

# The Indian Journal of Tuberculosis

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## RESEARCH ON BCG

The tuberculosis Expert Committee of the World Health Organisation observed in September, 1959 "Existing knowledge and experience show that BCG vaccination can give a considerable degree of protection against tuberculosis; that the inconveniences and risks associated with the vaccination are insignificant; that it can be applied on a mass scale at costs and with personnel which any country can afford and in a way which is acceptable to the population; and it is therefore the considered opinion of the Committee that BCG vaccination should have an important place in and form an integral part of the tuberculosis programme in most countries."

No one has yet proved scientifically that BCG vaccine is harmful or that it is useless. On the other hand, there is conclusive evidence, based on scientifically controlled investigations in human beings and animals, to show that BCG vaccination can give, as the W.H.O. Expert Committee pointed out, considerable degree of protection against tuberculosis. Some critics, however, question the *degree of protection* conferred by BCG on different groups of human beings and ask whether infection by non-specific organisms as evidenced by low tuberculin reactions in some groups of the population in different areas of the world affect the extent of protection afforded by BCG in those communities.

There are still some in this country and elsewhere who question the *efficacy* of BCG vaccination and ask for proof of its usefulness. This is surprising especially against the background of the mass of evidence in favour of BCG. Yet one may not ignore such a demand, especially when it comes from responsible administrators and persons of standing whose opinions count with the public. A scheme for research on BCG was prepared some two years ago with the assistance of competent statisticians and submitted to the

Indian Council of Medical Research but this was kept in abeyance for some reason or other. As the BCG vaccination programme in India is one of the largest in the world, involving considerable cost, it seems necessary to revive the scheme for research, either in the form already submitted to the ICMR or with modifications if necessary by competent statistical experts. In a democratic set up one cannot ignore the demand for research in this respect. The country may have to pay the price even if some persons however scientific minded they may be, consider that further research on the efficacy of BCG is not called for. The question whether non-specific infection noted in India do play a part in influencing the degree of protection given by BCG vaccination, calls for a scientific answer. No research has yet been done to elucidate this. It seems to us that any research undertaken in India on BCG should include this aspect also.

## PRIORITIES IN TUBERCULOSIS CONTROL MEASURES IN DEVELOPING COUNTRIES\*

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Recent advances in medical science and technology have provided us with effective tools and the technical know-how to mount an attack on tuberculosis on a mass scale in any country where it poses a serious problem with the certain knowledge that within the period of one decade the spread of the disease in the community can be checked and the hazard it presents to the public health can be eventually eliminated. The highly developed countries have applied this new knowledge with great success and established quite definitely the efficacy of the weapons we possess to combat tuberculosis and the practicability of their application on a mass scale.

It seems but natural that developing countries, faced as they all are with a serious tuberculosis problem, should take full advantage of the new knowledge available and, profiting from the experience of the developed countries which have pioneered the practical application of this new knowledge, they should proceed expeditiously with vigour and determination to bring tuberculosis under control. Yet it is painfully apparent that most developing countries are not setting about this task in the spirit of a crusade which one would expect of them. Even those which are willing in spirit and bold in determination are experiencing considerable difficulty in organising and developing an effective control programme at the national level.

The most formidable obstacle confronting all developing countries is an acute shortage of technically trained medical personnel at all levels from doctors and nurses to technicians and other para-medical personnel. An equally thorny problem is the vexed question of providing adequate funds both for capital expenditure which these countries may be able to scrape up and recurrent expenditure which they can ill-afford because it has a cruel

habit of mounting inexorably in each succeeding year of any new venture. Yet a further restraining factor is the relative place tuberculosis occupies in the overall public health picture of the country which may well be burdened by other equally pressing public health problems like malnutrition, malaria, diphtheria to name only a few of a whole host of conditions which afflict most developing countries.

These three major difficulties impose severe limitations on the ability and capacity of developing countries to embark on a full scale attack on tuberculosis. Yet the need to take some positive action seems compelling and urgent, particularly in view of the proven efficacy of the weapons which are available to combat tuberculosis. A workable solution to this dilemma has to be found, even if it is only a compromise.

Any country which is determined to tackle the problem despite the seemingly insurmountable difficulties present, can find a solution to this predicament if it is prepared to make some important adjustments to its general public health programme immediately and then proceed to develop a tuberculosis control programme at the national level on a long term basis keeping within the financial, physical and public health capacity of the country.

As an immediate step much can be done with the resources already available. All that is required is to channel the existing effort into streams which will provide the utmost benefit to the nation in tuberculosis control. To do this it is necessary to establish firmly at the very outset a strict schedule of priorities in tuberculosis control measures contemplated. In working out these priorities the basic principles of tuberculosis control using the new knowledge available should be strictly adhered to.

\* Paper read at the meeting of the Eastern Regional Committee of the International Union Against Tuberculosis in Bangkok in November, 1962.

The primary aim of the control campaign should be to protect the healthy persons of the community from being infected. The emphasis should, therefore, be shifted from the individual patient to the community as a whole and all effort directed to the promotion of public health. To be effective, a tuberculosis control programme requires to be dominated by two paramount priorities: protecting with BCG vaccination all the susceptible members of the community who are living and working 'at risk', and finding the excretors of tubercle bacilli to render them non-infectious to their contacts with treatment and education. No other consideration, however important it may seem, should be permitted to divert the national effort from these two overriding priorities.

The control campaign should be developed as an extension of the existing medical and health services in the country and should remain fully integrated with the general public health programme. It is always more practicable to develop and steadily extend the existing organisation than to start anew a separate and independent one. The only change necessary is the establishment at the national headquarters of the public health service a separate division of tuberculosis control to organise and direct the national control programme. The national character of the control campaign should be established at the very outset and strictly maintained thereafter. The importance of a strong central body at national headquarters with powers of enforcement of national tuberculosis control policy throughout the nation transcending provincial barriers cannot be over-stressed. The successful implementation of the national control plan hinges firmly on this pre-requisite.

Examination of the existing resources will show that BCG vaccination is the first prong in the attack on tuberculosis which can be introduced with immediate effect without much disruption of the medical services. It is usually possible to extend the scope of existing immunization programmes to include BCG vaccination. The existing medical staff engaged in this work can adjust themselves to this change. Alternatively where such a programme does not exist and one is contemplated, BCG vaccination could be incorporated into the immunization time-table arranged for children. Where a school health service exists, the staff manning this service can undertake BCG

vaccination of school children who are non-reactors to tuberculin. If vaccination of newly born babies is desirable which is often the rule in developing countries with a high prevalence of tuberculosis, the technique of BCG vaccination can readily be taught to the maternity unit staff and all babies born in hospitals can be covered.

It will be found in developing countries that the BCG campaign is largely directed at the child population and it is generally feasible to utilize the existing child health promotion services to start and gradually develop the campaign. In order to obtain the widest cover possible with the limited trained personnel available, BCG vaccination should be offered to the readily accessible groups within the child population like babies born in hospitals, children attending Maternity and Child Health Clinics, primary school children and contacts of known cases, particularly infectious cases.

Case-finding on a mass scale is, on the other hand, usually a later development but even in the beginning a start can be made by using the existing radiographic and laboratory services to concentrate on persons with symptoms, who in turn are the most likely excretors of tubercle bacilli and, therefore, dangerous reservoirs of infection. Simple direct smear microscopy of the sputum is sufficient to discover the highly infectious persons in the community. The existing facilities for tuberculosis treatment, follow up and prevention in hospitals and clinics should be exclusively reserved for the infectious case and his household contacts, and all effort that can be mustered directed primarily towards rendering him non-infectious and keeping him so. His household contacts should always have priority attention over the contacts of non-infectious cases.

Laboratory facilities for culturing sputum and conducting sensitivity tests are not readily available in developing countries, nor are they really so very necessary at the commencement of the control campaign. When the primary concern of developing countries is to find the highly infectious cases, such additional facilities, though very desirable for other reasons, are actually refinements in diagnostic procedure which at best improve the diagnostic power of direct smear microscopy by hardly 15 per cent and help to uncover the 'hidden positives' or relatively less infectious cases which do not

claim such a high priority in the initial phases of the control campaign. It is, however, highly desirable at the earliest possible opportunity to develop at least one central reference laboratory for culture and sensitivity tests to cater mainly for problem cases in diagnosis and treatment.

Mass Miniature Radiophotography when it becomes available for the case-finding campaign should be directed to high prevalence and danger groups, that is, those which will produce the highest yield of cases and those who, if suffering from tuberculosis, constitute a serious danger to the community. The first group includes persons presenting with symptoms, in-patients and out-patients of hospitals, patients referred by private medical practitioners, contacts of known cases and self-referred members of the general public; and the second group, primary school teachers, food handlers, domestic servants, government servants, barbers, hair dressers and all those whose work brings them into frequent and prolonged contact with large numbers of the general public and children. In reading X-rays, recalling abnormals for investigation and rounding up defaulters, priority should be accorded to those showing soft shadows with cavitation, as they are the most likely to turn up sputum-positive on bacteriological examination. Serial radiography to assess periodically the radiological progress of cases under treatment should be reduced to the barest minimum to conserve film and as far as possible the miniature film should replace the large plate in progress assessment. If treatment is not going to be changed for two years and the bacteriological status of the patient provides sufficient evidence of the patient's progress there is little point in quarterly or even half yearly radiographic checks apart from satisfying the whims of the clinician! Nor do large plates provide any more information to the clinician than a good miniature 70mm. X-ray picture.

There is a regrettable tendency in developing countries embarking on a tuberculosis control campaign to lay an unduly excessive emphasis on research, controlled trials, pilot studies and other limited and narrow fields of activity. These are luxuries few developing countries can afford. Whatever the reasons for indulging in them may be, the fact remains that their contribution to tuberculosis control on a

community-wide basis is infinitesimal. They tend to immobilize for prolonged periods of time the limited resources available in equipment and trained technical personnel and all they achieve apart from some glory, personal or national, or some contribution to existing world knowledge, real or imaginary, is a complete and thorough cover of a small insignificant fraction of the community while the whole population is clamouring for promotive public health measures. It is necessary to resist this temptation most strenuously not because research or scientific studies are undesirable and valueless, but because developing nations are not quite ready for this type of exercise, and must perforce accord it a low priority at the commencement of a control campaign. It is infinitely more rewarding and it makes a greater contribution to the promotion of public health if the net of tuberculosis control is spread as wide as possible to cover as much of the population as the available resources will allow so that the utmost benefit is obtained by the greatest number of persons.

Granted that it is desirable to establish a base-line against which the progress of the control programme can be assessed and evaluated at periodic intervals in the future and that pilot studies, research and controlled trials are necessary to set up an accurate base-line. An approximate but workable base-line can be obtained from the wealth of data already available. The BCG campaign will provide valuable information on the tuberculin sensitivity of the child population which is a very reliable index of the prevalence of tuberculosis in the community. Hospital and clinic attendances, the load on these institutions exerted by tuberculosis *per se*, death rates and morbidity rates even if they are imperfect, the incidence of tuberculous meningitis, statistics compiled from the results of the case-finding campaign when Mass Miniature Radiophotography is introduced—all these bits of information taken collectively will provide a rough but fairly reliable yard-stick with which future progress can be measured and assessed. Accurate and exact information is very desirable but it need not necessarily be mandatory when crude but reasonably reliable impressions will serve the purpose just as well.

There is only one condition under which pilot studies and research may be permitted in developing countries embarking on a

national control campaign and that is when these projects are fully integrated and do not conflict with the service which is being provided or when they serve as demonstration exercises to train technical personnel required for the country-wide campaign and even then they should form an integral part of the service. In other words the paramount aim of the control programme is to provide a service to the community and all else, however necessary or important should at all times occupy a subordinate position.

As trained technical and medical personnel are required to implement the control programme it is imperative to institute at an early date a vigorous Training Programme and accord it a high measure of priority. A special centre or centres will have to be developed as demonstration units to provide the necessary training in tuberculosis control methods. In the initial phases of the programme the trainees will in all probability be the existing staff of the country's public health service who will be able to undertake tuberculosis control duties in their spheres of activity in addition to their normal work. Later special staff will have to be recruited for training in special fields—tuberculosis laboratory technique, operation of Mass X-ray Units, BCG teams, home visitors, etc. These special personnel would, on completion of their training work exclusively in tuberculosis control in their respective technical fields. The development and extension of the control programme throughout the country has to be geared to the training programme. As more and more trained personnel become available the scope and extent of the control programme is stepped up in all the different parts of the country.

The foregoing describes in some considerable detail the principles which have governed the development of the National Tuberculosis Control Campaign in Malaya which was launched in June 1961 and has been in operation for nearly eighteen months. Priorities in tuberculosis control measures adopted in

Malaya conform very closely to the principles enunciated and constitute an integral part of the control plan.

#### SUMMARY

Limitations imposed by shortage of technical personnel, equipment and funds hinder developing countries in mounting a full scale attack on tuberculosis. Yet much can be achieved with existing resources if priorities are firmly established at the very outset and a properly phased control programme is drawn up which the country can afford.

The primary aim of any effective control campaign is to find the infectious cases in the community, to render them non-infectious, and protect with BCG vaccination all those who are living and working at risk. No other consideration, however important it may seem, should be permitted to divert the national effort from these two overriding priorities.

A three-pronged attack needs to be mounted: (1) Training of technical personnel, (2) BCG campaign and (3) Case-finding campaign in that order of priority. In order to derive the utmost benefit with the limited resources available, the attack should be directed to selected groups of the population and the widest possible coverage obtained within these groups.

The infectious case commands the highest priority. Finding him, rendering him non-infectious, supervising his treatment and investigating his contacts are measures of paramount importance.

The temptation to engage in research, to conduct controlled trials and to commit available facilities to limited fields of activity, academic or clinical, should be strenuously resisted.

The Control campaign should remain fully integrated with the general public health programme of the country.

Priorities in control measures adopted in Malaya in the National Tuberculosis Control Campaign currently in operation are based on the principles enunciated above,

# THE AMBULATORY TREATMENT OF PULMONARY TUBERCULOSIS IN JAPAN AND SOME PROBLEMS TO BE TAKEN CARE OF IN ITS PRACTICE\*

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According to the tuberculosis prevalence survey of Japan in 1958, there were about 2,970,000 pulmonary tuberculosis cases which were considered to require treatment, and of these cases 880,000 were considered to need treatment in hospital and 2,090,000 in out-patient clinics.

But the number of patients really treated in Japan can only be known by the registered cards in public health centres. At the end of 1961 the active pulmonary tuberculosis cases registered in health centres in Japan were 900,000 and the cases in hospital, 250,000 and the others at home with and without bed rest, 650,000.

Therefore in Japan ambulatory chemotherapy (this means extra-hospital chemotherapy) is now widely carried out, because there are only 260,000 beds for tuberculosis patients and because there are many general practitioners skilled in the treatment of tuberculosis.

The out-patients receiving chemotherapy usually visit the clinic twice a week in the case of regimen of a combination of two or three drugs, that is, SM, PAS, INK or SM, PAS, or SM, INH, and twice a month in the case of a combination of INH and PAS.

Now I will discuss about the effect of ambulatory chemotherapy, the influence of bed-rest on the course of pulmonary tuberculosis, the course of the cases aggravated, and some problems in practice of ambulatory chemotherapy.

As regards to the effect of ambulatory chemotherapy,

I will show you it according to the results of our Joint Research Committee of the Japan Anti-tuberculosis Association (in co-operation with 13 affiliated clinics).

## 1. The materials of our study

Our materials are 2,902 cases, containing primary treatment cases (totaling 2,117) and re-treatment cases (totaling 785), which received only chemotherapy for more than six months and finished their treatment during the period

from 1953 to 1959 and were followed up for an average of three years.

The "background factors of these 2,902 cases are shown in figure No. 1. You see in this figure that 70 per cent of these cases belong to the minimal, that fresh lesion (type A and B) occupies 50 per cent in primary cases and 30 per cent in re-treatment cases and that cavitory cases comprise 10 per cent. In the primary cases, the non-sclerotic walled cavity occupies 80 per cent of cavitory cases, and in re-treatment cases, about 60 per cent. The cases under 30 years of age comprise 60 per cent of these cases, and 30 per cent to 40 per cent of these cases had treatment of less than one year.

## 2. Radiological improvement at the end of chemotherapy

(After 18 months treatment on an average for non-cavitory lesion and 22 months for cavitory lesion).

Figures Nos. 2 and 3 show radiological improvements of the main types of pulmonary lesion:

As to the improvement of non-cavitory lesion, (figure No. 2).

- (a) Exudative type of lesion (called type 'A'. Homogeneous shadows). Improvement of this type is 100 per cent, and significant improvement is 86 per cent (in primary cases) and 100 per cent (in re-treatment cases).
- (b) Caseo-infiltrative type (called as type 'B'. Poorly defined shadows). Improvement is 94 per cent (in primary cases) and 88 per cent (in re-treatment cases), and significant improvement is 66 per cent and 48 per cent respectively.
- (c) Fibro-caseous type, partially with caseo-infiltrative foci (called type 'CB'. Over half of these lesions are well defined and partially have the lesion of type B). Improvement, 64 per cent and 50 per cent. Significant improvement, 24 per cent and 17 per cent.

\* Paper read at the Far-Eastern Regional Conference of I.U.T. at Bangkok, November 1962.

As to cavitory lesion (figure No. 3), the cavity closure rate of non-sclerotic walled cavity is 89 per cent in primary cases and is 74 per cent in re-treatment cases. Significant improvement (that is, scar and filled-in cavity with reduction more than 50 per cent of initial lesion) is 78 per cent and 67 per cent respectively.

### 3. Radiological aggravation during chemotherapy (figure Nos. 4 and 5)

In these figures we see that the cumulative aggravation rate during treatment up to the end of two years is about 3 per cent in primary cases (fig. No. 4) and 4 per cent in re-treatment cases (fig. No. 5) calculated by life-table method, regardless of the type of pulmonary lesion.

### 4. Radiological aggravation after the end of treatment

Figure No. 6. In the cases having the pure fibro-caseous type of lesion (called as type 'CC' These lesions are all well defined without type A and B), at the end of chemotherapy, we see that the cumulative radiological aggravation rate is 9 per cent four years after the end of treatment, regardless of the anamnesis of chemotherapy. In the cases of fibro-caseous type, partially with caseo-infiltrative foci (type CB), the rate is 24 per cent up to the completion of four years, both in primary and re-treatment cases. (Figures Nos. 7a and 7b.) This data was obtained from the comparison of two groups, namely, primary cases and re-treatment cases, containing the same numbers of cases as regards to the factors except regimen, such as, age, extent of lesion, maximal size of lesion at the end of treatment duration of treatment, and type of lesion at start.

Thus we have shown the results of our ambulatory chemotherapy of pulmonary tuberculosis.

These results of ambulatory chemotherapy are almost the same as those of hospital treatment reported so far in Japan.

What, then is the influence of bed-rest on the course of pulmonary tuberculosis, when treated by chemotherapy?

There are some specialists in Japan who believe the role of bed-rest to be important in the chemotherapy of pulmonary tuberculosis, even for minimal tuberculosis, but there is no comparative study of this problem in Japan which considers the influence of various factors on the course of pulmonary tuberculosis.

For the purpose of studying this matter, we collected non-cavitory caseo-infiltrative cases (271 cases) and non-sclerotic walled cavitory cases (191 cases), both of primary treatment, apart from the above-mentioned materials of the Joint Research Committee.

We divided these non-cavitory and cavitory cases into three categories respectively, that is, hospital group (group A), home group (group B), and the group continuing to work (group C). In this classification, the home group means the group maintaining bed-rest at home for more than three months under chemotherapy. The group continuing to work means the group receiving medicaments while working from the beginning of chemotherapy. The hospital group means the group entering hospital for treatment and keeping somewhat longer daily bed-rest hours than the home group.

We have tried to clarify the influence of bed-rest, first, by comparison of both radiological improvement and the bacterial positivity rate among the three groups of newly collected cases; second, by comparison of the rate of radiological aggravation after the cessation of treatment between the home group and the group continuing to work, from the materials of the Joint Research Committee; and third, by comparison of the aggravation rate after treatment between the group treated in outpatient clinics and the group in hospitals.

1. The influence of bed-rest on the improvement of the cases showing caseo-infiltrative type of lesion (type B.) at the start of chemotherapy figure No. 8.

The comparison was carried out among the three groups containing similar numbers of cases with similar factors, such as regimen, age, extent of lesion and maximal size of lesion. Each group had 35 cases respectively and the improvement was shown by the percentage of improved cases at the end of each three-month period up to one year. The bacterial positivity rate was presented as the percentage of positivity of tubercle bacilli at the end of each three month period up to one year.

Figure No. 9. The result discloses the same marked and significant improvement, and the same bacterial positivity rate among those three groups. But as to the improvement rate, the group continuing to work is inferior to the other groups only at the third month, but the same from the sixth month and after.

2. The influence of bed-rest on the

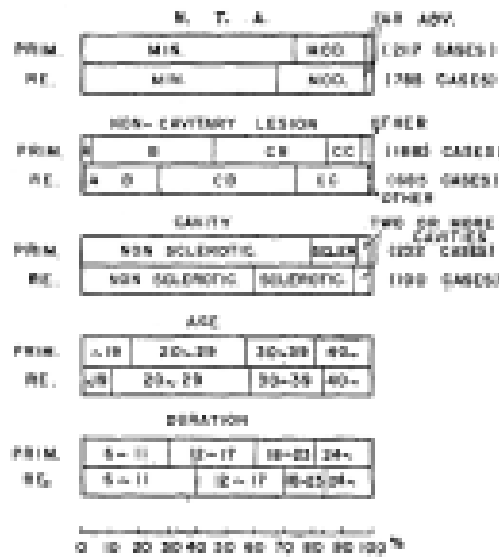


FIGURE 1

Background Factors at the Start of Chemotherapy of out-Patients.

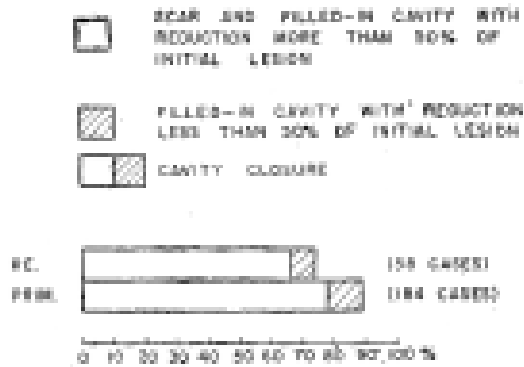


FIGURE 3

The rate of cavity closure of non-sclerotic walled cavity.

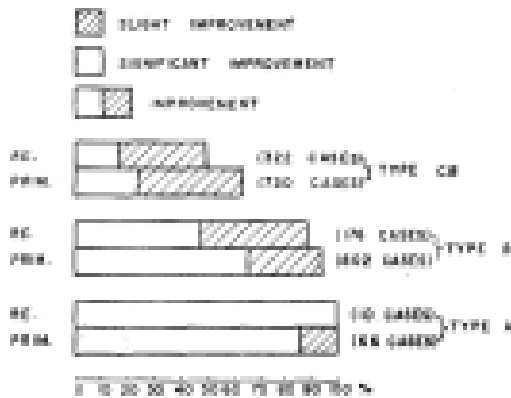


FIGURE 2

The percentages of radiological improvement of the main types of non-cysticary pulmonary lesion.

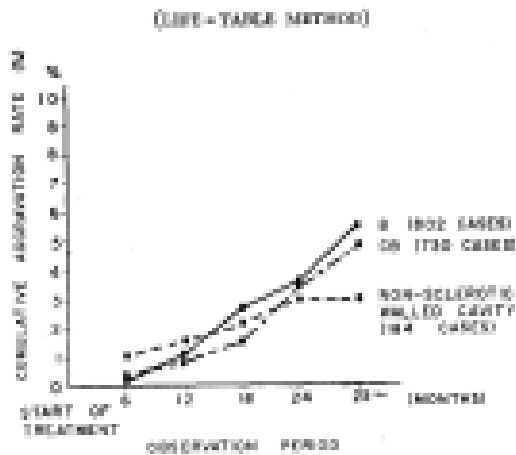


FIGURE 4

The rate of cumulative radiological aggravation during chemotherapy of primary treatment cases.

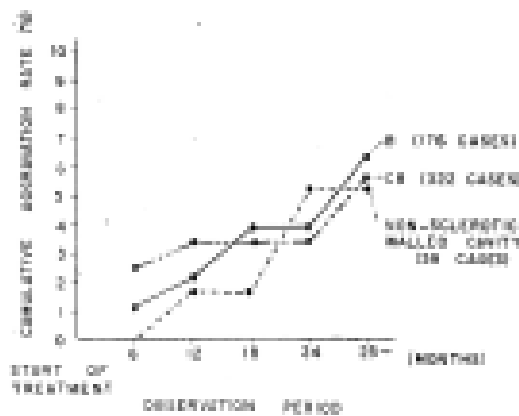


FIGURE 5

The rate of cumulative radiological aggravation during chemotherapy of retreatment cases (Life-Table Method)

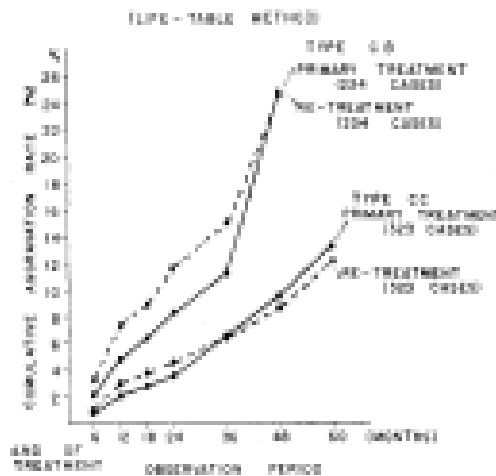


FIGURE 6

The percentages of cumulative radiological aggravation after the end of chemotherapy. (Life-Table Method)

FACTORS	MISCELLANEOUS				PRIM.	RE.
	SP	SP	SP	SP		
DURATION OF TREATMENT	8-11	12-17	18-23	24-30	PRIM.	RE.
	8-11	12-17	18-23	24-30	PRIM.	RE.
MAXIMAL SIZE OF LESION	~1 CM	1-2 CM	2 CM+	2 CM+	PRIM.	RE.
	~1 CM	1-2 CM	2 CM+	2 CM+	PRIM.	RE.
EXTENT OF LESION	~1/2	~1/2	~1/2	~1/2	PRIM.	RE.
	~1/2	~1/2	~1/2	~1/2	PRIM.	RE.
AGE	~20	30+	30+	30+	PRIM.	RE.
	~20	30+	30+	30+	PRIM.	RE.
TYPE OF LESION AT START	CB	B	B	B	PRIM.	RE.
	CB	B	B	B	PRIM.	RE.

0 10 20 30 40 50 60 70 80 90 100 %

FIGURE 7a

Background factors of the primary treatment group and of the re-treatment group (Type of lesion CB at the end of treatment)

- Sip : Six twice a week and pas daily
- Sp : Six twice a week and pas daily
- Sip-tp (sp, s-tp) : Six followed by tp
- Sp (p) : Six daily and pas daily
- Sip (s) : Six and six daily or twice a week

FACTORS	MISCELLANEOUS				PRIM.	RE.
	SP	SP	SP	SP		
DURATION OF TREATMENT	8-11	12-17	18-23	24-30	PRIM.	RE.
	8-11	12-17	18-23	24-30	PRIM.	RE.
MAXIMAL SIZE OF LESION	~1 CM	1-2 CM	2 CM+	2 CM+	PRIM.	RE.
	~1 CM	1-2 CM	2 CM+	2 CM+	PRIM.	RE.
EXTENT OF LESION	~1/2	~1/2	~1/2	~1/2	PRIM.	RE.
	~1/2	~1/2	~1/2	~1/2	PRIM.	RE.
AGE	~20	30+	30+	30+	PRIM.	RE.
	~20	30+	30+	30+	PRIM.	RE.
TYPE OF LESION AT START	B	CB	CC	CC	PRIM.	RE.
	B	CB	CC	CC	PRIM.	RE.

0 10 20 30 40 50 60 70 80 90 100 %

FIGURE 7b

Background factors of the primary treatment group and of the re-treatment group (Type of lesion CC at the end of treatment)

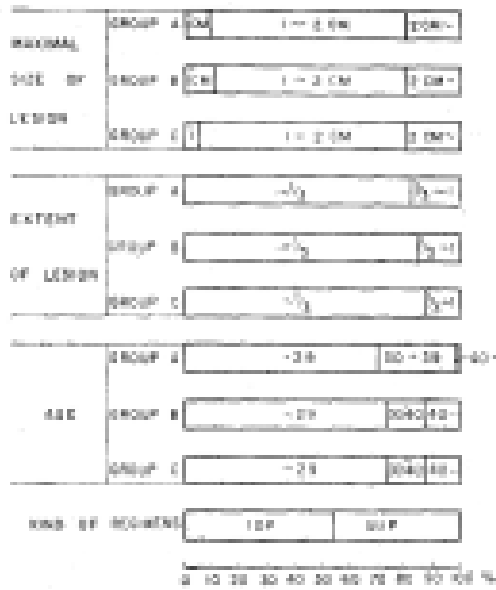


FIGURE 8

The percentages of some factors in the three groups

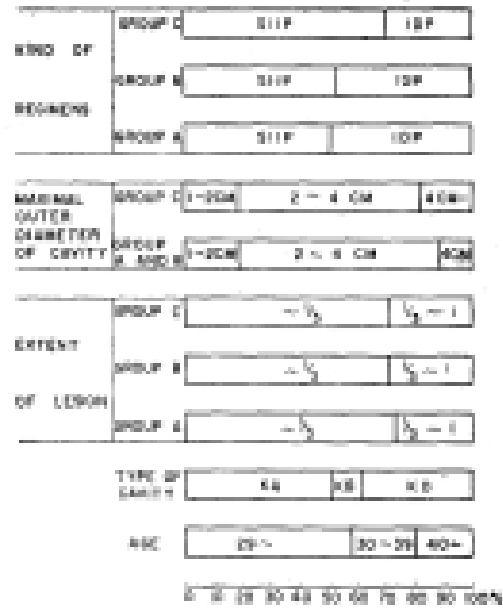


FIGURE 10

The percentages of some factors in the three groups

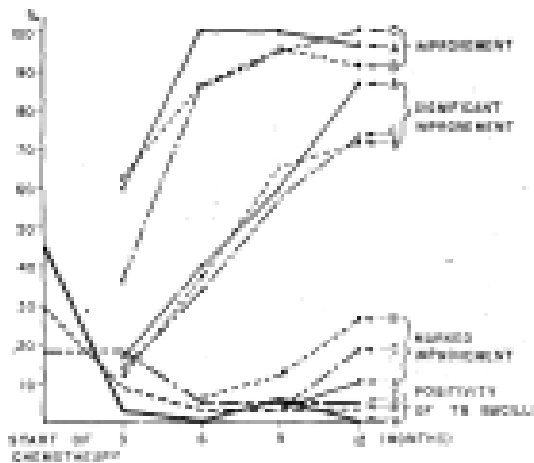


FIGURE 9

Comparative results among the three groups (Each group contains 35 primary cases with type B)

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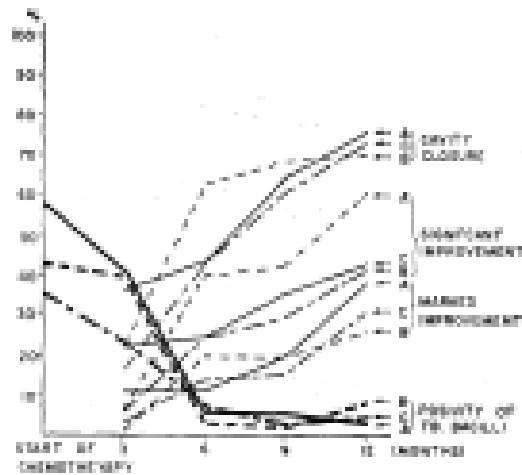


FIGURE 11

Comparative results among the three groups (Each group contains 35 primary cases with fresh cavity)



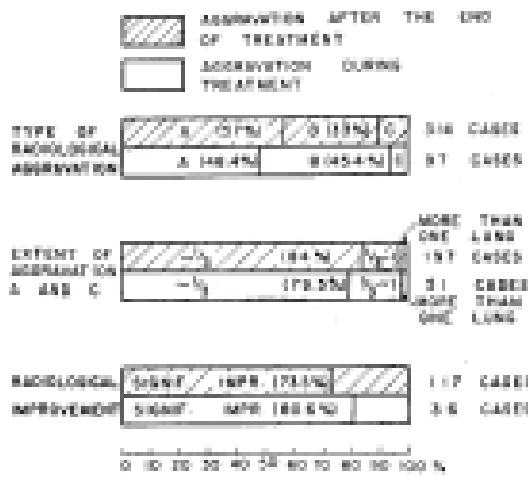


Figure 17. Aggravation

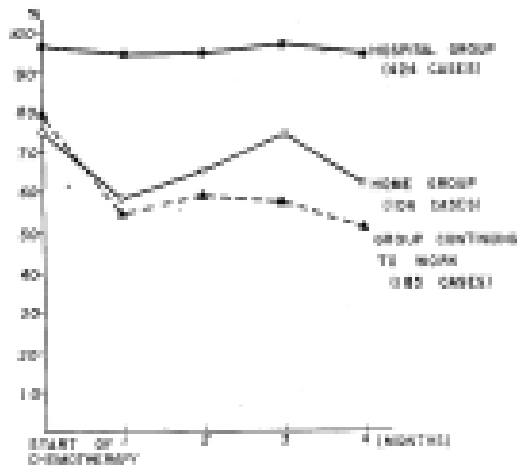


Figure 18a

Regularity of examination for tubercle bacilli of the cases treated for more than 4 months (Comparison among hospital group, home group and group continuing to work)



Figure 18b

The rate of sputum examination of the patients visiting one of our clinics during the survey period for one month

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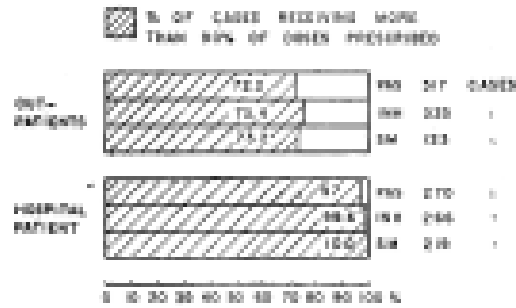


Figure 19a

Drug-taking of hospital patients and of out-patients

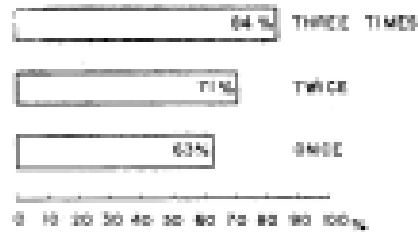


Figure 19b

The rate of drug-taking of the patients visiting one of our clinics during the survey period for one month

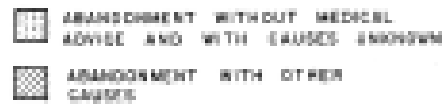


Figure 20

The rate of early abandonment of treatment by hospital patients and out-patients

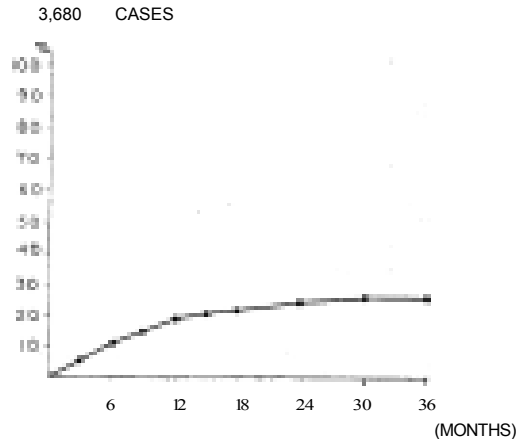


FIGURE 21  
The rate of abandonment against medical advice by the study on 3,680 cases

improvement of the cases showing non-sclerotic walled cavity at the start of chemotherapy.

Figure No. 10. Each group contained 35 cases and had similar numbers of cases with similar factors, except regimen, such as, age the type of cavity, extent of lesion, size of cavity.

Figure No. 11. We see among these groups, about the same rate of both bacterial positivity and marked improvement.

But the rate of significant improvement and cavity closures of the home group seems to be more frequent than those of the other two groups; however, this difference is not statistically significant.

3. The influence of bed-rest during chemotherapy on the radiological aggravation after the cessation of treatment.

From the materials of the Joint Research Committee, we selected the primary treatment cases showing the two types of pulmonary lesion at the end of chemotherapy, that is, the pure fibro-caseous type (type CC) and the fibro-caseous type, partially with caseo-infiltrative foci (type CB). We divided these cases with different types of lesion, into two groups respectively, that is, the bed rest group keeping bed-rest at home for more than six months and the group continuing to work from the beginning of chemotherapy.

<sup>1</sup> According to the Gakken Classification cavities are classified in two groups, that is, non-sclerotic walled cavity and sclerotic one; by a presence or by absence of the sclerosis of the wall, which will be an diagnosed by the sign of a shrinkage of either the cavity wall itself or the surrounding tissues. And in non-sclerotic walled cavities, we have four types as follows: KA: the form of cavity is round and the wall is not thick. KB: a cavitation in the midst of a diffused shadow. KG: the form of the cavity is remarkably irregular as if several cavities become communicated. Surrounding tissue must not have a sign of shrinkage. KD: Cavitation of the part of tuberculoma.

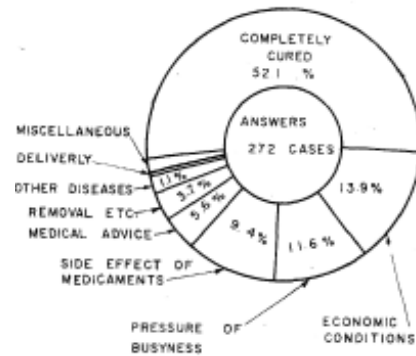


FIGURE 22  
The answer of enquiry into the out-patients abandoned chemotherapy (recovery rate: 30%)

Figure No. 12. In the cases of type CB, each group having similar numbers of cases with similar factors, such as, age and maximal size of lesion at the end of treatment, contains 200 cases.

Figure No. 13. The rates of aggravation of the two groups with different degrees of bed-rest are 17 per cent and 20 per cent up to the end of four years calculated by the life-table method.

Figure No. 14. In the cases of type CC, each group having the same numbers of cases as regards to age factor, contains 221 cases. Back to figure No. 13, the rates of the two groups are 11 per cent and 8 per cent up to the end of four years.

Then, we compared the aggravation rate after treatment of the out-patients with that of hospital patients treated in one of our sanatoriums.

Figure No. 15. These two groups have the same numbers of cases as regards to the factors, such as, the type of lesion, extent of lesion, age, maximal size of lesion, at the end of treatment, primary or re-treatment cases, duration of treatment, regimen, and radiological improvement.

Figure No. 16. The rate of aggravation of each group, each consisting of 172 cases, is

9 per cent in the hospital group and 7 per cent in the out-patient group up to the end of three years, and 14 per cent and 13 per cent respectively up to the end of five years.

As to the influence of bed-rest, from this comparative study we see that the rates of improvement, positivity of tubercle bacilli, and the aggravation rates after the end of treatment are not influenced by bed-rest during chemotherapy.

What about the course of aggravated cases, during and after treatment, of out-patients? We obtained 411 aggravated cases from the materials of 2,902 cases observed in our affiliated clinics, and we divided these cases into three categories, as follows:

Aggravation A; newly discovered pulmonary lesion where no lesion existed before.

Aggravation B; enlargement of a pulmonary lesion existing before.

Aggravation C; Aggravation A and Aggravation B discovered simultaneously in the same individual.

1. Cases aggravated during treatment (Blank area)

Figure No. 17. We saw 97 cases aggravated during treatment, of these, 48 per cent were of type aggravation A and 45 per cent were of type B, and the extent of aggravation was mostly within 1/3 of one lung field.

The significant improvement of the aggravated lesion in primary cases was 80 per cent during further chemotherapy of more than twelve months.

2. Cases aggravated after treatment (Lined area)

We found 314 cases and of these, type A were 57 per cent; type B, 33 per cent; and both together 10 per cent; the extent of these lesions was also mostly within 1/3 of one lung field. The significant improvement of these aggravated cases of primary treatment was 74 per cent during further treatment of more than twelve months.

We can say that these aggravated cases are not so serious because their extent is mostly minimal and the improvement can be considered satisfactory.

Now I would like to speak about some problems in practice.

It is said that the sputum examination of out-patients is not carried out sufficiently often, that they are apt to forget to take medicaments, and that they sometimes discontinue treatment too early.

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Figure No. 18 a. In our comparative study in co-operation with Japanese national sanatoriums, we saw that the frequency of sputum examination of the out-patients, which ought to be carried out at least once a month, is inferior to that of hospital patients.

Figure No. 18 b. But in one of our out-patient clinics this frequency goes up to about 94 per cent as estimated from one month's survey of the out-patients visiting this clinic and this rate increases with the frequency of visiting the clinic, namely, 79 per cent and 77 per cent in the cases visiting only once and twice respectively during the month of this survey, and 94 per cent for those visiting three times.

Figure No. 19 a. In this comparative study it was also revealed that drug taking as expressed by the percentage of drugs really taken to the dose prescribed up to six months, was about 98 per cent in hospital patients and about 73 per cent in out-patients.

Figure No. 19 b. In the out-patient clinic this percentage also increase with the frequency of visiting the clinic; namely 63 per cent and 71 per cent in the cases visiting only once and twice respectively during the month of this survey, and 84 per cent for those visiting three times.

This data suggest that we can expect more improvement in sputum examination and drug-taking of out-patients by more care in out-patient clinics.

As to the early abandonment of medical treatment by out-patients, we recognized in this comparative study that the rate of abandonment of chemotherapy was higher than that by hospital patients.

This is shown in figure No. 20. The rate up to six months is about 5 per cent in hospital patients, while 10 per cent in out-patients.

Figure No. 21. In one of our out-patient clinics, it was 20 per cent during the first twelve months, and 25 per cent up to 24 months according to the study of 3,680 cases treated from 1953 to 1960.

Figure No. 22. From the enquiry into these abandoned cases (the recovery rate of the answer was about 30 per cent), it was assumed that the causes of these abandonment were the patients' mistaken confidence that they were completely cured and the pressure of business and economic conditions on them.

These facts strongly suggest that more attention should be paid to the education of out-patients and their families in co-operating with the treatment- and that greater activity of public health nurses is needed in this field.

# GLUCOSE TOLERANCE STUDIES IN HOSPITALISED TUBERCULOUS PATIENTS

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Tuberculosis occurring in the elderly age group has been claimed to be an important indicator of some underlying predisposing cause, the most important of which is diabetes. While diabetes in the elderly tuberculous patients has received considerable attention in the past, the attention is now being focused more and more towards the younger age groups. It is being realised that perhaps, the important pathogenic factor in the development of tuberculosis, even in the younger age group, could be a pre-diabetic state in some cases at-least. The presence of tuberculosis in such cases, in some instances, could lead to precipitation of frank diabetes. Such cases might be detected if properly investigated.

However, a significant group of young tuberculous patients may continue to remain in pre-diabetic state and some of these cases even though going into a phase of frank diabetes in the later stage may remain completely undetected. The work was taken up to investigate the hospitalised tuberculous patients irrespective of their age groups for the presence of diabetes and pre-diabetic state.

## Review of Literature

Banyai (1931) reported that .59 per cent of 5,225 tuberculous admissions were found to have diabetes.

Wiener and Kavee (1936) reviewed previous incidence of .25 per cent to .66 per cent diabetes among tuberculous patients, although they reported that 6.4 per cent of their own 3,385 tuberculous admissions had diabetes. This high figure was attributed to the fact that their hospital was specializing in the care of tuberculous diabetics and also to the fact that their population consisted of almost exclusively Jewish people.

Rest (1941) reported an incidence of 0.025 per cent diabetes in 1,360 tuberculosis admissions in a sanatorium for Jewish patients. This probably illustrates the minimal incidence which might be found where special diabetes 'case finding' is not employed.

Israel and Payne (1940) found 2 per cent diabetes among 610 tuberculous patients.

Banyai and Cadden in 1944 reviewed previous reports concerning the incidence of diabetes among tuberculous patients showing rates of

0.31 per cent in 4,500 patients (Tompkins 1929) 0.7 per cent in another 3,963 patients (Banyai 1931), and 1.6 per cent in 5,575 patients in a 13-year study of their own (Banyai and Cadden 1944).

Among 2,366 tuberculous admissions in the city of Honston Tuberculosis Hospital in the period 1940 to 1950, only 0.63 per cent were found to have diabetes (Speck *et al* 1952).

Ferrara (1952) found 2.1 per cent diabetes among 3,178 tuberculous admissions from 1937 to 1950.

Reaud (1953) cited previous rates of 0.17 to 1.6 per cent diabetes among tuberculous patients and 0.98 per cent diabetes among 3,850 sanatorium admissions from 1950 to 1952. However, he referred to one of the highest rates of diabetes, reported in tuberculous patient—14.2 per cent diabetes among predominantly Jewish patients in Montefiore Hospital in New York.

Commenting on Reauds paper, E. R. Smith of Jack Sonuille stated that Florida Sanatorium had a diabetic census of 2.7 per cent only.

Nichols (1957) conducted diabetic screening in the form of a modified glucose tolerance test on 305 subjects. 178 of these subjects comprised of a uniform group of young otherwise healthy military men hospitalised for tuberculosis. Follow up testing showed that 22 per cent of latter group presented various abnormalities of glucose tolerance and that at least 5 per cent were mild diabetic. It was believed that previous induction examinations, annual physical examinations, routine urinalysis had already excluded the more severe grades of diabetics from this group. Although these figures probably indicated the maximal incidence of diabetes in the group examined, but if other accepted criteria for the diagnosis of diabetes were substituted for the criteria used here, then the incidence of diabetes might be listed as 9 per cent, 11 per cent or 18 per cent rather than 5 per cent.

## MATERIAL AND METHODS

150 cases of pulmonary tuberculosis admitted during the year 1959 in Kasturba T.B. Clinic and Hospital have been taken up for study.

Out of 150 cases, 145 cases were admitted in the hospital as cases of pulmonary tuber-

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culosis only, 5 cases had pulmonary tuberculosis associated with diabetes.

145 tuberculous cases were subjected to screening test for diabetes as recommended by Nichols (1957). Those patients who showed abnormalities in the screening test for diabetes, were subjected to a 3-hour detailed glucose tolerance test.

#### **Preparation of the patients for screening test and glucose tolerance test**

*Preparation for the cases who were admitted in the hospital with the diagnosis of pulmonary tuberculosis only (not associated, with diabetes),*

Patients were given a diet containing 300 g. of carbohydrate per day during the preceding 3 days. During the test the patients were instructed to rest in bed and not to smoke. Oral medicines such as Chloral hydrate, Aspirin, PAS and INAH were not given during the testing and had been withheld for 48 hours prior to testing. When unfavourable testing conditions were known to exist it was usually possible to repeat or re-schedule laboratory examination.

Unfavourable testing conditions are explained as follows:

1. If the patient vomited after taking glucose solution.
2. If there was any intercurrent minor illness or recent surgery.

#### **Preparation of the diabetic tuberculous patients for screening test and Glucose Tolerance test**

This group consists of those patients who were admitted to the hospital with the diagnosis of pulmonary tuberculosis associated with diabetes (5 cases only) and cases detected in the hospital as frank diabetes with tuberculosis (5 cases only) after routine screening test and glucose tolerance test.

Preparation of the patient was done by the method described by Luntz and Smith (1953). During the test the patients were instructed to rest in bed and not to smoke. Oral medicines such as Chloral hydrate, Aspirin, PAS and INAH were not given during the testing and had been withheld for 48 hours prior to testing. All the patients were kept on soluble Insulin, for a week before and during the trial. Soluble Insulin was given in 2 divided doses i.e., morning and evening. On the day of the test

the morning Insulin was not given until after the test had been completed.

#### **Technique of screening test for diabetes**

Duncan (1952), and Nichols (1957) have recommended this abbreviated glucose tolerance test for conducting the survey for detection of diabetes.

The preparation of the patients was done as stated above. Overnight fasting patient was given 100 g. of glucose in the morning time. Single blood and single urine was collected, 2 hours after the ingestion of glucose. Those patients, who showed abnormality in the screening test in the form of glycosuria or blood sugar level above 120 mgm. per 100 c.c. were subjected to detailed glucose tolerance test after a week. Patients showing normal screening test were excluded from the detailed 3-hour glucose tolerance test.

#### **Standard 3-hour glucose tolerance test**

This test was performed if the patient showed abnormal screening test (i.e., the presence of glycosuria or blood sugar concentration more than 120 mg. per 100 c.c.). The preparation of the patients was done as stated above. The patients were made to fast overnight. In the morning time 2 c.c. of fasting blood and fasting urine were collected. Then 50 g. of glucose in 250 c.c. of water was given. After this 1/2-hourly collection of blood and 1/2-hourly collection of urine was done till 3 hours. In the meantime the patient was not allowed to take any thing. The blood samples were collected in fluoride tubes.

Blood sugar estimation was then done by King's Modification of Folin and WU Method (Colorimetric estimation).

Routine examination of urine was performed. Benedict's qualitative solution was used for the detection of the presence of sugar in urine.

Quantitative estimation of sugar in urine was made by Benedict's Quantitative method.

All the cases included in the present study were classified into 4 main groups (Nichols 1957).

1. Those with a normal screening test.
2. Those with an abnormal screening test but a normal glucose tolerance test.
3. Those with an abnormal screening test and an abnormal but not diabetic glucose tolerance test.
4. Those with an abnormal screening test and a diabetic glucose tolerance test.

## RESULTS

TABLE I

*Age and Sex distribution of the cases studied*

Different age Groups	Total No. of Cases	Sex	
		Female	Male
15 to 20 years ...	22	10	12
20 to 25 years ...	42	26	16
25 to 30 years ...	45	18	27
30 to 35 years ...	11	4	7
35 to 40 years ...	14	3	11
Over 40 years Total	16	5	11
...	150	66	84

TABLE II

*Result of screening test for diabetes in 150 hospitalised Tuberculous patients*

	Abnormal Screening Test			
	Normal screening test	Test		
		Only glycosuria (More than yraces)	Only blood sugar above 120 mg.	Both glycosuria as well as blood sugar above 120 mg.
Number of cases ...	130	2	7	11
Percentage ...	86.6%	1.4%	4.6%	7.4%

TABLE III

*Grouping of cases according to Nichols (7.957) after 3 hours detailed glucose tolerance studies in 20 cases showing abnormalities in the screening test*

Groups	No. of cases in different groups	Percentage
Group II	2	10%
Group III	8	40%
Group IV	10	50%

TABLE IV

*Effect of age in relation to abnormal glucose tolerance patterns obtained*

Age of the patients	Groups			Total
	Group II	Group III	Group IV	
Below 40 years ...	2 (18.2%)	6 (54.5%)	3 (27.3%)	11
Above 40 years...	...	2 (22.2%)	1 (77.8%)	9

TABLE V

*Effect of sex in relation to Abnormal glucose tolerance patterns obtained*

Sex of the patients	Groups			Total
	Group II	Group III	Group IV	
Male	2 (13.3%)	3 (20%)	10 (66.7%)	15
Female	...	5	...	5

TABLE VI

*Showing effect of extent of lesion of tuberculous disease on glucose tolerance reaction*

Radiological extent of disease (zonal)	Group II	Group III	Group IV	Total
1 Zone ...	...	...	...	...
2 Zones ...	1	2	1	4
3 Zones ...	1	2	1	4
4 Zones ...	...	3	5	8
5 Zones ...	...	...	2	2
6 Zones ...	...	...	2	2

TABLE VII

*Nature of disease in relation to abnormalities in glucose tolerance studies*

Radiologi- of disease	Groups			Total
	Group II	Group III	Group IV	
Exudative	...	13 (33.3%)	6 (65.6%)	9
Productive	2 (22.2%)	4 (44.4%)	3 (33.3%)	9
Fibrotic ...	...	1 (50%)	1 (50%)	2

## DISCUSSION

We have found that the patients above 40 years of age on the whole demonstrated a higher incidence of abnormal glucose tolerance pattern as compared to that of those below 40 years. It is important to note that out of a total of 16 cases only who were above 40 years of age admitted to our hospital, 9 cases demonstrated one or the other abnormalities of glucose tolerance test. The figures for those below 40 years of age is only 8.2 per cent (11 cases out of a total of 134 cases). This again stresses the importance of performing routine screening test and wherever needed, a detailed 3-hour glucose tolerance test in cases of pulmonary tuberculosis above 40 years of age. The results of glucose tolerance test are always likely to be more fruitful in age group above 40 years, because 77.8 per cent of the cases with abnormal screening test above 40 years of age came out to be frank diabetics. Another 22.2 per cent cases belonged to Group III which may be including some cases of mild diabetes (Nichols 1957). The figures for the younger age group were 27.3 per cent for group IV and 54.5 per cent for group III.

On the whole it appeared that the tuberculous diabetics had greater extent of lung involvement by tuberculous process as compared to that of other two groups of cases demonstrating the abnormal screening test. Not only this, the cases under Group III had also a greater extent of involvement of lungs as compared to that of cases in Group II, although less than that of Group IV. There was no basic difference in the extent of involvement of lungs in the cases belonging to Group II and non-diabetic tuberculous patients. This again goes to show that the patients with diabetes tend to have a more extensive lesions as compared to those of non-diabetics. The greater extent of involvement of lung in the diabetics has been stressed in the literature by other workers also. Root (1952) found only 28 patients with minimal lesions among 686 tuberculous diabetics on routine radiography. The Philadelphia Survey (Boucot *et al* 1952), however, found that 63 per cent of 261 tuberculous diabetic patients had minimal lesions but only 80 of these patients had active tuberculosis and the proportion with minimal lesion among the number was not mentioned. Giving the explanation for this phenomenon Hims-

worth (1938) suggested that because the tuberculous process begins deeply in the lung, the signs and symptoms in such cases are scanty, therefore, the tuberculosis is far advanced before it is diagnosed. Involvement of larger number of zones in patients belonging to Group III may perhaps be accounted for by the inclusion of some of the mild diabetics, future diabetics and latent diabetics in this group.

The radiological nature of the disease reveals a high incidence of mainly exudative lesions in frank cases of tuberculous diabetics. The incidence of productive and fibrotic lesion was practically the same as in Group III. However, the cases in Group II revealed mainly the productive lesions.

## COMMENTS

The significance of abnormal screening test has not been till now properly evaluated, because out of a total of 20 cases showing abnormal screening pattern only 10 cases were ultimately proved to be frank diabetics. Whether the rest of the cases really could be believed to be in a pre-diabetic stage or they were not prone to develop diabetes in later life, could not be assessed in such a short period of study. However, from the literature it appears that these cases could be believed to be more susceptible to develop diabetes in later life. Nichols (1957) believed that the separation of cases belonging to Group III from those of Group IV was only arbitrary. He believed that the possibility of inclusion of some of the mild diabetics in Group III could not be excluded. Also, in his own words 'No doubt a number of future diabetics may also have been included'. He further advised that patients in Group III should be subjected to routine follow up study every two years.

Thus on the whole, out of a total of 20 tuberculous cases demonstrating the abnormal screening test for diabetes 10 cases were frank diabetics and 8 cases belonged to Group III. The value of screening test hence cannot be over estimated because it led to the detection of these cases, many of which could otherwise have gone undetected. It would not be out of place for us to give the Hospital statistics of Kasturba T.B. Hospital of the year 1958. Out of a total of 381 cases admitted during the year only 4 cases of frank diabetes were detected.

Had the screening test been done during 1958 perhaps many more cases would not have gone undetected.

When these cases demonstrating abnormal screening test were subjected to detailed glucose tolerance test, (results of which have already been partly reproduced above), it was found that there were 2 cases who could be classified under Group II. The significance of these cases demonstrating abnormal screening test in the form of glycosuria only but a normal glucose tolerance test is far from clear. Every precaution was taken to see that the patients had not taken PAS, INAH salicylates or other drugs which could lead to the excretion of reducing agents in the urine. However, such a possibility cannot be excluded completely.

This glycosuria can also be explained on the basis of pseudorenal glycosuria, which differs from the renal glycosuria in the sense that true renal glycosuria shows presence of sugar in all the specimens of urine collected at the time of glucose tolerance studies whereas in pseudorenal glycosuria, sugar in the urine is not found in the fasting state, but other specimens of urine showed the presence of glucose in the urine. In these two cases, fasting urine did not show the presence of sugar but other specimens of urine up-to two hours showed the presence of sugar after which subsequent specimens of urine did not reveal the presence of sugar. The blood sugar levels in both the cases had returned almost to their fasting levels at the end of two hours.

Thorn and Emerson (1953) pointed out that there was an increased tendency for the development of diabetes late in this syndrome. They further point out that nephritis and pregnancy may cause pseudorenal glycosuria due to impaired tubular absorption of glucose and lowered renal threshold for glucose respectively. In the present cases symptoms or signs of nephritis were absent and both the patients were males so glycosuria cannot be explained on the basis of nephritis or pregnancy.

We quite agree with the view of the authors that these cases of unexplained glycosuria may be potential or future diabetics. In the present

study out of 2 cases belonging to Group II, one case managed to escape to Group III after chemotherapy i.e., it started showing abnormality in screening test of diabetes as well as 'abnormal but not diabetic' glucose tolerance pattern. Of course, it is not possible to assess as to how much responsibility for change in groups can be laid on chemotherapy and how much on the natural tendency of the patients suffering from pseudorenal glycosuria to develop diabetes in later life.

Nichols (1957) believed that Group III cases may be potential future diabetics.

#### SUMMARY

150 tuberculous patients admitted to Kasturba T.B. Clinic and Hospital during the year 1959 were subjected to a preliminary screening test for diabetes. 20 cases demonstrated an abnormal pattern. Glycosuria, more than a trace, was obtained in 1.4 per cent cases, blood sugar level above 120 mg. per 100 c.c. in 4.6 per cent cases and both the abnormalities were recorded in 7.4 per cent cases.

When these 20 cases were subjected to detailed glucose tolerance studies, 2 cases (10 per cent) had a normal glucose tolerance test; 8 cases (40 per cent) had abnormality in curve but were not diabetic, and 10 cases (50 per cent) demonstrated frank diabetes.

Out of 9 cases above 40 years of age showing the abnormal screening test for diabetes, 7 cases had frank diabetes as opposed to that of 3 cases out of a total of 11 cases, in the age group below 40 years. This clearly demonstrated that abnormal screening pattern in elderly age group was mainly due to diabetes itself. All the detected diabetics were males.

The extent of lesion in the lung was greater in frank diabetics as compared to that of other groups. The lesion in the lung was mainly exudative in diabetics. Involvement of larger number of zones in patients belonging to Group III (abnormal but not diabetic glucose tolerance pattern) may perhaps be accounted for by the inclusion of some of the mild diabetics, future diabetics and latent diabetics in this group.

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## SPONTANEOUS MEDIASTINAL EMPHYSEMA AS A COMPLICATION OF PULMONARY TUBERCULOSIS

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By spontaneous mediastinal emphysema we mean to describe the condition when it is not induced by surgical interference or diagnostic procedure. It is a rare condition and it is extremely rare as a complication of pulmonary tuberculosis.

Spontaneous mediastinal emphysema can take place in Pulmonary Tuberculosis only under two circumstances e.g. (1) When an associated emphysematous bulla ruptures, but because of pleural symphysis, the air cannot produce spontaneous pneumothorax; it can travel along the pulmonary vascular sheath to induce mediastinal emphysema, or (2) When an endobronchial tuberculous ulcer ruptures due to intractable cough, air can escape in the mediastinum giving rise to the condition. We encountered one case at Shri Brij Sewa Samiti T.B. Sanatorium, Vrindaban.

*Case Report*—K.K. (case No. 2495) aged 23 was admitted on 1-7-60 as a case of extensive bilateral pulmonary tuberculosis. He had a hacking cough from the beginning and was having blood streaked sputum for more than 3 months after admission. This could not be checked with all regular styptic agents like Coagulen Ciba, Clauden, Ayazol, Vitamin K. etc. He was bronchoscoped on 27-10-60 and was found to have active endobronchial disease but no clearcut ulcer was noted. This was thought to be the cause of the blood streaked sputum and hacking cough. He was given all the three usual anti-tuberculosis drugs but since the symptomatic improvement was not satisfactory, Prednisolone was also added. But hacking cough did not improve in spite of everything. Radiologically he showed clearance of exudation. On the evening of 29-3-61, the patient complained of pain in the chest and also in the right side of the neck. We noticed some surgical emphysema on the right side of the neck. Sedatives were given but by next morning the surgical emphysema was worse. X-Ray of chest was taken on 30-3-61 in which extensive surgical emphysema was diagnosed but no evidence of mediastinal

emphysema could be seen. Now the surgical emphysema extended in the face and trunk also. Sedations and needle aspiration was done with no relief. X-ray on 31-3-61 showed presence of mediastinal emphysema in addition to the presence of air in the subcutaneous tissue. Sedatives and antibiotics were continued and aspiration with thickbore needle (No. 16) along the pretracheal fascia was repeated with no apparent relief. No cardiac embarrassment or evidence of pressure on great veins in the mediastinum was noticed but the patient died on the night of 4-4-61.

### DISCUSSION

Spontaneous mediastinal emphysema as a complication of pulmonary tuberculosis is an extremely rare condition. After we encountered this case, we sent an enquiry to almost all the big tuberculosis institutions of the country about incidence of this complication and we heard from 35 institutions having more than 100 beds that they did not encounter this complication in any of their patients over a period of last 5 years. This is thought by many authors to be a benign condition (Koshy *et al* 1961). According to them crackling or crunching sounds synchronous with the heart beat heard on auscultation over the chest is characteristic. This is called Hamman's sign (Hamman 1945). In our case due to extensive surgical emphysema this sign could not be elicited but the X-ray left no doubt about the diagnosis. Though in the literature the condition was described in most cases to be benign, unfortunately in our case it proved fatal. We feel that in this case, the endobronchial disease probably ulcerated through, due to violent bout of cough and since in spite the sedation and needle aspiration, the source of leak could not be checked, the emphysema rapidly increased. Tracheotomy has strongly been recommended by Pecora and Hochwold (1958) and this was contemplated for our patient but since there was no evidence of pressure on the great veins, it was reserved as a last measure. The needle

aspiration though widely recommended seems a pretty useless procedure to us. We do not know how far tracheotomy would have been helpful but it is worth while trying. To our mind spontaneous mediastinal emphysema in pulmonary tuberculosis is fortunately a very rare complication but when it does occur it is very serious.

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## CASE REPORT

### FATAL REACTION TO PARA-AMINO-SALICYLIC ACID AND STREPTOMYCIN

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Among the various reactions to the anti-tuberculous drugs the toxic reaction to streptomycin and PAS, viz., nerve deafness and gastrointestinal upset respectively are commonly met with and readily recognized. The hypersensitivity reactions are however less common and are not recognized, until there is high fever and appearance of skin rash. It appears the following case report is the first one reported of a fatal hypersensitivity reaction to PAS and streptomycin in our country.

#### CASE HISTORY

A 60-year old, retired postal clerk, was seen in the Tub. O.P.D. on June 23, 1961. He was found to be suffering from pulmonary tuberculosis with advanced disease, multiple cavitations in the right upper lobe, left pleural effusion, and fever ranging from 99°F in the morning to 101.5°F in the afternoon. Anti-tuberculous chemotherapy was started on 24-6-61. Therapy consisted of streptomycin 1 gm. I.M. and 400 mgm. of isoniazid orally, every day.

The patient started improving and continued on the treatment, and was seen in the O.P.D. once every week. He was very well and felt happy about his declining temperature, improving appetite and general sense of well-being.

On July 23rd patient reported with high fever and an itchy feeling on the hands and forehead. No definite eruption was seen. Streptomycin was discontinued. Immediate hospitalization could not be effected for lack of hospital beds. He was however, advised to report as frequently as he could in the O.P.D. with a view to observe his progress as also to put him on the first bed available. He was put on PAS Sodium 12 gm. per day with INH 300 mgm. per day.

On July 25 and 26, patient was reported to be slightly better.

On July 27 patient was seen again in O.P.D. with an indefinite kind of eruption all over the face, arms and trunk. His conjunctivae appeared congested and the eyelids heavy. The temperature was still elevated. He was given anti-histaminics, corticosteroids and asked to report the next day. On July 31st patient was admitted with a temperature of 105°F a severe maculopapular, eruption all over the body with intense itching, marked toxæmia, severe conjunctivitis, restlessness, a hacking cough hardly productive.

Therapy was discontinued. He was given high doses of Anthisan I.M., Cal. Gluconate with glucose I.V., and calamine lotion locally to relieve itching which was severe. Sputum examination did not reveal A.F.B. The leucocyte count was 12500/cm. containing 48 per cent polymorphs, 6 per cent lymphocytes, 2 per cent monocytes and 48 per cent eosinophils. Urine examination showed trace of albumin only. Skiagram chest on 3-8-61 showed improvement in the lung lesions and decrease in the pleural effusion on the left side. The temperature was coming down very slowly and the patient had no relief whatever in the itching. He was given 2 c.c. Decadron I.V. and he felt better the next day. This was repeated. On 6-8-61 patient appeared comfortable, his temperature had come down to 98.4°F. But the eruption on the whole body had taken the look of a typical exfoliative dermatitis. Patient was having difficulty in ingestion because of ulceration in the buccal mucosa. The patient was steadily going downhill in spite of all treatment. His temperature was usually subnormal, and he was becoming drowsy. On 11-8-61 patient went into delirium and coma and died the same evening.

(Autopsy could not be obtained).

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## DISCUSSION AND CONCLUSION

A case of fatal hypersensitivity to anti-tuberculous drugs viz. streptomycin and PAS has been reported in the literature (11).

The suddenness with which these, reactions occur, their relentless progress to a fatal termi-

nation despite all possible treatment point to the need of a method of determining and anticipating such a catastrophic reactions specially in countries like ours, where, by far the largest majority of patients take treatment in their homes without any supervision.

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## NEWS AND NOTES

### **Twenty-Fourth Annual General Meeting**

The 24th Annual General Meeting of the Tuberculosis Association of India will be held in New Delhi at 11.15 a.m. on 9th May, 1963 at the conference hall of the Association, 3, Red Cross Road, New Delhi.

The Central Committee of the Association will meet on the same day at noon.

The Secretaries' Conference will also be held on the same day at 3 p.m. The Standing Technical Committee will meet on 10th May, at 9.30 a.m.

### **1963 TB Health Visitors Course**

1963 Tuberculosis Health Visitors course commenced in the New Delhi TB Centre on 7th January, 1963. Fifteen candidates from all over the country are taking the training.

### **Donation of Books by the Colombo plan**

On the request of this Association, Colombo Plan authorities in Canada have donated to the library of this Association 38 books on Tuberculosis costing about \$ 500.

The books are in the library of the Association.

### **Collections of 12th Seal Sale Campaign**

According to the reports so far received, seal sale collections of the 12th campaign amounted to Rs 4,21,000. Reports from Bihar, Gujarat, Himachal Pradesh, Orissa, Pondicherry and Vidharba are awaited.

### **The 13th Seal Sale Campaign**

The 13th TB Seal Sale Campaign terminated on 26th January, 1963. In all 1,00,00,000 seals were printed and distributed for sale all over the country. Collection reports from the states are awaited.

### **Design for the 14th Seal Sale Campaign**

Designs have been invited from artists in India of a suitable seal for the 14th TB Seal. The last date for receiving the seal design is 15th March, 1963.

The 14th Seal Sale Campaign will commence on October 2, 1963 Mahatma Gandhi's birthday and terminate on 26th January, 1964, the Republic Day.

### **Proceedings of the 18th TB workers conference**

Copies of the proceedings of the 18th Conference of Tuberculosis and Chest Diseases workers held in Bangalore are now available with the Tuberculosis Association of India, 3, Red Cross Road, New Delhi. The Proceedings is priced at Rs 14.50 nP. per copy.

### **XVIIth International TB Conference, Rome**

The XVIIth International Tuberculosis Conference will be held in Rome (Italy) from September 24th to 28th, 1963, under the auspices of the International Union Against Tuberculosis and the Italian Federation Against Tuberculosis. The programme and Executive Committees of the Union have selected the following five representatives from India to present papers mentioned against their names:

1. Dr P.K. Sen: Co-reporter, on "Physical Activity and work during treatment of tuberculosis."
2. Dr J. Frimodt-Moller: Co-reporter on "Recent data on Pathogenicity of mycobacterium tuberculosis (exclusive of INH-resistant strains) with special reference to the differences between strains isolated in different part of the world."
3. Dr D.R. Nagpaul: Principal Reporter on "Tuberculosis Control programme in Developing countries."
4. Mr B.M. Cariappa: Principal Reporter on "Problems in the organisation and development of voluntary tuberculosis associations."
5. A biochemist from the Chemotherapy Centre, Madras. Co-reporter on "Endocrine and Metabolic changes noted in patients treated by anti-bacterial drug INH."

Details about this conference can be had from the Secretary, TAI.

### **Obituary**

We regret to report the passing away of Sir Shri Ram on 11th January this year. He was 82. The Executive Committee of the Association which met on 15th January, recorded the following resolution:

**Ind. J. Tub., Vol. X, No 2**

“This meeting of the Executive Committee of the Tuberculosis Association of India records its profound sorrow at the passing away on 11th January, 1963, of Sir Shri Ram, who was its Vice-Chairman for the past twenty four years.

Sir Shri Ram was most intimately connected with the Tuberculosis Association of India from its inception and was taking continuous and keen interest in its activities. His personal interest in the development and working of the institutions of the Associ-

ation, *viz.*, the Kasauli Sanatorium, the New Delhi TB Centre and Mehrauli TB Hospital was a source of great encouragement to the Association. As Chairman of the Managing of the New Delhi TB Centre Sir Shri Ram associated himself very closely with the different welfare schemes of that centre, particularly with its domiciliary service programme and the development of the Care Committees. In his passing away the Association has lost one of its main architects and constant friend.’

# The Indian Journal of Tuberculosis

## ABSTRACTS

Vol. X

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Abst. No. 2

### **Isoniazid Prophylaxis in an undeveloped area**

Of the 7333 residents of eight villages and two boarding schools, 3017 took placebo and 3047 isoniazid given in a dosage of 5 mgm per Kg. of body weight once daily for a year.

Isoniazid prevented approximately 70 per cent of the serious manifestations of Tuberculosis. Tuberculosis rates among persons who took isoniazid were lower than among those who took placebo.

If no one in this study population had taken prophylactic isoniazid, 173 serious manifestations of tuberculosis would have been expected during the period since the initiation of the trial contrasted with an estimated 88, if all participants had taken isoniazid. Once again it appears that prevention is less costly than cure.

(George W. Comstock: *Amr. Rev. Resp. Disc.*, No. 6, Vol. 86, Dec., 62).

### **Tissue Metabolism in Infection**

The Lungs, Liver and Spleens from tuberculous mice were found to exhibit about two to three fold higher diphosphopyridine nucleotidase as compared with in normal animals.

The diphosphopyridine nucleotide content of Livers from infected mice was about one half that of livers from normal animals.

In Liver Homogenates and mitochondria from tuberculous mice, the oxidation of substrates whose dihydrogenases are linked to, diphosphopyridine nucleotides was one half to one tenth that of homogenates and mitochondria from normal animals.

The succinic oxidase of tuberculous mice was unimpaired.

(A. Bekier Kunst and M. Artman: *Amr. Rev. Resp. Disc.*, No. 6, Vol. 86, Dec., 62).

### **Pulmonary Function in Scleroderma**

Pulmonary Function studies were done in 13 cases with systemic Scleroderma.

Of these 6 patients had abnormal chest roentgenograms and only 6 were dyspneic, but all 13 patients had low vital capacity and 12 had low diffusing capacity.

The incidence of Pulmonary involvement in systemic scleroderma is much higher than shown by roentgenography or suspected by clinical evaluation.

(Parsant, K. Adhikari; Ferdin and A. Bianchi; Samuel F. Bomshy, At sushi Sakamoto and Beryami M. Lewis: *Amr. Rev. Resp. Disc.*, No. 6, Vol. 86, Dec., 62).

### **The Classification of 'Anonymous' Acid Fast Bacilli From Human Sources**

Anonymous Bacteria can be separated into four assemblies on the basis of three simple tests which are independent of such subjective Criteria as pigmentation and rapid growth.

According to Runyon group the organisms are divided into four.

Group I and III described as Photochromogens and non-photo chromogens respectively, appear to include those strains regarded as pathogenic for man. Group II and IV-Scoto-chromogens and rapid Growers contain organisms usually regarded as Saprophytes or very rarely incriminated in human disease.

The disadvantage of classifying them according to pigment production and speed of growth is that productions are liable to misinterpretation and strains of doubtful pigmentation are not uncommon. Pigment production by a particular strain of microorganism may be of assistance in identification, but cannot be regarded as an absolute criterion in classification.

Rapid growth is a subjective phenomenon and depends on the nature and quality of the culture medium. Strains which are dysgonic become adapted after several subcultures and grow rapidly. Any Criterion used in classification should give consistent results whether applied to newly isolated strains or laboratory maintained sub-cultures.

The following tests give useful information for allowing these organisms to, assemblies similar to those of 'Runyons' groups.

(1) Growth on a Lownstein medium containing 10 ug per ml. of p-acetamidobenzaldehyde thiosemicarbazone found that all anonymous mycobacteria other than photochromogens are resistant to this concentration.

(2) Growth in a synthetic medium-'N' medium with ammonium sulphate as the sole source of nitrogen and glucose as the sole source of Carbon.

(3) Growth at 44°C and (less important) at 20°C indicates usefulness of growth at various temperatures in characterizing some species of mycobacteria.

(4) The arylsulphatase test is useful but not essential.

(C. H. Collins: *Tubercle, Land.*, (1962), 43, 22).

#### **Sensitivity to Avian and Human old Tuberculin in Man in Great Britain**

Intracutaneous tests were done simultaneously with human and avian old Tuberculin in 1119 men between the ages of 18-20 years.

Of these 605 were neither previously skin tested nor given BCG vaccination, and 354 who had received BCG vaccination about five years previously.

In the initial test, a small dose (0.1 ml of 1/3000 dilutions) of each tuberculin was used. In those men, who reacted to both small doses the reaction to human tuberculin tended to be larger than those to avian tuberculin both in the non BCG group (a mean excess of 2.5 m.m. induration) and in BCG group (a mean excess of 1.3 m.m.).

Those who showed less than 5 m.m. induration at 48 hour to both small doses were tested with a large dose (0.1 ml of 1/100 dilution) of each tuberculin.

In the non-BCG group, there was a tendency, in those reacting to both these large

doses, for the reaction to avian tuberculin to be larger than those to Human tuberculin, and there were also many more reactions to avian tuberculin only than to human tuberculin only. There was therefore a 'Cross Over' in this group in passing from the small to large doses. This cross over was not shown in BCG group; the relative reaction size with the large doses being similar to that with small doses.

A total of 182 patients with active, bacteriologically positive pulmonary tuberculosis, of whom 28 were aged 15-24 years; were tested similarly with the same two tuberculins. The average excess of the human over avian reactions with the small doses was greater (5.8 m.m. induration) than in either the non-BCG or the BCG group. Because of greater reaction, the possibility of a cross over in passing from small to large doses was not examined.

The cross over in the non-BCG group and its absence in the BCG group suggests that the reactions to the large dose of human tuberculin in the non-BCG group were largely caused by organisms other than mammalian tubercle bacilli antigenically related to the avian tubercle bacilli.

The differences in relative reaction size with small doses of human and avian tuberculin between the patients (all with active disease), the non-BCG group (infected at some time in the past 18-20 years) and BCG (all infected about five years previously) suggest that the relative reaction size may be influenced by the interval since infection or by its current activity, this could provide an alternative explanation for the crossover in the non-BCG group.

(P. D'Arcy Hart; Christine L. Miller and Ian Sutturland: *Tubercle, Land.*, (1962), 43, 268).

#### **The Eradication of Tuberculosis ' Theoretical Problems and Practical Solutions'**

The possibility of eradicating tuberculosis in a country is essentially a function of its economic level.

Three major weapons which can be used in eradication are: chemotherapy, vaccination and chemoprophylaxis.

Of these, chemotherapy is the most important, because it destroys the infective pool of human tuberculosis.

Chemotherapy must then receive absolute priority.

The main improvements to be made in the practice of chemotherapy are: proper education of patients, so that they do not prematurely abandon treatment; close supervision of the taking of drugs; constant use of combined regimens of proven efficacy; the regimens to be based on the results of resistance tests and the carrying of these tests in all patients.

The choice and international standardization of technique of testing resistance is of great importance.

Systematic and widespread use of BCG vaccination constitutes an important element in eradication.

Instead of chemoprophylaxis of long duration (one year), controlled study of the efficacy of chemoprophylaxis of short duration (three to four months) would be of great importance in increasing the practicability of this procedure.

On the international scale among the efforts that are necessary to accomplish the eradication of tuberculosis, there is one absolute priority: the perfecting of chemotherapeutic methods adapted to conditions of developing countries.

In realising this objective, the 'developed' countries can give 'developing' ones considerable help.

(Georges Canetti: *Tubercle, Land.*, (1962), 43, 301).

#### **Long Term Chemotherapy in the Treatment of Chronic Pulmonary Tuberculosis with Cavitation**

Two-hundred-forty-eight patients with chronic extensive Pulmonary Tuberculosis with cavitation were included in a trial with long term chemotherapy for three years.

Four times as many men as women were admitted, about three quarters of the men and just under half the women were aged 45 years or more.

Isoniazid was given in doses 200 mg.m plus P.A.S. (Sodium) 10 gm. daily in two divided doses. Half the patients chosen at random in the first stage of trial were given Streptomycin 1 Gm. daily for first six weeks in

addition till the results of initial drug sensitivity indicated that strains were sensitive to Isoniazid and P.A.S.

Nearly all the patients were admitted to one of the two main intakes. They were allocated at random to one three *Durations of chemotherapy*.

- (a) 1/1/2—year intake (duration of six months, one year or two).
- (b) 1/2/3—year intake (duration of one, two or three years).

The effects of long term chemotherapy have been assessed in the patients admitted to 1/2/3 year intake.

Of 187 patients assessed at one year, 91 per cent had bacteriologically Quiescent disease (negative cultures for at least last three months). The corresponding proportion of the smaller numbers who continued on chemotherapy by allocation were 86 per cent of 86 patients at two years and 86 per cent of 35 patients at three years. Thus a high rate of bacteriological Quiescence was achieved with Chemotherapy alone by one year and this was maintained but not improved upon, by the continuation of chemotherapy for a second or a third year with the same drugs in the great majority of patients.

In patients in 1/1/2 year intake; 8 (62 per cent) of 13 patients who stopped therapy at six months relapsed (Bacteriological relapse) and showed clinical as well as radiological deterioration in two and half period of subsequent observation, where as only one (9 per cent) of the 11 patients who continued chemotherapy for at least one year relapsed and none showed Clinical and radiographic deterioration. Thus a period of only six months was inadequate to prevent later relapse.

Of the patients in the 1/2/3 years intake, 14 (19 per cent) of the 74 patients, who stopped chemotherapy at one year had a bacteriological relapse in the second and third year compared with 3 (4 per cent) of the 82 patients, who continued chemotherapy for a second or third year. At the end of fourth year the figure became 16 (22 per cent) and 3 (4 per cent) respectively. Thus extending the period of chemotherapy from one to two or three years led to considerable reduction in the relapse rate.

The radiographic deterioration in the second and third year were 2 of the 74 patients, who

stopped Chemotherapy at one year compared with 1 of the 82, who continued for a second or third year.

There was high incidence of persistent cavitation in the absence of positive bacteriological findings (open-negative syndrome). It was present in 108 (70 per cent) of the 155 patients with Quiescent disease at one year of these 108 patients, 15 (14 per cent) relapsed subsequently, compared with 2 (4 per cent) of the 47 patients without residual cavitation at one year, a non-significant difference.

But continuation of combined chemotherapy for a second year in patients with the open negative syndrome led to substantial reduction in relapse rate i.e., 24 per cent of 50 who stopped chemotherapy at one year relapsed compared with 5 per cent of the 58 who continued on Chemotherapy.

Progress of the two groups Isoniazid plus P.A.S. (PH series) and with initial Streptomycin for six weeks (SPH series) showed unfavourable response in 16 per cent of the PH and 3 per cent of SPH series.

Toxic or Hypersensitivity reactions occurred in 14 per cent of the PH and 27 per cent of the SPH series. This may be attributed to the initial Streptomycin supplement.

Subsequent relapse rate was 22 per cent for the PH and 18 per cent for the SPH patients.

In patients with chronic disease and cavitation, a high rate of bacteriological Quiescence was achieved by the end of one year with Chemotherapy alone. The results obtained with isoniazid plus P.A.S. supplemented by daily Streptomycin for the first six weeks, were better than those with isoniazid plus P.A.S. throughout. However stopping chemotherapy at one year led to a substantial relapse rate, especially among those patients who had persistent Cavitation at one year. Continuation of combined chemotherapy for a second year substantially reduced the relapse rate.

*(A Report to the Medical Research Council by their Chemotherapy Trial Committee. Tubercle, London, (1962), 43, 201).*

#### **The Log Dose-Response Relationship for intradermal old Tuberculin in Tuberculous Patients**

Linear relationship between logarithm of dose of old Tuberculin and the mean dia-

meter of the indurated area was shown in 5 patients with pulmonary tuberculosis. This finding is consistent with the results of intradermal tuberculin in animals.

Diameter of reaction is a better index of the response than the area.

*(A.T. Bermingham: Tub., Land., (1962), 43, 287.)*

#### **Uses and Abuses of X-Ray Examination**

“The Committee felt strongly that chest X-ray examination by radiophotography or radiography is an extremely valuable tool in tuberculosis control and that the amount of radiation from properly constructed and properly operated machines used for such purposes is negligible compared with the benefits when chest X-ray examination is indicated. Nevertheless, the Committee advocated that every possible effort should be made to abolish all unnecessary radiation; it believed that fluoroscopy should not be used as a screening procedure, not only because of the greatly increased degree of radiation but also because it does not provide a permanent record for comparison with subsequent X-ray films. Whether or not tuberculin testing should precede X-ray examination of the chest in various population groups to reduce exposure to radiation would depend on local circumstances (i.e., the prevalence of tuberculosis infection and disease) and therefore should be determined locally; but the Committee concurred with the general view that the examination of children in countries where the yield of cases is known to be low in this age-group should be confined to those first shown to have been naturally infected.”

*(Extract W.H.O. Chronicle, Vol. 15, No. 1, January, 1961).*

#### **Epidemiological Studies of Tuberculosis**

“The epidemiology of tuberculosis varies considerably in different countries. It is important for countries to make local epidemiological studies to determine as precisely as possible in which population groups the tuberculosis problem is concentrated and how the disease is being spread in the areas concerned. For example, in some areas, household exposure seems to be very important in the

spread of the disease while in others it does not seem to be of greater significance than other types of exposure."

(Extract from *W.H.O. Chronicle, Vol. 15, No. 2, February, 1961*).

### **Patients are People—not 'Cases'**

Since I am a patient with tuberculosis, I have not only lived through the disease but reflect back upon its emotional aspects. It came as a blow to me as it does to everyone. Every patient is depressed and anxious when confronted with the diagnosis of tuberculosis. No one is made cheerful by this diagnosis.

All tuberculosis patients must be completely dependent upon doctors, nurses, and non-professional personnel for everything. How well they accept this is a measure of their maturity and closely reflects their childhood experiences with mother, father and teacher, but particularly mother. Tuberculosis means the loss of all freedom, and what is most painful for the man in our society, loss of all aggressive action.

The inability to express physical aggression, of having physical outlets for emotional tensions, often results in hostility to the doctor, nurse, the hospital, or just simply the food. What the patient is really angry about is being forced into a dependent role. He can no longer be the bread-winner, or she can no longer be the home-maker, and they are both, threatened with financial social insecurity.

It seems to me that a considerable proportion of people in these close-knit hospital communities are failing to understand each other and appreciate what they represent to each other. Nurses are people, but they symbolize or act as mothers, fathers or strict teachers: Patients are people, not cases.

The cases are the filing cabinets, the people are in the beds; and doctors are people. They all come together with their own shortcomings and talents. The only trouble is that one of them is "it." It is more important to know "what kind of fellow has the germ" than "what kind of germ has the fellow."

Accepting complete dependence on others is essential to physical and mental rest. But I must emphasize that those entrusted with the patient's care should realize that this

dependence on them is often a resentful dependence.

The patient with the "painless disease," tuberculosis, is sick all over till it hurts. He is angry, he is afraid. His cheerfulness is a defence. Awareness by the staff workers of the patient's everyday human needs will help him accept his role of dependency.

(Editorial "*Lockport News*," *Lockport, New York, U.S.A. via Firland, May, 1962*).

### **Radiation Exposure in everyday life**

The extent to which man is exposed to radiation in everyday life is difficult to assess. At present it seems to be small, but it will probably increase in the future unless more care is taken. One of the most common sources of radiation is the luminous watch dial; here, although the dose is small, the range of radioactivity is wide. Some radiation-occurs in television receivers, but is usually screened off. In some countries X-ray fluoroscopy is used for fitting shoes. Luminous paints containing radium frequently appear on the market; radioactive brushes are sometimes used to remove the dust from photographic films and gramophone records; and so on.

(*W.H.O. Chronicle, December, 1961*).

### **"Quotable"**

They want of energy is one of the main reasons why so few persons continue to improve in later years. They have not the will, and do not know the way. They "never try an experiment" or look up a point of interest for themselves; they make no sacrifice for the sake of knowledge; their minds like their bodies, at a certain age become fixed. Genius has been defined as "the power of taking pains", but hardly anyone keeps up his interest in knowledge throughout a whole life. The troubles of a family, the business of making money, the demands of a profession destroy the elasticity of the mind. The waxen tablet of the memory, which was once capable of receiving "true thoughts and clear impressions", becomes hard and crowded; there is no room for the accumulation of a long life. The student, as years advance, rather makes an exchange of knowledge than adds to his stores. "Jowett's introduction to plato."

**Tuberculosis and alcoholism**

There is no evidence that excessive drinking is a direct cause of tuberculosis. Nevertheless, poor nutrition and other negative health habits that often accompany alcoholism impair the body's defences against infection.

As in tuberculosis, relapses also occur in the alcoholic. He learns, eventually, that he must not drink alcoholic beverages if he is to avoid a relapse. "A little alcohol" is impossible—he is as unsafe with a little alcohol as he is with "a little tuberculosis".

*(Massachusetts Department of Public Health  
Abstracted from the Firland Bulletin).*

**Keep Your Health**

With health, everything is a source of pleasure; without it, nothing else is enjoyable. It follows that the greatest of follies is to sacrifice health for any other kind of happiness, whatever it may be . . . for gain advancement, learning, or fame, let alone, then, for fleeting sensual pleasures.

*(Schopenhauer)*