Lepr. Rev. (1978) **49**, 171–181

Abstracts

14. WATERS, M. F. R., REES, R. J. W., PEARSON, J. M. H., LAING, A. B. G., HELMY, H. S. & GELBER, R. H. **Rifampicin for lepromatous leprosy: nine years' experience.** *Brit. Med. J.* 21 January 1978, 133–136.

This paper is a very important and authoritative contribution to the subject of alternative chemotherapy in leprosy. It presents the results of 9 years' experience of rifampicin in leprosy treatment by a distinguished group of clinicians and bacteriologists, based on 4 carefully designed clinical trials covering over 100 patients with lepromatous leprosy. It is noteworthy that rifampicin was first used for treating leprosy after it was found to inhibit the multiplication of *Mycobacterium leprae* in mice. In clinical trials the drug was used either alone or in combination usually at a dosage of 600 mg daily, occasionally 900 mg twice weekly.

The rapid bactericidal action of rifampicin on *M. leprae* was confirmed, with a fall in Morphological Index within 14 days and signs of clinical improvement detectable in from 10–21 days. The action was nevertheless incomplete, with persisting viable *M. leprae* detected even after 5 years of treatment with either rifampicin alone or rifampicin in combination with thiambutosine. Nevertheless, when combined with dapsone, fewer persisting viable bacilli were detected than are usual after the use of dapsone alone.

Although in the groups of patients studied ENL appeared to develop on average earlier than with dapsone alone, there was no evidence of sudden severe ENL.

In a long term trial, the rapid initial clinical and bacteriological progress on rifampicin was not continued after the first 3–4 months, subsequent progress being comparable with that under treatment with clofazimine.

Although rifampicin is considered to be more effective in leprosy treatment than dapsone, it is not considered likely that used by itself it can significantly shorten the period of treatment essential in lepromatous leprosy. The further investigation of intensive combined treatment from the start is advocated, using rifampicin combined with one or more other bactericidal drugs both in untreated leprosy and in patients with lepromatous leprosy resistant to dapsone.

This paper deserves to be read by all concerned with leprosy treatment.

T. F. Davey

15. PRABHAKARAN, K., HARRIS, E. B. & KIRCHHEIMER, W. F. **Hypopigmentation of skin lesions in leprosy and occurrence of *o*-diphenoloxidase in *Mycobacterium leprae*.** Pigment Cell, v. 3, 152–164 (Karger, Basel, 1976).

This article follows on Dr Prabhakaran's general thesis that *Mycobacterium leprae* is unique in utilizing DOPA. It deals mainly with certain distinguishing characteristics of the *o*-diphenyloxidase in *M. leprae,* together with experimental evidence suggesting a possible mechanism of pigment loss in the skin lesions of leprosy.

Although at least 2 of the figures, and some of the points made in the text are similar to those of, for instance, "The interaction of *Mycobacterium leprae* and melanocytes *in vitro*": Prabhakaran *et al.* (1971), *Cytobios,* **4,** 93–95, it is becoming difficult to keep up with the sequence of the numerous publications and letters on this subject by Dr Prabhakaran and his associates. Apart from its potential value in the identification of *M. leprae,* by no means universally accepted by other workers now, the point which has interested leprologists and dermatologists for a long time concerns the alteration of skin colouring in leprosy lesions, usually towards hypopigmentation. In tuberculoid leprosy, where bacilli are often difficult to find at all, hypopigmentation is of course marked, whereas in lepromatous leprosy, with as many as 7

billion (U.S.A. terminology) bacilli per g of tissue, hypopigmentation may be minimal or absent. The authors attribute this situation in lepromatous leprosy (p. 163) to the presence in the skin of "numerous mast cells loaded with catecholamines", which they have shown to be readily oxidizable by *M. leprae*. (In some instances of erythema nodosum leprosum, mast cells may be conspicuous, but apart from this, few experienced histologists would agree that they are "numerous" in lepromatous tissues.)

A. C. McDougall

16. HARBOE, M., CLOSS, O. & DEVERILL, J. **Production of monospecific antisera against antigenic components of *Mycobacterium bovis* (BCG).** *Scand. J. Immunol.*, v. 5, 861–866 (1976).

The authors describe a technique for the production of antisera specific for individual antigenic components of BCG, by immunizing rabbits with antigen–antibody precipitates cut out from agarose gels.

Culture supernatant from BCG grown in Sautons medium was concentrated by ultrafiltration, and preliminary fractionation was performed by dialysis against buffers of low ionic strength, at various pH values. The resulting precipitates were washed by centrifugation, dissolved in buffer, and then partially separated into individual components by electrophoresis in agarose gels on glass plates.

The plates were then rotated through 90° and re-electrophoresed so that these antigenic components ran into a gel containing a reference anti-BCG serum (crossed immuno-electrophoresis). There was sufficient separation between individual antigen–antibody precipitates formed in this way, to allow some of them to be cut out and used for immunization of rabbits. An electrophoresis system similar to that described above was used to prove that the antibody produced by these rabbits was monospecific.

The authors discuss the possible value of this elegant technique for taxonomy, and for the elucidation of the mechanisms underlying the immunological spectrum of leprosy. If the position of a leprosy patient in the clinical and immunological spectrum is determined by which antigenic components of the organism he can respond to, the technique will clearly be of immense value. If on the other hand, the patient's position in the spectrum is determined by other factors, the technique will be of less help.

G. A. W. Rook

17. FREERKSEN, E. & ROSENFELD, M. **Leprosy Eradication Project in Malta: first published report 5 years running.** *Chemotherapy,* v. 23, 356–386 (1977).

This article describes "the initial 5-year period of the eradication programme since its introduction in the Maltese Islands in the second half of 1972". There were originally 206 patients, including those on the closely adjacent island of Gozo. By the end of the 5-year period, 20 had died or emigrated; treatment had been discontinued in 180; thus 6 patients only remained under treatment. Professor Freerksen emphasizes that this is an eradication project based on chemotherapy and he gives great weight to the use of "almost bactericidal combined therapy". The majority of patients, irrespective of classification and severity of disease, were given rifampicin, isoniazid, prothionamide and dapsone. A combined tablet of isoniazid, prothionamide and dapsone was used, but "in rare cases when intolerance phenomena were observed or in refractory cases, we gave a suitable alternative fixed combination without DDS; prothionamide and ethambutol". Other patients began with the combined rifampicin, isoniazid, prothionamide and dapsone tablet and then switched to isoniazid, prothionamide and dapsone alone. "According to tolerance, or due to other reasons (e.g. temporary unavailability of the drug) rifampicin was also given in combination with other partners (for instance, DDS, sulfonamides, sulfonamide-trimethoprim combination or ethambutol) during shorter or longer periods".

The clinical and bacteriological progress of patients under treatment is described in detail and was judged, on the somewhat limited follow-up periods after stopping therapy, to be satisfactory.

Professor Freerksen lists 88 references in support of the policies he has advised for the eradication of leprosy in Malta, of which 17 are from his own publications, and largely concerned with multiple drug combination. He believes (Abstract) that "fixed combinations not only make treatment simple, but also guarantees a more reliable acceptance of the medication and the adherence to dosage". The Abstract continues: "For an eradication programme the classification into different leprosy types plays not a too important role" but—towards the end—records that 30,000 histological slides have been collected, "representing all stages of leprosy, i.e. from the period before, during and after treatment (about 5000 biopsies)". On page 375, the author gives his reasons for not using clofazimine which—like a great many other statements and opinions in this interesting article—are totally at variance with those of other observers.

A. C. McDougall

18. McDOUGALL, A. C. **The work of the Leprosy Study Centre in London: a review of over 13,000 biopsies.** *Proc. roy. Soc. Med.* 1977, v. 70, 731.

That leprosy has taken its rightful place in the main stream of medical research is due in no small measure to R. G. Cochrane, whose scientific approach is evident, not only in his writings but in the incomparable collection of histological material matched by clinical records at his consulting rooms in London. It was his dream that this should form the nucleus of an international focal point of leprosy study, and the Leprosy Study Centre is the fulfilment of that dream. Standards of excellence in patient care, in training and in histopathology have given the Centre a high reputation. Biopsy material has been sent from many parts of the world, and now in magnitude, range and in detailed records the histological collection is unique.

This Article, the result of much careful study of this great wealth of material, concentrates more on the results than on the techniques used, already well described by Harman [*Lepr. Rev.* **46,** 125 (1975)]. Unusual aspects of differential diagnosis are mentioned, as is the value of serial sections in indeterminate cases. There is particular reference to microfilariasis and the contribution of the Centre to elucidating exit routes of leprosy bacilli from the body.

T. F. Davey

19. EDITORIAL. **Relapse in leprosy.** *Brit. Med. J.* 8/10/77, 914.

This timely article states the present position regarding relapse in leprosy, succinctly, clearly and with authority. Inevitably the main stress is on drug resistance as a cause of relapse. The list of antileprosy drugs to which resistance can arise has now been extended by the addition of rifampicin, but by far the most important aspect of the subject is the widespread emergence of resistance to dapsone. "Each year this phenomenon may be expected to emerge in about 3% of patients with multibacillary leprosy who have been under dapsone alone for 8 years or longer." This particularly applies when treatment has been irregular.

The need for early recognition of relapse due to resistant organisms, and the great desirability of combined therapy from the start in multibacillary leprosy are rightly emphasized. Both these aspects pinpoint the need for higher standards of training and management, especially in field workers engaged in antileprosy programmes.

T. F. Davey

The Abstracts which follow are reprinted from Tropical Diseases Bulletin, *October and November 1977 and January 1978, through the courtesy of the Director, Bureau of Hygiene and Tropical Diseases. They are classified according to subject.*

I. MICROBIOLOGY

20. MATSUO, Y., TASAKA, H. & UTSUNOMIYA, S. **A culturable mycobacterium isolated from leproma of a leprosy-transmitted armadillo.** *Lepro,* 1976, v. 45, No. 2, 63–67.

Mycobacterium scrofulaceum was isolated, apparently, from a lesion of an armadillo infected with *M. leprae.* The culture medium was a monolayer growth of mouse footpad cells, which

produced a 3-fold increase in the number of inoculated bacilli on primary culture, followed by a heavy increase on secondary culture from which *Myco. scrofulaceum* was isolated. The authors think there is no doubt that this contaminant originated from the leprosy lesion of the armadillo. Organisms transmitted from the lesion to a mouse footpad were identified as *Myco. leprae.*

[It is of interest also that Pattyn and others are recently reported to have identified the Skinsnes organism as *Myco. scrofulaceum,* while Kato and Skinsnes suggest that *Myco. leprae* grown *in vitro* might be related to *Myco. scrofulaceum* (see *Int. J. Lepr.,* 1976, v. 44, 385 and 491)].

D. S. Ridley

21. KIRCHHEIMER, W. F. **Occurrence of *Mycobacterium leprae* in nature.** *Lepr. India,* 1977, v. 49, No. 1, 44–47.

The discovery of a leprosy-like disease in wild armadillos in southern Louisiana was reported in 1975 [*Trop. Dis. Vull.,* 1976, v. 73, abstr. 896], but other workers have not so far confirmed the natural occurrence of leprosy in these animals. Three hundred and nine armadillos from Louisiana, Florida and Texas were examined at Carville. A histopathological study of lymph nodes, spleens, livers and other organs was made on 164 of these; blood buffy coat and ear-clip examinations were done on 159, and in 14 both kinds of examination were performed. No evidence of "mycobacteriosis" was found. The negative results of other studies in Colombia and in Paraguay are reported. A mycobacterium cultured from an armadillo caught in Louisiana was typed as *Mycobacterium peregrinum.*

F. I. C. Apted

22. MATSUO, Y. & UTSUNOMIYA, S. **Viability of *Mycobacterium leprae* pretreated with rifampicin.** *Lepro,* 976, v. 45, No. 3, 174–176.

Suspensions of *Mycobacterium leprae* were incubated at 4°C or 30°C for 60 min with rifampicin at a concentration of 2 mg/ml. Before inoculation of mice, halves of the suspension were repeatedly washed with a balanced salt solution. The unwashed bacilli did not multiply in mouse footpads regardless of the exposure temperatures to the drug. The washed ones pretreated at 4°C multiplied normally. The organisms treated with the same procedure but at 30°C resulted in a significant growth delay.

23. OLITZKI, A. L. **Further potential sources of energy modifying the multiplication of *Mycobacterium leprae.*** *Boll. Ist. Sieroter. Milan,* 1977, v. 56, No. 4, 384–386.

The multiplication of *Mycobacterium leprae* was modified by graded dilutions of organic acids. 0.01%–0.05% gluconic acid inhibited its multiplication. 0.005% of it promoted the growth of 2 out of 6 strains. 0.2%–1.0% glucuronic acid promoted the multiplication of the majority of strains. 2.0% inhibited their multiplication, and 0.05% promoted the growth of one strain.

Galacturonic and pyruvic acids were active in 0.2–2.0% concentrations, while the activity of citric acid was mainly noted at 1.0 and 2.0% concentrations.

[See *Trop. Dis. Bull.,* 1977, v. 74, abstr. 54.]

24. PATTYN, S. R. **The effect on the multiplication of *Mycobacterium leprae* of irregular administration of dapsone to mice. Results of the total minimal inhibitory test.** *Ann. Soc. Belg. Méd. Trop.,* 1977, v. 57, No. 3, 175–179.

Dapsone in a 0.01% concentration in the food was administered to mice for 1–6 days a week every week and every 2, 3 and 4 weeks. It was further administered daily for periods ranging

from 4–28 weeks after infection. In all drug regimens dapsone was purely bacteriostatic, since multplication started in some of the animals sometime after stopping treatment. It is concluded that human paucibacillary leprosy should preferably be treated with a more bactericidal drug and multibacillary cases during an initial phase with drug combinations.

2. IMMUNOLOGY, PATHOLOGY

25. KAWAGUCHI, Y. & MATSUOKA, M. **Observation of host reactions to murine leprosy bacilli in spread subcutaneous tissue preparations of various strains of mice.** *Jap. J. Exp. Med.,* 1977, v. 47, No. 2, 71–79.

Male mice of 6 inbred strains (C3H, CF1, KK, BALB/C, DDD and C57BL/6) were inoculated subcutaneously in the back with 0.25 ml of a 1 : 1000 leproma suspension (Hawaiian strain). Growth patterns of murine leprosy bacilli in subcutaneous tissue at the inoculation site were examined on the spread tissue preparations.

No remarkable differences were observed among these mouse strains during the first 3 weeks after inoculation. An acute inflammatory reaction with accumulation of many polymorphonuclears disappeared in 1 week and elongation of the bacilli was evident in mononuclears without increase in number. The bacilli were about 2–3 times as long as the initial length. At 2 weeks the elongated bacilli were fairly abundant within the cells, but some were present extracellularly. At 3 weeks enlarged mononuclears, being crowded with long bacilli, could easily be demonstrable by low magnification. Four weeks after inoculation, however, significant differences in the growth patterns were seen among these mouse strains. In C3H and CF1 mice, an infiltrate consisting mainly of mononuclears was seen in the subcutaneous tissue at the inoculation site. Most of the mononuclears were heavily loaded with the long bacilli and were scattered or accumulated in the whole specimens. In contrast, lymphocytes and polymorphonuclears were predominant in the other 4 strains of mice, and they surrounded a smaller number of mononuclears containing the long bacilli. Such differences between mouse strains became more remarkable at 5 weeks because of more pronounced cellular reactions in these 4 strains. The difference between C3H and CF1 mice was manifested in 8–10 weeks by infiltration of lymphocytes, surrounding accumulated mononuclears loaded with the bacilli, which was seen only in CF1 mice.

The mouse strain differences as above in response to murine leprosy bacilli are discussed on the basis of cellular immunity in the hosts.

26. WESTERHOF, W. **A possible dysfunction of melanosome in leprosy: an electron-microscopic study.** *Acta Derm.-Vener.,* 1977, v. 57, No. 4, 297–304.

An E.M. study was carried out to investigate whether *Mycobacterium leprae* occur intracellularly in epidermal melanocytes. As this could not be confirmed, the selective killing of melanocytes by cytotoxic lymphocytes could not explain the hypopigmentation in types of leprosy with a relatively good immune response. There were indications that these hypopigmented lesions resulted from a disturbed transfer of melanosomes from melanocytes to keratinocytes. Further research in progress.

27. CHOGLE, J. B. & KHANOLKAR, S. R. **T & B lymphocytes in the spectrum of leprosy.** *Lepr. India,* 1977, v. 49, No. 1, 36–43.

The percentage of T and B lymphocytes were estimated in 52 leprosy patients by "E" and "EAC" rosette techniques. The mean percentage values for "T" lymphocytes were significantly lower in lepromatous group as compared with that of tuberculoid and borderline groups. Also, a significant difference was observed in the mean percentage values of T and B lymphocytes of the borderline and tuberculoid patients and of the normal control group. These findings were correlated with skin smears and lepromin testing.

28. SAHA, K. & GUPTA, I. **Immunologic aspects of leprosy with special reference to the circulating antispermatozoal antibodies.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 28–37.

Macroscopic sperm agglutination in gelatin, sperm immobilization and tanned red cell hemagglutination tests could detect antispermatozoal antibodies respectively in 41%, 37% and 23% sera of 35 leprosy patients, including 5 female cases. Interestingly, all of the above tests were positive in one serum from a female patient with borderline leprosy. Sperm antibodies were detected in both lepromatous and tuberculoid forms of leprosy by the above three technics and no significant difference was observed in their incidences among the 2 groups of patients. A three-dimensional correlation was observed in 57% of 42 tests performed with 14 sera. Head-to-head type of agglutination was the predominant feature of spermagglutination observed in the sera of these patients. In the control group, only 1 of 50 normal fertile males showed a positive spermagglutination test. Not one in this group showed positive sperm immobilization and tanned red cell hemagglutination tests.

Antihuman globulin consumption test, presumably a very sensitive test, was also employed to demonstrate sperm-specific antibodies in the sera of these leprosy patients. These antibodies were adsorbed on the surface of the normal donors' spermatozoa when the latter were incubated with the patients' sera. Antispermatozoal antibody could be demonstrated by this sensitive technic in the sera of 2 female patients. Moreover, antihuman globulin was consumed more intensely by the antispermatozoal antibodies present in the sera in the lepromatous than in the tuberculoid and borderline leprosy groups.

29. BALAKRISHNAN, S. & RAMU, G. **Blood DDS levels and acetylation rates of sulphadimidine in leprosy patients.** *Lepr. India,* 1977, v. 49, No. 1, 59–64.

The plasma DDS clearance rates and the acetylation rates of Sulphadimidine were studied in a group of 30 leprosy patients comprising of 17 non-responders and 13 responders to DDS treatment. No differences in the acetylator type or in the plasma DDS clearance were seen between the responders and non-responders. Acetylation rate did not bear any relation to the plasma clearance of DDS in the non-responders. The findings indicate that the resistance to DDS therapy in these patients is not related to any abnormal metabolic disposition of DDS.

30. HARADA, K. **A modified allochrome procedure for demonstrating mycobacteria in tissue sections.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 49–51.

A modified allochrome staining procedure is presented as being the most reliable and sensitive method for demonstrating mycobacteria in tissue sections. The technic is as follows: Deparaffinize formalin fixed sections, oxidize in 10% periodic acid for 24 h, differentiate in 1% HCl-70% ethanol, stain in Weigert's iron hematoxylin nuclear stain, and counterstain in picro-methyl blue. Mycobacteria stained brilliant red in contrast with the allochrome-stained background tissues, and apparently otherwise chromophobic bacilli are demonstrated.

31. NATH, I., CURTIS, J., SHARMA, A. K. & TALWAR, G. P. **Circulating T-cell numbers and their mitogenic potential in leprosy—correlation with mycobacterial load.** *Clin. Exp. Immunol.,* 1977, v. 29, No. 3, 393–400.

The effect of treatment and mycobacterial load on circulating T-cell numbers and their functional ability was investigated in 41 patients with leprosy. Both early binding T-cells and their responses to phytohaemagglutinin (PHA), concanavalin A (Con A) and pokeweed mitogen (PWM) were profoundly and uniformly depressed in untreated, and partially treated, bacilliferous lepromatous leprosy (LL) patients as compared with normal subjects and tuberculoid patients. On elimination of mycobacteria, subsequent to chemotherapy, LL patients regain normality in T-cell numbers and their functions. On the other hand, the specific response

of lymphocytes to *M. leprae* did not alter with decrease in mycobacterial load. It appears that the decrease in T-cell numbers and the deficit in their mitogenic potential is a secondary consequence of disease and is related to the antigenic load in patients with lepromatous leprosy.

32. YOUNGCHAIYUD, U., CHANDANAYINGYONG, D. & VIBHATAVANIJA, T. **The incidence of HLA antigens in leprosy.** *Vox Sang.,* 1977, v. 32, No. 6, 342–345.

HLA antigens were studied in 36 patients with leprosy, 20 cases of lepromatous and 16 cases of tuberculoid type. Eleven out of 36 (30.55%) had BW40 as compared to 9.33% of 150 controls. The frequency of BW40 in tuberculoid patients (31.25%) was not different from that in lepromatous cases (30%).

33. KWAPINSKI, G., KWAPINSKI, E. & ALMEIDA, J. O. **Preliminary investigations on abnormal immunoglobulin(s) in leprosy.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 24–27.

A new, abnormal immunoglobulin designated IgK has been discovered in leprous Rubino-negative sera. The IgK having a negative net charge and its own antigenic specificity appears to be partly related to the Fc fragment of IgA and to Fab fragments of known immunoglobulins, but its net charge is negative at pH 8.8. Its molecule seems to possess kappa but not lambda light polypeptide chains. Implications of this discovery are discussed.

34. POULTER, L. W. & LEFFORD, M. J. **Development of delayed-type hypersensitivity during *Mycobacterium lapraemurium* infection in mice.** *Infection & Immunity,* 1977, v. 17, No. 2, 439–446.

Various preparations of *Mycobacterium lepraemurium* were used to elicit delayed-type hypersensitivity in the footpad of mice infected with this organism. With a sonicated preparation of the mycobacterium, a significant increase in footpad swelling was elicited in mice infected with *M. lepraemurium* 5 weeks previously, but not in BCG-infected animals or uninfected controls. This footpad reaction was shown to peak at 24 h and to be associated with an infiltration of mononuclear cells. The kinetics of footpad swelling, its association with lympho-proliferation, and its dependence on T lymphocytes were each examined. The results support the hypothesis that this is a delayed-type hypersensitivity reaction. The ability to transfer this reactivity to normal mice with cells but not serum offers further confirmation that this hypersensitivity is dependent on cell-mediated immunological mechanisms rather than humoral antibody. The relevance of this to the study of the immunological response of mice to murine leprosy is discussed.

35. JACOB, W., PATTYN, S. R. & DOCKX, P. **Cytochemical evidence for aerobic pathways in *Mycobacterium lepraemurium.*** *Int. J. Lepr.,* 1977, v. 45, No. 1, 9–13.

Three enzymes of aerobic pathways (cytochrome *c* oxidase, peroxidase and catalase) and one key enzyme of the tricarboxylic acid cycle (succinate dehydrogenase) were investigated for their ultrastructural localization in *M. lepraemurium* in infected mouse liver and in cultures of *M. fortuitum* as a control. All 4 enzymes were localized in *M. fortuitum.*

To *M. lepraemurium* only cytochrome *c* oxidase and peroxidatic activity were detected. The localization of the latter enzyme activity was different compared with *M. fortuitum.* Succinate dehydrogenase was not detected in *M. lepraemurium* but rather surprisingly was found in the membrane of the phagosomes containing the bacteria.

It is concluded that *M. lepraemurium* can function aerobically and has either a glyoxalate pathway or is an obligate autotroph.

3. CLINICAL

36. QUINETE, S. S., MARQUES, A. S., RANGEL, E. R. & ROCHA, G. L. Lepra de Lucio [**Leprosy: Lucio type.**] *Anais Bras. Derm.,* 1977, v. 52, No. 1, 107–115.

The English summary appended to the paper is as follows:

"One case of lepromatous leprosy with Lucio phenomenon is presented. The conception of Lucio leprosy and of Lucio phenomenon is discussed; the vasculitis underlying the phenomenon in the case presently described is stressed."

37. SEHGAL, V. N., REGE, V. L. & SINGH, K. P. **The age of onset of leprosy.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 52–55.

The age of onset was determined in 1053 consecutive patients having different types of leprosy. There were 675 males and 378 females. The majority had onset of the disease between ages 20 and 39, although all age groups were affected. The age of onset was significantly related to the type of leprosy; the mean was lowest in tuberculoid, highest in neuritic, while in borderline and lepromatous it was in between. The comparison of reports of the age of onset from India and elsewhere suggest that this varies in different regions within the country, and from country to country.

38. HARRELL, J. D. **Ocular leprosy in the Canal Zone.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 56–60.

The results of a 2 year survey of eye problems among the patients at the Palo Seco Hospital in the Canal Zone are presented. Only 2 patients, one classified as having lepromatous leprosy and the other as having the tuberculoid form of the disease, failed to exhibit ocular complications. The high prevalence of leprotic ocular disease (96%) is most probably due to the advanced age of the patients, the lengthy duration of their illness, and the high percentage of patients afflicted by the lepromatous form of the disease.

4. THERAPY

39. PATTYN, S. R. & SAERENS, E. J. **Activity of three new rifamycin derivates on the experimental infection by *Mycobacterium leprae*.** *Ann. Soc. Belg. Méd. Trop.,* 1977, v. 57, No. 3, 169–173.

Three new rifamycin derivates characterized by longer lasting serum levels were tested against *M. leprae* in the mouse model. Their minimal effective dose is slightly to moderately lower than that of rifampicin. Intervals of administration can however not be increased over once every 2 weeks.

On a weight basis one of the drugs is 8 times more potent than rifampicin.

40. SHEPARD, C. C., VAN LANDINGHAM, R. & WALKER, L. L. **Effect of levamisole on *Mycobacterium leprae* in mice.** *Infection & Immunity,* 1977, v. 16, No. 2, 564–567.

Levamisole, an antihelminthic drug that is capable of enhancing immune responses in mice and in humans, was tested in experimental *Mycobacterium leprae* infections in mice by a number of schedules. Intermittent schedules were used, and administration of the drug was started (i) around the time of inoculation with *M. leprae,* (ii) when the *M. leprae* population was approaching the plateau level, (iii) after the onset of the plateau phase, or (iv) after BCG vaccination 28 days following the inoculation with *M. leprae.* No effect of drug could be discerned with any of the schedules.

41. SANTOS, I. Tetramisol em Hanseníase. I. Viragem lepromínica. [**Tetramisole in leprosy. I. Effect on lepromin reaction.**] *Anais Bras. Derm.,* 1977, v. 52, No. 2, 165–173.

The English summary appended to the paper is as follows:

"Tetramisole was administered to 30 lepromatous patients and 10 healthy lepromin-negative persons, in a daily dosage of 160 mg during 30 days. An activation of the Mitsuda reaction was obtained in 19 lepromatous patients and in 6 healthy people."

42. ALMEIDA NETO, E. & JORGE, M. D. Tratamento da lepra com a associação sulfamoxol e trimetoprin. Ensaio duplo cego com o DDS em 20 pacientes lepromatosos. [**Treatment of leprosy with a combination of sulphamoxole and trimethoprim. Double blind test with DDS in 20 patients.**] *Anais Bras. Derm.,* 1977, v. 52, No. 2, 153–164.

The English summary appended to the paper is as follows:

"Therapeutic effectiveness of the association sulfamoxole + trimethoprim as compared to DDS for the treatment of lepromatous patients is studied through a double-blind test, over a period of 12 months. The authors conclude that trimethoprim is devoid of therapeutic activity and that sulfamoxole is specifically active but less than DDS."

5. EPIDEMIOLOGY, PREVENTION, CONTROL

43. LECHAT, M. F., MISSON, C. B., BOUCKAERT, A. & VELLUT, C. **An epidemiometric model of leprosy: a computer simulation of various control methods with increasing coverage.** *Int. J. Lepr.,* 1977, v. 45, No. 1, 1–8.

An epidemiometric model of leprosy has been developed to predict and simulate trends of leprosy under various control conditions. This model, whose structure was previously described, is based on data collected in the Polambakkam leprosy control scheme in South India over a 16-year period, from 1954–1970. Incidence of leprosy has been computer simulated at 5, 10, 15 and 20 years. The following control measures, some of them still in the development stage, were considered: (a) unmodified leprosy control as carried out in the study population, based on early detection and regular treatment; (b) vaccination with a BCG-like type vaccine effective for preventing development of leprosy as the lepromatous type and converting potentially lepromatous cases into tuberculoid ones; (c) vaccination with a disease specific vaccine supposed to be 100% effective in preventing leprosy; (d) improvement over present conditions in case-holding; (e) isolation of lepromatous patients for 1 year after detection. The methods tested were simulated at different ranges of coverage, ranging from 10–100%, and compared to the results predicted with the present control strategy taken as base lines.

Under all circumstances, specific vaccination was the most effective method. A 100% coverage of the population with an effective vaccine will interrupt transmission after 10 years. A 90% incidence reduction is achieved at approximately 8 years with 100% coverage, 10.5 years with 90% coverage, and 18 years with 80% coverage. Compared to other methods, specific vaccination with 20% coverage is as effective for controlling the disease as isolation of all the lepromatous patients for 1 year after detection. This clearly stresses research in the development of a vaccine as the highest priority for leprosy control.

A computer program has also been designed which predicts annual prevalences and cumulative prevalences over time, since these parameters can be of particular interest to governments and funding agencies. These data provide the base lines for cost-effectiveness analysis of leprosy control.

[See Lechat *et al., Trop. Dis. Bull.,* 1976, v. 73, abstr. 1324.]

44. KOLONEL, L. N. & HIROHATA, T. **Leprosy and cancer: a retrospective cohort study in Hawaii.** *J. Natn. Cancer Inst.,* 1977, v. 58, No. 6, 1577–1581.

We used data collected on a retrospective cohort of 1123 leprosy patients living in Hawaii between 1940 and 1970, to test the hypothesis that patients with lepromatous leprosy, who have an impairment in their cellular immune response, would have an increased risk for cancer and that patients with tuberculoid leprosy, who are immunologically competent, would have a normal or even a reduced cancer risk from beneficial stimulation of their cellular immune system by exposure to the *Mycobacterium leprae* organisms. Based on a survival analysis method, the results of the study supported the predicted increase in cancer cases among the lepromatous leprosy patients (19 observed, 12.7 expected; risk ratio = 1.5) and the predicted decrease among the tuberculoid leprosy patients (14 observed, 17.8 expected; risk ratio = 0.8); in both groups, the findings were consistent across the 5 racial categories of the study. However, none of these differences between observed and expected cases was statistically significant at the 5% level. The study provided no support for the alternate hypothesis that chronic antigenic stimulation by the *M. leprae* organisms might lead to an increase in tumors of the lymphoreticular system.

6. REHABILITATION AND SOCIAL ASPECTS

45. SANKALE, M., NDIAYE, P. & BEYE, I. Enquête préliminaire sur l'opinion du noir sénégalais vis-à-vis de la lèpre. [**Preliminary enquiry into the opinions held by the Senegalese about leprosy.**] *Méd. Afr. Noire,* 1977, v. 24, Nos 8/9, 571–581.

By means of a verbal questionnaire distributed to health workers in contact with a cross-section of African opinion in Senegalese villages, the authors hoped to obtain information on currently held beliefs about leprosy. Out of 1310 forms distributed, only 532 were returned adequately completed from healthy people and 100 from patients with leprosy. This highly selective sample is analysed.

Most of the replies came from one ethnic group, and the background of the individuals composing this group is not given in detail, apart from age and sex structure and district of residence.

Among the healthy, most people seem to know what leprosy is, and fear it as a "great sickness": various equivalents in local dialects are given. The cause of the disease is commonly held to be explicable only in supernatural terms—it is a punishment or a curse (42%), but heredity (29%) or the taking of certain foods, e.g. goat meat, fish, milk (17%), may also be factors.

About two-thirds of the replies held that leprosy was an hereditary condition, and cited as proof its common appearance among the young in families where there was already a sufferer, but a high proportion (98%) thought that it was contagious, being transmitted by clothing, body secretions (such as sweat, saliva, sputum), sexual relations or other forms of physical contact.

The authors emphasize that public opinions and attitudes are based on beliefs. Thus the great majority of persons questioned considered that those suffering from leprosy should be segregated, although most of them admitted that the disease was curable—especially by doctors (rather than by medicine men).

To avoid catching leprosy, opinion seemed to advocate: no contact with sufferers from the disease, and maintain high standards of cleanliness and hygiene.

[Despite the relative sophistication of many of those responding to the questionnaire, the prevailing ignorance about leprosy is very obvious, as is the need for health education.]

S. G. Browne

46. FRIST, E. **A study of community attitudes and knowledge in relation to leprosy.** *Hansenologia Int.,* 1976, v. 1, No. 2, 184–190.

A study of community attitudes and knowledge in relation to leprosy was undertaken in the Bauru Region of the Brazilian State of São Paulo as preparation for an integration project in the

region. A representative sample of approximately 500 persons was interviewed in 7 municipalities by 15 psychology students. The results of the study showed that the level of knowledge about leprosy in the region is very low with the mean score on a basic knowledge test being 37.5% correct. While results showed the existence of a "leprosy stigma" in the region, they also demonstrated a considerable degree of acceptance on the part of the general population to maintaining close work and friendship relationships with patients under treatment. Other answers to questions in the study indicated that the roots of the "leprosy stigma" lie more in the fear of "contagion" and the disease's effect on social relationships than in the fear of physical problems such as pain and deformities. The author is left with a feeling of cautious optimism as to the success of integration efforts when these are accompanied by health education activities with those with whom the patient is to maintain close contacts.