answer to be made to this problem yet.

6. A small number of patients are uncooperative, and no amount of exhortation on the part of the physician will make them any less quixotic in their demeanour.

If long-term antituberculous chemotherapy is to succeed for the vast majority of patients, with failure to take drugs confined to the small hard core of uncooperative patients, then the problem demands attention to the following points. The chest physician must accept and assume continuous responsibility for his tuberculous patients, and every effort must be made to emphasize in the strongest possible terms, with persuasive propaganda and compelling conviction, the importance of taking the drugs as prescribed. In these circumstances it is to be hoped that the default rate would be much less than that found in the present study. There was some excuse for omitting urine-testing when only the cumbersome laboratory methods were available, but there is no excuse now that a test as simple and rapid as phenistix is obtainable.

The increasing tendency to allow tuberculous patients home at an early stage of treatment in order to continue chemotherapy as out-patients needs to be reconsidered in the light of these findings. It is inadvisable to permit young adults aged 15-24 of either sex, females of 25-44, and males over the age of 55 to leave hospital after only a short stay, as patients in these age groups showed the highest default rates. Hospital treatment for a much longer time would be far more appropriate for such tuberculous patients.

Summary

A new test for P.A.S. in urine ("phenistix" reagent strips) is described. Phenistix has a good degree of specificity for P.A.S., and no essential difference was noted whether the sodium or the calcium salt of P.A.S. had been taken. Positive results for reasons other than P.A.S. were relatively few; 1,370 consecutive new out-patients were examined and positive results with phenistix were obtained in 91 (7%), the majority due to aspirin.

The extreme simplicity of phenistix, together with its optimum sensitivity, makes it the ideal test for the qualitative estimation of P.A.S. in urine in both out-

patients and in-patients. A negative phenistix test is evidence that no appreciable amount of P.A.S. is present in the urine and that no P.A.S. has been taken for 12 to 18 hours.

Of a total of 444 tests at unexpected times on hospital in-patients receiving P.A.S., 436 (98%) gave a positive and 8 (2%) a negative result. Not all patients in hospital can be relied on to take their medicine unless the nurse makes sure that the medicine is actually swallowed.

Of 705 tuberculous out-patients on P.A.S. therapy, 467 gave a positive phenistix result, and the remaining 238 (34%) were "defaulters." Negative results were found in 39% of the women and 30% of the men. The length of time that patients had been taking chemotherapy and the time elapsing since discharge from hospital had a significant effect on the results. The failure rate steadily increased in both instances with each year of the duration of chemotherapy. It is inadvisable to permit young adults aged 15-24 of either sex, females aged 25-44, and males over the age of 55 to leave hospital after only a short stay, as patients in these age-groups showed the highest default rates.

Self-testing by 20 patients revealed the reasons for negative tests and gave insight into patients' drug-taking habits. The problem of self-administration of drugs is discussed. It is suggested that the best results will be obtained in cases where the whole course of treatment is directed by one experienced physician and that continuity of medical surveillance is essential.

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USE OF A VACUUM EXTRACTOR (VENTOUSE) IN OBSTETRICS

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For at least 250 years attempts have been made to shorten labour by means of traction applied to the foetal head. Early in the seventeenth century the obstetric forceps was invented by the Chamberlin family, and modifications of it are in use throughout the world to-day. As an alternative, the use of a vacuum to affix a tractor to the foetal scalp has been attempted since Yonge used a cupping glass in 1706. The next attempt of the kind appears to have been that of Simpson, in 1849, who described a rubber cap attached to a brass syringe. In 1890 MacCahey used a rubber cap with a solid handle which was pressed on to the presenting part and created its own vacuum.

Torpin (1938) reported the delivery of 10 women with prolonged second stage by means of a rubber suction cup extracted by a vacuum pump, and bearing a loop for traction and lugs which enabled the operator to aid rotation. In 1947 Couzigou described the use of a metal cup, which he called the "ventouse," the name now in general use in the French-speaking countries. Koller (1950) applied prolonged weight traction to the foetal head in cases of uterine atony by means of a suction cup, and with a weight of 0.5-1.5 kg. for up to 18 hours achieved augmentation of the uterine contractions and acceleration of the labour. An apparently unique use of the vacuum principle was that of Gastaldo (1951), who occluded the lower birth canal with a metal cup covered with rubber. Subsequent creation of a vacuum was said to promote advance of the foetus down the birth canal. Finderle (1952) described his trumpet-shaped metal cup extracted by a vacuum pump, and in 1955 he reported that the instrument had replaced forceps completely for three years and that in 132 deliveries no deaths or complications were attributable to the extractor.

Malmström (1954) described his instrument, which was used primarily to increase labour pains in inertia by promoting good contact between scalp and cervix and so leading to increased stimulation of the uterus. Prolonged weight traction for up to several hours was originally used, but, later, direct extraction or improvement of the position of the head for subsequent forceps delivery was undertaken. Later, Malmström (1957a) described the modification of his instrument which is now the form most widely used. Since his first report his instrument has been used in many European countries, including Russia (Petchenko, 1958), North and Central Africa, China, and South America. We have been unable to find any report of its use in either the British or the North American literature, though at the Second World Congress of Obstetricians and Gynaecologists in Montreal in 1958 films demonstrating its use were shown by Muller, of Strasbourg, and deWatteville, of Geneva.

The only British references we have found are in nursing publications. Lobban (1955) claims that