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ABSTRACTS

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TRAINING IN TUBERCULOSIS

Training facilities for tuberculosis workers available in the country are at present confined mostly for doctors through Diploma Courses in Tuberculosis conducted by some of the universities in India. This training covers both theoretical and practical courses including lectures on Pathology, Bacteriology and differential diagnosis and treatment of various forms of tuberculosis. The emphasis is usually on clinical aspects of tuberculosis and how best to deal with individual sufferers. Though Epidemic-logical aspects are included in the curriculum, in actual practice in many centres this occupies a secondary place, and teaching in this respect is mainly theoretical with little or no field training. While this type of training may still be needed for providing the staff required for tuberculosis institutions, specially hospitals and sanatoria, the time has come to introduce a type of training in which the emphasis will be on tuberculosis control measures in a community rather than dealing with individual sufferers. This is specially needed in countries where the disease is widely prevalent and where dealing with individual sufferers alone is not likely to make a dent in the tuberculosis problem. The policy now adopted in India is to expand tuberculosis clinic services with special emphasis on domiciliary treatment. For this purpose and for dealing with tuberculous cases on a community basis not only doctors but a large number of specially trained ancillary personnel, such as home visitors, technicians, etc., are needed. The country is finding it difficult to secure the services of adequate number of doctors even for its current public health and medical work, and it is unreasonable to expect that the expanding tuberculosis work can be undertaken mainly by doctors. Our policy, therefore, should be to make use of as many ancillary personnel as possible and be satisfied with a minimum number of doctors. All these categories will need special training to equip them for the new type of work. For this purpose a Tuberculosis Training Institute is now being established in Bangalore.

This Institute will undertake to train the senior staff who are to man the various Tuberculosis Centres in the country and also those who are likely to direct anti-tuberculosis work in the States. The

trainees will include doctors, health or home visitors, laboratory and X-ray technicians, health educators and social workers. This training programme is not meant to supplant post-graduate training given to doctors in the existing set-up but is only to supplement this. Moreover, the Institute is not meant or planned to train all doctors and all tuberculosis workers needed for the country. It will confine itself to training of doctors, who are to be in charge of tuberculosis clinics, and senior public health nurses who are to supervise the home visiting services. It will also train laboratory and X-ray technicians specially needed for the type of work in a tuberculosis clinic. The responsibility of training the majority of workers needed for the implementation of Tuberculosis schemes in the country will be that of Demonstration and Training Centres in various States. What will be attempted at the National Tuberculosis Institute will be to inculcate in those who are to direct tuberculosis work in different centres, a new vision, a new outlook to enable them to accept the Community Service as the important normal procedure in tuberculosis work, rather than clinical work and running of tuberculosis hospitals and institutions.

The training visualised in the Institute will be mainly in two parts, namely:—

(1) Lectures and Demonstrations given at the National Training Institute itself. This will enable trainees to get a comprehensive view of tuberculosis, the problems connected with it and its control.

(2) The main work will be in the field, both urban and rural, where the programme for dealing with tuberculosis will be undertaken. The trainees will be expected to carry out anti-tuberculosis measures that are being undertaken in these areas, and also have an active part in some of the special investigations which the Institute will be undertaking. Special care will be taken *to work out the training programmes in such a way that the trainees will fit into the new type of work planned for clinics.* The senior officers of the Institute will prepare the necessary protocols and will also undertake statistical evaluation of material received from field units in addition to their teaching programme. The trainees will be associated in these also. Trainees of various categories will be taken in batches to urban and rural centres and will be expected to camp out for considerable periods along with their teachers.

As dealing with tuberculosis on a community basis is a new approach it is necessary to make certain investigations and studies as to how best this can be undertaken, and how much we can make use

of the normal workers connected with Community Development Programme in the implementation of anti-tuberculosis measures. It must, however, be emphasised that though investigation and research will form part of the work, the main emphasis will be on applying TB control measures in the community. The programme may be described as an "investigation-cum-action programme".

Immunological Studies in Tuberculosis

Non-pathogenic Mycobacteria and Immunity to Tuberculosis in Mice*

By

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Besides using the attenuated human or bovine tubercle bacilli to produce immunity against tuberculosis, some attempts have been made, using mycobacteria isolated from various animal species and also some saprophytic mycobacteria. Thus the use of the vole bacillus, occurring naturally in the voles (Wells 1937), the acid-fast organisms occurring in the turtle (Friedmann 1903, 1904), the use of *Mycobacterium marinum* occurring in the fish and garter snakes (Aronson 1929) and the use of *Mycobacterium phlei* (Bloch and Segal 1955) have been reported in literature. Very recently, the use of *Mycobacterium ulcerans* and *Mycobacterium balnei* for developing immunity against mycobacterium infections in mice has been reported by Fenner (Fenner 1957).

The authors have also attempted to produce immunity in mice against tuberculosis using a naturally occurring saprophytic mycobacteria, *Mycobacterium lacticola,* isolated from the intestines of the Indian earthworm. This paper summarises some of the salient aspects of the study, in brief.

Experimental

Materials and methods: The organism : It is one of the eighteen micro organisms isolated by Khambata and Bhat (1954) from the intestines of the Indian earthworm, using the oxalate-enrichment technique of Bhat and Barker (1948). It was identified as *Mycobacterium lacticola* and the identification was confirmed by Dr. Ruth E. Gordon of the Rutgers University, U.S.A.

Challenging infection : Fourteen-day old culture of the standard H_{37} Rv strain *of Mycobacterium tuberculosis* var *hominis* from the surface of Youmans medium was taken, weighed, washed twice with sterile saline and finely ground into a uniform suspension using a sterile pestle and mortar. Suitable amounts were injected into the animals intravenously through the tail vein.

Animals Used in these Studies

Mice: Our laboratory strain of mice, originally obtained from the Haffkine Institute, Bombay. Their susceptibility to tuberculous infection and dose-mortality curve were previously established (Sirsi and De 1951).

Rats: Our laboratory strain of albino rats.

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Guinea pigs:—Our laboratory strain of animals, originally obtained from the Vaccine Institute, Bangalore.

Rabbits:—Our laboratory strain of rabbits, originally obtained from the Vaccine Institute, Bangalore.

Chicks:—White Leghorn strain, hatched and maintained in the Malaria Section of our laboratory.

Dogs:—Healthy dogs supplied by the Bangalore Corporation.

Pathogenicity of the Organisms

The organism was found to be negative to the *in vitro* tests for pathogenicity, like the neutral red test, the nile blue tests, cord formation etc. The *in vivo* studies of pathogenicity were done in the several species of laboratory animals mentioned before.

In mice, it was carried out both by subcutaneous and intravenous injections, with the organism ranging from 0.1 to 5.0 mg. wet weight per animal. In the case of rats and chicks, 10.0 mg. of the organism was injected intravenously, while in the case of guinea pigs, rabbits and dogs, 25 mg. was injected subcutaneously.

The animals were carefully observed for any evidence of pathogenicity for at least two months. Histopathologic studies were also carried out on sections of the organs of representative animals in each group.

Both microscopic and histopathologic observations did not reveal any evidence of pathogenicity of the organism in the animals even at these high doses.

The Tuberculin Test

The capacity of the organism to elicit a tuberculin type of allergic reaction was studied using guinea pigs. The animals were injected substernally with 25 mg. wet weight of the organism, and were tuberculin-tested with old tuberculin every week. A control group of animals were injected with 25 mg. wet weight of B.C.G. organisms.

It was observed that the *Mycobacterium lacticola* injected animals could not show any positive reaction of 6 mm. diameter or more even after 8 weeks, while the B.C.G. group of animals showed a marked positive reaction at the end of three weeks, the allergy persisting throughout the 8-week experimental period.

Prophylaxis against Tuberculosis

Thirty-six mice of about the same age and weight were taken from our laboratory strain and divided into three groups of 12 mice each such that the total initial weight in each of three groups was the same. Animals in Group I were then injected each with 0.1 mg. weight of a 2-day old culture of *Mycobacterium lacticola* O^{11} (in nutrient broth), while the animals in Group II were injected each with 0.1 mg. wet weight of a 1.4-day old culture of B.C.G. in Youman medium. Animals in Group III served as the non-immunised controls. The animals were separately

housed in individual cages and the three groups were set apart, both among themselves and from any tuberculosis source.

An arbitrary incubation period of one month was allowed for the development of immunity in the animals, after which time all the animals in all the groups were challenged with 1.0 mg. wet weight of a 14-day old culture of the standard H_{37} Rv strain of *Mycobacterium tuberculosis* intravenously through the caudal vein.

At the end of 23 days after challenging infection, when all the control animals had died, all the survivors in the other two groups were sacrificed. The mortality, survival period, weight loss and the degree and types of lesions (macroscopic and microscopic) observed after autopsy were used as the criteria in assessing the amount of the tubercular disease in the mice. Table below summarises the results in the three groups of animals.

TABLE

Post-mortem observations of Mycobacterium lacticola and B.C.G. immunized animals

	No. of animals	ST50	Average amount of lesions (Macroscopic)	Average amount of bacilli (Z. N. Stain)
1. Mycobacterium lacticola and infection	12	23	2.2 +	2 +
2. B.C.G.+ infection	12	23	2.4 +	2 +
3. Controls	12	17	3.5 +	4 +

These studies were repeated in another statistically controlled experiment. Seventy-five mice were picked up from our laboratory stock and divided at random into three groups of twenty-five each, using the random figures taken from the statistical Tables of Fisher and Yates (1957). Animals in one of these groups were injected subcutaneously with 0.1 mg. W3t weight each of a 2-day old culture of *Mycobacterium lacticola* O_{11} while those in another group were injected with 0.1 mg. wet weight of a 12-day old B.C.G. culture. The third group of animals served as controls.

At the end of six weeks, all the animals were challenged with 0.1 mg. wet weight each, of a 14-day old culture of the H_{37} Rv strain of *Mycobacterium tuberculosis* intravenously through the tail vein. The animals were carefully followed as in the previous experiment and their weight changes, survival period, mortality rates closely followed.

At the end of 45 days when 21 (88%) out of 24 controls had died, only 4 (16%) out of 25 of the B.C.G. group and *5* (20%) out of 25 of the *Mycobacterium lacticola* group had died. A statistical evaluation of the results has been carried out. The X^2 test showed that the *Mycobacterium lacticola* conferred definite protection against tuberculosis and this protection is statistically significant (P 0.0001). Further, the difference in mortality rates between the B.C.C. and *Mycobaterium lacticola* groups is not statistically significant, indicating that there is not any difference in their immuno-biological potencies as far as the results in the experiments show.

Histopathological Observations

The non-immunised infected controls invariably showed the involvement of more than 80% of lung tissue in the majority of animals. The lesions were exudative in nature consisting of macrocytes, polymorphs, lymphocytes and cell debris and the alveoli completely filled with cellular masses. The central region of some of these lesions showed necrosis, due to cellular disintegration. In the Ziehl Neelsen stained slides large clumps of tubercle bacilli were found both ingested in the monocytes and in the extra cellular material distributed all over the lungs.

The lesions in the immunised and challenged animals showed both qualitative and quantitative variations. The involvement of the lung tissue was comparatively less, ranging from 25-40 per cent. The intervening spaces were free from exudate. The cellular character was more proliferative in type consisting mostly of epithelial cells and monocytes. No necrotic lesions were seen. The tubercle bacilli were found in the lesions but not in such heavy clumps and number as seen in the controls. The histopathology of the B.C.G. immunised animals was very similar to those observed with the *Mycobacterium lacticola* immunised mice.

DISCUSSION

The results presented above indicate that the organism *Mycobacterium lacticola* O_{11} did not exhibit any macroscopical or microscopical evidence of pathological disturbance in the various species of laboratory animals, even at the high doses of infection. The results also show that the organism could produce a resistance in mice against heavy intravenous infection of tubercle bacilli, as indicated by the mortality, survival period, weight changes and amount of lesions in the various organs of the animals. The resistance produced by this organism was almost equal to that conferred by B.C.G. under similar conditions.

It is pertinent at this stage to compare these results with those obtained with the use of B.C.G. and vole bacilli on which much literature has accumulated in recent times. If we exempt the differences in the antigenicity due to the difference in methods of preparation, etc, the results presented in this paper show that the immunity conferred by this organism is at least equal to that produced by B.C.G. As this is a natural non-pathogenic organism, the possibility of its gaining virulence is remote. Hence this has an advantage over the vole bacillus, which is slightly more virulent than even the B.C.G., though it is difficult to compare the relative efficacies of this organism and vole bacillus in conferring immunity against tuberculosis. Further, this does not have any effect on the tuberculin sensitivity, which is considered a very useful diagnostic tool in the hands of the clinicians.

While considering these results, some points are of necessity to be realised. First among these, is the heavy intravenous challenging infection which is necessitated by the mortality studies in mice. This is rather an unfairly large dose of infection, as compared to the much smaller inoculum in spontaneous infections in man. Secondly, it is to be borne in mind, that any vaccination against tuberculosis however powerful it may be, can only achieve an increased resistance rather than a complete protection. This is more so when heavy challenging infections are used, as in these studies. Finally, it is to be noted while comparing these results with B.C.G. with those obtained by regular B.C.G. vaccination, that the preparation and use of B.C.G. in these studies, was not similar to that carried out by B.C.G. workers, and as such, these results with B.C.G. may not be exactly simulating of the classical B.C.G. vaccination.

Considering all these factors, the results presented in this paper indicate the capacity of the organism to elicit a definite immunological response in mice against an intravenous tubercular infection without having any effect on the tuberculin reaction. These positive results are not in agreement with the views of Irvine (1949) and of Wells and Wylie (1954) that a minimum amount of virulence is necessary to elicit resistance in tuberculosis. However, Weiss and Dubos (1955) mentioned that pathogenicity or virulence of the immunising organism is not an essential factor for the development of immunity, and that the two phenomena, antigenicity and virulence are quite independent. Further, these results also indicate that the tuberculin-type of skin allergy may not be an essential phenomenon in immunity to tuberculosis. Recently Pierce *et al* (1953) have also mentioned that anti-tuberculosis immunity is independent of skin allergy.

Summing up, these results indicate sufficient evidence of the possible application of *Mycobacterium lacticola* in developing anti-tuberculosis immunity in mice, though it is premature to draw conclusions on its efficacy in different species of animals and in humans on long-term practice.

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Thoracoplasty in Pulmonary Tuberculosis—An Evaluation based on 500 Cases

By

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Of all collapse therapy measures in the treatment of pulmonary tuberculosis, none has so completely withstood the test of time and established itself as thoroughly satisfactory measure, as thoracoplasty. The long experience has made it comparatively easy to choose suitable patients for this procedure and the technical improvements have gradually expanded the field of its application.

Not before long thoracoplasty was strictly performed on unilateral cases of long standing where all other therapeutic measures failed to improve or to arrest the disease. Corrylos, however, advocated to employ it at an earlier stage and the wisdom of his views were subsequently ratified almost from every quarter. Alexander's insistence on removal of limited number of ribs at each stage reduced the incidence of complications like paradoxical respiration and mediastinal flutter and showed also a noticeable fall in the post-operative mortality rate.

Experience has also shown that disease of the opposite side is not necessarily a contra-indication for thoracoplasty provided it could be brought under control. Chemotherapy has also widened the field of indications by relieving the endo-bronchitis and putting the patient under better conditions to stand the operation.

Improved methods in anaesthesia, the adoption of local anaesthesia in particular, wider use of bronchoscope both before and after operation and post-operative physiotherapy have also contributed in great measure towards the soundness of procedure.

At a time, when the indications for resection and thoracoplasty seem to overlap in a very large number of cases, we find it worth while to publish our clinical and surgical material which we have ploughed through a period of 8 years.

Clinical Material

The total number of patients who have undergone either a single or multi-staged thoracoplasty during eight years were 500; 317 males and 183 females, the total number of stages performed being 932. The youngest patient was 15 and the oldest was 68. The patients were divided in three groups according to the extent of lesions as under :

1. Far advanced: Extensive bilateral fibrocaseous lesions with one or more cavities.
   Total number being ... 320.
2. Moderately advanced: Extensive lesions on the operated side and minimal or no lesion on the other side.
   Total number being ... 156.

3. Strictly localised: Localised in a single lobe or a segment.
Total number being ... 24.

Sputum Status of Patients before Thoracoplasty

97% of patients had a direst positive smear and 3% were negative by smear, d.f. and stomach wash, though they showed demonstrable cavitations in their skiagrams.

Hospitalisation period prior to surgery ranged from two weeks to two years. The duration of period is given below.

Less than one month	...	21	Patients.
Less than three months	...	69	,,
Less than six months	...	75	,,
Less than one year	...	205	,,
Less than two years	...	130	,,
Above two years	...	nil	

TABLE I

Distribution per Age-Group and Sex

Age	*Males*	*Females*	*Total Number of Patients*
15-20	*6*	*2*	*8*
20-30	121	111	232
30-40	117	68	185
40-50	53	2	55
50-60	16	nil	16
Above 60	4	nil	4
Total	317	183	500

Pre-Operative Treatment

Every patient received a combination of Streptomycin and Isonex, or Isonex and PAS or all the three. Majority of them received a supportive pneumoperitoneum

TABLE II

Pre-Operative Treatment Received by Patients

Nature of treatment					No. of Patients
Steeptomycin, I.N.H. Pas	…	…	…	…	500
Pn. P.	…	…	…	…	276
Phrenic crush :	…	…	…		
(a) On the opposite side 12	…	…	…	…	…
(b) On the opposite side 76	…	…	…	…	88
Transthoricic intracavitary instalations with I.N.H. solutions	…	…	…	…	152
Wax ro Ball Plombage	…	…	…	…	27
A.P.	…	…	…	…	3
Extra-pleural Pneumolysis	…	…	…	…	7

varying from 3 months to over an year. A small group were given a phrenic crush either on the side of the thoracoplasty which followed at a later stage or on the opposite side to bring the infection on that side under control.

Selection of Material

We have been reasonably liberal in the choice of our material since we have included cases where a meagre chance could be given to patient. Thus a number of fairly extensive bilateral cases have been included; a number of patients suffering from other systemic diseases like diabetes, tubercular nephritis and nephrosis and tubercular empyema have been also included in the series and the procedure was also carried out on two pregnant women in 4 and 5 months, respectively.

Operative Technique

In all cases we have adopted the technique as given by Alexander under 1 % procain infiltration of the operative field. Intravenous glucosesaline infusions were given to every patient during the operation. In most of the cases we restricted ourselves to the removal of 4 ribs at one stage though on rare occasions we have removed upto 6 ribs in one stage without any untoward effect. During the post-operative period patients were given strepto-penicillin and Isonex for at least 10 days, the latter finding its continuation in every case for a very long time. The stitches were removed on the llth day after the operation.

Complications during and immediately after Surgical Procedure

As recorded below, we have come across few negligible complications in our series, which in majority of cases were overcome with little difficulty.

Complication	No.
Surgical shocks	2
Tears of parietal pleura	6
Pleural effusions	4
Secondary wound infections	10
Hemiplegia	2
Post-operative atelectasis	4
Tubercular empyema	2
Homer’s Syndrome	1
Acute Pulmonary Oedema	1
Death due to Anaesthesia: (Anaesthaine Poisoning duet o overdose)	1
Death due to post-operative haemorrhage	1

The pleural tears were immediately stitched and the post-operative course was uneventful in all cases. The surgical shocks were managed by intravenous administration of large doses (upto 20-40 cc.) of Coramine by drip method and intramuscular administration of adrenalin hydrochlor. Subsequently these patients were managed by depot camphor. In two cases of pleural effusion, only one puncture was needed; in two other cases it was so massive that they needed repeated aspirations. But in every case the aspirated fluid was sterile and the post-operative course was uneventful. Secondary wound infections could be easily managed in every case through broad-spectrum antibiotics. Two of the patients developed total

hemiplegia on the operated side on the sixth and seventh post-operative day, respectively, on account of post-operative cerebral embolism. One patient left the Hospital immediately afterwards and all our efforts to trace him have unfortunately failed. The other patient is still showing residual paresis of the arm after six years of surgery, but has otherwise no complaints of any nature.

One patient developed Horner's syndrome on the operated side, which was probably induced by impactation of the brachial nerve in the scar tissue. The patient has found little relief in his symptoms after a period of three years.

Seven patients from the series died of cardiorespiratory insufficiency during the course of 2-6 post-operative days whose total pre-operative vital capacity ranged between 800 cc. to 1300 because of extensive lesions.

One patient died of secondary massive haemorrhage on the third post-operative day. We succeeded in catching the bleeding points during the revision of the operation on the third day, but the patient succumbed to the massive blood-loss, which could not be replaced by timely blood transfusions because of want of its supply.

One patient died after infiltration of anaethaine solution in a state of extreme convulsions even before an incision for the thoracoplasty could be undertaken. Two foregoing patients on the same day, who were administered the same solution did not show any degree of intolerance towards the drug. Here is probably a case which was oversensitive to this particular drug. The use of this drug has been abandoned by us ever since.

Evaluation of the Results of our Series

We may best compile the results of our series in the following groups:

I Operative deaths		10	**...**		**2%**
(a) Cardio respiratory insufficiency		...			7
(b) Acute Pulmonary oedema		...			1
(c) Surgical shock due to haemorrhage		...			1
(d) Anaesthesia shock		...			1
II Late deaths	...	18	...	3.6%	
(a) Progressive Pulmonary Tuberculosis also in contralateral side	...	...			12
(b) Acute nephritis	...	...			**2**
(c) Coronary thrombosis	...	...			2
(d) Diabetic coma	...	...			2
III Relapse in disease after surgical arrest of lesions	...	40	...	8%	
(a) Ipsilateral side with residual cavities or chinks	...	12	...	2.4%	
(b) Involvement of contralateral lung		28	...	5.6%	
IV Patients whose contact is lost	...	45	...	9.0 °	
V Improved cases	...	387	...	77.4%	

All the cases in Group V show a good collapse after thoracoplasty, show no radiological evidence of active disease after repeated periodical check ups for over a period ranging from one to eight years after surgery. Repeated bacteriological examination of stomach wash samples show no evidence of the presence of Koch's bacilli. The patients of this group are following their normal routine of life without any complaints or social handicaps. A number of them have been rehabilitated in other more suitable vocations where they have been happily settled.

Four patients from this group were readmitted after a period ranging from 2-3 years with minor complaints of negligible haemoptysis but without any radiological or bacteriological evidence of activity of disease. The bleeding originated probably from residual bronchiectasis which disappeared on giving them bed rest for some days.

Method of giving Discharge to Patients, Follow-Up and Ambulatory Treatment

Patients were given discharge from the hospital after operation when three consecutive samples of stomach wash at an interval of one month each were negative for Koch's bacilli. Patients were called for checking every three months after discharge during first year, every six months during the second year and third year and once a year during the fourth and fifth year. Postal contacts are maintained with the patients after the five year period in order to collect the data pertaining to their general condition of health and their tubercular disease in particular.

Discussion

At a time when excisional surgery is catching the imagination of majority of people and while it is still quite early to make an accurate assessment of this method, a comparison between the results of the two methods is not possible. However, on the basis of knowledge and experience which has been gathered so far, it may be safely concluded that thoracoplasty on the one hand is an established procedure with a commendable percentage of proved successes over a period of many years; on the other hand excision, though young and untried, has proved its worth in cases where thoracoplasty would not render any scope of success. Thus both the methods have a place in the therapeutic armamentarium against Pulmonary tuberculosis. Where collapse therapy measures have failed or are likely to fail, excision remains the method of choice. Where collapse therapy is likely to give good results, there is much in favour for thoracoplasty. As Alexander puts it: "Where there is a choice between thoracoplasty and resection in individual cases, thoracoplasty should be chosen."

The chief handicaps of a thoracic surgeon in under-developed countries like India are—unsuitable clinical material for resections because of advanced bilateral disease in majority of the cases of pulmonary tuberculosis, inadequacy of blood supply and trained staff for the management of anaesthesia and post-operative care, and very often inadequacy of funds.

Considering the background of all the social, economical and medical factors involved and looking to the adequacy of the results of successful thoracoplasties, the procedure seems to retain its place for some time to come.

Summary

A follow-up for a period ranging from 1 to 8 years of 500 patients, who had undergone thoracoplasty have shown that 77.4% of these cases remained arrested

and inactive. The patients were rehabilitated to full normal activity of life. The results would have been more impressive, if the choice of the patients would have been less liberal. It is comparatively seldom that a patient with a well performed thoracoplasty shows evidence of relapse. In under-developed countries where facilities are lacking, thoracoplasty is a reliable and worthy substitute for excision.

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Analysis of Results in 469 Consecutive Sanatorium Discharges

By

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Tuberculosis has been described as a disease of the mind. We would also add to that phrase, one of the purse for without insight and willingness to get well, the doctor's advice is of little use. Without the economic ability to procure treatment when not otherwise available, the patient is usually doomed.

That ambulatory treatment partly, or even largely, superseded sanatorium therapy is a reflection of the socio-economic factors involved and must admittedly be recognized as a poorer form of therapy. However, there is often no other reasonable choice today.

It is the purpose of this paper to review the results in 469 consecutive patients discharged from the sanatorium six months or more ago. These patients are not a completely representative sample, as a large number of these patients were referred for specific surgery. However, they do give figures which illustrate the problems encountered in a small sanatorium.

During the years 1954-1958 inclusive, there were 469 patients discharged. They were approximately 50% private or paying patients, and 50% who were supported by various agencies. These latter patients were thereby financially free from worries for the most part.

TYPE OF CASE

Age and Sex

Table I shows the age and sex groups of the patients. There were, roughly, two men for every woman patient, a rather usual figure. The ages ranged from 8 to 70 and women tended to come at a younger age than their male counterparts. Many of the older men were "good chronics", that is, cases without a reasonable hope of cure, but

TABLE I

Age	Women	Men	Total
0 — 9 years	1	1	2
10—19 "	22	35	57
20—29 "	65	106	171
30—39 "	27	117	144
40—49 "	20	46	66
50—59 "	5	14	19
60+ "	4	5	9
Unknown	0	1	1
	144	325	469

in whom the disease remained relatively quiescent. A large number of these patients spent the hot months in the sanatorium, leaving at the end of summer to return the next year.

Extent of Disease

Patients are rarely referred to a sanatorium today unless far advanced, as shown in Table II. Classification was according to the National Tuberculosis Association, U.S.A. classification (1950). There was no difference according to the sex as far as the extent of disease was concerned.

Generally speaking, the older the patient, the worse the disease. This is to be expected because after relapsing from an earlier lesion, our patients usually found themselves with a more extensive disease.

TABLE II

Age	Far advanced	Mod. far advanced	Minimal	Unknown
0 — 9 years	1	0	0	1
10—19 "	26	22	3	6
20—29 "	81	51	21	18
30—39 "	82	9	13	10
40—49 "	41	19	2	4
50—59 "	15	2	0	2
60 + "	7	2	0	0
unknown	0	0	1	0
	253	135	40	41

Sputum examination on admission is deceptive. Only 50% of the patients had positive sputum by concentration methods. Had cultures been available, more undoubtedly would have been positive. However, over 50% of the patients had been receiving drug therapy for 3 or more months prior to admission, further lowering the incidence of positive sputums. Many of these had never had a proper sputum test and establishment of diagnosis.

Previous Treatment (Table III)

27.9 % of our cases were retreatment cases. We have defined this to include only patients who had been told by medical practitioners that they were well and could

TABLE III

	Men	Women	Total
% Retreatment cases	30.5	22.2	27.9
% Previous Treatment	79.1	68.1	75.7
% who had received 6 Mo. or more drug treatment	39.1	33.4	37.9
% who had received 3-6 months drug treatment	15.1	15.9	15.4
% who had 0 — 3 months drug treatment	24.3	13.8	21.1
% who had intermittent drug treatment	44.8	36.1	43.5
% who had continuous drug treatment	33.2	29.2	32.0

discontinue therapy and who then relapsed, Of these cases, many probably could have been cured at the first treatment had antibacterial treatment been continued longer or surgery used.

Only 23 % of the patients had not received previous treatment, most of these being local patients from the hills. We have differentiated previous treatment cases from retreatment cases to include all cases who received treatment for a continuous period immediately prior to admission as well as retreatment cases. Of those having had previous treatment, 50% had received drug therapy for more than 6 months. To further complicate the problem of treatment, 57 % had had their drugs administered intermittently.

Pregnancy

Of the 134 women in the childbearing age, 34 developed their lesion immediately (within 3 months) following delivery and another 4 during pregnancy. In all, this means that 28% of the women eligible to bear children developed the first symptoms of tuberculosis in association with pregnancy. Indeed, in the 20-24 ags group, the percentage rose to 37%. Lest this be misconstrued, it should be pointed out that the majority of our women bore two or more children in this period of five years, representing 36% of their time. The symptoms seemed to be more acute, although the extent of the disease was not. As noted above, 34 out of 38 developed diagnosable symptoms immediately following pregnancy rather than during it. The sudden descent of the diaphragm with relative distension of the lungs would seem to play a role. We have, therefore, routinely adopted the policy of immediate pneumoperitoneum following delivery, although it may be questioned on theoretical grounds.

Duration of Disease Prior to Admission

As can be seen from Table IV, 57 % of our patients had been ill for one year or more, and 35% for two or more years.

TABLE IV

Duration of Illness prior to Admission

	Men	Women	Total	Percent of total
Less than 6 months	74	40	114	24.3
6 Mo. to 1 year	57	25	82	17.5
1—2 years	69	31	100	21.3
2—3 years	27	9	36	7.7
3—5 years	44	22	66	14.1
More than 5 years	48	15	63	13.4
Unknown	6	2	8	1.7
	325	144	469	

TREATMENT

In all cases, anti-tuberculosis treatment was similar in principle. The patients were encouraged to take as complete bed rest as possible. However, it is difficult to keep a patient who feels well in bed. Furthermore, with the public interest in and publicity for the clinics for ambulatory therapy, it is becoming increasingly difficult to stress rest. However, it is still our feeling that rest plays an important role in the management of the tuberculous patient. Antibiotics were routinely given—Dihydro-

streptomycin 1 gram bi-weekly and Isoniazid 5 mgm./Kg. body weight in the majority of cases. Sodium PAS 16 grams daily was used with one of the other two when resistance was suspected or intolerance to one drug became a problem. Viomycin, 2 grams bi-weekly, or daily streptomycin was used on occasion.

Pneumothorax has been completely abandoned and pneumoperitoneum was used only in a few cases where the extent of the disease has precluded the indicated surgery for basal cavities.

Surgical treatment was carried out as indicated and approximately 40% of our patients received this adjunct. However, it should not be concluded that we feel that this is the proper percentage in general. Rather, many cases were referred specifically for surgery in the absence of adequate facilities in their home areas.

However, treatment was carried to completion as advised by the medical staff in only 50% of the cases. This was mainly due to lack of finances. In another 18% treatment was classified as "compromise", while the rest of the patients were unable to follow advice or even "compromise" treatment.

By "compromise" treatment we mean treatment short of our ideal. Most of these patients were discharged long before the sanatorium staff thought they should be, but with our consent if the disease was not too far advanced or too symptomatic. In most cases, they were advised treatment elsewhere or returned later for their surgery as required. In a few cases, the form of surgery was compromised—thoracoplasty being carried out rather than resection because of expense or inability to wait as long as deemed necessary pre-operatively.

RESULTS

Of the 469 cases available for study, 42 died in the hospital on their first admission. This represents 8.9% of the patients admitted and is the hospital mortality. Of these, 35 were far advanced, 4 moderately far advanced, and 3 unclassified. 13 of these deaths were in patients having surgery.

Results have been determined in all cases as far as possible. However, it is difficult to obtain adequate follow-up, especially when patients come from a long distance and often cannot reach.

Our follow-up has been divided into 5 groups :

(a)	Lost to follow-up—	187 cases
(b)	Known to be ill of tuberculosis—	52 cases
(c)	Known to be alive—	23 cases
(d)	Known to be well—	133 cases
(e)	Dead (either at home or on readmission)—	32 cases

In the group known to be alive, we have received reports that the patients are alive but do not know the status of their lungs. However, past experience has taught us that most of this group are well rather than ill.

The group known to be well is limited to those with radiographic proof of stability, and whenever possible, bacteriological proof. It should be noted here that a few of the patients listed as well are still receiving antibacterial drug therapy. For the most part, this is limited to isoniazid alone, and all of these few patients were desperately ill on arrival with multiple relapses and very poor prognoses. One had been ill for 21 years, another for 12, and it was felt that these patients could least afford any relapse. However, this is a small group and does not affect the over-all

pattern. It is realized that all should have had tomographic and culture studies, but this is impossible in our financial group of patients.

Follow-up has been possible in only 53.4% of the patients discharged from the hospital alive. However, 124 of the 187 patients in whom no follow-up was possible remained in the hospital less than 6 months and were in the group where poor results were to be anticipated. Most of these cases were hopeless cases who came to the sanatorium for the summer months or else became discouraged very soon and were psychologically untreatable. Therefore, the follow-up figures obtained represent only the more favourable or cooperative cases.

Follow-up varied from 2 days to 5 years. Most of the follow-up was for more than one year, and 33% for two or more years. No case was admitted to a "well" classification unless 3 months had passed, and usually, at least 6 months.

The late deaths occurred usually within the first 18 months after discharge, and as yearly as 2 days and as late as 30 months.

TABLE V

% Results according to prior Illness

	0-6 months	6-12 months	1-2 years	2-3 years	3-5 years	Over 5 years
Late deaths from tuberculosis	3.7	9.1	6.7	9.4	5.4	6.8
Late deaths from other causes	0.8	0.0	1.1	0.0	5.4	0.0
No follow-up	47.2	55.9	40.0	37.5	42.9	33.9
Known to be ill	15.3	5.2	10.0	15.6	42.5	15.3
Known to be alive	6.6	5.2	2.2	0.0	8.0	8.4
Known to be well	26.4	24.6	40.0	37.5	25.0	35.0
Number of cases	106	77	90	32	56	59

In the 427 patients discharged alive, our results have been studied in 4 groups:

(a) Treatment and duration of illness prior to admission.
(b) Status on admission.
(c) Type of treatment.
(d) Status on discharge.

Duration of Treatment Prior to Admission

The previous duration of disease as shown in Table V would seem to be of little importance in the prognosis. In fact, although probably not significant, the longer the pre-existing disease, the higher the percentage that we know to be well. Probably this is a reflection of the attitude of many of these more chronic cases who finally, after several "half-hearted" attempts at cure, have decided to keep with the treatment as long as required as well as better resistance of these patients. In our experience, chronicity of disease does not preclude ultimate cure.

While we had anticipated that retreatment cases would have poorer results, this was not found to be the case. Similarly, previous treatment influenced the outcome not at all regardless of duration of drugs or whether given intermittently or continuously. This finding is probably a result of increased resistance in the chronic cases, as well as the fact that most patients' previous treatment was manifestly inadequate and often far too brief to produce drug resistance. However, a

large number of cases arriving untreated were local hill people, very poor, and unable to remain long in the sanatorium. This, also, may help to explain the equal relapse rate in the untreated group.

TABLE VI

Results according to prior Treatment

	Retreatment Cases	%	No. primary treatment Cases	%	Continuoulsy ill cases %	under reatment outside
Late deaths from tuberculosis	8	6.2	6	5.6	11	4.7
Late deaths from other causes	2	1.5	2	1.9	1	0.6
No follow-up	46	35.7	41	38.3	100	43.3
Known to be ill	14	10.9	16	14.9	22	9.5
Known to be alive	10	7.8	3	2.8	10	4.3
Known to be well	37	28.9	33	30.8	63	27.2
Hospital deaths	12	9.3	6	5.6	24	10.4
Total	129		107		231	

Status on Admission

While the treatment prior to admission would seem to be an unimportant factor in prognosis, the evaluation of the case on admission is definitely important (Table VII).

No cases of minimal tuberculosis are known to be either ill or under treatment, whereas 15% (35 of 224) of the far advanced cases and 11% (14 of 131) of the moderately far advanced cases are known to be ill. Only 20 % (44 of 224) of the far advanced cases are known to be well.

It is difficult to assess the more seriously ill cases. As can be seen, the more advanced the case, the lower the follow-up rate. It must be presumed that many of the 50% (112 cases) lost to follow-up who were in the far advanced group are dead, whereas few, if any, from the other groups are dead, and relatively few ill.

Admission sputum is also an important prognostic sign. Table VII shows the follow-up results according to admission sputum. 26.5 % of the patients with a positive sputum are dead or ill of tuberculosis, and only 8.8 % of the patients with a negative sputum are dead or ill.

The disease was recorded as primarily unilateral in 103 cases and bilateral in 288. This affected the prognosis considerably, especially as regards late deaths and those known to be ill. However, the presence or absence of cavity, especially if bilateral, was even more of a determining factor. All of our late deaths from tuberculosis came in patients with cavity on admission. Bilateral cavity was a very bad prognostic sign. Of 61 cases successfully followed, 36 are known ill or dead of tuberculosis and only 18 are known well, while 7 are listed as alive.

The size of the largest cavity was of importance only in cavities greater than 4 cm., the so-called "giant cavities". Good results are known to be obtained in only 16% of patients with giant cavities, and known bad results in 36% of the cases. The rest are unknown and probably bad. When the largest cavity was under 4 cm., the prognosis was much better and 35% are known well while only 14% are known ill or dead of tuberculosis. Giant cavities are still a formidable problem in therapy.

Where the total size of all cavities was measured, the results were even more striking. From a figure of 44% well when the total size was less than 4 cm., it dropped to 6.7% when the figure rose to 16 or more cm. The late deaths from tuberculosis rose similarly.

TABLE VII

% Results according to Status on Admission

	Far adv.	Mod adv.	Far minimal	Sputam +	Sputam -	Cavity		
						None	Unilat.	Bilat.
Late deaths of tuberculosis	9.4	0.0	0.0	10.9	0.5	0.0	4.0	7.9
Late deaths of other causes	1.2	2.3	2.5	0.8	1.0	2.9	0.0	1.5
No follow-up	50.0	38.9	39.0	42.2	44.4	38.8	38.8	45.2
Known to be ill	15.6	10.7	0.0	15.8	8.5	8.3	8.7	13.5
Known to be alive	4.5	5.4	12.2	4.2	6.8	9.7	6.8	5.2
Known to be well	19.3	42.7	46.3	26.1	38.8	40.3	41.7	26.7
Total number of cases	224	131	41	237	180	72	103	288

TABLE VIII

	Size largest cavity in %				Total size of cavities in				%
	None	0-4 cm.	4-8 cm.	8 + cm.	0-4 cm.	4-8 cm.	8-12 cm.	12-16 cm.	16+ cm.
Late deaths from tuberculosis	0.0	4.1 1.1	15.5	15.0	1.8	6.4	9.5	8.8	36.6
Late deaths from other causes	2.9	44.2	1.2	0.0	1.0	1.4	1.8	0.0	0.0
No follow-up	38.8	9.9	41.2	40.0	36.0	57.7	42.9	43.9	30.0
Known to be ill	8.3	5.2	19.4	25.0	10.8	8.9 5.1	23.8	26.9	16.7
Known to be alive	9.7	35.5	5.2	5.0	6.3	20.5	0.0	4.4	10.0
Known to be well	40.3		17.5	15.0	44.1		22/.0	17.0	6.7
Total cases	72	172	97	20	111	78	42	23	30

Type of Treatment

The treatment given has been outlined above. It is beyond the scope of this paper to differentiate between different drug regimes. However, there) were two methods of evaluating treatment, namely by duration of hospital stay and by the cooperation of the patient and willingness to follow advice.

TABLE IX

Evaluation of Treatment with reference to Length of Hospital Stay

	0-2 months	2-4 months	4-6 months	6-12 months	Over 12 months
Late deaths from tuberculosis	5.4	3.6	7.3	7.9	6.0
Late deaths from other causes	1.4	0.0	0.0	1.0	1.5
No follow-up	63.5	60.7	47.3	34.5	31.3
Known to be ill	10.8	7.1	5.4	2.7	10.4
Known to be alive	10.8	2.4	7.3	3.5	7.5
Known to be well	8.1	26.2	32.7	50.4	43.3
Number of cases	74	84	55	113	67

Table IX shows the follow-up results by various time periods of sanatorium care. As can be seen, the follow-up increases with the duration of hospital stay, a sign of patient interest and cooperation, and freedom from financial worries. The results were bad in patients who remained less than 2 months, and we feel that 6 months is usually the minimal period of time if much is to be accomplished.

The patients were also divided into groups of those who followed the advice of the sanatorium authorities, those in whom treatment was "compromise", and those who manifestly would not take any recommendations or who refused obviously needed surgery. The figures speak for themselves, only 12% of those going against advice are known to be well whereas 43 % of those who followed advice are well, and 25 % of those patients in whom treatment was compromise are well.

TABLE X

Type of Treatment

	As advised	%	Compromise	%	Against advice	%
Late deaths from tuberculosis	12	5.7	0	0.0	11	12.2
Late deaths from other causes	3	1.4	0	0.0	0	0.0
No follow-up	72	34.2	47	61.8	46	51.1
Known to be ill	22	10.4	8	10.6	14	25.5
Known to be alive	10	4.7	2	2.6	8	9.0
Known to be well	91	43.5	19	25.0	11	12.3
Total cases	210	100	76	100	90	100

TABLE IX

Follow-up Results as Determined by Sputum and Cavity on Discharge in %

	Sputum positive	Sputume negativ	Evidence of open cavity	No evidence of open cavity	Either open cav. or pos. sputum	Both closed cav. and sput. negative
Late deaths from tuberculosis	15.8	3.0	12.8	2.0	13.0	2.0
Late deaths from other causes	1.0	1.0	0.7	1.5	0.7	1.5
No follow-up	48.5	42.0	60.0	31.0	54.8	32.0
Known to be ill	20.9	9.0	12.2	7.0	16.9	6.5
Known to be alive	6.9	5.0	6.4	4.5	6.7	4.5
Known to be well	6.9	41.0	7.8	54.0	7.9	53.5
Number of cases	101	303	157	202	177	200

Evaluation of the Discharge Status

Sputum and x-ray examinations at the time of discharge were of paramount importance in determining the prognosis of the patient. As is easily seen, best results were obtained when both sputum conversion and cavity closure were obtained. In fact, of 200 patients in this group, only 17 or 8.5% are either ill of disease or dead of disease, whereas, when the sputum conversion or cavity closure were not obtained, the figure rises to 29.9% with only 7.9% known to be well. Most of these latter cases received long term ambulatory chemotherapy or else returned at a later date for surgery. When one of these is uncontrolled, that is, either an open cavity or positive sputum, but not both, the percentage of known good results was only 24%.

DISCUSSION

It is clear from this survey of cases entering the sanatorium that patients do not come voluntarily or are not referred to a sanatorium unless they are severe cases and had received rather considerable therapy previously. This results in a rather considerable selection of cases and these are not completely representative of the problem in India today. However, from our experience in treating local patients, we doubt that the over-all picture is really much different. Mass surveys undoubtedly will reveal earlier cases, but we are referring to symptomatic disease which has compelled the patient to seek hospital care.

It has been rare that patients did not benefit at all from their stay if it was more than 2 months. However, we feel that 6 months should be the minimum sanatorium treatment but not the minimum chemotherapy. We advise at least 12 months of drug therapy for minimal tuberculosis and a period of at least one year after cavity closure, conversion of sputum, or post-surgery.

Why the patients in the retreatment group should have results as good as the others is confusing. It is our impression that this is a reflection of two factors: First, inadequate initial treatment, for the majority of this retreatment group had received very minimal therapy in the first instance, usually less than 6 months; secondly, the patients who survived 5 years of active disease before entering the hospital undoubtedly had a higher resistance than the average or else they would have long been dead.

The largest number of our patients fell into the groups which had been receiving treatment prior to admission. Many of these were sent because on domiciliary care their disease had progressed or failed to improve. With only a change from the home care (where they were supposed to be on bed rest) to sanatorium care (drug treatment often being identical) marked improvement was frequently noted.

Our figures show that tuberculosis in India is often curable, and that previous treatment and chronicity of disease do not preclude a reasonable hope of cure.

That ideal treatment is sanatorium treatment we do not doubt. However, this is a physical impossibility today, nor is it necessary. Several years ago we used some of our reserved beds in consultation with a clinic for ambulatory and domiciliary therapy. Used in this fashion, with good cooperation, short term sanatorium care has proved useful, and indeed, almost all of the patients well in the group remaining less than 4 months in the sanatorium are from this group. Patients were sent either during the most toxic phase of their disease, or pre- and post-operatively for a short period. Ambulatory therapy was continued in the clinic in cooperation with the sanatorium authorities. This enabled more patients to benefit from the free beds and gives the maximum advantage to the public.

Finances complicate the problem both in the sanatorium and outside. Relatively few patients can afford a complete course of treatment in a sanatorium or hospital. Many patients are eligible for free treatment but the waiting lists are usually long, and the disease often progresses to an incurable state while the patient is waiting for admission. There is little compromise between these completely free beds and completely paying beds. We have had only one agency which helps the patient beyond what he can afford. This, we feel, is the ideal type of financial help. Every patient should be required to pay within his or her means, and the rest by a supporting agency. This enables the patient to keep his self respect and at the same time stretch the limited funds of the supporting agencies further.

SUMMARY

The case histories and x-rays of 469 consecutive discharges from a small and private tuberculosis sanatorium have been reviewed. They have been studied with regard to admission status, pre-sanatorium therapy, sanatorium therapy, and follow-up studies according to the various factors in the treatment, etc. We have discussed the reasons for differences between various groups of patients.

We have found that previous treatment or chronicity of disease plays a lesser role in the outcome than had been supposed.

The thesis that "tuberculosis is a disease of the mind" has been extended to include the purse as well. Given adequate desire to get well, a patient must have financial backing to succeed. A suggestion as to how the limited finances of various supporting agencies can be extended is made.

Tuberculosis Survey in Mental Hospital, Hyderabad 1958

By

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Tuberculosis Control measures can be well carried out only, if the incidence of the disease has been found out. There are two methods to learn about the incidence of the disease. One is the correct registration of all known cases, and the other is to survey the population. Through surveys, either in the general population or in the special groups, not only cases are found, but also etiological factors come to light, which will help in formulating effective control of Anti-TB measures.

The association of Tuberculosis and mental diseases has been the subject of numerous studies. The greater liability of mental patients and their attendants to get the disease has been known for many years.

Mortality and morbidity has been found much higher in mental hospitals in England and America than in the general population in those countries. Berrington and Greenwood report an average death rate of 640 per 100,000 among male psychotics which rose to 2,450 per 100,000 in 1941. Evans reported the rising of the death rate of 1,700 in 1914, to 3,720 in 1917, and 5,180 in 1918. He also showed that in England Tuberculosis mortality was much higher in public mental hospitals than in private institutions, for example in 1922, the tuberculosis death rate per 100,000 in public hospitals were 1,240 for males and 1,140 for females; in private hospitals 760 for males and 250 for females. The percentage of tuberculosis deaths in proportion to all deaths in public hospitals was 13.2, in private hospitals 4.7. This difference probably is due to overcrowding in the public hospitals. Elkins and Thomson reported on the increase* in Tuberculosis mortality in a London mental hospital, where the rate rose from 20 per 1,000 in 1914 to 72.6 per 1,000 in 1917 and 117 in 1918. They considered that contact infection aggravated by overcrowding and malnutrition were the important factors. The death rate in California mental hospital and mental institutions was 950 and 766 per 100,000 respectively in 1922; it came down to 457 and 361 in 1945 and compares with the total TB death rate of 40.1 per 100,000 for U.S.A. and 43.4 California in 1945. Anderson reports a death rate of 535 in 1948 in comparison to 30 per 100,000 death rate in America. He also mentions that the death rate for TB in America has dropped 34.5% during the years 1940 and 1948, while the rate for persons hospitalised in mental institutions dropped only 15.5%. According to Deegan, Chip and Beek (1942) the death rate from Tuberculosis during 1937-1939 in mental institutions in New York State, outside New York City, was 6.18 per 1,000 as against 0.51 per 1,000 in the general population as a whole, that is, over 12 times as high.

In 1946 Mass Radiographic Survey in Sweden with seven years' follow up revealed that the mortality from Tuberculosis in mentally ill patients dropped from

35,1% and 12.4%. In males it dropped from 20% to 12.9% and in females from 52.9% to 11.9% which was found much higher than in the general population.

In 1938 there was a 3% morbidity rate and 504 mortality per lakh in Ontario menial hospitals which was 14 times greater than in the cross-section of the population. These figures show the high incidence of tuberculosis in mental hospitals.

To find out the incidence of tuberculosis in Hospital for Mental Diseases in Hyderabad a preliminary survey was conducted during the year 1958.

Method of Survey

In this survey Mantoux testing of all patients was done with 5 Unit PPD and 70 mm X-ray films were taken. Bacteriological examinations were carried out in all radiologically suspicious cases (2 direct smears and culture).

Material

514 cases were examined out of 521 total in-patients, 7 cases could not be X-rayed as they were not able to stand for X-ray. At the same time 430 persons, staff members and their families, were examined.

TABLE I

No. of patients examined	521
No. of patients X-rayed	514
Percentage of patients X-rayed	98.6%
No. of staff with families examined	450
No. of staff with families X-rayed	430
Percentage of staff with families X-rayed	95.5%

Results

In this survey 944 were tested. Out of them 676 were Mantoux Positive giving 76.27% among patients and staff.

TABLE II

X-ray Classification with grand total No.	Mantoux Positive		Mantoux Negative		Mantoux Not Read	
	Total No.	Per-centage	Total No.	Per-centage	Total No.	Per-centage
X-ray suspicious group of both patients and staff (177)	135	76.27	17	9.60	25	14.12
X-ray negative group of both patients and staff (767)	541	70.53	140	19.04	86	11.21
Total (944)	676	71.61	157	16.63	111	11.76

Of the 177 cases who had suspicious shadows in X-ray four cases were found having pleural effusions. Out of 128 mental cases 78 were having minimal lesions, and 16 and 30 were having moderately and far advanced lesions, respectively, and four had pleurisy (Table III).

TABLE III

X-ray suspicious group	Minimal lesion	Moderate Adv. lesion	Advanced lesion	Pleurisy	Total	Percentage
Mental hospital patients	78	16	30	4	128	24%
Mental hospital staff and families	24	15	8	2	49	11.40%

All suspicious cases were examined for bacilli twice. Only 9 cases were found bacteriologically positive, i.e., 1.75% among the patients. This figure is very low as it is difficult to get proper sputum or proper laryngeal swab for bacillary examinations from mentally sick persons. Among the staff members and their families 49 were found X-ray suspicious, i.e., 8.8 % and out of these four cases were bacillary positive, i.e., 0.9%.

TABLE IV

Survey Group	Laryngeal Swab positive for Tubercle bacilli by culture	Percentage
M. H. Patients	9	1.75
M. H. Staff	4	0.93

As regards to sex, the majority of cases were found among males and as regards to age, tb.2 majority of cases were found in the 25-44 age group (Table V A & B).

TABLE V (A)

Age and Sex Classification of X-ray Suspicious among Patients

Type of lesion	0—1		1—4		5—14		15—24		25—44		45—64		65 & over		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Minimal lesion	—	—	—	—	3	—	3	7	28	10	14	9	2	2	50	28	78
Moderately advanced lesion	—	—	—	—	1	—	2	3	3	3	3	1	—	—	9	7	16
Advanced lesion	—	—	—	—	—	—	1	—	7	3	15	3	—	1	23	7	30
Pleurisy	—	—	—	—	—	—	—	—	2	—	1	1	—	—	3	1	4
Total:	—	—	—	—	4	—	6	10	40	16	33	14	2	3	85	43	128

TABLE V (B)

Age and Sex Classification of X-ray Suspicious among Staff

Type of lesion	0—1		1—4		5—14		15—24		25—44		45—64		65 & over		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Minimal lesion	—	—	—	—	3	5	4	1	8	—	2	1	—	—	17	7	24
Moderately advanced lesion	—	—	—	—	5	4	1	1	2	1	—	1	—	—	8	7	15
Advanced lesion	—	—	—	—	—	1	1	—	3	—	2	—	1	—	8	—	8
Pleurisy	—	—	—	—	—	—	1	—	2	—	—	—	—	—	1	1	2
Total:	—	—	—	—	9	9	7	2	13	2	4	2	1	—	34	15	49

Considering the mental diseases the majority of T.B. cases were found in cases of Schizophrenia and very few in epileptics and mental defectives as shown in Table No. VI.

TABLE VI

Mental Diseases in Correlation to X-Ray Suspicious Cases with Sex Classification

	X-ray Lesion Classification with Sex Groups								
Mental Diseases	Minimal lesion		Moderately Adv. lesion		Advanced lesion		Pleurisy		Total
	M	F	M	F	M	F	M	F	
Schizophrenia	41	26	8	6	22	6	2	1	112
Epilepsy	6	—	—	—	—	—	1	—	7
Mental defectives congenital	3	1	2	—	2	—	—	—	8
Toxic confusional state (post-peurperal)	—	1	—	—	—	—	—	—	1
Total:	50	28	10	6	24	6	3	1	128

As a bye-product of the survey other chest and cardiac diseases were also detected in the hospital among patients as well as among the employees of the hospital, as shown in Table No. VII.

TABLE VII

Disease	Males	Females	Total
Cardiac enlargement	2	7	9
Emphysema Lungs	4	1	5
Mediastinal enlargement	—	2	2
Bronchiectasis	—	1	1
Total :	6	11	7

DISCUSSIONS

It has been pointed out earlier, that the incidence of T.B. in Mental Hospital cases is much higher as compared to the general population. The recently conducted National T.B. Survey showed that the incidence of T.B. in the general population of Hyderabad City is 1.66% by X-ray suspicious and .46% by bacteriologically positive cases as compared to 24.90% suspicious ones by X-ray and 1.75% positive by bacteriology in our survey. From figures it is also evident that the majority of T.B. cases were found in Schizophrenics.

There are some diseases which make the persons susceptible to Tuberculosis such as Diabetes and other chronic diseases. In cases of mental diseases and defects, an increase in the incidence of Tuberculosis is found. Cases with Schizophrenia, Dementia Praecox and depressives are more liable to contract tuberculosis. Whitkower says "Emotional disturbances often precede and probably precipitate the onset of tuberculosis." Though there is a high incidence of tuberculosis in mental cases, there is no evidence that mental diseases are directly responsible to cause tuberculosis. It is a fact that mental cases are specially exposed to T.B. infection and due to mental defects these cases get repeated massive infections and probably develop the disease.

The present Survey of patients and staff in the Mental Hospital reveals that (a) The incidence of Tuberculosis in mental hospital patients is much higher than in a cross-section of the population, (b) The incidence of T.B. in Schizophrenics is much higher than in other mental patients, (c) The incidence of Tuberculosis in staff members who are attending to these patients is also much higher than that in the general population.

The general impression about this high incidence of the tuberculosis disease is probably due to (1) Overcrowding as most of the mental patients are kept in a ward, together with tuberculosis patients; (2) Poor nutrition, as the Schizophrenics do not take their diet regularly and in a sufficient quantity; (3) These patients are in the Hospital for a long duration in most cases. During this long stay they get the infection and develop the disease; (4) Higher incidence in the staff members is due to not observing the infectious disease nursing techniques.

SUGGESTIONS

Tuberculosis Control is very important in mental hospitals and also in the group of hospital employees. It is not advisable to admit mental patients having associated tuberculosis, along with other patients as these will spread the infection to the other inmates of the ward. If they are not having tuberculosis they may contract tuberculosis in the mental hospital through the other in-patients having tuberculosis. If tuberculosis is not detected in the mental hospital patients on discharge they go home with tuberculosis and spread the disease to the members of their families.

Employees of the Hospital not knowing which patient has tuberculosis or not by attending on them might get the infection and probably the disease. Unknown cases of tuberculosis are dangerous.

To control T.B. in the mental hospitals the following arrangements are suggested:

1. All Bact. positive cases should be isolated in a separate ward and treated.

2. Patients with suspicious X-ray but negative bacteriologically, should be isolated in another ward for observation and should get prophylactic treatment. Thus there should be two wards, one for open cases and the other one for closed cases. Treatment of T.B. cases should be carried out simultaneously with the treatment for the mental defects.
3. All new cases should be sent to the T.B. Centre for a complete check up before they are admitted to the ward.
4. Indiscriminate spitting should be avoided in and around the ward. Employees posted have to observe strict cleanliness. The infectious and non-infectious cases as well as the employees should put on masks and every patient should observe personal hygiene.
5. On discharge all patients should be checked for tuberculosis and only those cases should be sent to their homes who have a "Lungs Clear Report". Thus every T.B. case should be transferred to the T.B. hospital to continue treatment for tuberculosis on discharge after recovery from mental condition.
6. It would be better to keep a separate register of these mental patients having associated tuterculosis and deaths from tuberculosis should be registered accurately. This will give the mortality rate of T.B. in mental cases.
7. A similar Survey should be carried out in the mental hospital after 3 years to note the effect of Anti-T.B. Control measures adopted.

ACKNOWLEDGEMENT

I am much grateful to Major K. N. Rao, Director of Medical Services, Andhra Pradesh State, for permitting me to conduct the Survey and to publish this report. I am thankful to the radiological, bacteriological staff for conducting the survey and statistical staff for helping me in the preparation of the report. I am thankful also to the Superintendent and the staff of the Hospital for Mental Diseases, Hyderabad, for their kind co-operation.

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Dermatological Complication of B.C.G.

By

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A CASE REPORT

21 years old Malaria Inspector was admitted in June 1959, with complaints of irregular fever, weight loss and multiple keloids.

He was tuberculin tested and B.C.G. vaccinated in June 1958. Since then he says he has lost 16 Ibs. of weight and is getting irregular fever in the evening with a maximum range of 101 °F.

He had no cough and gave no history of haemoptysis. He also stated that his lymph node suppurated and broke down after B.C.G. vaccination.

He was hospitalised for about 8 weeks and investigated.

1. Temperature —Normal—except intermittent temperature 100.4°F on three different days.
2. Weight —Questionable weight loss.
3. X-ray Chest —PA, Oblique; Tomography—N.A.D.
4. Tuberculin Test —Positive to 5 T.u.
5. Blood —Complete Haematological investigations including Blood Culture for T.B. were negative. E.S.R. 8 m.m. Blood Proteins Normal. A/G ratio—Normal.
6. Urine including culture for T.B. —Negative.
7. Sputum and Fasting gastric contents for A.F.B. —Negative.
8. Bronchoscopy including Bronchial lavage —N.A.D.

9. Glands —No palpable glands anywhere.
10. Skin —A large keloid at the site of vaccination on the left deltoid region. During

last 6 months keloids appeared on right epitrochlear region, Right knee region and lateral side of Left thigh. (See—Photograph).

First a red papule appeared, it was tender with some itching. Gradually the papule became larger and elongated and formed a keloid. The keloid remained to be tender. Biopsy of the keloid revealed evidence of Chr. dermatitis, without any specific evidence of tuberculous histology.

He has been treated on :—

1. S.M. —1 gm. twice a week.
2. I.N.H. —100 mgm. B.D.
3. Local —Intra lesion hydrocortisone with Rondase (Permease Hyaluronidase Celag).

This patient has improved since then. He has a sense of well being, is gaining weight and he has had no irregular fever. There are no fresh skin lesion and the pervious keloids are diminishing and no more tender.

COMMENTS

The complication rate in relation to the number vaccinated is low. About 3 per 1,000 can be expected, if one excluded minor degree of adenopathy and small ulcerations of less than 10 mm. diameter. A considerable variety of lesions have been recorded, the chief of which are ulceration, keloid scars, lupoid skin lesions, lupus, implantation ulcers, tuberculoids, erythema nodosum, enlarged lymph glands, abscess formation with or without sinuses phyctenular conjunctivitis, enlarged hillar glands, pneumonitis and enteritis. In addition to these temporary complications, it is necessary to mention the four deaths that have been reported in Scandinavian literature, two of which have been proved due to B.C.G. infection. These fatalities do not in any way lessen confidence in the vaccine in view of the extreme rarity of such a tragic event in comparison with the millions of vaccinations that are done every year, and in which only a small number of temporary complications occur.

The reason for more generalized lesions is not easy to explain except by assuming that the inherent resistance of the subject is very low. Birkhaug (1953) has shown that in guinea-pigs a B.C.G. bacillaemia occurs shortly after intradermal vaccination, but microscopic lesions are rarely found in the internal organs. It is not, however, difficult to imagine certain states of resistance and allergy of the host that would produce non-caseating lesions of a similar but less severe nature to those following primary virulent infection.

A keloid type of lesion is found more frequently than the ulcerative type when using freeze-dried vaccine, probably because of the large number of dead bacilli injected. Dermatological complications following B.C.G. vaccination are relatively rare, but when they occur they can be very troublesome. Jorgensen and Horwitz (1956) describe 166 complications, 150 of which were specific. They note that lupus and lupoid affections and Koch's phenomenon occurred only in adults, and universal tuberculoids only in children. Complications were more frequent and more severe in the re-vaccinated than in those persons vaccinated once only. Universal adenitis occurred in one case and Koch's phenomenon with constitutional symptoms in several cases.

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ABSTRACTS

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B.C.G. and Vole Bacillus Vaccines in the Prevention of Tuberculosis in Adolescents

A controlled clinical trial of B.C.G. and Vole Bacillus vaccines was carried out for the prevention of tuberculosis in 56,700 participants, who were free from active disease and were from known contacts with the disease at home.

On entry they were children all aged from 14 to 15i years and about to leave school.

The participants were classified into five groups:

1. Tuberculin negative to 100 T.U. and left unvaccinated (13,300 participants).
2. Tuberculin negative, B.C.G. vaccinated (14,100).
3. Tuberculin negative, Vole Bacillus vacci nated (6,700).
4. Tuberculin positive to 3 T.U. (16,000).
5. Tuberculin positive to 100 T.U. but not to *3* T.U. (6,600).

All cases were followed by routine periodic radiographic examinations and Tuberculin tests.

All definite and suspected cases of tuberculosis and all cases of pulmonary radiographic abnormality persisting for more than 14 days, were submitted to an independent assessor for a final diagnosis; to avoid bias, the assessor was kept unaware of the results of all tuberculin tests and of whether any vaccination had been performed.

A total of 349 definite cases of tuberculosis started within five years of entry to the trial; of these, 70% were of pulmonary tuberculosis and 17% of tuberculous pleural effusion without evidence of pulmonary tuberculosis; 70% of the total cases (73% in the negative unvaccinated group) were severe enough to be taken off work for at least three months; 32% of the pulmonary cases (33 % in the negative unvaccinated group) showed cavitation radiographically and 28% (36% in the negative unvaccinated group) involved more than two rib interspaces. There was one death from tuberculosis in the five-year period.

During the five-year period the annual incidence of tuberculosis in the B.C.G. vaccinated group was 0.38 per 1,000, compared with 2.29 per 1,000 among those in the tubercular negative unvaccinated group. This represents a reduction attributable to vaccination of 83 %.

Over the same period, the annual incidence of tuberculosis in the Vole Bacillus vaccinated group was 0.33 per 1,000 compared with 2.62 per 1,000 among those admitted concurrently to the tuberculin negative unvaccinated group, this represents a protection of 87% (the difference in incidence between the two vaccinated groups, when based also on concurrent admission could well have arisen by chance). The protective efficacy of each vaccine was closely similar to that found for the first 2J years in earlier report (M.R.C. 1956).

The degree of protection was similar for pulmonary tuberculosis, for tuberculous pleural effusion and for hilar gland enlargement.

Four cases of T.B. meningitis and four of miliary tuberculosis were found among the negative unvaccinated participants but none among those who were vaccinated showed greater degree of protection among these forms.

Further lesions in vaccinated cases were les extensive and less severe than those in the negative unvaccinated cases. The proportion oe participants reacting to 3 T.U. after B.C.Gf vaccination varied slightly with the routin. fluctuations in the viable count of batches usede though virtually all participants converted to, 100 T.U. Even the batches with the lowest counts gave substantial protection.

The strength of the early batches of Vole Bacillus vaccine was below the standard intended and the conversion rates, both to 3 T.U. and 100 T.U. were considerably less for these batches than for the later batches. The early batches, nevertheless conferred substantial protection against tuberculosis and lupus vulgaris at the site of vaccination (noted in the first report) did not occur with these batches.

Among those with strong positive reactions to 3 T.U. on entry (15 mm in duration or more) the annual incidence of tuberculosis was 3.50 per 1,000 in the first two and half years, 1.67 in the

second two and half years and 0.88 in the incomplete) five to seven-and-half year period. In contrast the annual incidence among those with weaker positive reactions to 3 T.U. and among those positive only to 100 T.U. were respectively 0.77 and 0.73 per 1,000 in the first two and a half years and remained at much the same level thereafter.

Thus in this age group, those highly sensitive to tuberculin had a special risk of devolping tuberculosis during the following few years. Those with lesser sensitivity to tuberculin on entry had consistently lower rates than those in the negative unvaccinated group, suggesting that they had some degree of protection against fresh infection, though not as great as that in vaccinated groups.

(Second Report to the Medical Research Council by their Tuberculosis Vaccines Clinical Trials Committee. Brit. Med. Jour., Sept. 12, 1959.)

Tuberculosis Contacts in North-West London

1,517 household contacts of 555 sputum positive patients were examined.

All those who are tuberculin positive should have an initial skiagram of the chest to be repeated after a year.

It has been estimated that 5.6 per cent of all these contacts may be expected to have tuberculosis at their initial examination and of those with initially normal chest radiographs, another 1.9 per cent may be expected to develop tuberculosis in the following year.

Yearly chest radiographs of those contacts below the age of 35 years are expected to give a yield of 0.2 per cent of the average urban population.

(Peter A. Emerson. Tuber., Land.; 1959, 40, 177.)

Tuberculin Reaction and B.C.G. Vaccination in Old Age

Tuberculin testing by the multiple puncture method of 1,000 geriatric patients showed that there is no waning of tuberculin sensitivity with increasing age. The incidence of higher positive reactors was higher with increased population. B.C.G. vaccination done in one hundred and one with negative reactors using Danish liquid vaccine and British freeze-dried vaccine was found to be safe and effective in producing Mantoux Conversion.

(D.M. Prinsley and H. Droller. Brit. J. Dis. Chest; 53, 296, 1959.)

B.C.G. Vaccination, A Preliminary Communication

97.7 per cent of 264 cases given B.C.G. Vaccination since 1950 maintained their hypersensitivity for a period of about five to eight years. This may be due to the fact that 36 per cent of the cases were having close contact with relatives known to have acid fast bacilli in their sputum.

The incidence of proven primary tuberculosis despite persisting positive tuberculin tests was 0.39 per cent.

(Philip Ellman and Leslie G. Andrews. Brit. J. Dis. Chest ; 53, 302, 1959.)

Tuberculosis Control in Denmark

The incidence of tuberculosis has fallen faster and farther in Denmark because of :

(1) Maintenance of a Central Tuberculosis Register.

(2) Intensive Examination of Sputa and Stomach washing in a specialized central Laboratory.

(3) Intensive use of B.C.G. at all ages and in Conjunction with mass Radiography.

(4) Selective use of mass Radiography including annual X-ray examination of all staff employed in schools, public utilities, etc., as part of their terms of contract.

(5) Invitations to public mass Radiography sessions to individual households by post.

(6) Wider use of powers for compulsory isolation.

(7) Unified control.

(H. Franks. Brit. Med. Jour., 87, July 25 1959.)

The Effect of Extension of the Head and Neck upon the Infra hyoid Respiratory passage and the Supra clavicular Portion of the Human Trachea

Observations were made on 15 healthy young male adults aged 18 to 22 years about the effect of head and neck extension upon elongation of trachea and of infra hyoid respiratory passage.

1. There is elongation of infra hyoid respiratory passage by 23-30 i.e. distance between the superior surface of the hyoid bone and the inferior border of the lamina of the thyroid.

2. Trachea was stretched by 2.6 cm.

3. Antero posterior diameter of the supra clavicular portion of the trachea was narrowed by 16% and was more marked in the phase of expiration.

4. The respiratory displacement of the Larynx was not affected.

5. There is associated elevation of Carina.

R. S. Harris, Thorax, 14, 176; 1959.

A Factor in Serum which prevents Propagation of D-29 Mycobacteriophage with Human Tubercle Bacilli

Fresh Human Serum contains a substance of the nature of gamma globulin which inhibits propagation of D-29 mycobacteriophage on Human Tubercle bacilli but not on the Saprophytic Mycobacterium ATCC 607. It is present in about the same titre in serum from tuberculin-negative and tuberculin-positive donors and in patients with active tuberculosis.

The factor persists after heating for one hour at 56°C, but is inactivated by trysin.

Adsorption of D-29 phage to tubercle bacilli is greater in serum containing the factor than in its absence.

(.Arthur White and Vernon Knight. Am. Rev. Res. Dis., Vol. 80, No. J, Part 1 of 2 Paris, July, 1959.)

The in vitro Effects of Specific and Non-specific Bacterial Products on the Migration of Leukocytes from Tuberculin Sensitized Guina Pigs

Studies on old Tuberculin and certain non-specific bacterial products for their inhibitory action *in vitro* on migration of leukocytes from tuberculin sensitized guinea pigs showed that old Tuberculin had Cytotoxicity.

(J. Wasserman and Th. Packalen. Am. Rev. Resp. Dis. ; Vol 80, No. 1, Part 1 of two parts.)

Atypical Mycobacteria and Drug-resistant Tubercle Bacilli Isolated during a Survey of untreated Patients with Pulmonary Tuberculosis

Drug-resistant tubercle bacilli to Streptomycin, P.A.S. and Isoniazid from patients with newly diagnosed untreated pulmonary tuberculosis were obtained from 55 of 1081 patients with positive cultures. The three *in vitro* identification tests that were found to be of greatest value in separating atypical strain from tubercle bacilli were the study of colonial morphology on Oleic acid albumin agar plates, the niacin test and thiosemicarbazone sensitivity tests.

Arylsulphatase test, formation of cords in slide culture and Catalase activity tests were less satisfactory.

Bacillary morphology, methylene-blue reduction time and neutral red tests were of limited value.

All atypical strains failed to cause progressive disease in guinea pigs, but the photochrornogens were as pathogenic to mice as tubercle bacilli.

(Seekon, J. B. and Mitchison, D. A. Tub. Land.; 1959, 40,141.)

Isoniazid in a Probable Role in Tuberculosis Control

Four years of observation has shown that most cases of active Tuberculosis occur in the Tuberculin positive group as shown by the Puerto Rican Control studies. In 82,000 positive reactors, 27,000 negative reactors and 50,000 who were tuberculin negative but were converted to positive by being vaccinated with B.C.G., it was found that there were 577 who developed tuberculosis in the positive reactors, 65 in the vaccinated group and 53 in the control group. This means that three-fourth of the cases occurred in those who were already tuberculin positive and who were obviously ineligible for vaccination with B.C.G. Hence the greatest problem is with those who have a positive tuberculin reaction as a result of having been infected after exposure to open cases of tuberculosis. These individuals may harbour within their bodies virulent pathogenic organisms and when for some reasons the natural existence of the individual becomes lower, tubercular disease developes.

Preventorium care of these children consisting mainly of non-specific measures such as good food, proper rest, fresh air and good medical supervision proved to be beneficial in the prevention of adult type of tuberculosis but is impractical because of expense and large number of patients.

Isoniazid was found to be highly effective on the prophylaxis of early complications of Primary tuberculosis during the period of its administration. Animal experiments have shown some resistance or immunity to tuberculosis persists after the cessation of the administration of the proper doses of Isoniazid.

In view of the low toxicity of Isoniazid and minimal exposure involved, Isoniazid has a place as an aid in the prevention of tuberculosis when used in the treatment of Primary tuberculosis.

(Eli Fridman : Arch. Pedriatic, Vol. 76 No, 6; June, 1959.)

The Effect of Isoniazid on the Synthesis of certain Amino-acids and Vitamins by Mycobacterium Tuberculosis

A study has been made of the production of certain amino-acids and vitamins by Isoniazid susceptible and resistant strains of H37RV tubercle bacilli when grown in the presence and absence of sub-inhibitory levels of the drug.

When susceptible strains were cultured, there was reduction in the synthesis of organic glutamic acid, lysine and threonine. Increased production was observed with leucine, Isoleucine and Phenylanine.

A comparison of amino-acid synthesis by an isoniazid resistant and susceptible strains revealed reduction in the amounts of arganin, lysine and threonine, as well as a large drop in the glycine and valine content. An increased synthesis of aspartic acid, leucine, isoleucine and phenylaniline was shown by the resistant organism.

Larger quantity of biotin was produced by resistant organism.

(Amer. Rev. Resp. Dis. ; Vol. 80, No. 3, Sept., 1959. Hilda Pope Willett.)

Studies on the Effect of Isoniazid upon the Antituberculosis immunity Induced by BCG Vaccination

The administration of Isoniazid before BCG vaccination considerably reduced both the development of immunity and of tuberculin sensitivity. When Isoniazid was given two weeks after BCG vaccination, the development of anti-tuberculosis immunity seemed unaffected by this procedure although the development of tuberculin sensitivity was definitely reduced.

Tuberculous changes were less in the group vaccinated with heat killed BCG than in the non-vaccinated control group.

(Mareichi, Toyo Kara ; Sukeyoshi, Kudoh and Yoji Obayashi. Tuber., Land. ; (1959), 40, 184.)

The Inhibition of Isoniazid Inactive action by means of P.A.S. and Benzoyl-P.A.S. in Man

Studies in a group of 12 to 20 patients with pulmonary tuberculosis showed that addition of oral doses of either P.A.S. of Benzoyl-P A.S. to isoniazid therapy induces a significant increase in the concentration of free isoniazid in the plasma and urine in majority of cases. The minimal effective dose of calcium benzoyl P.A.S. for augmenting the excretion of free Isoniazid was found to be 8 Gm. per day.

Smaller doses of benzoyl P.A.S. and small P.A.S. Fraction of the molecular Isoniazid P.A.S. compound are ineffective.

(H. Lauener and G. Favez. Amer. Rev. Reap. Dis., Vol. 80, No. 1, Part I of two pans, July, 1959.)

The Use of Prednisone in Primary Tuberculosis in Children

Prednisone was given in addition to the anti-tuberculous drugs in 10 children whose disease either showed no change or became worse after a period of chemotherapy. Of these 7 children showed improvement, though the improvement was neither rapid nor dramatic. This may be due to small doses employed, but none of the cases showed deterioration nor any ill effects from the the use of the steroid.

(Lovers, Kenneth, W; and Roberts, John, C: Tuber., Land. (1959), 40, 173.)

Chemotherapy of Pulmonary Tuberculosis

With the introduction of chemotherapy, there has been considerable fall in mortality and morbidity.

Prophylactic chemotherapy is justifiable in infants particularly below one year with a positive tuberculin reaction.

Patients with mild and uninfectious pulmonary tuberculosis can be as effectively treated with chemotherapy while working, as with chemotherapy while resting in bed.

Resistance against the drugs can be avoided by proper methods of chemotherapy.

With proper methods of chemotherapy the sputum always becomes negative provided the bacilli are sensitive to the standard drugs.

To avoid relapse, chemotherapy should be continued for a minimum of one year and in most patients for 18 months to 2 years or even longer.

Corticosteriods are only indicated for very ill patients.

(John Crofton. Brit. Med. Jour.; June 27, 1959.)

The Present Status of Pulmonary Resection in the Treatment of Tuberculosis

Of the one hundred and thirty-four patients who had resection in the treatment of Pulmonary Tuberculosis from January, 1953 to June, 1956, the surgical mortality was less than 1 per cent, the morbidity rate was 10 per cent and the

disease in 97 per cent of patients became inactive.

In spite of the satisfactory results there were only 6 pulmonary resections for tuberculosis done in 1957.

The average population in the sanatorium dropped from 226 in 1954 to 183 in 1957.

Further 35 per cent of the population were over 60 years in 1954, while in 1957, 61 per cent were over 60, thus the population was older and poorer risk for pulmonary resection. The reasons for marked decrease in surgery are decreasing number and increasing age of patients with tuberculosis and the effectiveness of the anti-tuberculous drugs in the treatment of new cases of tuberculosis.

After appropriate antibiotic therapy, the present indications for pulmonary resection in the treatment of Tuberculosis are:

(1) Localized disease with persistently positive pulmonary secretions.

(2) Open Cavity.

(3) Significant residual nodular disease greater than 2 cm.

(4) Undiagnosed mass.

(Josiah Fuller. J. Thorac. Surg., Vol. 37, No. 6; June, 1959.)