declined to 0.61% in 1985, representing a decline of approximately 37% in nearly 23 years. This amounted to an *annual decline* of 3.2% per annum over the period, a trend normally representing the natural dynamics. Studying various aspects, Chakraborty reports: *Organised intervention may in all likelihood have modified it to an extent. From a hypothetically constructed mathematical iteration of TB situation for the area over a 50-year period, it could be suggested that the aforementioned trend in risk appeared consistent with a programme efficiency of around 30% only*[87] .

However, the above idea was not without problems. In fact, an acute technical problem has been foreseen. Tuberculin surveys are best done among unvaccinated children. Since BCG vaccination is currently being carried out under the UIP, vaccination coverages were quite high. In fact, in some states BCG coverages were reported to be as high as 90%. In such a situation, to get the required number of unvaccinated children in the selected areas to carry out tuberculin surveys to represent the communities under scrutiny posed a serious challenge. The NTI began to work in right earnest to overcome this seemingly unsurmountable problem. There arose a second problem: carrying out tuberculin surveys in huge metropolises like Chennai, Delhi, Calcutta etc. Working on this problem area, NTI has developed a method applicable to Bangalore city. The method is still under field trial.

4.3. Era of short course chemotherapy

Chemotherapy of TB has undergone revolutionary changes in the seventies owing to the availability of two well tolerated oral bactericidal drugs – rifampicin and pyrazinamide. Short Course Chemotherapy (SCC) implies a new rationale of chemotherapy and not merely administering formally accepted regimens for short periods. By using these regimens it has now not only become possible to simplify treatment and reduce its duration, but it is also possible to improve the efficacy of treatment. Discovery of rifampicin in 1967 is

Dr. Wallace Fox, Director BMRC, UK
Father of Chemotherapy

considered as one of the greatest achievements in the history of development of anti-TB drugs. After its discovery no new drug has been found nor is in the offing. However, one should not forget that INH is still the queen of all drugs and if we wish to have a new drug(s) it should be comparable with INH. In the words of Dr Wallace Fox : *"INH, the wonder drug of 1950's is (and is likely to remain) the standard drug to be given for the full duration of all SCC regimens because of its efficacy and high early bactericidal activity, its small bulk and low toxicity. However, laboratory evidence suggests that the sterilizing role of INH is less than those of rifampicin and pyrazinamide. In planning short course regimens the choice the physician faces is what drugs should be added to INH"*[97]. Dr Fox is considered as the father of clinical trials for chemotherapy of TB.

4.3.1. Collaboration with TRC

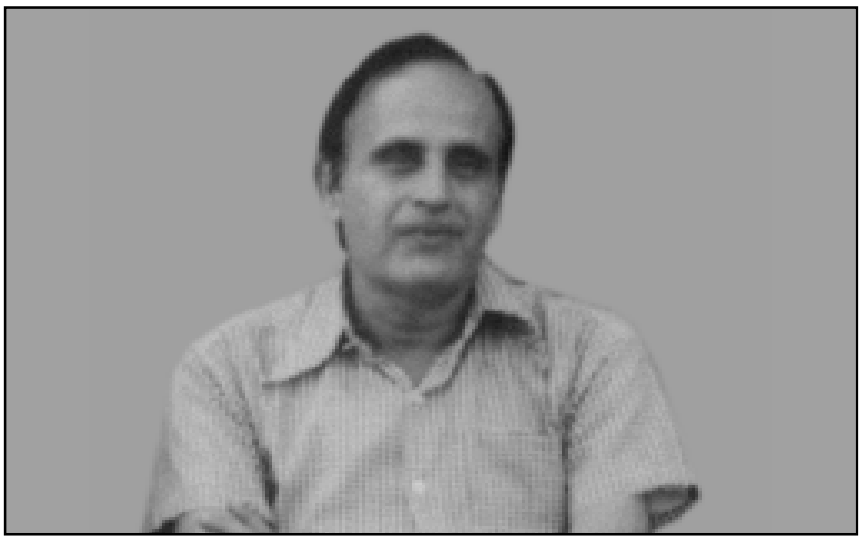
After the advent of rifampicin there was a new hope of reducing the total duration of treatment. The clinical trials, which are time consuming and painstaking, were urgently required to develop SCC regimens. NTI was not entrusted with the responsibility of conducting clinical trials, as TRC already existed to carry out the

research. It was felt that there was an urgent need to find out a suitable SCC regimen for the programme and if two institutions join, then required number of patients would be intaken into the study in half of the time. The early visionaries who created NTI and TRC as enshrined in the plan of operations had also assumed that these two institutions along with the UMTS would work in close coordination. All the three institutions were in the south. No joint ventures ensued for a long time. Perhaps the very objectives of the three institutions were different. When Dr NK Menon took over as Director of NTI in 1976, because of his earlier association with TRC, collaborative studies in SCC began to take shape. In 1978, TRC did a collaborative study with NTI on three SCC regimens in first phase, six in the second phase. The collaboration lasted upto 1983. The results of 5 and 3 month regimens tested in the first phase showed 99% and 93% bacteriological negativity and relapse rates after two years were 4% and 20%. In 3 month regimen relapses were very high[98]. The collaboration helped NTI in many ways. Like a longitudinal study, it had a very committed work discipline and this enabled all the staff involved to learn another research discipline. After five years of work, when the study was wound up, the staff was well versed with this methodology and attained a new expertise that NTI could carry out some important operational studies on SCC with great ease. In his Ranbaxy Robert Koch Oration - 1989, Dr Wallace Fox recalls: *I went to NTI, Bangalore in 1977 specifically to discuss direct collaboration in a controlled clinical trial of SCC. This was readily agreed by Dr Menon and the NTI participation was in the LWSTC. The staff members of the two units worked side by side and in harmony with the clinic's staff. The research on bacteriology was centred in the TRC, ensuring standardised bacteriological tests. The collaboration was a great success. Dr P Jagota of the NTI proved a gifted team leader with a special talent for clinical research but unfortunately, it was unexpectedly terminated, for unforeseen administrative reasons which arose in Bangalore. Thus the NTI could only contribute a two-year*

period of observation of its patients[99].....

In 1983, TRC was given the responsibility of implementing three different SCC regimens in 18 pilot districts in the country. It reported in 1990 a wide spectrum of treatment completion rates ranging from 30% to 80%[100]. The problem of non-compliance as envisaged earlier could not be overcome with the implementation of SCC in the programme.

From the time it was resolved to include SCC regimens, the NTI began to study the operational aspects of implementing SCC in the programme. It may not be difficult to treat patients with SCC in trial conditions where careful selection of cases, adequate organisational set up and efficient default retrieval could be maintained. But, this seemingly simple set up is hard to achieve in the programme conditions. As Dr Jagota puts it: *There is a wide difference between clinical trial and programme organisational resources...SCC alone will not solve the problem of TB.... An efficient treatment organisation is required for the management of the TB patients during the therapy leading to the actual consumption of drugs for the required period*[101]. Aneja summarised in 1982: *Based on the*



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TB Specialist I/c Control Section, 1976

clinical trials and operational studies in actual working conditions, a sea change in the understanding of chemotherapy has occurred. The right type of chemotherapy and the right type of organisation for its delivery at the distribution points near the patients homes have emerged to be the key factors. The drug default nevertheless, continues to be the major problem and efforts are being made to tackle it at the operational level. Meanwhile, the introduction of SCC and MPW scheme are some of the recent developments which are likely to influence the outcome of chemotherapy. However, for deciding about feasibility of the application of SCC and involvement of MPWs in operational conditions, the available knowledge requires to be supplemented with scientific operational studies in actual working conditions of NTP[102].

A study on "acceptability of two, six month SCC regimens i.e., 1SHRZ/ 7TH and 2SHR/6TH" was conducted by NTI in 1989. It was seen that around 80% of patients starting on either regimen completed optimum treatment. The bacteriological conversion in either regimen was of the order of 91% as against almost 100% obtained in controlled clinical trials with a relapse rate of the order of 12% and 17% respectively. These regimens have shown a relapse rate of about 7% under controlled trial conditions. Thus, it could be seen that both bacteriological conversion and relapse rates are quite close to rates observed in clinical trials[103].

Since 1986-87, the GOI began the implementation of SCC in the DTPs in a phased manner. Therefore, it became necessary to carry out a study on adverse reactions to two regimens of SCC. Sputum positive patients attending the LWSTC, Bangalore without history of anti-TB treatment, who agreed to attend the centre regularly, were selected for this purpose. Published in 1989, Sudha Xirasagar concluded that adverse reaction was not by itself a major difficulty but a manageable one[104]. For the SCC to succeed in NTP, additional resources and trained human power are needed. In another study of operational factors published in 1989, the paper revealed that domiciliary SCC

proved feasible and advantageous in an urban TB programme. The study examined the following factors: necessary willingness, drug default, treatment completion pattern, adverse drug reactions and initial drug resistance with their potential harmful effects on the treatment outcome as well as the work load and additional cost involved in providing SCC regimens under DTP[105].

There were other problems associated with SCC. For e.g., what is the fate of resistant cases treated with three different regimens of SCC under programme conditions? In 1990, Jagota and others investigated the fate of 100 INH resistant patients. They found: (i) a high, favourable response among patients with INH resistant strains but with no history of treatment, (ii) emergence of drug resistance to rifampicin was directly related to the duration of its use, (iii) fewer deaths occurred by the end of 24th, 36th month of follow up in comparison with conventional regimens[106].

In 1993 Chaudhuri and others carried out a study in Kolar district and reported: *of the 382 patients put on unsupervised SCC regimen under the existing DTP conditions, only 33.2% completed over 75% drug collections in both intensive and continuous phases. The pattern of compliance did not vary with the place of treatment viz., DTC or PHI. Due to robustness of the SCC regimen, nearly 72-75% of the total cases attained smear negative status at the end of treatment. However, low compliance was a very disturbing finding*[107].

In a good programme, case holding is as important as case finding. In 1992, Balasangameshwara and others have shown through a mathematical model that if any of the two components was given less importance, the overall purpose of DTP, as a system gets defeated[108]. This important mathematical model is yet to be clearly understood. Mathematical models, look simple; but are enigmatic. Hence, they are more often ignored. Once understood, they could be used freely. The history of science is replete with ignored models coming to life long after the discoverer was

gone. Galileo, Newton and Einstein are some examples.

4.4. Monitoring of the programme

As stated earlier it is not possible to measure disease burden accurately through monitoring. However, it is an important tool to evaluate the performance of the units of the DTPs in an ongoing manner and take corrective action simultaneously. This would improve the programme efficiency on a regular basis. Till 1978 monitoring of the programme was done by northern and southern regional centres and from then by NTI only.

In an appraisal paper presented in the 49th National Conference on TB and Chest Diseases held at Pondicherry in 1994, L Suryanarayana and others reported: *"DTPs numbering 390 registered by DGHS, are covered under monitoring. The percentage of DTPs implemented accounts for 81% of the total districts and 64% of such DTPs have been covered under SCC. As far as PHIs are concerned, 56% of the available health institutions have been implemented. Reporting efficiencies of the DTPs and the PHIs are 78% and 70% respectively. Only 41% of the PHIs have been supervised by the respective DTCs (i.e.,at least once in a quarter). The smear positivity rates are 12.3% and 4.8% at DTCs and PHIs respectively. As far as case detection efficiency of smear positive cases is concerned, DTCs have achieved an efficiency of 71% and PHIs 36%. Quality of X-ray reading and smear microscopy, as reflected by smear confirmation rates, among the pulmonary cases diagnosed are 20% and 24% respectively. Treatment completion rates derived from the annual cohort analysis reports are 34% for standard regimens, 44% for SCC regimen A and 52% for regimen B. Out of 276 DTCs reporting on the availability of trained man power and equipment, trained DTOs are posted in 56%, XTs in 60%, LTs in 73%, TOs in 73% and SAs in 46% of the DTCs"*[109]. The above observations were made to impress upon the senior TB workers and administrators the shortfalls in the functioning of the NTP so as to take timely corrective actions to improve the efficiency of the programme.