

hepatic diseases when the remaining part of the liver has good compensatory function. In the various forms of cirrhosis the galactose test is uniformly positive, strongest in alcoholic cirrhosis. In septic conditions or advanced stages of infectious diseases, a positive galactose test results from liver degeneration. In cases of phosphorus poisoning, chloroform and mineral poisons, liver degeneration is not shown by the galactose test until some days after administration of the poison; in phosphorus poisoning, sometimes not until the second or third week. The great value of these tests for differential diagnosis lies in the conclusions which can be drawn from their combined use, as will be seen from the accompanying table.

The foregoing tests, used regularly in my work, are of such great value in diagnosis and so easy of application as to commend themselves in the routine examinations of all hospital and private practice. In my opinion, the urobilinogen test will be adopted in insurance examinations.

Western National Bank Building.

REPORT OF 150 CASES OF PULMONARY TUBERCULOSIS TREATED WITH TUBERCULIN

HARRY LEE BARNES, M.D.
Superintendent of the State Sanatorium
WALLUM LAKE, R. I.

The material for this report was derived from the histories of 150 cases of pulmonary tuberculosis treated with tuberculin at the Rhode Island State Sanatorium during the five years 1907 to 1912 inclusive.

In this series of cases tuberculin was not usually given to incipient or far advanced patients. The usual type of patient selected was the chronic one whose disease had been arrested or improved, but who was still having tubercle bacilli in the sputum with a moderate amount of signs. Tubercle bacilli had been present at some time in 132, or 88 per cent., of the cases. Only three or four had cavity signs. In a few cases, however, tuberculin was tried in those who had completely failed to improve under the usual hygienic-dietetic régime and who had sufficient temperature to indicate an active process. The tuberculin was given after the manner advocated by Trudeau, an effort being made to develop tuberculin tolerance by gradually increasing doses with as few reactions as possible. Tenderness at the point of injection, which was regarded as a local reaction, was present at times in the majority of cases. Slight general reactions occurred in 20 per cent. of the cases. There were no severe reactions. Fifty-six of the patients were given Watery Extract, forty were given Old Tuberculin, thirty-seven Bacilli Emulsion, and the remainder Bouillon Filtrate. The tuberculin books published by the Outdoor Life Publishing Company, recording in detail the prominent symptoms, were used to watch the progress of the cases in many patients who had sufficient education and intelligence to use them. In a few instances the treatment was discontinued because of the onset of temperature or continued loss of weight, yet it was thought proper to include these cases. A large proportion of the patients did not take the treatment as long as advised, as they could see no effect from it. Most of the patients were above normal weight when the tuberculin treatment was begun, yet ninety-one patients gained an average of 4.7 pounds, while forty patients

averaged a loss of 3.4 pounds. Over 3,000 doses were given, or an average of twenty doses per patient and the average duration of treatment was sixty days. About half of the patients taking Watery Extract reached a maximum dose of over 0.5 c.c. of Solution 100, many taking a full cubic centimeter. The maximum dose of Old Tuberculin was about 0.331/3 c.c., and the maximum doses of Bouillon Filtrate and Bacilli Emulsion were much smaller. One patient developed pleurisy with effusion, another patient developed tuberculous meningitis, and three patients who had improved little or none on the ordinary sanatorium régime failed rapidly a few weeks after commencing tuberculin treatment, but as such complications and failures occur about as often no matter how patients are treated, they may be regarded as coincidences. In a few cases striking improvement occurred, but equally striking instances occur on the usual sanatorium régime, and on the whole these patients appeared to do neither better nor worse than patients not so treated.

No attempt will be made to review the voluminous literature on the subject, yet it may be useful to point out that many writers have reported too few cases, often without adequate subsequent histories, and many have contented themselves with ascribing improvement to the tuberculin which may have been due to other causes. Others have allowed their judgment to be influenced by a few striking instances of improvement which follow the use of tuberculin and have forgotten to mention striking instances of improvement which occur without its use. Some appear to labor hard to find something favorable to tuberculin.

In forming an opinion as to whether or not any treatment is beneficial, parallels should be drawn between two classes of patients, those who take the treatment and those who do not, and these parallels should be made from cases that are as similar in prognosis as possible. For this study, an attempt was made to match each one of the 150 patients taking tuberculin against another patient of the same classification, according to the National Association, and also anatomically according to Turban, and likewise to match only cases having similar records of bacilli in the sputum, temperature, pulse, respiration, general condition, weight, race and year of discharge.

An unsparing logic would also demand that the amount of intelligence and self-control, duration of disease, family infection, amount of sputum, sex, age, duration of sanatorium residence and many other factors should also be similar, but this was found impossible, as all the available material, comprising about 1,500 patients who did not take tuberculin, was barely sufficient to fulfil the conditions first named. There were, however, few marked differences in age and about 75 per cent. of the cases were matched as to sex. The condition on admission was allowed to stand unless tuberculin was given a long time after admission, during which time the condition had undergone marked change, when the case was reclassified. The length of time patients had fever and the number of febrile attacks were considered of more importance than mere height of the fever. The pulse averages for the first week were the same within ten beats. Respiration was only matched when abnormal, as was also the temperature. Under the general condition were considered not only strength and vigor, but digestive disturbances. No attempt was made to match the exact gain or loss in weight in pounds but only to match slight or marked changes, or the general

tendency. No negroes took tuberculin and none were used for this comparison. Patients were matched against those discharged within a year of each other, except in two instances.

To eliminate bias in the selection of cases they were chosen from printed records containing the main clinical facts as to classification, pulse, temperature, etc., but not containing the names of the patients, so that a knowledge of the subsequent histories should not create prejudice. Two or three options were selected in this way, then the names of the patients were ascertained, their charts studied, and the one having the greatest similarity accepted; if all were unsuitable, more options were found in the same way. Of course, no pretense is made that the two classes of cases were exactly matched in prognosis, but no pains were spared to carry out the method as completely as possible. Drawbacks to the use of this method are the abundance of material required and the amount of labor necessary to carry it out. While not perfect it should be much superior to slip-

TABLE 1.—CONDITION OF PATIENTS ON ADMISSION

	With Tuberculin	Without Tuberculin
Inipient	10	10
Moderately advanced..	137	137
Far advanced	3	3
Total.....	150	150

TABLE 2.—CONDITION OF PATIENTS ON DISCHARGE

	With Tuberculin	Without Tuberculin
Apparently cured	13	11
Arrested	30	51
Improved	38	61
Unimproved	19	27
Died	0	0
Total.....	150	150

TABLE 3.—COMPARISON OF PRESENT CONDITION OF PATIENTS WHO DID NOT TAKE TUBERCULIN AND OF THOSE WHO DID

	With Tuberculin	Without Tuberculin
Well	47	43
Living and working...	14	20
Living	23	19
Dead	66	68
Total.....	150	150

shod methods of stating results of treatment and if widely adopted it would help to weed out more rapidly worthless methods of treatment in pulmonary tuberculosis. If applied to mooted questions like the "value of climate," it would eventually solve them, as the fruitless war of theories and opinions would eventually be displaced by evidence.

Patients did not as a rule take tuberculin until several weeks or months after admission, so that ample records were available prior to the specific treatment.

The average duration of sanatorium residence for the tuberculin-treated patients was 11.1 months against 5.1 months for those who were not so treated. This difference in the duration of treatment would probably account for the difference in condition on discharge, as many patients who remain only two or three months are steadily progressing toward arrest or apparent cure, which terms nevertheless require time limits, from the last symptoms of activity, of two and three months, respectively. Of the patients who did not take tuberculin 37.3 per cent. remained less than four months, against 2 per cent. of those who took it. About 60 per

cent. of the patients have been discharged over four years and 86 per cent. over three years.

The tuberculin-treated class has 2.7 per cent. more recoveries and 1.3 per cent. fewer deaths, but the untreated class has 1.3 per cent. more able to work. The present condition of these two classes of patients is therefore as nearly identical as one could expect it to be if the tuberculin treatment had been entirely without value.

The average length of life of those tuberculin-treated patients who have died up to this time was 22.1 months from the date of discharge against 14.2 months for those who did not take tuberculin. This extra eight months of life cannot be taken as sufficient evidence that tuberculin prolonged life because the tuberculin-treated patients remained in the sanatorium six months longer. In fact, if the tuberculin-treated patients, remaining as they did six months longer in the sanatorium, had not lived longer, it would have been evidence that the tuberculin actually did harm because it cannot be denied that sanatorium treatment prolongs life.

Through the courtesy of Dr. von Ruck, Watery Extract was furnished free of charge and was given to fifty-six of the above series. The solutions as furnished were convenient for administration and they seemed

TABLE 4.—CONDITION OF PATIENTS AT BEGINNING OF WATERY EXTRACT TREATMENT

Arrested	21
Improved	22
Unimproved	13
Total.....	56

TABLE 5.—PRESENT CONDITION OF PATIENTS WHO TOOK WATERY EXTRACT

Well	15
Living and working.....	1
Living	4
Dead	36
Total.....	56

more easily given without reactions than some of the other tuberculins, B. E., for instance. So far as known it gave neither better nor worse results than the others, but as it was given at an earlier period (1907), more time has been allowed for the progress of the disease and death. The patients given Watery Extract were for the most part moderately advanced cases who had been in the sanatorium long enough to be in good general condition and the Watery Extract was given as recommended by Dr. von Ruck.

Nearly all of those classified as improved were above normal weight and fell but little short of the requirements of arrested cases. The average duration of treatment with Watery Extract was sixty-five days; the average maximum dose was slightly over 0.5 c.c. of Solution 100.

Even when these patients who were classified as unimproved at the initiation of Watery Extract treatment are excluded from consideration, 53 per cent. of the patients are dead.

CONCLUSION

While other observers using other methods of tuberculin administration and with more prolonged treatment may get different results, established by equally thorough statistics, this analysis furnishes no evidence that these 150 patients taken as a whole were influenced by the tuberculin treatment.