

- Diabetologia* 1994; **37**: 150-4.
- <sup>12</sup>Fowden AL. The role of insulin in prenatal growth. *J Dev Physiol* 1989; **12**: 173-82.
- <sup>13</sup>Taylor DJ, Thompson CH, Kemp GJ *et al.* A relationship between impaired fetal growth and reduced muscle glycolysis revealed by <sup>31</sup>P magnetic resonance spectroscopy. *Diabetologia* 1995; in press.
- <sup>14</sup>Barker DJP, Martyn CN, Osmond C, Wield GA. Abnormal liver growth in utero and death from coronary heart disease. *Br Med J* 1995; **310**: 703-4.
- <sup>15</sup>Martyn CN, Meade TW, Stirling Y, Barker DJP. Plasma concentrations of fibrinogen and factor VII in adult life and their relation to intra-uterine growth. *Br J Haematol* 1995; **89**: 142-6.
- <sup>16</sup>Fall CHD, Vijayakumar M, Barker DJP, Osmond C, Duggleby S. Weight in infancy and prevalence of coronary heart disease in adult life. *Br Med J* 1995; **310**: 17-19.
- <sup>17</sup>Vijayakumar M, Fall CHD, Osmond C, Barker DJP. Birthweight, weight at one year and left ventricular mass in adult life. *Br Heart J* 1995; in press.
- <sup>18</sup>Law CM, de Swiet M, Osmond C *et al.* Initiation of hypertension in utero and its amplification throughout life. *Br Med J* 1993; **306**: 24-7.
- <sup>19</sup>Martyn CN, Barker DJP, Jespersen S *et al.* Growth in utero, adult blood pressure and arterial compliance. *Br Heart J* 1995; **73**: 116-21.
- <sup>20</sup>Edwards CRW, Benediktsson R, Lindsay RS, Seckl JR. Dysfunction of placental glucocorticoid barrier: link between fetal environment and adult hypertension? *Lancet* 1993; **341**: 355-7.
- <sup>21</sup>Seckl JR. Glucocorticoids and small babies. *Q J Med* 1994; **87**: 259-62.
- <sup>22</sup>McCrabb GJ, Egan AR, Hosking BJ. Maternal undernutrition during mid-pregnancy in sheep: variable effects on placental growth. *J Agricul Sci* 1992; **118**: 127-32.
- <sup>23</sup>Wheeler T, Solleró C, Alderman S *et al.* Relation between maternal haemoglobin and placental hormone concentrations in early pregnancy. *Lancet* 1994; **343**: 511-3.
- <sup>24</sup>Barker DJP, Bull AR, Osmond C, Simmonds SJ. Fetal and placental size and risk of hypertension in adult life. *Br Med J* 1990; **301**: 259-62.

## TUBERCULOSIS AND TANZANIA

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The International Union against Tuberculosis and Lung Disease (IUATLD) helps to implement and supervise national tuberculosis programmes in countries with a high incidence of tuberculosis and limited resources, such as Tanzania, Senegal, Malawi, Mozambique, Benin and Nicaragua. The increasing incidence of tuberculosis, especially in those with a high prevalence of HIV infection, led to an invitation to accompany, as visiting consultant, Dr Hans Rieder, chief of the tuberculosis section, IUATLD, during one of his twice-yearly trips to 'inspect' the national tuberculosis programme of Tanzania.

### TANZANIAN NATIONAL TUBERCULOSIS PROGRAMME

The tuberculosis programme, brainchild of Dr Karel Styblo of the IUATLD, developed in the late 1970s in association with the Tanzanian government. Overseas donors funded the provision of drugs and diagnostic services, training and transport; the Tanzanian government provided and paid the staff. The present overseas financial aid amounts to one million Swiss francs annually, supplemented from 1995 by the addition of over one million US dollars per year from the Dutch Government and 250,000 US dollars from the Royal Netherlands Tuberculosis Association for the supply of drugs, diagnostic materials and training. The German Leprosy Relief Association provides Toyota Land Cruisers for all regional tuberculosis and leprosy control officers and Honda motorcycles for all district officers every three years. The Tanzanian government provides the petrol.

The service is centrally controlled from Dar es Salaam with drugs supplied through regions to districts. All districts maintain a tuberculosis register from which national case diagnostic and treatment data and outcomes can be determined.

### Size of problem

By the early 1980s case registration in Tanzania was considered to be sufficiently reliable to reflect national trends in disease notification which at that time were reasonably stable at about 12,000 cases/year. In the last 10 years however there has been a continuing increase in notifications (Fig 1 for comparison with Scottish figures). This is in spite of the introduction of extremely effective short-course chemotherapy with an initial two months of directly observed rifampicin based daily quadruple chemotherapy for all smear positive pulmonary or infectious cases. These cases have increase from 12,092 per annum in 1984 to an estimated 40,000 per annum in 1994—an increase of over 300%. There was a greater increase in smear positive pulmonary (13%) and extrapulmonary (15%) cases from 1992 to 1993 than smear negative pulmonary cases (6%). The number of relapsed cases submitted to retreatment fell by 9%. Treatment outcomes have been remarkably good with 72% of new smear positive pulmonary cases demonstrated cured (smear negative at completion of chemotherapy) and a further 5% completing treatment without final bacteriological confirmation. Eight per cent

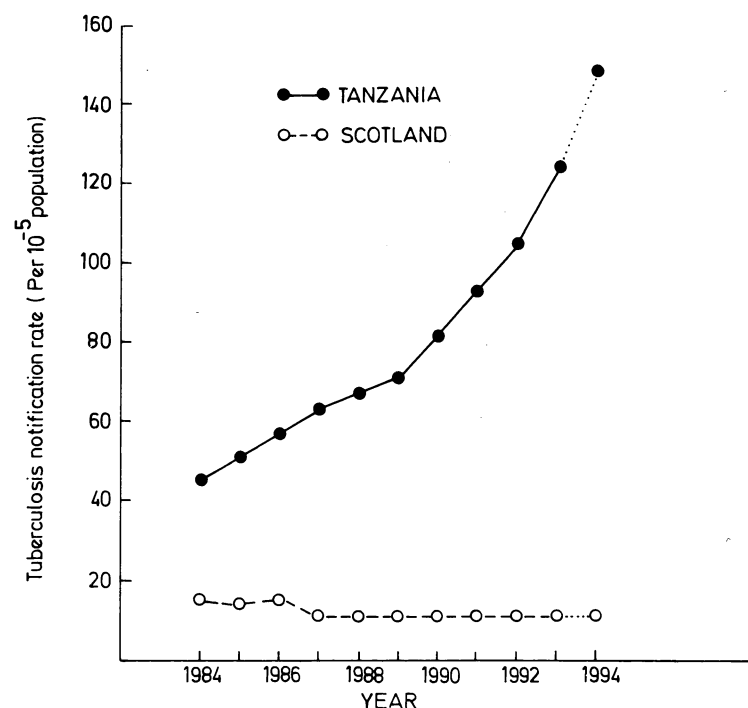


FIGURE 1

Tuberculosis notification rates ( $10^{-5}$  population) for Tanzania (●-●) and Scotland (○-○) from 1984-1994 (1994—estimated rate).

died, 7% absconded, 6% were transferred to another region and lost to follow-up and 1% failed treatment in the second half of 1993.

The explanation for the continuing increase in case numbers lies in efficient case registration and the high prevalence of HIV positivity. In the ongoing WHO survey of HIV infection in tuberculosis patients 30% of 6,000 were HIV positive (40% of smear negative pulmonary, 40% of extrapulmonary, 28% of smear positive pulmonary and 30% of treatment relapse patients). WHO estimates that at least two-thirds of the increase in tuberculosis notifications can be attributed to HIV infection. Particularly worrying is the continuing rise in smear positive and therefore infectious pulmonary cases in the community with the associated increase in risk of transmission of disease, not only to the at risk HIV infected but also to the non-HIV population at large including children.

#### Coastal region

On my first day I was taken from Dar es Salaam to Kibaha District Hospital by the Regional Tuberculosis and Leprosy Control Officer (RTLCO) for the coastal region which was inland from Dar es Salaam. One of 23 regions in Tanzania the Coast has a population of about 700,000 with about 1,000 cases of tuberculosis per year, a rate of  $140/10^5$ , of whom 62% are smear positive or infectious. HIV positivity was 30% in an earlier survey but is now believed to be nearer 50%. There are five district hospitals in the Coastal Region each with a District Tuberculosis and Leprosy Control Officer (DTLCO); the DTLCOs are responsible

for the tuberculosis in-patients and clinics in their own hospitals and they also travel, by Honda motorcycle, to conduct tuberculosis clinics at 5-9 dispensaries throughout their district where they see follow-up patients to issue and supervise treatment and complete the patients' treatment cards.

#### Diagnosis of tuberculosis

The mode of diagnosis of tuberculosis is straightforward; anyone with a cough of more than three weeks' duration with or without suggestive symptoms who presents to the medical services has three sputum smears examined by Ziehl-Neelsen staining for acid-fast bacilli. Ten to 30% of such patients have positive sputum smears. If the sputum smears are negative, a course of a broad spectrum antibiotic is given and, if there is no improvement, a further three sputa are examined. Only then, if these sputa are negative, might chest radiography be used to establish a diagnosis of smear negative pulmonary tuberculosis. Extrapulmonary tuberculosis is diagnosed clinically, radiologically, bacteriologically or, exceptionally, pathologically.

#### Treatment regimens

These are standardised with initial and continuation phases of therapy which differ for those with smear positive pulmonary disease (infectious cases) and those with smear negative pulmonary or extrapulmonary disease (non-infectious cases). Smear positive patients are treated with supervised (directly observed) in-patient or daily out-patient administration of streptomycin, rifampicin, pyrazinamide and isoniazid for two months followed by six months of daily thiacetazone and isoniazid supervised in the out-patient clinic (2SRZH/6TH regimen). Non-infectious cases are treated by two months of daily streptomycin, thiacetazone and isoniazid followed by ten months of thiacetazone and isoniazid (2STH/10TH regimen). Rifampicin and thiacetazone are each given in combined tablet form with isoniazid. Previously treated patients or relapsed patients are re-treated with standard quadruple chemotherapy plus ethambutol. Defaulters are 'rounded-up' by the DTLC on his motorcycle.

Sputum is examined microscopically at 2, 5, 8 (and 12) months after treatment initiation to document smear status. Most smear positive patients are smear negative after two months of directly observed quadruple chemotherapy.

Each DTLC keeps his own district tuberculosis register which records name, address, age, sex, site of disease, sputum status at appropriate intervals, and the treatment regimen for each individual patient who has his own District TB number. Each laboratory keeps a register and serially numbers every sputum specimen stained for acid-fast bacilli.

#### HIV infection

HIV infection may be suspected in patients with oral candidiasis, chronic diarrhoea, herpes zoster or Kaposi's sarcoma, but HIV sero-status is not determined other than as part of the regular TB/HIV surveys which take place. There are problems with thiacetazone therapy in a minority of HIV-positive patients who may develop the Stevens-Johnson syndrome or exfoliative bullous dermatitis, with a case-fatality of 20%. As a consequence all patients are now being warned to notice and report to the clinic with any skin manifestations; these are currently being recorded as episodes of exfoliative bullous dermatitis, maculo-papular rash or severe self-reported itch and the outcome determined. Any such patients are

advised to discontinue treatment and, on resolution of symptoms, treatment is started again with ethambutol replacing thiacetazone. To treat all patients with ethambutol rather than thiacetazone is an option which is under consideration but would substantially increase the cost of chemotherapy (which is currently borne by overseas donors).

#### THE TOUR OF INSPECTION—RUVUMA PROVINCE

##### Field trip

On my second day we set off on our two-day journey to Songea in Ruvuma region, 1,030 km by road from Dar es Salaam. Dr Muwinge, from the central office, who travelled with us, was a man with much, if not the most, experience of the national tuberculosis programme in Tanzania. He was now in charge of the third national tuberculin survey of Tanzanian schoolchildren, having performed previous surveys in 1983–87 and 1988–92. These tuberculin skin tests of tens of thousands of schoolchildren nationwide are performed by a dedicated band of highly trained workers who travel the length (1,700 km) and breadth (1,400 km) of the country with Dr Muwinge to collect this information. The surveys allow the estimation of the annual rate of tuberculosis infection which is an indicator of the extent of transmission from sputum smear positive or infectious pulmonary cases in the community. The annual rate of infection in the two previous surveys had been relatively constant nationally at about 1% but surveys as yet incomplete, indicate that the infection rate was rising significantly—just one marker of the possible impact that HIV infection was making on the epidemiology of tuberculosis in Tanzania. Like almost all of the RTLCs, though so designated, Dr Muwinge does not possess a medical degree.

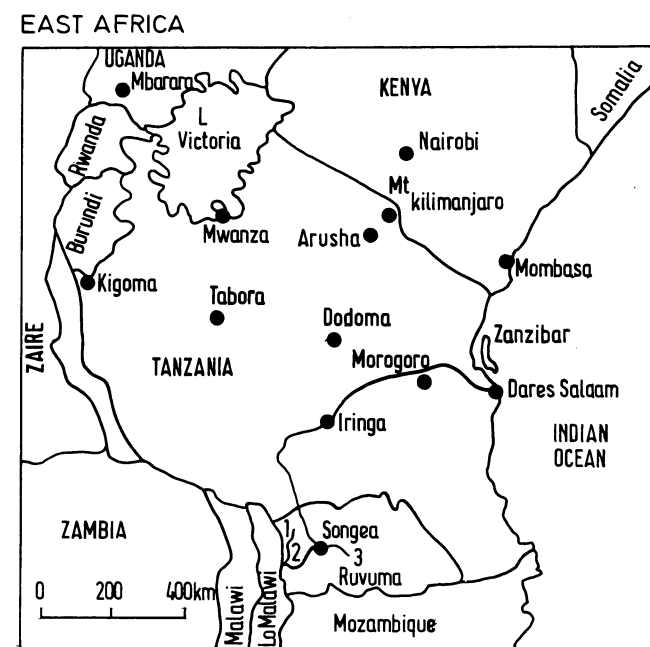
Our journey, over a surprisingly good metalled road from Dar es Salaam to Morogoro (see map—Fig 2), revealed scattered baked mud-brick, thatched or corrugated iron roofed dwellings set in maize fields. Lunch was taken in Morogoro, a dusty thriving agricultural market town of 110,000 or more people in the centre of the lowland plain of Tanzania. From there the road journeyed on for 100 km before entering and passing through Mikumi National Park for about 50 km before the ascent to the highland plateau began.

Iringa, population 80,000, at an altitude of 5,000 feet and 502 km from Dar es Salaam is a farming centre where maize, vegetables, fruits and tobacco are grown. Its tuberculosis notification rate is 120/10<sup>5</sup>; more than 50% of tuberculosis cases are HIV positive and the death rate for treated smear positive cases is 22% compared with a national average of 8%. The explanation for the high mortality is not yet known but is likely to be due to the high prevalence of HIV infection, possibly arising from Iringa's situation at the junction of three main roads.

We stayed the night at Fafinga. The following day the encroaching rainy season manifested itself in intermittent torrential rain but we continued our climb up the plateau to Njombe at 6,000 feet. Thereafter the overall progression was downwards through lush green mountainous countryside to Songea, the principal town of Ruvuma. Coffee and tea plantations became more evident and we crossed a coniferous plantation which provided the raw material for a paper industry.

##### Songea hospitals

At Songea General Hospital (300 beds) we were met by the RTLC, and then



Map of East Africa showing route from Dar es Salaam—Morogoro—Iringa—Songea (Ruvuma Region) 1=Litombo, 2=Mbinga, 3=Nantumbo.

FIGURE 2

Map of East Africa to show route from Dar es Salaam to Songea and centres visited (1–3).

followed his Land Cruiser 20 km out and off the metalled roads to the village of Peramiho where a German Benedictine mission had been established for over 100 years and we were to be accommodated in the mission rest house.

The next day we paid courtesy visits to the Regional Medical Officer. The RMO explained that he was responsible for three government and four non-government hospitals, 16 health centres, 128 dispensaries and 134 village health posts. The common health problems were malaria, pneumonia and diarrhoea. HIV was not a major health service problem—only 7–10% of blood donors were HIV positive! The RTLC touched on the difficulties he was having in providing fuel for the motorcycles of his four DTLCs so that they could keep up their schedule of visits and drug supplies to hospitals, health centres and dispensaries throughout the region. The RMO's budget sheet for December showed an entry of 240 shillings (50 US cents) provided for TB services from which the fuel costs (80 US dollars) per month for the motorcycles were supposed to be met. We were assured that the visits were being made and that imaginative accounting ensured that fuel was obtained.

The tuberculosis beds for Songea numbered 30, located not in the General Hospital, but in Peramiho Mission Hospital (300 beds) which we visited next. The out-patient department saw about 30 patients daily. The laboratory was visited; about 90–100 sputum specimens per month were received for examination for acid fast bacilli. There were some minor difficulties with the laboratory register; the laboratory serial numbers had no individual hospital code and

specimens were numbered starting at 1 for each month rather than being numbered serially for the whole year, so complicating the tracing of individual slides; as a consequence there were major difficulties in identifying slides from the laboratory register relating to patients in the district tuberculosis register, but when these were identified and checked the quality was found to be satisfactory.

A further defect was a failure to record the age of the patients. This was of some concern to Dr Rieder as he wished to pursue an observation he had made in Senegal that although equal numbers of sputum specimens were examined for male and female patients, twice as many male as female specimens proved to be smear positive. Analysis of the last 200 patients at Peramiho proved that this was also the case here; knowledge of the ages might have helped to explain the difference. Were all these smear negative coughing women suffering from chronic bronchitis and emphysema after decades of cooking over wooden fires indoors?

The tuberculosis wards were spacious but fully occupied, almost all patients committed, usually by dint of residence far away, to spending two months there while they received their supervised rifampicin containing quadruple chemotherapy. The patients had been well educated about their illness, their medication and the proposed duration of their chemotherapy. They confirmed that the nurses stood over them until they swallowed their medication. Unfortunately half of them were receiving inadequate chemotherapy; those over 50 kg were receiving the same dose as those under 50 kg in weight, that is only three quarters of the correct dose of streptomycin, rifampicin and pyrazinamide. This had been happening for at least some months and it was not possible to establish for how much longer. Steps were taken to rectify the defect by ensuring that treatment dose recommendations were prominently displayed and were known to all nursing staff.

One patient in the ward, a 65 year old retired teacher, had studied linguistics in Edinburgh in the 1960s and fondly reminisced with me about the beauties of Leith Walk! Two patients had Kaposi's sarcoma; one had been diagnosed as having miliary TB on the basis of an unproductive cough and a chest radiograph taken two months previously which I thought was normal. A recent radiograph taken because of deterioration in spite of adequate anti-tuberculosis chemotherapy showed extensive infiltrative and macronodular disease which I presumed was pulmonary Kaposi's sarcoma. We were told that some more tuberculosis patients were accommodated at Morogoro Leprosarium also part of the Mission where they occupied 11 of the 60 leprosy beds and where, we were to find, the same inadequate chemotherapy was being given to those weighing less than 50 kg, although once again the patients were well informed.

#### *Mbinga District and Litembo Hospital*

Mbinga District (Fig 2) has a population of about 300,000 and is rich in cash crops including coffee, tobacco and cashew nuts as well as the omnipresent maize; some fishing was done on Lake Nyasa. The DTLC at Mbinga Hospital was an experienced officer having been in post for 11 years but had fractured a fibula in a motorbike accident several months previously. As a consequence he had been unable for that time to make his routine visits to the health facilities, so essential for restocking drug supplies. He was responsible for 51 health units including dispensaries, health centres and hospitals. He usually visited all units at least once a

year, dispensaries three times a year, health centres once a quarter and hospitals monthly.

The district register was complete except that dates were only occasionally recorded. Most patients attended out-patients daily for their streptomycin injections for two months rather than lodging in the hospital but the DTLC was surprised that we could not understand why they did not bring their tablets to take under supervision at the same time. There were many cases of Kaposi's sarcoma in Mbinga but it did not appear to be known locally that this was an indicator of *Ukimwi* or AIDS and these people were rarely seen by the health service—no one talked about AIDS, he said.

Litembo Hospital (320 beds) which we visited the following day was a mission hospital founded 30 years previously by a German doctor who was still working there with four other doctors. In spite of its apparent inaccessibility its reputation ensured a constant continuing stream of patients to its clinics. Presently it had 31 patients with tuberculosis under supervision of whom 13 were in-patients in what was still known as the isolation ward.

Our analysis of the Mbinga district tuberculosis register had shown more smear negative than positive cases, a reversal of the usual pattern for Tanzania. Possible explanations had been poor laboratory services failing to detect positive smears or the almost routine use of chest fluoroscopy for the diagnosis of TB at Litembo. Both of these problems were addressed during our visit. It appeared that the diagnostic process at Litembo had deviated from the national norm until recently with more diagnoses being made by initial fluoroscopy, relegating sputum examination to a secondary role. The superintendent agreed that not all the doctors were equally expert at fluoroscopy and that mistakes were possible, even likely. He was somewhat taken aback when the radiation risks to medical staff of regular fluoroscopic examination were explained. He also admitted that there had been some difficulties with smear examination but that these had now been resolved. An extended visit to the laboratory and the sister-in-charge revealed only total competence in preparation, examination, storage and registration of sputum smear specimens. The Mission was clearly well-funded; the sister demonstrated the smears using a video-camera and colour television monitor.

#### *A health centre and a village health post*

On our last day we had a further dusty and bone jarring journey to the west of Songea to visit a village health post and a village health centre. Ngwinde village was a mere 50 km but more than two hours away from Songea. We were met by the village chairman and executive secretary who explained the organisational structure of the village of 280 households and 1,694 people. The health workers, a man and a woman, had been in post for five and seven years respectively and were happy to show us their registers of illness and immunisation. Patients attended in single numbers most days and malaria was the commonest illness followed by diarrhoea. This was fortunate for the only medications available to them (stocked from the dispensary) were chloroquine and aspirin for the former and oral rehydration fluid mixture for the latter. If medical supplies were exhausted the patients were directed to the nearest hospital (return bus trip 2,000 shillings). The immunisation book confirmed BCG vaccination of all children born in the village within a month or two of birth, vaccination being carried out

at the nearest dispensary 15 km away—the EPI, the Expanded Programme on Immunisation appeared to be working well. We asked if they had diagnosed a case of tuberculosis in the last year and were told of a young woman with persistent cough, haemoptysis and weight loss who had been told she had tuberculosis and to go to the nearest hospital. She was dubious of her diagnosis but went to the hospital because she felt ill. When she returned two months later she congratulated the health worker on his diagnostic skills and brought him up-to-date with the management of tuberculosis!

Namtumbo Health Centre was a further one hour away; staffed by 31 employees including three medical officers (not doctors), nurses, midwives, laboratory assistants and a mortuary attendant, it served a population of 60,000 surrounding people along with eight associated dispensaries. There were said to be 100–200 out-patient attendances daily including on average 42 cases of malaria, 14 of pneumonia and 4 of diarrhoea. Only nine patients with tuberculosis had been seen in 1994 although it was visited monthly by the DTLC. One had had AIDS and an adverse reaction to thiacetazone. This number seemed remarkably low and prompted, firstly, a detailed review of the district register which confirmed the number and also that other cases in the district had been diagnosed and were being treated at dispensaries. The total number of cases was still much lower than might have been expected—was the diagnosis being missed by the medical officers and/or the laboratory? A visit to the laboratory was short for there was little to see; only 95 sputum specimens had been examined for acid fast bacilli in the last four years and only one had been positive. With 100–200 out-patients per day, this level of diagnostic intervention seemed remarkably low, low enough to justify withdrawing the microscope, and the RTLC decided to investigate further.

#### REVIEW IN DAR ES SALAAM

On our return to Dar es Salaam, we met for an all day debriefing session with the tuberculosis programme manager, the medical officer responsible for training and statistics and Dr Becx-Bleumink from the Royal Netherland Tuberculosis Association who had been inspecting services in Dar es Salaam. We had concluded from our own tour that central supervision had been lacking—there had been no thorough visit to Ruvuma for several years. As a consequence many administrative details particularly relating to registration had gone astray. The drug dosage error detected had been a serious one though this had now been resolved and various other defects in implementation were corrected and/or drawn to the attention of the RTLC whose overall performance particularly in terms of ensuring education and supervised treatment of patients appeared to be good.

Dr Becx-Bleumink reported that diagnostic services in Dar es Salaam were severely overstretched. Laboratories were performing up to 50–100 smear examinations daily with insufficient staff; only about half of the patients were having the regulation three sputum smears examined. There was need for more supervision, more space and more staff to cope with the continually increasing workload. The introduction of fluorescence microscopy might speed up diagnosis but the primary requirement was for more technicians. Decentralisation of laboratory services was discussed and rejected in favour of improving the supervision and performance of the present service prior to any such move.

In contrast to the laboratory services case registration had improved but documentation of proven cure was not perfect particularly in private hospitals. The entire service could be improved by the appointment of an enthusiastic medically qualified RTLC to one of the currently vacant posts. The treatment results which Dr Becx had seen had been poor in comparison with previous years, particularly for retreatment cases because she thought, of the increased patient workload and the resultant pressure. Some attempt had to be made to decentralise treatment centres. Dr Becx concluded that Dar es Salaam needed more supervision, more staff, more training and more regular review.

The meeting concluded with separate discussions of the bacteriology reference laboratory service, the proposed new manual for the national tuberculosis programme and the Arusha international course on tuberculosis.

The following day was spent in reviewing the needs of the diagnostic and therapeutic services and training for the forthcoming year. Drug supplies had been stretched in the past year but with additional support from donors in the Netherlands and Switzerland it would be possible to establish a six month reserve supply of drugs in all regions. With the aid of a lap-top computer and the contributions of the Central Office and laboratory personnel it was possible to compile the order for all supplies for the next year.

The next two days were held in conference with all 23 RTLCs who had driven to Dar es Salaam and were resident in the Roman Catholic Mgabala Spiritual Centre. Twenty-three Toyota Land Cruisers were parked in tidy rows. On the first day there was a full discussion on leprosy—case finding, rehabilitation, funding, transport, drugs and supplies; the second day on tuberculosis.

Dr Rieder reported that the Tanzanian study of 1,600 adverse reactions to thiacetazone in relation to HIV had clarified the time course of the adverse reaction and its outcome over two separate six month periods. The policy should be modified so that ethambutol was substituted for thiacetazone in patients with likely AIDS, i.e. those with oral candidiasis, herpes zoster, Kaposi's sarcoma or chronic diarrhoea. Ethambutol should not be given to those known to be HIV positive who were not aware of their status and had not been counselled. The results of the ongoing WHO TB/HIV study were presented suggesting that two-thirds of the current increase in patients with tuberculosis could be attributed to HIV.

The national statistics for the first half of 1994 showed that more than 16,000 new cases had occurred and, on the basis of previous years, the annual total for 1994 would probably reach 40,000. The increase was almost entirely due to an increase in the 15–44 age group where the rate is more than 400/10<sup>5</sup> in Dar es Salaam where HIV positivity is high. In new cases isoniazid resistance was present in only 5% whether or not they were HIV positive; rifampicin resistance was present in only 2% but only 1% of HIV positive; multiple drug resistance, to both isoniazid and rifampicin, was found in only 1%. Resistance levels were higher as would be expected in retreatment cases (range 4–19%). Only one isolate had resistance proven to four drugs. Since the introduction of rifampicin based supervised quadruple chemotherapy there is no evidence of decreasing drug sensitivity. This endorses the continuing need for its strict application.

The preliminary results of the third annual schools tuberculin skin test survey suggested for the first time in 12 years that the annual rate of infection had



increased and that the number of smear positive infectious cases was now increasing because of infection of the young.

#### DISCUSSION

Tuberculosis is increasing rapidly in the developing world where HIV infection is prevalent. With the projected and actual introduction of short course chemotherapy to these countries,<sup>1</sup> it is possible that the most powerful drugs currently available to treat tuberculosis may be utilised irresponsibly; this might be due to inadequate provision of health services in some countries. The potential for the emergence of tubercle bacilli which are multiply drug resistant, as happened in recent years in New York City, where up to 25% of tubercle isolates became multiply drug resistant,<sup>2</sup> is real. That this need not happen is demonstrated by the IUATLD supervised Tanzanian National Tuberculosis Programme. Although cure rates approach 80%, notification rates for all forms of tuberculosis are still rising steeply and up to half of these patients are HIV positive. In spite of these pressures, the introduction of directly supervised short course chemotherapy in the initial treatment of infectious cases in this well-organised programme has maintained the cure rate without (to date) the emergence of drug resistant organisms.

The programme is funded by overseas donors with £1.5 × 10<sup>6</sup>/annum and supervised by the IUATLD as in similar programmes in many but not all qualifying countries. If the emergence of multiply drug resistant tubercle bacilli is to be avoided, the international community needs to respond to WHO's appeal for financial support to provide sound tuberculosis services in the developing world.<sup>1</sup>

The United Kingdom at present makes no contribution either directly to governments or through WHO or IUATLD to the development or maintenance of such tuberculosis services.<sup>1</sup> Humanitarian reasons dictate that it should. The fact that in England and Wales tuberculosis notifications in the first half of 1994 have increased from 106 to 304 in the last five years<sup>3</sup> in ethnic groups, other than White and Asian, the largest of which is black African, supports this view. It would be our fault if, as a result of the lack of appropriate overseas development aid, both the developing and the developed world were to experience a proliferation of tuberculous disease due to multiply drug resistant tubercle organisms and so, in effect, a return to the pre-chemotherapy era.

#### ACKNOWLEDGEMENT

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#### REFERENCES

- <sup>1</sup> World Health Organisation. 1994 TB. A Global Emergency. WHO/TB/94.177.
- <sup>2</sup> Frieden TR, Sterling T, Pablos-Mendez A, Kilburn JO, Cauthen GM, Dooley SW. The emergence of drug-resistant tuberculosis in New York City. *N Engl J Med* 1993; **328**: 521-6.
- <sup>3</sup> Anonymous. Tuberculosis in 1993: preliminary results of the National Survey. *Comm Dis Rep* 1994; **4**: 235.

## PSYCHOLOGICAL FACTORS IN RECOVERY FROM ILLNESS AND FROM SURGERY

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It is widely accepted by lay people that psychological factors may influence the onset, progress and recovery from disease. Indeed, high blood pressure has been regarded by non-professionals as evidence of psychosocial stress (rather than of the cardiovascular system).<sup>1</sup> Medical scientists have in the past dismissed such lay beliefs as anecdote-based or speculative and lacking support evidence. However a body of evidence is accumulating which goes beyond the merely speculative and anecdotal, and there is now a challenge for modern medicine to incorporate the implications into clinical practice.

Research on recovery from surgery has demonstrated the importance of psychological factors in the pre-operative period and this knowledge has been successfully applied to improve patient outcomes, although without adding to the understanding of how the effect is achieved. Research on recovery from illness has a less coherent literature and provides fewer answers to clinical problems but does show the range of psychological mechanisms which may influence recovery. This paper is presented in three sections: the first on the assessment of recovery, the second on studies of psychological preparation for surgery, and the third on the psychological processes of potential importance to recovery from illness and surgery.

#### ASSESSMENT

##### *What is recovery?*

In clinical practice and in research, recovery is assessed in several measures which include:

- (1) the reduction of symptoms, e.g. pain, breathlessness, anxiety
- (2) the reduction of disability/increased activity
- (3) the reduction of use of medication and analgesics
- (4) clinical and laboratory measures of the physiological functions of the various systems e.g. heart rate and increased T-cell count
- (5) length of hospital stay
- (6) participation in normal activities, e.g. return to work and to social and leisure activities
- (7) improved quality of life.

Multivariate analysis of measurements of recovery from surgery indicate that it is multidimensional<sup>2</sup>—a measurement on one dimension is not necessarily reflected in another. The mechanisms that influence outcomes may differ. Thus a patient may become more active but simultaneously increase the use of analgesics. Some measures of utilisation may not reflect a patient's condition; for example the length of hospital stay may not reflect speed of recovery, but the hospital bed state manipulation.

##### *Behavioural indices of recovery*

Few physiological measures are relevant especially beyond the early stages of recovery. Clinicians deciding whether or not to discharge patients from hospital