CURRENT LITERATURE

This department carries selected abstracts of articles published in current medical journals dealing with leprosy and other mycobacterial diseases.

General and Historical

Kaur, P., Sharma, U. C., Pandey, S. S. and Gurmohan, S. Leprosy care through traditional healers. Lepr. Rev. **55** (1984) 57–61.

An encouraging increase in the knowledge of leprosy has been found in traditional healers after training has been given. Evaluation was by pre- and post-training questionnaires to which scores were assigned. Their role in leprosy care at the community level is also discussed.

The traditional healer is part and parcel of the social milieu where he commands respect and has an intimate relationship with his clientele. Considering the present manpower in the National Leprosy Control Programme we can think of this alternative approach as a boost. In addition, the negative aspects of health care as practiced by many practitioners can also be corrected by the appropriate training.—Authors' Summary

Pankhurst, R. The history of leprosy in Ethiopia to 1935. Med. Hist. **28** (1984) 57–72.

Leprosy has for centuries been prevalent in Ethiopia. Ethiopian Christians were well aware of biblical references to the disease; their literature also contains many legends of miraculous cures. Ethiopians, perhaps for this reason, adopted a much more tolerant attitude to the disease than was common in the West. Leprosy patients were, however, in large measure isolated from the rest of the population, but were permitted to beg at court and around churches, and to accompany the army on expeditions. Leprosy sufferers were allowed to accost and even to threaten the public with remarkable impunity. Ethiopians seem traditionally to have been largely unaware that leprosy was contagious—they regarded it rather as an inherited complaint. They sought to cure it in numerous ways: by prayer and amulets, by medicines for internal and external application, by medicated vapor baths, and by immersion in thermal pools. Foreign medicines, mainly from the Arab world and Europe, began to exert limited influence only in the nineteenth century. The first leprosarium was established at Harar in 1901, and the second at Akaki, just outside Addis Ababa, in 1934.—Author's Summary

Chemotherapy

Bulakh, P. M., Kowale, C. N., Ranade, S. M., Burte, N. P. and Chandorkar, A. G. The effect of clofazimine on liver function tests in lepra reaction (ENL). Lepr. India **55** (1983) 714–718.

Twenty patients with suspected dapsone resistance and repeated attacks of lepra reactions were selected for the study. Clofazimine was administered in different doses over a period of 12 months. Elevated levels of transaminases and alkaline phosphatase prior to therapy attained values to near normalcy. Progressive fall in serum bilirubin and proteins with normal A/G ratio at the end of therapy was also observed. Clofazimine by its anti-inflammatory and antibacterial action could inhibit the process of liver damage and happened to have minimal deleterious effect on the liver by studying the liver function tests.—Authors' Abstract

Delamarche, C., Markovits, P., Mester de Parajd, M., Dautheville, C. and Mester de Parajd, L. Desoxyfructo-serotonin: in

vitro toxicity and mutagenesis. Acta Leprol. (Geneve) **1** (1983) 223–231.

Deoxyfructoserotonin is effective against leprosy, and its use as a therapeutic agent has given promising results. It was therefore essential to ascertain the toxicity and mutagenicity of this compound. For this purpose, we used the cell culture method to compare the effect of deoxyfructoserotonin with that of the natural compound, serotonin.

The toxicity of DFS was found to be comparable to that of serotonin, since the two toxicity curves were similar. LD_{50}, i.e., the dose which permits survival of half the cells was 680 μM for DFS, and 1160 μM for serotonin.

With respect to mutagenicity, a 1000 μM solution of DFS induced the formation of 1.5×10^4 mutant colonies, whereas 30 μM of bis chlorethylnitrosourea solution (BCNU) sufficed to induce the same amount of mutation. Consequently, DFS has little or no mutagenic effect.—(*From* the article)

Ferracci, C., Baquillon, G. and Pattyn, S. R. Activité de la désoxyfructo-sérotonine sur *Mycobacterium leprae.* Résultats de l'inoculation de biopsies humaines à la souris après un an de traitement. [Activity of deoxyfructo-serotonin on *Mycobacterium leprae.* Results of inoculation in mice of biopsies of humans after one year of treatment.] Acta Leprol. (Geneve) **1** (1983) 233–235. (in French)

Mycobacterium leprae extracted from cutaneous biopsies of 4 out of 7 patients treated with DFS during one year at doses of 1000 to 1500 mg/day were injected in mouse foot pads. Bacterial multiplication was observed in each case. The purely bacteriostatic activity of DFS for *M. leprae,* previously observed in mice, is thus confirmed.

The eventual place of DFS in the therapy of leprosy is discussed.—Authors' English Summary

Goloshchapov, V. K., Steklovsky, V. K., Filipskikh, T. P. and Khromova, E. B. Treatment of leprosy with diucifon. Vestn. Dermatol. Venerol. **4** (1983) 67–71. (in Russian)

The results of treatment of 121 patients with leprosy using a new original antileprous preparation diucifon in comparison with a control group of patients given other antileprosy drugs (dapsone, Ciba-1906, clofazimine, etc.) are presented. The necessary experimental studies in animals had been carried out previously. The toxicity of diucifon was shown to be lower (five times) and its antileprous effectiveness higher than those of the other drugs because in ten patients the lepromatous type of leprosy was transformed into the tuberculoid type as confirmed histomorphologically by the detection of cells of a tuberculoid structure and clinically by the appearance on the skin of plaques and foci characteristic of the tuberculoid type of leprosy. No side effects in the treatment with diucifon were observed in contrast to sulfone drugs. The periods of hospital treatment were shorter.—Authors' English Summary

Klokke, A. H. Antibakterielle Behandlung der erregerreichen Lepra. [Antibacterial treatment for leprosy.] Hautarzt **34** (1983) 203–208. (in German)

A historic introduction reviews the start of DDS (diaminodiphenylsulfone) therapy in leprosy, stressing the fact that, long after the start of combined therapy in tuberculosis, leprosy continued to be treated with monotherapy of DDS. Reports about resistance of *Mycobacterium leprae* to DDS initiated a review of policy.

A complete breakthrough toward combined therapy started after 1962, when Shepard introduced mouse foot pad inoculation of *M. leprae* to be used for therapeutic trials.

Full attention is given to Freerksen's trial in Malta, where combined treatment with rifampin, INH, prothionamide, and DDS were given for two years only to all patients, while at resurvey after four years no relapse was found.

The applicability of short-term combined therapy for endemic areas is discussed.—Author's English Summary

Li Wenzhong, *et al.* Observation on the therapeutic effect of isobutylpiperazinyl rifamycin (R761) in treating lepromatous leprosy. Chin. J. Dermatol. **16** (1983) 223–227. (in Chinese)

Thirty cases of LL and BL leprosy were treated for 6–12 months with isobutylpiperazinyl rifamycin (R761). Group A: 17 cases received R761 150 mg daily for one year. Group B: 13 cases received R761 600 mg daily on two successive days every month plus dapsone 100 mg daily for six months. The viability of *Mycobacterium leprae* obtained from skin scrapings of seven cases before treatment and 1, 2, and 4 weeks after treatment, respectively, was tested with the mouse foot pad test.

The results of clinical trials showed that R761 is effective for dapsone-resistant cases, relapsed, and new cases of LL and BL leprosy during the period of treatment for 6–12 months. Clinical, bacteriological, and histopathological improvements in group A were consistent with that in group B in six months of treatment; particularly the skin smears showed that the MI fell rapidly in both groups, but the fall of the BI was not as rapid as that treated by other effective antileprosy drugs. The results of the mouse foot pad test showed that *M. leprae* were killed rapidly. In group A, *M. leprae* became noninfective to mice within 8–28 days, and in group B, within 1–14 days. The severity and frequency of lepra reaction were increased in both groups. Except for two cases with mild hepatic injury, no other severe side effects were seen in all cases.—Authors' English Abstract

Naik, S. S. Tile test to monitor the self administration of dapsone by leprosy patients. Lepr. India **55** (1983) 665–669.

The regularity of attendance of leprosy patients at clinic does not correlate well with regularity in drug consumption. This feature has been reported by several workers from different parts of the world. For monitoring self administration, a periodical check up of urine for drug content is necessary. The dapsone tile test described by Irudayaraj is performed on porcelain tile with a drop of a leprosy patient's urine. An appearance of pink color and its intensity shows the drug content in urine. Instead of a porcelain tile a cheap and readily available plastic blistered capsule card was used which is convenient to carry in the field and is disposable. A total of 184 urine samples were collected in the field and tested at a field clinic by paramedical workers employing the dapsone tile test. The same urine samples were later processed for dapsone/creatinine ratios at the laboratory by photoelectric colorimetric investigations. It was found that the results of the dapsone tile test in the field correlated well up to 96% with the dapsone/creatinine ratio estimations in the laboratory. The tile test on the plastic card is simple to perform under field conditions and it is reliable, too.—Author's Abstract

Nakai, E.-I. Leprosy in Northern India. IX. Effect of treatment for lepromatous leprosy patients from Ghatampur tahsil. Jpn. J. Lepr. **51** (1982) 68–74. (in Japanese)

Four hundred eighty-four lepromatous leprosy patients (male 399 and female 85) were registered from all of Ghatampur tahsil [county] between 1966 and 1971 at the Ghatampur clinic of JALMA, Kanpur District, Uttar Pradesh State, India.

Out of them, 58%, 279 patients (male 246, female 33) were treated for over 25% of the scheduled period. Some analysis is reported here about these 279 patients from the point of view of the treatment period and the effect of treatment.

Seventy percent of the 246 male lepromatous patients had turned to negative in slit-skin smear examination when the data were collected in 1972–1973. In female patients the value was below 50%. Further, about 85% of the male patients were treated for over 50% of the scheduled period for the treatment, corresponding to 46% of the total male lepromatous leprosy patients living in Ghatampur county at that time. The value was lower than those reported from the clinics and hospitals of other parts of India.

Better effects were obtained in the younger patients. Patients whose treatment was more regular obtained negative slit-skin smear examinations more frequently. The treatment (DDS 25–50 mg per day for the maintenance doses in the ordinary cases) seemed effective for a fairly large number of lepromatous patients.

A large number of patients showed negative results in two successive slit-skin smear examinations between the fourth and sixth year of treatment. From these results it may be concluded that when male lepromatous

leprosy patients can get fairly regular treatment for 6–7 years, about 60–70% of them will show negative results in the two successive slit-skin smear examinations.

In general, when one showed a highly positive result in the slit-skin smear examination at the start of treatment, a longer period of treatment was needed to reach bacterial negativity. Some patients (not many) remained positive after taking regular treatment for over seven years.—Author's English Summary

Nogueira, N., Kaplan, G., Levy, E., Sarno, E. N., Kushner, P., Granelli-Piperno, A., Vieira, L., Gould, V. C., Levis, W., Steinman, R., Yip, Y. K. and Cohn, Z. A. Defective γ interferon production in leprosy. Reversal with antigen and interleukin 2. J. Exp. Med. **158** (1983) 2165–2170.

Antigen and mitogen-induced gamma-interferon (γ-IFN) production was studied in peripheral blood mononuclear cells from 34 leprosy patients. Seventeen of 18 lepromatous leprosy and borderline lepromatous patients (LL and BL) failed to release γ-IFN in response to specific antigen (*Mycobacterium leprae*) and displayed reduced responses to mitogen (concanavalin A) stimulation. In contrast, cells from six tuberculoid and borderline tuberculoid patients (TT and BT) produced considerable levels of γ-IFN under the same experimental conditions. Normal controls failed to respond to *M. leprae* and most displayed good responses to concanavalin A. Mid-borderline patients (BB) showed intermediate levels of γ-IFN release. Gamma-IFN release by lepromatous patients could be partially restored with purified interleukin 2 and *M. leprae* antigen, but not with interleukin 2 alone.—Authors' Summary

Raj, P. O. I., Lilly, L., Aschhoff, M. and Balakrishnan, S. Application of "tile reaction" test for screening dapsone in urine. Lepr. India **55** (1983) 654–655.

A modified tile reaction test for monitoring self administration of dapsone (DDS) by leprosy patients is described. A total of 385 urine samples collected at 24 hours after a single dose and at 24, 48, and 72 hours after daily doses of 25, 50, and 100 mg were screened for the presence of DDS by this test, and the corresponding DDS/C ratios were studied for comparison. Patients' compliance was assessed on 268 urine specimens collected on surprise visits. The feasibility of application of this test in field situations is discussed.—Authors' Abstract

Sheskin, J., Mückter, H. and Frankus, E. Supidimid, ein nicht teratogenes Thalidomidanalog zur Behandlung der Lepra-reaktion? [Supidimide, a non-teratogenic analog of thalidomide for the treatment of lepra reaction?] Hautarzt **34** (1983) 168–170. (in German)

Treatment of leprosy reactions with supidimide, the non-teratogenic analog of thalidomide, was without success in the dosages applied.—Authors' English Summary

Waldinger, T. P., Siegle, R. J., Weber, W. and Voorhees, J. J. Dapsone-induced peripheral neuropathy. Case report and review. Arch. Dermatol. **120** (1984) 356–359.

A severe motor and a minor sensory neuropathy developed in a man being treated with dapsone (4,4′-diaminodiphenylsulfone) for dermatitis herpetiformis. He had received dapsone for 16 years before any signs of neurotoxicity became evident. Electrodiagnostic and clinical features were consistent with an axonal neuropathy. Clinical characteristics of dapsone-induced neuropathy include a motor neuropathy affecting the extremities, usual onset within five years after the initiation of dapsone therapy, dapsone dosage usually equal to or greater than 300 mg/day, and, almost always, complete recovery from the neuropathy after dapsone-dose reduction or withdrawal. The patient was found to be a slow acetylator of sulfamethazine, and therefore is a slow acetylator of dapsone. An HLA typing was done on the patient. New cases of dapsone-induced neuropathy should be HLA typed and have acetylation profiles in an attempt to identify future high-risk patients. This case is noteworthy for the length of time of dapsone usage (16 years) and the low daily dosage of dapsone (100 mg) taken prior to the development of neuropathy.—Authors' Abstract

Clinical Sciences

de Sousa del Pino, G., Ferreira, J., Bernardi, C., Salomon Ponzio, H. A. and Cestari Ponzio, T. Evaluación clinica e histólogica de 417 casos con el diagnóstico de lepra. [Clinical and histological evaluation of 417 cases with the diagnosis of leprosy.] Med. Cutan. Iber. Lat. Am. **11** (1983) 99–106. (in Spanish)

A total of 417 suspected cases of hanseniasis reported in Rio Grande do Sul State, Brazil, between 1 November 1974 and 31 December 1977 are analyzed. New cases diagnosed only on clinical grounds by dermatologists and general practitioners are analyzed separately. All cases were submitted to anatomo-pathological tests. Cases clinically diagnosed and cases confirmed by histological and clinical findings demonstrated that differences between the two classifications do not exert a significant influence in any of the granulomatous forms case count. A considerable amount of suspected cases of the indeterminate form were eliminated during the study because they revealed a granulomatous histological structure. These findings reduced the proportion between the indeterminate form and other forms.—Authors' English Summary

Duncan, M. E., Samson, R. R., McGrath, J. and McClelland, D. B. L. Humoral defence factors in the breast milk of Ethiopian women with leprosy and health controls. Am. J. Clin. Nutr. **38** (1983) 921–928.

Secretory IgA, lactoferrin, albumin, and total protein were quantitated in colostrum and milk samples obtained from 215 Ethiopian nursing mothers over a period ranging from one day to two years postparturition. IgG, IgM, C3, and C4 complement components were quantitated in 11 day 1 samples. The subjects were classified into three groups: lepromatous leprosy, borderline lepromatous leprosy, and a nonlepromatous group consisting of women with tuberculoid leprosy and healthy controls. Results obtained from the above groups were also compared with a group from Edinburgh. No major variation in levels of secretory IgA, lactoferrin, albumin, and total protein was found between the three groups of Ethiopian women. Results from the Edinburgh group were significantly higher, mainly in the level of total protein. When the individual proteins were expressed as a percentage of the total protein, there was no difference between the milk samples from the Ethiopian and Edinburgh mothers.—Authors' Abstract

Dutta, A. K., Mandal, S. B. and Jopling, W. H. Surface temperature of bald and hairy scalp in reference to leprosy affection. Indian J. Dermatol. **28** (1983) 1–5.

The skin of the scalp, axillae, groin, palms, soles, antecubital and popliteal fossae are usually spared from leprosy affection. Those areas are thought to be relatively warm; whereas leprosy bacilli favor cooler temperatures. However, the scalp of bald areas is found to be affected relatively more because the temperature of the bald areas is thought to be less, although no definite data is available. A comparative surface temperature study was undertaken with a thermocouple on hairy and bald scalp in 35 subjects in each group. On an average, the scalp temperature appears higher than all other regions of the skin, while the bald areas are relatively cooler than the hairy areas of the scalp.—Authors' Abstract

ffytche, T. J. Iritis in leprosy. Trans. Ophthalmol. Soc. U.K. **101** (1981) 325–327.

Iritis in leprosy is still a significant cause of blindness and visual impairment in this disabling disease. Evidence is accumulating from clinical observations and from pathological and pharmacological studies that the chronic iritis of lepromatous leprosy may have a neuroparalytic origin. A hypothesis derived from this evidence is presented in order to stimulate further research into the pathogenesis of this condition with a view to developing new methods of management and prevention.—Author's Summary

Fleury, R. N., Oliveira, M. de, Câmara, C. P. and Ura, S. Reação de tipo pseudo-exacerbação e carcinoma bronquiolar dos

pulmões. [Pseudo-exacerbation type reactions and bronchiolar carcinoma.] Hansenol. Int. **7** (1982) 95–104. (in Portuguese)

An elderly man with Hansen's disease during a period of 20 years, and previously considered as an inactive Virchowian case, presented in the last four years of his life two episodes of reversal reaction (pseudo-exacerbation), the last one at the time of a hospital admission for severe respiratory symptoms. During this admission a diagnosis of bronchiolar carcinoma was made and seven months later the patient died due to progressive respiratory insufficiency. The paper discusses the problems involved in making a differential diagnosis between this particular form of carcinoma and other diseases with similar clinical and X-ray characteristics, as well as the difficulties involved in arriving at the diagnosis of bronchiolar carcinoma only by the means of an evaluation of a single lung biopsy. In relation to the reversal reaction episodes, two different interpretations are contrasted: one being the possibility that these reactions can result as consequences of bacillary growth which can occur in any phase of the infection's course in borderline patients due to irregular treatment or drug resistance. The paper also analyzes the possible relations between the last reactional episode and secondary immunological changes brought about by the lung tumor.—Authors' English Abstract

Gervazoni, B., Mestre, M. J., Ravioli, R., Vicardi, B., Contreras, F. and Terencio de las Aquas, J. Linfadenitis lepromatosa con abcesos. [Lepromatous lymphadenitis with abscess.] Fontilles **14** (1983) 223–231. (in Spanish)

A patient with a typical clinical picture of lepromatous leprosy with prolonged intercurrent febrile episodes is presented. After many consultations to rule out other pathology and because of a lack of evidence for any other etiology, the patient was diagnosed as having lepromatous lymphadenitis.—Authors' English Summary

Mukherjee, A. and Ghosh, S. Pathogenesis of acute lepromatous activation. Indian J. Dermatol. **28** (1983) 11–23.

The present work investigates an immune complex syndrome in 105 patients with different types of leprosy, with special reference to acute lepromatous activation (ALA) and subsided lepra reaction as follows:

1) Protein profile of plasma including fibrinogen and heparin-precipitable-fraction (HPF) values, turbidity tests, bilirubin and alkaline phosphatase activity of serum, as well as urinary urobilinogen excretion.
2) Hemostatic status as coagulation factors, euglobulin lysis time and platelets.
3) Histopathology of leprous granulation tissue.

The results, showed in the ALA group, manifest hepatic dysfunction as marked changes in the protein profile, raised values for serum turbidity, alkaline phosphatase and urinary urobilinogen excretion; platelets were normal but HPF and fibrinogen values were significantly raised, coagulation factors V, VII, VIII, IX, and XI were variably deficient, either singly or in combination. There were histologic deposits of deeply acidophilic, irregular, amorphous material with physical and tinctorial properties of fibrin. All these changes were reversed after the subsidence of the acute phase. The observations were indicative of periodical episodes of a generalized Shwartzman reaction during the course of the disease in a lepromatous case when preceding hepatic dysfunction results in profound qualitative and quantitative alteration of fibrinogen leading to its widespread deposition in the microvasculature.—Authors' Abstract

Murray, K. A., McLelland, B. R. and Job, C. K. Early leprosy with perineural proliferation. Arch. Dermatol. **120** (1984) 360–361.

A 62-year-old woman, who lived in an area of the United States nonendemic for leprosy, was seen for an enlarging anesthetic lesion that involved the entire left breast. Microscopic examination of skin biopsy specimens taken from the edge of the lesion disclosed chronic perineural inflammation and neural proliferation, with an acid-fast bacillus demonstrable in one nerve. Gran-

ulomas, giant cells, epithelioid cells, nerve abscesses, or other characteristics of tuberculoid leprosy were not seen. This woman had a skin lesion of leprosy in an atypical site. It appeared to be indeterminate on pathologic examination and was accompanied by an unusual degree of neural proliferation.—Authors' Abstract

Nigam, P., Dayal, S. G., Mukhija, R. D., Goyal, B. M. and Joshi, L. D. Hepatoprotective role of indigenous drug Liv-52 in lepromatous leprosy. Hansenol. Int. **7** (1982) 36–44.

The present study incorporates a study of 42 cases of lepromatous leprosy for hepatic involvement and the role of indigenous herbal preparation in protecting the liver in leprosy. Liver was enlarged in 32 cases which was tender in 8 patients. Alteration in liver function irrespective of extent and duration of the illness (3 months to 10 years with mean duration of illness = 2 years 5 months) was mainly seen as uniform elevation of serum proteins (6.2–9.2 g%, mean = 7.5 g%) with hypoalbuminemia (2.0–4.4 g%, mean = 2.9 g%). Highest level of serum bilirubin of 1.6 mg% was detected in 6 cases, emphasizing the presence of leprous hepatitis. Raised level of serum transaminases (SGOT = 65.2 IU, SGPT = 78.7 IU) were proportionate to the liver and muscle involvement. Presence of characteristic granulomata in the liver around the central vein, periportal area and even distribution at various locations in the liver lobules were the most significant changes in 12 out of 15 liver tissues. Acid-fast *Mycobacterium leprae* were demonstrated in 12 patients. The present work emphasizes the detection of hepatic involvement in the early stage of the disease and hepato-protective role of indigenous drug Liv-52 in lepromatous leprosy which usually lead to dreaded mutilated complications in the body.—Authors' Abstract

Ortin Castaño, A., Gobernado Serrano, J. M., Iglesias Rozas, J. and Gimeno Alava, A. Polineuropatía como forma de presentacíon primaria de la lepra. [Polyneuropathy as the presenting sign of leprosy.] Med. Clin. (Barc.) **80** (1983) 17–19. (in Spanish)

The authors describe the clinical, histological and ultrastructural data of a patient who presented with a primarily sensorial neuropathy as the main manifestation of leprosy. Although not pathognomonic for this type of polyneuropathy, the association between thermanalgesia and vegetative nervous system affectation is a characteristic feature of the disease. Nevertheless, a definite diagnosis can only be established through nerve biopsy.—Authors' English Abstract

Padma, M. N. and Bhatia, V. N. "Nose-blow" smears in multibacillary leprosy patients. Lepr. India **55** (1983) 640–647.

Three hundred thirty-two nose-blow specimens have been examined from 73 untreated multibacillary leprosy patients before and periodically after they were put on a maximal, minimal, or an intermediate multidrug regimen. Eighty percent of these specimens were found to be positive for acid-fast bacilli (AFB) initially. The bacillary positivity rate was more in samples containing pus or blood. Bacilli were seen in LL, LI, as well as BL patients. Nearly half of the cases became negative for AFB in their nose-blow specimens within three months of initiation of treatment; whereas none of these patients has become negative in skin smears. However, a few cases have continued to discharge bacilli in their nasal secretions even after 12 months of multidrug regimen therapy.—Authors' Abstract

Pannikar, V. K. and Jesudasan, K. Spontaneous healing in lepromatous leprosy? Lepr. India **55** (1983) 712–713.

Spontaneous healing in nonlepromatous leprosy is well known. However, spontaneous resolution of lepromatous leprosy has not been well documented and, in general, not thought to occur. We wish to report the possibility of this having occurred in one of our lepromatous patients.—(*From* the article)

Ramanujam, K., Arunthathi, S., Chacko, C. J. G. and Jacob, M. "Neural histoid." Histoid leproma in peripheral nerve; a case report. Lepr. Rev. **55** (1984) 63–68.

A case of "neural histoid" nodules occurring in the peripheral and cutaneous

nerves in an otherwise inactive case of lepromatous leprosy is presented. It is postulated that this is an instance of relapse of the disease occurring exclusively in the nerve, the nodules resulting from the unrestricted multiplication of drug-resistant mutants. The pathogenesis of the condition is discussed.—Authors' Summary

Schochina, M., Wolf, J., Blank, A., Gonén, B. and Sheskin, J. El reflejo de Hoffman en el nervio tibial en la hanseniasis. [The Hoffman reflex in the tibial nerve in hanseniasis.] Actas Dermosifiliogr. **74** (1983) 225–229. (in Spanish)

Among 17 patients whose Hoffman reflex was examined, a normal response was found in 3, a pathological response in 12, and a doubtful response in 2. The tendon test, studied in the same 17 patients, yielded results that were similar: pathological responses in 12, normal in 2, and doubtful in 2. However, not all of the patients were found to yield the same kind of response to both tests. The Hoffman reflex permits examination of the status of the proximal tract of the tibial nerve, between the popliteal fossa and the spinal cord; whereas the tendon test permits examination of the status of the distal tract between the Achilles tendon and the spinal cord. Both methods are easily applied, and are more sensitive and less traumatic than earlier means of evaluating nerve function. Moreover, these methods permit more exact localization of damage to the tibial nerve.—Authors' English Summary

Singh, K., Iyenger, B. and Singh, R. Hypopigmentation in leprosy. Lepr. India **55** (1983) 675–679.

Hypopigmentation of macular leprosy lesions was not found to correlate with cellular infiltrate and acid-fast bacilli load in tissues. It is felt that hypopigmentation is in some way related to neural involvement.—Authors' Abstract

Terencio de las Aguas, J., Rodriguez Peralta, J. L., Gervazoni, B., Acevedo, A., Iniguex, L. and Ravioli, R. Recaida de lepra lepromatosa evolucionando a dimorfa. [Reactivation of lepromatous leprosy evolving into dimorphous.] Fontilles **14** (1983) 253–262. (in Spanish)

A 62-year-old male patient is presented with polar lepromatous leprosy of 40 years duration. The patient experienced frequent relapses due to incorrect and irregular therapy. The most recent relapse presented with clinical and histopathologic lesions which were classified as dimorphous (BB).—(*From* the Authors' English Summary)

Touw-Langendijk, E. M. J., Brandsma, J. W. and Andersen, J. G. Treatment of ulnar and median nerve function loss in borderline leprosy. Lepr. Rev. **55** (1984) 41–46.

A rigid cortico-steroid treatment regimen was given to borderline leprosy patients who had recent nerve function loss due to reversal reaction. In order to record nerve function changes objectively a nerve index was used which was based on the results of voluntary muscle testing and sensory testing. Ninety-three ulnar and median nerves were followed in this study. Improvement in ulnar nerve function was obtained in 60% and in the median nerve in 67%. Overall improvement was better in BL nerves (85%) when compared with BT nerves (51%). The results show a more rapid recovery of median nerve function as compared to the ulnar nerve. There was a slightly better recovery of nerve function in previously untreated leprosy patients (69%) as compared to patients who developed nerve function loss while on antileprosy treatment (59%).—Authors' Summary

Zawar, P. B., Chawhan, R. N. and Mahajani, V. V. A study of systolic time intervals in lepra reaction. Lepr. India **55** (1983) 697–700.

Systolic time intervals (STI) were measured in 20 control subjects and 20 cases of lepromatous leprosy in lepra reaction. Significant differences in the pre-ejection period (PEP), PEP/LVET, and isovolumic contraction time (IVCT) were observed between the groups. The abnormalities of STI observed in patients with lepra reaction are characteristic of left ventricular dysfunction, indicating the presence of subclinical left ventricular dysfunction in patients of lepra reaction.—Authors' Abstract

Immuno-Pathology

Apte, D. C., Zawar, M., Mehta, M. C., Zawar, P. B. and Chawhan, R. N. Regional lymph node involvement in tuberculoid leprosy. Lepr. India **55** (1983) 680–685.

A study of regional lymph nodes in 44 cases of proved tuberculoid leprosy (BT and TT) is presented. Out of 26 cases of tuberculoid polar (TT) leprosy, 76.92% showed the presence of paracortical lymphocytes, 61.52% showed the presence of granuloma, and 11.54% showed the presence of acid-fast bacilli (AFB) in lymph nodes. In the borderline tuberculoid (BT) group, 61.1% showed granuloma, 72.22% showed the presence of paracortical infiltration by lymphocytes, and 11.11% showed the presence of AFB in lymph nodes. Lesions of tuberculoid leprosy have been conclusively demonstrated in low resistant tuberculoid (BT) leprosy and polar tuberculoid leprosy (TT). The presence of paracortical lymphocytes in large numbers in the lymph nodes could indicate high cell-mediated immunity (CMI) and possibly a tuberculoid end of the spectrum. The skin lesions and lymph nodes had comparative histopathology.—Authors' Abstract

de Arruda, M. S. P., de Arruda, O. S., Fleury, R. N., Garcia, D. D. O., Opromolla, D. V. A. and Ura, S. Estudo da imunidade celular em pacientes branqueados. [A study of cellular immunity in arrested lepromatous patients.] Med. Cutan. Iber Lat. Am. **10** (1982) 231–238. (in Spanish)

Forty-eight clinically arrested lepromatous patients were submitted to several tests to evaluate cellular immunological competence (PPD, trichophytin, DNCB, determination of the percentage of T lymphocytes in the peripheral blood, and early and late reactions to lepromin). The results of the trychophytin test and of the lymphocyte percentage test did not differ from those of the control group; whereas the results to the PPD test were more often positive for the arrested Virchovian cases. All the patients presented positivity to the DNCB test, and none of them showed positivity to the Fernandez reaction.

As for the late reaction to the lepromin, all the patients were negative, although in histopathological testing four degrees of reactivity were observed, ranging from focal, nonspecific inflammatory reaction to granulomatous histiocytic with an epithelioid outline.

By means of these results the authors were able to confirm that: 1) There is no cross-reactivity between the PPD and lepromin tests. 2) Sulfone therapy does not interfere in immunocellular results for the tests employed. 3) Lepromatous patients respond like the general population to the nonspecific sensitivity tests utilized. 4) The finding of histiocytic reaction with epithelioid outline in some biopsies of Mitsuda reaction in lepromatous patients suggests the presence of a subpopulation within this group, probably borderline patients who suffered, during the infection's evolution, a downgrading of their clinical and histological characteristics.—Authors' English Summary

Graham, L., Jr., and Navalkar, R. G. Evaluation of *Mycobacterium leprae* immunogenicity via adoptive transfer studies. Infect. Immun. **43** (1984) 79–83.

The immune response of mice to live, heat-killed, or autoclaved *Mycobacterium leprae* was investigated. After sensitization with 10^7 organisms in each group, recipient mice were transfused with the sensitized splenocytes 28 days later. A selected number of these mice were infected with 5×10^3 *M. leprae,* and the remaining animals were sacrificed at scheduled intervals for evidence of cell-mediated immunity to the *M. leprae* cell extract. Data from these and the bacteriological assays showed that all three materials induce cell-mediated immunity and also extend protection against the *M. leprae* challenge but not against a *Listeria monocytogenes* challenge. Adoptive immunity against *M. leprae* was expressed equally effectively in both non-irradiated animals and those sublethally (500 R) irradiated. This study reveals that, after adoptive transfer of immunity, a bacillary restriction occurs with concomitant onset of delayed hypersensitivity and that the pro-

tection observed could be specifically directed against an *M. leprae* challenge.—Authors' Abstract

Gupta, S., Singh, R., Iyengar, B. and Reddy, B. S. N. A study of clinico-histologic correlation in lesions of borderline leprosy with multiple skin biopsies from different sites. Lepr. India **55** (1983) 686–693.

Twenty active, untreated cases of borderline leprosy were subdivided on clinical, bacteriological, and immunological grounds. None had reactional episodes. Multiple skin biopsies from each one of them showed varied histopathology from different lesions; 84 out of 93 biopsies (90.3%) were found not to be in agreement with the clinical diagnosis. Even multiple biopsies obtained from single large lesions revealed varied histopathological pictures. The reason for the histopathological disparity has been postulated.—Authors' Abstract

Haregewoin, A., Yemaneberhan, T., Aredath, S. P., Fekete, E. and Mock, B. HLA-D identity in a family with multiple cases of multibacillary leprosy. Lepr. Rev. **55** (1984) 51–56.

HLA-D identity was determined by mixed lymphocyte reaction in a family with eight members affected by leprosy. The mother (BL) and all the children (1LL, 4BL and 1BT) were HLA-D identical; whereas the father was HLA-D identical with four of the children except two BL cases. All the children formed HLA-D identical sib-pairs with the exception of one pair (LL and BL). Analysis of disease susceptibility frequency showed the mode of inheritance to be recessive, with the probability that the affected sibs would share both haplotypes.—Authors' Summary

Horwitz, M. A., Levis, W. R. and Cohn, Z. A. Defective production of monocyte-activating cytokines in lepromatous leprosy. J. Exp. Med. **159** (1984) 666–678.

We have examined the capacity of monocytes from patients with leprosy to undergo activation and the capacity of mononuclear cells from these patients to incorporate [^{3}H]thymidine and produce monocyte-activating cytokines.

Monocytes from patients with either lepromatous or tuberculoid leprosy were activated by concanavalin A (ConA)-induced mononuclear cell supernatants generated from the leukocytes of a normal person. Monocytes activated by these supernatants strongly inhibited *Listeria pneumophila* multiplication, and the degree of inhibition was comparable in both groups of patients.

Mononuclear cells from patients with either form of leprosy responded comparably to ConA with vigorous [^{3}H]thymidine incorporation. Mononuclear cells from patients with tuberculoid leprosy also vigorously incorporated [^{3}H]thymidine in response to *Mycobacterium leprae* antigens. In contrast, mononuclear cells from patients with lepromatous leprosy did not exhibit significant [^{3}H]thymidine incorporation in response to *M. leprae* antigens.

The capacity of mononuclear cells to generate monocyte-activating cytokines generally paralleled their capacity to incorporate [^{3}H]thymidine in response to ConA and *M. leprae*. Mononuclear cells from patients with either form of leprosy responded to ConA with the production of cytokines (supernatants) able to activate normal monocytes, expressed by inhibition of *L. pneumophila* multiplication. However ConA-induced supernatants from patients with lepromatous leprosy were less potent than ConA-induced supernatants from patients with tuberculoid leprosy. Mononuclear cells from patients with tuberculoid leprosy responded to *M. leprae* antigens with the production of potent monocyte-activating supernatants. In contrast, mononuclear cells from patients with lepromatous leprosy did not produce monocyte-activating cytokines in response to *M. leprae* antigens.

These studies support the hypothesis that the immunological defect in lepromatous leprosy results from a failure to activate mononuclear phagocytes rather than from an intrinsic inability of these cells to be activated. We suggest that the failure to activate mononuclear phagocytes stems from defective production of monocyte-activating cytokines in response to *M. leprae* antigens.—Authors' Summary

Ivanyi, J. Application of monoclonal antibodies towards immunological studies in leprosy. Lepr. Rev. **55** (1984) 1–9.

Monoclonal antibodies produced by hybridoma cell lines are of restricted and uniform specificity. They represent reagents which are in many aspects superior to the heterogeneous mixture of "polyclonal antibodies" present in antisera from immunized or infected individuals. The technology for producing MABs is now firmly established, relatively easy to perform and requires facilities for tissue culture, immunoassays and a supply of an inbred strain of mice or rats. Three protein antigens (MY1-12K, MY2 and 68K) carrying distinct antigenic determinants, which are expressed by *Mycobacterium leprae,* but not by several other species of mycobacteria, have been identified by MABs. These *M. leprae*-specific determinants may help to make important advances in: 1) detection of antigen or immune complexes in tissues or body fluids; 2) serological diagnosis, disease monitoring and epidemiology; 3) development of a specific skin test; and 4) further research on therapeutic or prophylactic immunization against leprosy. So far, a serological test based on the use of the ML04 (anti-MY2a) monoclonal antibody has been developed and evaluated in a pilot study. The diagnostic potentials of this test as well as the various other possible applications of MABs deserve attention in future studies.—(*From* the Editorial)

Kar, H. K., Mohanty, H. C., Mohanty, G. N. and Nayak, U. P. Clinico-pathological study of lymph node involvement in leprosy. Lepr. India **55** (1983) 725–738.

One hundred five leprosy patients, including 37 cases of LL and LI, 22 cases of BL, 3 cases of BB, 17 cases of BT, 23 cases of TT, and 3 cases of indeterminate type, during the period of 1980–81 have been examined clinically. All the patients of LL, LI, BL and BB types, 94% of BT, 70% of TT, and 66.6% of indeterminate type have showed clinical enlargement of lymph nodes. In order of frequency, the enlarged nodes are inguinal (76.2%), cervical (69.5%), axillary (69.5%), epitrochlear (64.7%), and lastly pre-auricular (9.5%). Although both regional and distant groups of lymph node enlargement have been observed in all cases of LL, LI, and BL, in the majority of the nonlepromatous cases there is only involvement of regional lymph nodes. Biopsies of lymph nodes were made from 51 leprosy patients: 22 from LL and LI cases, 11 from BL cases, 2 from BB cases, 8 from BT cases, 6 from TT cases and 2 from indeterminate leprosy cases. Major histopathological changes have been studied in different types of leprosy. The humoral antibody response and the cellular immune response are well reflected on the histopathological finding of the lymph nodes belonging to different parts of the immunological spectrum of leprosy patients. The examination of lymph nodes is recommended as a useful adjunct for the diagnosis and classification of leprosy.—Authors' Abstract

Kaufmann, S. H. E. Biological activities of a murine T-cell clone with reactivity to *Mycobacterium leprae.* Cell. Immunol. **83** (1984) 215–220.

Mice were immunized subcutaneously with killed *Mycobacterium leprae* in incomplete Freund's adjuvant and draining lymph nodes removed. Lymph node cells were propagated *in vitro* and cloned at limiting dilution in the presence of syngeneic accessory cells, antigen, and T-cell growth factor. Cloned T cells were restricted by the H-21-A sublocus. *In vitro* interaction(s) of cloned T cells with accessory cells presenting *M. leprae*-derived determinants resulted in T-cell proliferation, interleukin secretion, and macrophage activation. The T cells were stimulated by killed *M. leprae* and *M. bovis* (strain BCG), but not *Listeria monocytogenes,* organisms indicating crossreactivity between *M. leprae* and BCG at the clonal level. *In vivo,* cloned T cells induced protection against the "bystander" bacterium *L. monocytogenes.* These data suggest that the cloned *M. leprae*-reactive T cells are involved in acquired antimicrobial resistance.—Author's Abstract

Krahenbuhl, J. L. and Humphres, R. C. Effects of treatment with muramyl dipeptide on resistance to *Mycobacterium leprae* and *Mycobacterium marinum*

infection in mice. Immunopharmacology **5** (1983) 329–339.

Studies were carried out to determine whether treatment of mice with the synthetic adjuvant muramyl dipeptide (MDP) afforded resistance to infection with *Mycobacterium leprae* or *M. marinum* in mice. Regardless of the timing, dose, or route of administration, there was no evidence that treatment with MDP or 3 of its analogs (desMDP, abuMDP, valMDP) enhanced resistance to foot pad infection with *M. leprae* or *M. marinum*. In parallel studies, systemic treatment with *Proprionibacterium acnes* failed to protect against either *M. leprae* or *M. marinum*. Administration of *P. acnes* locally into the foot pad afforded marginal resistance to *M. marinum* when injected prior to infection. Local treatment with *P. acnes* afforded marked resistance to growth of *M. leprae*, even when administered months after infection.—Authors' Abstract

Kuzina, A. Z. Interdermal test with PHA for the assessment of the functional activity of T-lymphocytes in patients with leprosy. Vestn. Dermatol. Venerol. **7** (1983) 7–9. (in Russian)

The functional activity of T lymphocytes in 86 patients with leprosy and 21 normal subjects was determined by the size of an infiltrate developing in response to intradermal inoculation of PHA. Marked suppression of cell-mediated immunity was observed in patients with lepromatous and marginal types of leprosy. The inhibition of the functional activity did not change during the course of specific chemotherapy of leprosy which indicates the necessity of searching for new methods for the treatment of leprosy using regulators of cell-mediated immunity.—Author's English Summary

Lad, S. J., Salgame, P. R. and Mahadevan, P. R. Surface membrane changes in lepromatous macrophages affecting the adherence of *Mycobacterium leprae*. J. Biosci. **5** (1983) 131–138.

Macrophages from lepromatous leprosy patients showed poor adherence to *Mycobacterium leprae*. The phagocytic activity of the macrophages was not correlated to the influence on the adherence ability. Based on the phagocytic behavior of macrophages from normal individuals and from lepromatous leprosy patients as well as the action of neuraminidase in reversing the extent of adherence, it is suggested that macrophages from lepromatous leprosy patients differ from those from normal individuals in regard to their surface properties. There was no relationship between the degree of adherence and the concentration of Fc receptors of the macrophages. It was also shown that an extract of lysed macrophages from lepromatous leprosy patient was able to reduce the adherence of *M. leprae* to normal macrophages. This study shows that adherence is a good indicator of the surface property of macrophages which in turn could play an important role in the cell mediated immunity of the patient. The observations suggest altered macrophage membrane structure in the long term-treated, otherwise normal, lepromatous leprosy patients.—Authors' Abstract

Lele, V. R., Raichur, B. S. and Grover, S. Study of lymph node biopsies in lepromatous leprosy patients under treatment. Lepr. India **55** (1983) 739–742.

A study of lymph node biopsies from lepromatous leprosy patients undergoing treatment was carried out for one year in 1978–79 in the Department of Pathology, Government Medical College, Nagpur, India. A total of 20 lymph node biopsies were studied. Out of them, 12 were accompanied with skin biopsies. Typical lepromatous granulomas and the presence of lepra bacilli were observed in 18 out of 20 lymph nodes, although this change was not constantly present in skin biopsies. Five out of 12 skin biopsies were bacteriologically negative. From this study, it is inferred that lymph node biopsies may be more helpful for the follow up of patients after treatment.—Authors' Abstract

Mahdi, A. M., Cumar, C. M., Abuukar, A. I. and Tarabini-Castellani, G. Ulterior control sobre la persistencia de la positividad del lepromin-test inducido por la asociacion de lepromina A + BCG. [The persistence of the positive lepromin test

induced by lepromin A + BCG.] Fontilles **14** (1983) 233–239. (in Spanish)

After three consecutive negative Mitsuda tests in 1978, two healthy young women were given lepromin A mixed with BCG. In both cases, the lepromin tests converted to positive with the development of ulceration and a post-lepromin scar. With the passage of time, the intensity of the lepromin positivity was diminished somewhat but remained high. The most recent tests in 1981 showed a typical granulomatous inflammatory process in one subject and a strong and long-lasting inflammation in the second. A third subject, who served as a control, was tested with lepromin alone. The most recent lepromin test (the seventh) in 1981 showed a positive response with a 3–4 mm nodule. Histological examination showed a weak inflammatory process which disappeared quickly. The effectiveness and persistence of lepromin conversion following the administration of BCG mixed with lepromin A are discussed.—(*From* the Authors' English Summary)

Malik, U., Khuller, G. K. and Kumar, B. Suppression of the antibody response to sulfolipids in leprosy patients by 4, 4′-diaminodiphenyl sulfone (DDS). Antonie Van Leeuwenhoek **49** (1983) 579–583.

Antibodies to sulfolipids were demonstrated in patients suffering from lepromatous leprosy. The antibody titer was found to decrease gradually on treatment with DDS. This effect was maximum for patients undergoing treatment for more than one year.—Authors' Abstract

Moncada, B., González-Amaro, R., Loredo, C. E. and Baranda, M. Células de Langerhans en lepra. [Langerhans' cells in leprosy.] Gac. Med. Mex. **118** (1982) 497–504. (in Spanish)

Las células de Langerhans, cuya función al tiempo de su descubrimiento en 1868 no era precisa, han llegado a tener gran realce en inmunobiología y en inmunopatología. Se les puede identificar por microscopía electrónica así como también por métodos enzimáticos e inmunológicos. Se trata de células de estirpe macrofágica y se ha sugerido la posibilidad de que en la lepra ocurran defectos de fagocitosis. En diez pacientes con lepra se observó, mediante una técnica de inmunofluorescencia indirecta, una significativa reducción en la cantidad de células positivas al anticuerpo monoclonal OKT6, que identifica células de Langerhans.—Authors' Abstract

Noordeen, S. K. and Sansarricq, H. Immunization against leprosy: progress and prospects. Bull. WHO **62** (1984) 1–6.

The limitations of the current approach to leprosy control through mass treatment of patients are well recognized. The long incubation period of the disease, the insidious onset, the chronic course, and the need for prolonged treatment have made control a formidable task. The recent years have seen tremendous progress in the field of immunology of leprosy, and the availability of large quantities of *Mycobacterium leprae,* grown in the nine-banded armadillo, has given impetus to the search for a vaccine specific for leprosy. Methods for production and purification of *M. leprae* have now been developed and the resulting preparation has been shown to produce good delayed-type hypersensitivity in mice and guinea pigs.

Small-scale studies in human subjects have shown that preparations of *M. leprae* and BCG can induce cell-mediated immunity in Mitsuda-negative patients and contacts. It is now appropriate to consider field trials of vaccine preparations in selected groups before moving on to large-scale trials in different populations.—Authors' Abstract

Proença, N. G., Farias, L. R., Kliemann, T. A. E., Martinez, E. W., Karazawa, E., Guedes, M. and Mimica, I. Estudo comparativo da lepromino-reação practicada em estudantes de medicina e em group controle. [A comparative study of lepromin reactivity among medical students and a control group.] Hansenol. Int. **7** (1982) 78–83. (in Portuguese)

The lepromin test was studied in 64 medical students and in a control group of 40 patients from the orthopedic clinic. Both groups matched with respect to age and sex, but differed with regard to socio-economic conditions. The Fernandez reaction showed low frequency of positive results in both

groups: 10% in the first group and 5.6% in the second one. This difference was not significant. The Mitsuda reaction showed high frequency of positive results: 98.4% in the medical students and 85.0% in the control group. This difference was significant. The authors discuss the factors that might have caused the high positivity of the lepromin test among the medical students.—Authors' English Abstract

Reitan, L. J., Touw-Langendijk, E. M. J., Closs, O. and Belehu, A. Skin test activity of an antigen fraction prepared from *Mycobacterium leprae* compared with standard lepromin and tuberculin PPD in leprosy patients. Lepr. Rev. **55** (1984) 33–40.

The reactivity of a cell wall antigen fraction, MLW1, prepared from *Mycobacterium leprae,* which induces strong lymphocyte responses *in vitro,* was compared in the lymphocyte stimulation test (LST) and the 48-hour skin test reaction in leprosy patients. A strong LST response was usually accompanied by a strong skin test response and vice versa. As a skin test reagent MLW1 was compared with standard lepromin and tuberculin PPD, and a significant correlation ($r = 0.79$, $p < 0.001$) was found between MLW1 and standard lepromin. Being a purified and highly active preparation that can be standardized based on protein concentration, MLW1 should be considered as an alternative to lepromin in the early reaction.—Authors' Summary

Sengupta, U., Ramu, G. and Desikan, K. V. Further modification on the haemolysis method in determining bacteraemia in leprosy patients. Lepr. India **55** (1983) 670–674.

Bacteremia was assessed and compared in the venous blood samples of leprosy patients by employing the existing and the modified hemolysis method, respectively. The modified method was more sensitive in determining bacteremia in these patients as evident from the finding of more numbers of positive cases detected by this method. A significantly higher yield of bacterial number was detected by employing the present method when compared to that obtained by the earlier method.—Authors' Abstract

Shannon, E. J., Powell, M. D., Kirchheimer, W. F. and Hastings, R. C. Effects of *Mycobacterium leprae* antigens on the *in vitro* responsiveness of mononuclear cells from armadillos to Concanavalin-A. Lepr. Rev. **55** (1984) 19–31.

Armadillos, immunologically intact animals, develop a disseminated disease analogous to lepromatous leprosy in man when experimentally infected with *Mycobacterium leprae* of human origin. However, some animals show resistance to such infection. In this experiment the suppressive effect of *M. leprae* on Con-A-induced *in vitro* proliferation of mononuclear cells, drawn from both susceptible and resistant armadillos, is investigated.

Peripheral blood mononuclear cells from armadillos which were resistant to infection with *M. leprae* consistently showed suppressed responses to Con-A when concomitantly exposed to antigens of *M. leprae.* Armadillos with disseminated *M. leprae* infections had mononuclear cells which responded to *M. leprae* by suppressing responses to intermediate doses of Con-A, enhancing the response to an optimal dose of Con-A, and inducing no significant change in response to a minimal dose of Con-A.

These observations in armadillos support the reports in human leprosy studies that *M. leprae*-induced suppression of a Con-A response is associated with resistance.—Authors' Summary

Sinha, S., Sengupta, U., Ramu, G. and Ivanyi, J. A serological test for leprosy based on competitive inhibition of monoclonal antibody binding to the My2a determinant of *Mycobacterium leprae.* Trans. R. Soc. Trop. Med. Hyg. **77** (1983) 869–971.

A novel serological assay for leprosy has been devised on the basis of serum inhibition of binding of ^{125}I-labelled MLO4 monoclonal antibody to *Mycobacterium leprae* sonicate-coated microtiter plates. Antibodies were detected in 93% of lepromatous leprosy patients; whereas controls from the endemic area, including leprosy contacts and patients with tuberculosis, were serologi-

cally negative. The specificity and efficacy of the test may offer an advantage over previously used techniques.—Authors' Summary

Stanford, J. L. Skin testing with mycobacterial reagents in leprosy. Tubercle **65** (1984) 63–74.

Skin testing has proved a most useful tool for the investigation of leprosy. The Mitsuda response to lepromin is a useful means of prognosis in indeterminate leprosy and in various manifestations of borderline forms of the disease. The soluble reagents prepared from *Mycobacterium leprae* are useful for epidemiological investigation. By their use it has been shown that the leprosy bacillus is just as infective as the tubercle bacillus, although clinical disease is much less likely to follow skin test sensitization in leprosy than in tuberculosis.

Tuberculin PPD used in conjunction with lepromin led to the recognition of the so-called specific immune defect of lepromatous leprosy. Quadruple skin testing with the new tuberculins has shown recognition of common mycobacterial antigen to be defective in all forms of the disease and that skin test unresponsiveness can be nonspecific or specific in type. By this test the breadth of the "specific" immune defect has been measured, and very recently mixtures of reagents have been employed to identify different suppressor determinants. There can be little doubt that the continuing investigation of leprosy patients by skin testing will lead to further knowledge about the disease.—(*From* the article)

Vishnevetskii, F. E., Pervukhin, Y. V. and Bronfman, Z. I. Effect of culture at suboptimal temperature on dehydrogenase activity of blood monocytes from healthy subjects and leprosy patients. Biull. Eksp. Biol. **95** (1983) 30–32 (in Russian)

The aim of the present investigations was to study the effect of culture at suboptimal temperatures on oxidative metabolism of blood monocytes from healthy subjects and patients with leprosy. Existing views on the affinity of *Mycobacterium leprae* for the coldest parts of the body served as the starting point.

High activity of the pentose phosphate shunt was observed in healthy human monocytes cultured at 37°C, in which it accounted for up to 50% of relative activity. Activity of glycolysis (31%) and the Krebs cycle (18.7%) was weaker. The ratio of aerobic to anaerobic oxidation showed some predominance of the latter (coefficient I = 0.73). The relative importance of the pentose phosphate shunt was high (coefficient II = 1.23). Lowering the culture temperature to 25°C was accompanied by a marked change in ratio between activities of the key dehydrogenases in normal human monocytes. This was reflected in a considerable increase (almost twofold) in LDH activity and a small decrease in SDH and G6PDH activity. Coefficient I was reduced by two thirds (from 0.73 to 0.25), indicating considerable predominance of glycolysis over aerobic oxidation. The sharp increase in coefficient II (from 1.23 to 3.03) reflected a fall in the relative importance of the pentose phosphate shunt.

Glycolytic activity (LDH) was most marked in blood monocytes from patients with the lepromatous type of leprosy, and activity of the pentose phosphate shunt (G6PDH) was rather lower. The relative activity of SDH, marker enzyme of the Krebs cycle, was only 12%. Coefficient I revealed definite predominance of glycolysis over aerobic oxidation; whereas coefficient II showed a relatively low contribution of the pentose phosphate shunt to oxidation-reduction processes in the monocyte.

Comparison with values obtained in healthy subjects at the same culture temperature (37°C) shows that in active lepromatous leprosy there is a marked increase (more than twofold) in LDH activity whereas G6PDH activity was reduced by one third. This change in the activity of the key dehydrogenase abruptly disturbs the balance of the monocyte's energy metabolism in patients with leprosy, bringing it closer to that observed in healthy human monocytes cultured at a suboptimal temperature (25°C). Meanwhile, lowering the culture temperature for monocytes from leprosy patients had virtually no effect on activity of the key dehydrogenases of the monocyte. This was shown both by analysis of absolute values and when the relative activity and coefficients I and II were calculated.—(*From* the English translation)

Wu Qinxue, *et al.* Fluorescent leprosy antibody absorption (FLA-ABS) test. Chung Kuo I Hsueh Ko Hsueh Yuan Hsueh Pao **4** (1982) 392–394. (in Chinese)

The technic of the fluorescent leprosy antibody absorption (FLA-ABS) test was described. Serum specimens from 89 cases of various types of leprosy and 16 healthy persons were examined with the FLA-ABS test standardized by us. At 1:40 serum dilution, 100% of LL patients showed positive reaction, 92.6% of BL, 85.7% of BB and BT, and 75% of TT. The average positive rate of the FLA-ABS test was 89.9%. None of the 16 serum samples from non-contact healthy persons gave a positive result. The positive rate increased with the clinical spectrum of leprosy, from TT to LL. These results were similar to those of Abe. The authors suggest that the FLA-ABS test is highly sensitive for the detection of anti-*M. leprae* antibodies and useful for the serodiagnosis of leprosy.—Authors' English Summary

Young, D. B., Khanolkar, S. R., Barg, L. L. and Buchanan, T. M. Generation and characterization of monoclonal antibodies to the phenolic glycolipid of *Mycobacterium leprae*. Infect. Immun. **43** (1984) 183–188.

Nine cloned cell lines producing antibodies to the unique phenolic glycolipid of *Mycobacterium leprae* have been established as a result of fusions with spleens from mice immunized with the glycolipid complexed with methylated bovine serum albumin. One of the antibodies was relatively nonspecific, binding to a related glycolipid from *M. kansasii,* but the remaining antibodies were specific for the *M. leprae* lipid. Some of the antibodies required the intact (trisaccharide) carbohydrate portion for recognition of the glycolipid antigen; whereas others recognized partially hydrolyzed forms lacking one or two sugar residues. Monoclonal antibodies directed at the terminal saccharide of the glycolipid showed the greatest specificity for *M. leprae* in enzyme-linked immunoassays. These antibodies brightly labeled whole mycobacteria in indirect immunofluorescence experiments, demonstrating the surface location of *M. leprae*-specific determinants of the glycolipid antigen. In addition to their use in providing information about the antigenic properties of the phenolic glycolipid, these antibodies have potential applications for elucidating the roles of glycolipid in the pathogenesis of leprosy.—Authors' Abstract

Microbiology

Daffé, M. M. Etude structural des consittuants lipidiques de *Mycobacterium leprae.* Comparaison avec diverses espèces de mycobactéries. [Structural study of the lipoid components of *Mycobacterium leprae.* Comparison with various species of mycobacterium.] Acta Leprol. (Geneve) **1** (1983) 205–209.

En conclusion, la souche de *Mycobacterium leprae* que nous avons étudiée peut être reconnue par la présence de ses trois mycolates (dicyclopropanique, méthoxylé et cétonique) (à condition d'en préciser la définition au niveau de l'homologie), et par l'absence de tuberculostéarate. Les divergences d'une partie de ces résultats avec ceux d'autres auteurs, en ce qui concerne la présence de mycolate méthoxylé et l'absence de tuberculostéarate posent le problème de la pluralité des souches. Seul l'examen d'un nombre suffisant de souches, d'origines géographiques différentes, permettra de conclure.—(*From* the article)

David, H. L., Asselineau, C., Daffé, M., Lanéelle, M. A., Clément, F. and Lévy-Frébault, V. Taxonomy of mycobacterial strains isolated from the tissues of leprosy patients. Ann. Immunol. (Paris) **134B** (1983) 367–377.

Thirty-six slowly growing mycobacteria isolated from the tissues of leprosy patients were studied using 40 characteristics as well as susceptibility to 27 distinct mycobacteriophages. The composition in mycolic acids of selected strains was also studied. Ac-

cording to the data, the strains formed five clusters. Some of the clusters were possibly as yet undescribed species; however, comparison of the data with the known properties of *Mycobacterium leprae* leads to the conclusion that none of the strains were identical to the leprosy bacillus.—Authors' Summary

David, H. L. and Rastogi, N. Partial characterization of the cell walls of *Mycobacterium leprae.* Curr. Microbiol. **9** (1983) 269–274.

Cell walls were prepared from *Mycobacterium leprae* (separated and purified from experimentally infected armadillo), *M. tuberculosis, M. smegmatis,* and *Micrococcus lysodeikticus.* The purity of the above wall preparations was confirmed after negative staining and shadow-casting and subsequent observation under the electron microscope. As judged from the electron microscopic observations, the bacteria were of different fragility in the following increasing order: *M. tuberculosis, M. smegmatis, M. leprae,* and *Micro. lysodeikticus.* The cell walls were hydrolyzed with 6 *N* HCl, and the amino acids were identified by thin-layer chromatograpy compared with the authentic standards. With the same purification procedures, it was not possible to obtain satisfactorily pure peptidoglycan from *M. leprae.* In leprosy bacilli, *meso*-DAP was found to be present in the walls; however, contamination by nonwall amino acids did not allow the confirmation of previous results, a finding that suggests that glycine completely replaced L-alanine in *M. leprae* cell walls.—Authors' Abstract

Fujiwara, T., Hunter, S. W., Cho, S.-N., Aspinall, G. O. and Brennan, P. J. Chemical synthesis and serology of disaccharides and trisaccharides of phenolic glycolipid antigens from the leprosy bacillus and preparation of a disaccharide protein conjugate for serodiagnosis of leprosy. Infect. Immun. **43** (1984) 245–252.

We examined the structural requirements within the species-specific 3,6-di-*O*-methyl-β-D-glucopyranosyl-(1→4)-2,3-di-*O*-methyl-α-L-rhamnopyranosyl-(1→2)-3-*O*-methyl-α-L-rhamnopyranose unit of the phenolic glycolipid I antigen of *Mycobacterium leprae* for binding to anti-glycolipid immunoglobulin M from human leprosy sera. We used chemically defined, partially deglycosylated fragments of phenolic glycolipid I, two other minor *M. leprae*-specific phenolic glycolipids (those containing 6-*O*-methyl-β-D-glucopyranosyl-(1→4)-2,3-di-*O*-methyl-α-L-rhamnopyranosyl-(1→2)-3-*O*-methyl-α-L-rhamnopyranoseand3,6-di-*O*-methyl-β-D-glucopyranosyl-(1→4)-3-*O*-methyl-α-L-rhamnopyranosyl-(1→2)-3-*O*-methyl-α-L-rhamnopyranose units), and phenolic glycolipids from other mycobacteria. Additionally, the trisaccharide of phenolic glycolipid I, the 3,6-di-*O*-methyl-β-D-glucopyranosyl-(1→4)-2,3-di-*O*-methyl-α-L-rhamnopyranose, the 6-*O*-methyl-β-D-glucopyranosyl-(1→4)-2,3-di-*O*-methyl-α-L-rhamnopyranose, and the β-D-glucopyranosyl-(1→4)-2,3-di-*O*-methyl-α-L-rhamnopyranose disaccharides were synthesized and characterized, and their activities were examined. Only the phenolic glycolipids containing the 3,6-di-*O*-methyl-β-D-glucopyranosyl at the nonreducing terminus were efficient in binding the anti-glycolipid immunoglobulin M, and the 3,6-di-*O*-methyl-β-D-glucopyranosyl-containing di- and trisaccharides were the most effective in inhibiting this binding. Thus, the 3,6-di-*O*-methyl-β-D-glucopyranosyl substituent was recognized as the primary antigen determinant in phenolic glycolipid I. With this information, bovine serum albumin containing reductively aminated 3,6-di-*O*-methyl-β-D-glucopyranosyl-(1→4)-2,3-di-*O*-methyl-L-rhamnose was prepared and shown to be highly active in the serodiagnosis of leprosy.—Authors' Abstract

Gigg, R., Payne, S. and Conant, R. The allyl group for protection in carbohydrate chemistry, Part 14. Synthesis of 2,3-di-*O*-methyl-4-*O*-(3,6-di-*O*-methyl-β-D-glucopyranosyl)-L-rhamnopyranose (and its α-propyl glycoside): a haptenic portion of the major glycolipid from *Mycobacterium leprae.* J. Carbohydrate Chem. **2** (1983) 207–223.

3,6-di-*O*-methyl-D-glucose was prepared via 5-*O*-allyl-1,2-*O*-isopropylidene-3-*O*-methyl-α-D-glucofuranose and was converted into 2,4-di-*O*-acetyl-3,6-di-*O*-methyl-D-glucopyranosyl chloride. Condensa-

tion of the chlorosugar with methanol or allyl 2,3-*O*-isopropylidene-α-L-rhamnopyranoside gave the corresponding crystalline β-glycosides. The allyl 4-*O*-(2,4-di-*O*-acetyl-3,6-di-*O*-methyl-β-D-glucopyranosyl)-2,3-*O*-isopropylidene-α-L-rhamnopyranoside was converted into the title compounds and into crystalline 2,3-di-*O*-acetyl-4-*O*-(2,4-di-*O*-benzyl-3,6-di-*O*-methyl-β-D-glucopyranosyl)-L-rhamnopyranosyl chloride which should serve as an intermediate for the synthesis of the trisaccharide portion of the major glycolipid of *Mycobacterium leprae.*—Authors' Abstract

Salem, J. I. and Fonseca, I. J. M. Bacilos álcool-ácido-resistentes na áqua do lago do aleixo. [Acid-fast bacilli in the waters of the Lake of Aleixo.] Hansenol. Int. 7 (1982) 25–35. (in Portuguese)

The presence of acid-fast bacilli in the waters of the lake of Aleixo is recorded. This site is a hanseniasis colony. The physical-chemical environment of this lake is described by an annual cycle and it is intended to relate the quality of the water to the highest or to the lowest frequency of detected mycobacteria. It is suggested that the work in this lake system should be continued towards a more specifical characterization of these microorganisms and the determination of their viability.—Authors' English Abstract

Silva, M. T. and Macedo, P. M. Ultrastructural characterization of normal and damaged membranes of *Mycobacterium leprae* and of cultivable mycobacteria. J. Gen. Microbiol. **130** (1984) 369–380.

Microdensitometry showed that the membrane profiles of normal cultivable mycobacteria were very asymmetric (outer layer denser and thicker than the inner layer), while the profiles of normal-looking *Mycobacterium leprae* in lepromatous patients, in experimentally infected armadillos, and in nude mice were approximately symmetric; moreover, the membrane of *M. leprae* was thicker than that of cultivable species. Using two cytochemical methods for the ultrastructural detection of periodic acid-Schiff (PAS)-positive molecules (the Thiéry procedure, and staining with phosphotungstic acid at low pH), we found that the membrane of cultivable mycobacteria, growing *in vitro* or *in vivo,* had PAS-positive components exclusively in the outer layer, while the normal-looking *M. leprae* in patients and in armadillos had membranes with PAS-positive components in both layers. The membranes of damaged cultivable mycobacteria, *in vivo* or *in vitro,* and of damaged *M. leprae,* in patients or armadillos, were PAS-negative.—Authors' Abstract

Siqueira, L. F. de G., Almeida, R. G. de and Belda, W. Modificação da coloração de fundo da técnica de Ziehl-Neelsen NA identificação do *Mycobacterium leprae.* [Modification of the counterstaining in the Ziehl-Neelsen technique for the identification of *Mycobacterium leprae.*] Hansenol. Int. 7 (1982) 88–94. (in Portuguese)

Authors analyze the counterstain with methylene blue solution in the usual Ziehl-Neelsen method. Considerations are made on the characteristics of the dye substance. A technique alteration is proposed: a "concomitant alkalization" of the classic aqueous methylene blue solution, by adding some drops of sodium hydroxide solution, 1:500, on the slide at the moment of the staining. By this technique it was observed: a) a longer period of usefulness of the solution; b) an absence of precipitate in the slides; c) an easier visualization of the substrate; d) a larger contrast between the substrate and the bacilli.—Authors' English Abstract

Šula, L., Matějka, M., Málková, J. and Primusová, J. The microscopical pattern of growth of *Mycobacterium lepraemurium* "Douglas" in microcolonies. Acta Microbiol. Acad. Sci. Hung. **29** (1982) 285–288.

A thin section technique of Ogawa egg yolk culture medium inoculated with *Mycobacterium lepraemurium* was found to reveal microscopical growth of the strain which could not be demonstrated by macroscopical examination. A peculiar structure of the growth, characterized by many lytic spots different in size, was observed indicating the possible presence of a temperate phage which may interfere with the synthesis of nucleic acids needed for the active multiplication of *M. lepraemurium.*—Authors' Abstract

Veeraraghavan, N. Cultivation of a well characterized armadillo strain of *M. leprae*. *Studies on Leprosy*, Supplement 1, 1983.

The author tested over 100 compounds considered likely to be beneficial to the growth of *Mycobacterium leprae* using a basic growth medium consisting of equal parts of the conditioned fluid from organ cultures of skin or adenoids and tonsils and Dulbecco's medim with 10% human umbilical cord serum, and many were found useful in promoting growth. With the addition of these compounds it was possible to eliminate the conditioned fluid and the serum from the medium, making it purely synthetic.

In this study the growth-promoting effect of some of the compounds were good, while those of others was either moderate or marginal. It was also not clear how the presence of the conditioned fluid and human serum in the basic medium affected the results. Investigations were, therefore, undertaken to reassess the value of the compounds in medium V in the absence of conditioned fluid and human serum. These studies were carried out with the well-characterized strain of *M. leprae* used by WHO in its IMMLEP program for the production of leprosy vaccine. The author is greatly indebted to WHO for making this strain available. It is found that a good number of compounds, whose growth-promoting properties were either moderate or marginal in the original study, could be deleted from the medium V. The growth of *M. leprae* in the modified medium V 1 is better than that in medium V.—Author's Introduction

Wheeler, P. R. Oxidation of carbon sources through the tricarboxylic acid cycle in *Mycobacterium leprae* grown in armadillo liver. J. Gen. Microbiol. **130** (1984) 381–389.

All the enzymes of the tricarboxylic acid cycle have now been demonstrated in extracts of *Mycobacterium leprae* grown in armadillo liver. Many were also present in homogenates of host tissue, but biochemical evidence is presented which indicates that all enzymes detected in extracts from *M. leprae* were authentic bacterial enzymes. Further evidence for a complete tricarboxylic acid cycle in *M. leprae* was obtained by first establishing that citrate could be taken up and catabolized by whole *M. leprae* organisms, then showing that oxidation of radioisotopically labelled pyruvate to CO_2 by suspensions of *M. leprae* was stimulated by adding unlabelled citrate. Control of tricarboxylic acid cycle activity in *M. leprae* by the inactivation of fumarase by a protease is speculated upon.—Author's Abstract

Experimental Infections

Curtis, J. and Turk, J. L. Resistance to subcutaneous infection with *Mycobacterium lepraemurium* is controlled by more than one gene. Infect. Immun. **43** (1984) 925–930.

The resistance of C57BL (high) and BALB/c (low) mice, their F1 hybrids, and the offspring derived from backcrosses of the F1 to both parental strains was assessed at 20 weeks after subcutaneous infection with 10^7 *Mycobacterium lepraemurium* organisms. The numbers of bacilli recovered from the infected foot and draining lymph node indicated that resistance to subcutaneous infection is controlled by more than one non-*H*-2-linked gene of intermediate dominance. In general, female mice were more resistant than males.—Authors' Abstract

Jacques, P. J., Delville, J., Dom, G. M. and Gillet, J. M. Effects antiinfectieux d'immunomodulateurs dans la lèpre et la malaria, chez la souris. [Anti-infectious effects of immunomodulators in experimental leprosy and malaria in the mouse.] Bull. Soc. Pathol. Exot. Filiales **76** (1983) 584–587. (in French)

Immunomodulators, whether natural (polysaccharides) or industrial (non-hemo-

lytic detergents) proved active by themselves, in preventive or curative schemes of experimental leprosy and malaria. However, their activity was most often increased, through joint administration with chemotherapeutic agents.—Authors' English Summary

Kohsaka, K., Yoneda, K., Ito, T. and Tanabe, S. An attempt to inoculate *Mycobacterium leprae* into "rhino" mice. Exp. Cell Biol. **52** (1984) 150–153.

Mycobacterium leprae proliferated in the foot pads of rhino mice even though the proliferation was very slight. The growth of the bacilli in the foot pad was also supported by histopathological examination. It seems that the rhino mouse will be useful, as well as the congenitally athymic nude mouse, for leprosy research and if the rhino mouse develops the lepromatous lesions, it will be an interesting experimental animal for transmission of *M. leprae* because it has a thymus at an earlier stage of life.—(*From* the article)

Kumar, R. and Vaidya, M. C. Mast cell and *Mycobacterium leprae* in experimental leprosy. Hansenol. Int. 7 (1982) 1–7.

The association of mast cells and lepra bacilli was studied in the foot pad skin of immunosuppressed mice inoculated with 10^5 lepra bacilli. The mice were killed at intervals varying from 2½–14 months post-inoculation. *Mycobacterium leprae* are found in large numbers in nerves, blood vessels, muscle fibers, hair follicles, sweat and sebaceous glands. Mastocytosis and extensive degranulation are seen at similar sites. Since these are the structures most affected in leprosy where the lepra bacilli and degranulating mast cells accumulate, there appears to be a close relationship between the two. This could be due to the composite role of mast cells in host tissue response and mastocytosis and degranulation may be related to this.—Authors' Abstract

Lancaster, R. D., McDougall, A. C., Hilson, G. R. F. and Colston, M. J. Leprosy in the nude mouse. Exp. Cell Biol. **52** (1984) 154–157.

The nude mouse has been shown to be highly susceptible to *Mycobacterium leprae* infection, permitting almost unrestricted growth of the organism in the cooler regions of the body. Such high yields of *M. leprae* may make the nude mouse a useful reservoir of the organism for further studies. The histological findings reveal that the infection developed in the nude mouse closely resembles human lepromatous leprosy and, occasionally, shows histoid features. While the immune deficiency in the nude mouse is not identical to the human situation, it may still prove to be a useful model for the evaluation of chemotherapeutic regimens and for monitoring patient therapy.—(*From* the article)

Mathew, R. C., Curtis, J. and Turk, J. L. T cell proliferation in *Mycobacterium lepraemurium* infection. I. Lack of correlation between antigen-specific proliferation of Lyt 1^+23^- cells and resistance in lethal infections. Immunology **51** (1984) 185–192.

Antigen-specific T lymphocyte proliferation and Lyt phenotypes of the T lymphocytes were studied in BALB/c and C57BL/6 mice infected with 10^9 *Mycobacterium lepraemurium* organisms intravenously. A highly disseminated form of the disease developed to which all mice succumbed by 17 weeks. Maximal antigen-specific T lymphocyte proliferation was detected at four weeks after the infection and persisted thereafter even when the mice started to die of the infection. Accessory cells of phagocytic and adherent type did not appear to be a requirement for this proliferation. The T lymphocytes generated during the course of the infection were mostly of the Lyt 1 phenotype. However, there appeared to be no correlation between sensitized Lyt 1 cells capable of antigen-induced T lymphocyte proliferation and protective immunity.—Authors' Summary

Saito, H., Tomioka, H. and Sato, K. Effect of streptococcal preparation, OK-432, on experimental infection due to *Mycobacterium lepraemurium* in mice of C3H/Jms strain. Hiroshima J. Med. Sci. **32** (1983) 32–36.

Streptococcal preparation, OK-432, was examined for its therapeutic effect on ex-

perimental infection due to *Mycobacterium lepraemurium* (Mlm) in mice. When C3H/Jms mice (Mlm-sensitive strain) were infected with 10^8 Mlm to the left hind footpad, weekly injections of OK-432 via the peritoneal route (0.1 mg dry weight per injection), considerably enhanced elimination of organisms from the infection site during the first six weeks, and thereafter suppressed the growth of organisms during 6–23 weeks after infection. In contrast, weekly injections of OK-432 to the infection site (left hind foot pad) resulted in the enhanced growth of Mlm in the infection site, indicating that multiple injections of OK-432 to the infection site might generate suppressor cells and/or antagonizing factors against the host defense mechanisms to Mlm.—Authors' Abstract

Samuel, N. M., Loudon, J. and Kohsaka, K. Growth of *Mycobacterium leprae* in nude mice. Lepr. India **55** (1983) 648–653.

Athymic nude mice were introduced in our laboratories in 1982. In this paper results over a one-year period of nude mice inoculated with small numbers of *Mycobacterium leprae* are described. In this study we showed that 1×10^4 *M. leprae* with low numbers of viable bacilli inoculated into the hind foot pads of nude mice housed both in vinyl plastic isolators and "clean room" conditions had the ability to grow and reach remarkable levels. There was dissemination of the infection to other uninoculated foot pads by six months.—Authors' Abstract

Turcotte, R. and Ishaque, M. Impairment of virulence of *in vitro* subcultures of *Mycobacterium lepraemurium*. Can. J. Microbiol. **29** (1983) 1589–1591.

Mycobacterium lepraemurium were cultivated *in vitro* on Ogawa egg-yolk medium. The pathogenicity of the third and eighth subcultures for C3H and C57BL mice was compared with that of *in vivo* grown murine bacilli by evaluating the mean survival time of infected mice. The results strongly suggest that a significant drop of virulence occurs during the *in vitro* cultivation of *M. lepraemurium*.—Authors' Abstract

Epidemiology and Prevention

Aredath, S. P. The occurrence of leprosy in an eight-member family—a case report. Lepr. Rev. **55** (1984) 47–50.

A family of six children aged between 11 years and 11 months and their parents affected with leprosy is reported. The mother and five children had multibacillary leprosy and one child had paucibacillary leprosy. The father, although apparently clinically normal, showed acid-fast bacilli in the skin. This family illustrates that the incubation period of leprosy can be shorter than one year and the possibility that this may be related, in some cases, to intrauterine transmission is discussed.

Leprosy is known to occur in more than one member of a family, but it is unusual to see all six children and both parents affected by leprosy at the same time. This paper describes the clinical, bacteriological, and histopathological findings in such a family.—Author's Summary

Beiguelman, B. Leprosy and genetics: a review. Rev. Bras. Genet. **6** (1983) 109–172.

The research lines which were explored to evaluate the importance of human inherited factors in the determination of resistance and susceptibility to *Mycobacterium leprae* infection are reviewed, after touching briefly upon the classification of leprosy and the Mitsuda reaction (its nature, clinical and microscopical expressions among leprosy patients and healthy individuals, as well as its prognostic value).

It is shown how family studies on the Mitsuda reaction have led the author to formulate a theory which admits that the primary defect in lepromatous leprosy is inherited and located in the macrophages, the lysing ability of these cells for leprosy bacilli being a threshold phenomenon (lysing threshold theory). Recent results which support this theory rather than the hypothesis

that the primary defect in lepromatous leprosy lies with the lymphocytes are presented, after reviewing both the *in vitro* studies on the behavior of blood-derived macrophages against *M. leprae* and the *in vitro* lymphocyte transformation test.

Special attention is given to the genetic-epidemiological studies on leprosy by reviewing the papers on the familial distribution of the polar types of leprosy, leprosy contagion rate among relatives of lepromatous patients, family clustering of leprosy patients, and genetic relationship between human groups and leprosy prevalence rates.

Both the only study on the Mitsuda reaction in healthy twin pairs and the studies on concordance of leprosy in twins are critically analyzed and a detailed collaborative program for twin pair studies on leprosy is proposed for countries where this disease is endemic.

The validity of continuing the studies on genetic polymorphisms or dermatoglyphics is discussed, and comments are made on the studies of chromosomal aberrations in leprosy patients.—Author's Abstract

Das, K. C. Leprosy control and primary health care. J. Commun. Dis. **14** (1982) 192–196.

The problem of leprosy and activities under the National Leprosy Control Programme in India have been reviewed. Areas for effective utilization of primary health care staff in leprosy control have been identified.—Author's Abstract

de la Cruz Castillo, F., Díaz González-Solís, J. W. and Goncharenko, I. Estudio de la asociación entre los antígenos del sistema HLA y la enfermedad de Hansen en pacientes cubanos no relacionados. [Study of the association between antigens of the HLA system and Hansen's disease in Cuban patients without genetic relationship.] Rev. Cubana Med. Trop. **35** (1983) 10–23. (in Spanish)

Results of a study about possible association between antigens of the HLA system and Hansen's disease in a group of patients not genetically related and affected by different clinical manifestations of the disease are offered. The study of 38 serologically demonstrable specificities proved the existence of different associations in each one of the main ethnic groups that make up our population. Thus, in the white ethnic group, disease is associated with B18, B7, B8, and BW17 antigens; in the black group it is associated with B7 and AW33 antigens; and in the half-breed with HLA-B1 and BW15 antigens. In addition, it was observed that each clinical aspect of the disease is associated to different antigens, and the study of risks related to haplotypical combinations for A and B loci, and phenotypical combinations for A, B, and C loci showed that some haplotypes are most frequently observed because increase of frequency to an antigen does not mean the same ascending risks related to combinations formed by it, and in the phenotypical combinations heterozygosis is favored, which allows to assume multifactorial characters of factors related to Hansen's disease, that seem to be associated to the HLA system.—Authors' English Summary

do Egito, E. P. Situação atual da endemia hanseníase no municipio de Parnaíba—Alta prevalencia. [The actual situation of the hanseniasis endemic in the city of Parnaiba—high prevalence.] Hansenol. Int. **7** (1982) 84–87. (in Portuguese)

The author describes the situation of endemic Hansen's disease in Parnaiba City (in the State of Piaui, Brazil) in 1980. The epidemiologic rates showed an incidence of 31.67‰ and a prevalence of 2.67‰. The author requires the attention of the Public Health Services for the important problem.—Author's English Abstract

du Plessis, P. A. The distribution of leprosy in Zambia. Med. J. Zambia **14** (1980) 39–41.

The distribution of leprosy in Zambia is analyzed on a district basis. High density areas are identified and it is suggested that genetic (tribal) factors may be relevant. It is shown that the treatment of leprosy patients has moved away from largely church-related institutions to government rural health centers. In spite of the urban drift, leprosy remains essentially a rural problem in Zambia.

Differences in provincial prevalence rates

for leprosy in Zambia have been recorded in previous annual reports of the Ministry of Health. However, an analysis of prevalence rates at a district level appears not to have been undertaken previously. It was felt this would prove of interest and be of value both for future planning of leprosy services and research.—Author's Summary

Guha, P. K., Pandey, S. S., Singh, G. and Kaur, P. Family studies on hanseniasis cases. Hansenol. Int. **7** (1982) 73–77.

Examination of intrafamilial contacts among the first degree relatives of 400 hanseniasis patients revealed an additional 101 cases. The distribution pattern of disease types detected in the contacts, in relation to that found in the index cases, are analyzed. An attempt has been made to evaluate the role of genetic factors in determining the type of hanseniasis in a patient.—Authors' Abstract

Kumar, A., Prasad, N. S., Sirumban, P., Anbalagan, M. and Durgambal, K. Community awareness about leprosy and participation in National Leprosy Control Programme. Lepr. India **55** (1983) 701–711.

To evaluate the health education component of our National Leprosy Control Programme (NLCP), 955 adult community members and 225 adult leprosy patients were interviewed with a view to assess their awareness about leprosy and participation in NLCP. The early signs/symptoms of leprosy were poorly perceived by the community. The majority of the community (81%) and patients (75%) were unaware or held superstitious ideas about the causation of leprosy.The spread of disease through close contact with patient(s) was better known to the community (65%) than the patients (45%); but the role of open cases in spread was stressed by more patients (17%) than community (5.5%). About 31% of the community and 23% of the patients had no idea about the ways to prevent leprosy spread. As against 89% of the patients, only 62% of the community believed in the curability of leprosy with early and regular treatment; but 20% of the community members did not know where to refer patients for treatment. The causation and prevention of deformities were poorly perceived by 71% of the patients, and likewise 62% of the patients did not take precaution(s) to prevent deformities. About 32% of the respondents were unaware of the efforts being made to control leprosy and their (79–84% of the respondents) participation in NLCP was very vague. About 44% of the community members showed prejudice towards leprosy. The NLCP infrastructure and mass media could not educate the community effectively. The implications of the findings are discussed in this paper.—Authors' Abstract

Lavrik, A. U. Features of leprosy epidemiology in the Yeman Arab Republic. Vestn. Dermatol. Venerol. **4** (1983) 46–49. (in Russian)

According to WHO data, the Yemen Arab Republic (YAR) was classified among leprosy non-endemic areas. In 1974, 1073 patients with leprosy were recorded in the YAR, and their actual number is presumed to be 18,000. Leprosy occurs predominantly among the indigent population groups in the coastal province of Tihama, and in some areas of Sana, Ibb, and Taiza provinces. In some villages, prevalence of leprosy varies from 1.1 (among school children) to 6.5 (among workers and peasants) per 1000 persons. Leprosy occurs predominantly in men; among patients the lepromatous type of leprosy prevails. Because of their life conditions, customs, and traditions, a large number of Yemen residents are at risk of contracting leprosy as a result of intra- and extra-familial contacts.—Author's English Summary

Lumpkin, L. R., III, Cox, G. F. and Wolf, J. E., Jr. Leprosy in five armadillo handlers. J. Am. Acad. Dermatol. **9** (1983) 899–903.

Five patients with leprosy are presented. Each had had extensive and chronic contact with armadillos. No other potential risk factor for the development of leprosy could be identified. Since the nine-banded armadillo is a known carrier of leprosy in the southern area of the United States, we believe that these patients may have contracted leprosy from infected armadillos.—Authors' Abstract

Neelan, P. N., Noordeen, S. K. and Sivaprasad, N. Chemoprophylaxis against leprosy with acedapsone. Indian J. Med. Res. **78** (1983) 307–313.

Results of a controlled study to determine the prophylactic value of acedapsone against leprosy, among 699 disease-free children aged 1–14 years who were household contacts of 330 active multibacillary leprosy patients on treatment in eight leprosy clinics in Madras City, Tamil Nadu, India, are reported. The contacts were allocated to a prophylactic group of 348 receiving injections of acedapsone 150 mg (1.0 ml) and 225 mg (1.5 ml) once in 10 wk in age groups 1–5 yr and 6–14 yr, respectively, and a control group of 351 contacts receiving similar quantities of placebo injections. Twenty-two children in the acedapsone prophylaxis group and 42 in the control group developed leprosy during the study period of 3½ years. The incidences were 63.2 per 1000 and 119.7 per 1000, respectively—a statistically significant difference ($p < 0.02$). The protection due to acedapsone was 47.2% as seen from the difference between the two groups. Protection was higher in the younger age groups and in children born to the index cases.—Authors' Abstract

Talhari, S., Kiesserlich, D., Benchaya, V. M. and Alcalde, A. M. Inquérito epidemiológico sobre hanseníase e outras dermatoses em escolares, Manaus, Estado do Amazonas, Brasil. [Epidemiologic investigations of hanseniasis and other dermatoses in schools in Manaus, State of Amazonas, Brazil.] Med. Cutan. Iber. Lat. Am. **10** (1982) 309–312. (in Spanish)

During the period from April 1978 to May 1980 some 10,178 school children in the city of Manaus, State of Amazonas, Brazil, were examined; 22 cases of Hansen's disease were discovered; 16 presented with the tuberculoid form of the disease; 5 lepromatous and 1 indeterminate cases were found. The most frequent dermatological conditions were dermatozoonosis, superficial mycosis, disorders of keratinization, nevus and bacterial infections.—Authors' English Summary

Rehabilitation

Bourrel, P. Concept épidémiologique de la prévention des mutilations lépreuses et chirurgie. [Epidemiological concept for prevention of mutilations in leprosy.] Bull. Soc. Pathol. Exot. Filiales 76 (1983) 628–633. (in French)

The frequency of mutilations reaches about 20–30% of the tuberculoid or borderline forms owing to the evolution of leprosy neuritis and their aggravation when leprosy reactions occur. In fact, the determinant cause is the loss of sensitivity of the extremities, as a result of internal compression of nervous bundles, which is increased by traumas in articular movements, and mainly by the external compression in the bony canals, in hypertrophic neuritis.

There are many propitious causes: exposure of the extremities to traumas which are related either to crafts or to walk, or to occupational traumas, and which are worsened by deformations and subacute infection.

In intractable neuritis, hygiene, protection from traumas of the extremities (especially of the feet), treatment of paralyses, resection of bony prominences in order to distribute pressure more equally, in spite of such care, will only be able to delay supervening of mutilations.

The best technique of prevention is represented by early diagnosis and early treatment of leprosy and neuritis, for which retrospective epidemiological investigations should be carried out, in order to identify the risk factors.—Author's English Summary

Chauhan, N. S., Dhar, U. and Chauhan, S. Frustration-anxiety behaviour as a function of leprosy patients age and personality. Lepr. India **55** (1983) 743–751.

The paper incorporates five studies (four of frustration and one of anxiety). The design is Multi-group-Control-group. Each one of the five studies has four 3 × 3 × 2 factorial experiments. Each experiment has 360 elements. These are three groups (of lepromatous, nonlepromatous and of disease-free normals). Each group consists of 120 elements (equally distributed among adolescents, adults, and senescents). The particulars of the patients have been obtained from the Central JALMA Institute for Leprosy and the Kushta Seva Sadan (Agra) in India. The disease-free normal elements are drawn freely from the population of Agra. The sample possesses statistical justification for size and representativeness. Data are collected with the help of reliable tools and the "F" test is run for verification of null hypotheses. Results show that experiences of fixation-regression frustration atypically belong to normal senescence. Resignation and anxiety experiences, as growing hazards, specifically relate to leprosy patients. Personality factors that normally demote frustration-anxiety behavior exhibit role-negation in the leprosy patients. Age shows role-reversion. Implications of such role changes relate to the self-eroding process of personality in the patients.—Authors' Abstract

Hildalgo Hidalgo, H., Castro Coto, A. and Rivera Varela, R. M. Hogares sustitutos en Costa Rica. Una alternativa en el cierre de las leprosarias. [Substitute homes in Costa Rica. An alternative to the closing of leprosaria.] Med. Cutan. Iber. Lat. Am. **10** (1982) 385–390. (in Spanish)

The actual knowledge about leprosy and its therapy determines it to be regarded and treated as any other disease.

Leprosaria dedicated to segregation and isolation of the patient are not needed anymore. Accordingly, the only leprosarium that existed in Costa Rica, the "Sanatorio Nacional de las Mercedes," was closed on March 30, 1979.

We are providing a historical account of the stages in the struggle against leprosy leading to the closure of the Sanatorio, as well as the main reasons supporting the inadequacy of having such an institution.

We explain the meaning and advantages of the foster homes, where the last 30 remaining patients were replaced, thus facilitating the closure of the Sanatorio.

Finally, three years later, we discuss the most significant results concerning the Hansen's disease control in Costa Rica.—Authors' English Summary

Kulkarni, V. N. and Mehta, J. M. Special features of physical therapy in the claw hand of leprosy. Lepr. India **55** (1983) 694–696.

This article emphasizes the vital role of a physical therapist in the surgical program of the correction of clawing caused by leprosy due to paralysis of intrinsics. Right from the assessment of the patient until the final re-education a physical therapist is a must to help in motivating the patient, planning the type of procedure to be performed, and training the patient post-operatively. If treated early a physical therapist himself can overcome the deformity by the help of various physical therapy measures without surgical intervention.—Authors' Abstract

Kumar, R. P. Blindness in leprosy: a report on evaluation and physical rehabilitation methods. Lepr. Rev. **55** (1984) 11–18.

A report is presented on rehabilitation measures used in 18 blind leprosy patients with primary and secondary deformities. The nature of their physical dysfunction, assessment methods used, effect on activities of daily living, treatment techniques to improve independent function, and their effectiveness and acceptability by patients are all discussed. The whole study is in the social context of South India and the geographical environment of a rural area.—Author's Summary

Other Mycobacterial Diseases and Related Entities

Bal, V., Kamat, R. S., Kamat, J. and Kandoth, P. Enzyme-linked immunosorbent assay for mycobacterial antigens. Indian J. Med. Res. **78** (1983) 477–483.

An enzyme-linked immunosorbent assay (ELISA) was standardized to detect the presence of mycobacterial antigens in the cerebrospinal fluid from patients of meningitis. Antibody directed against certain fractions of *Mycobacterium tuberculosis*-H37Rv sonicate was coupled to alkaline phosphatase and used for the assay. Of the 41 patients studied, 32 proved to be of non-tuberculous etiology and were nonreactive for mycobacterial antigens in the ELISA test. The remaining nine patients, who were clinically diagnosed as tuberculous meningitis (TBM), were reactive for mycobacterial antigens in the ELISA test. Of these, seven were proved to have a definite tubercular etiology, using independent means. In one patient, no such evidence could be found; whereas one was definitely false positive. With some improvement, the ELISA appears to be a promising approach for a definitive diagnosis of tuberculous meningitis.—Authors' Abstract

Grange, J. M., Kardjito, T. and Setiabudi, I. A study of acute-phase reactant proteins in Indonesian patients with pulmonary tuberculosis. Tubercle **65** (1984) 23–39.

The levels of eight acute phase reactants (α_1-antitrypsin, α_2-macroglobulin, transferrin, α_1-acid glycoprotein, C-reactive protein, ceruloplasmin, haptoglobin and the third component of complement) and immunoglobulin in the IgG, IgM and IgA classes were assayed, by laser nephelometry, in sera from 107 East Javanese patients with smear-positive pulmonary tuberculosis and 144 healthy subjects. These levels were correlated with clinical, hematological and radiological features, the levels of antibody to *Mycobacterium tuberculosis,* and the diameters of the tuberculin skin test read at various times.

Levels of all acute phase reactants increased significantly in tuberculosis except for that of transferrin which was lowered. The correlations between the various acute phase reactants in health and disease were calculated. In general, the correlations were lower in disease than in health, except for the third component of complement and a greatly increased correlation between the levels of α1-antitrypsin and ceruloplasmin.

There was a significant correlation between levels of some of the acute phase reactants and those of antibodies to *M. tuberculosis,* mainly with IgG, less with IgA and least with IgM antibodies. By contrast correlations between acute phase protein and total immunoglobulin levels were most evident in the IgM class, less with IgA, and not at all with IgG.

Although there were some associations between protein levels and age, sex and weight of controls and patients, these were not great enough to account for the differences between the two groups. There was a tendency for patients, but not controls, with intestinal helminthiasis to have higher levels of total IgM than those without evidence of parasites.

In general, the levels of proteins bore very little relation to the clinical and radiological features of disease and were, with the exception of the antimycobacterial antibodies, of no diagnostic value. Likewise, protein levels were not associated with the extent of disease; better correlations were found with the ESR and leukocyte count. Transferrin levels tended to be higher in those with chronic disease and showed a correlation with the diameters of the dermal reactions to tuberculin at 24 hours, which were also significantly larger in chronic disease.

Among the hematological findings, the most significant was a negative correlation between the lymphocyte count and haptoglobin levels in disease, suggesting a possible regulatory role for this protein.—Authors' Summary

Gupta, A. K., Jamil, Z., Srivastava, V. K., Tandon, A. and Saxena, K. C. Antibodies to purified tuberculin (PPD) in pulmonary tuberculosis & their correlation with PPD skin sensitivity. Indian J. Med. Res. **78** (1983) 484–488.

Pulmonary tuberculosis patients have been shown to possess antibodies to PPD in peripheral circulation. A direct correlation between PPD antibody and the size of induration in the Mantoux test was observed in the patients as well as the controls. The correlation was, however, highly significant only in the patients. Close correlation was also observed between ELISA positivity and Mantoux positivity. A significant number of patients were negative to the Mantoux test but more than 60% of them were positive to ELISA test.—Authors' Abstract

Hendler, S. S. and McCarty, M. F. Thalidomide for autoimmune disease. Med. Hypotheses **10** (1983) 437–443.

The therapeutic efficacy of thalidomide in erythema nodosum leprosum (ENL) suggests that thalidomide might play a useful therapeutic role in other human immune-complex diseases. Thalidomide has shown anti-inflammatory or immunosuppressive actions in several animal models. Current evidence suggests that its rapid activity in ENL may result from suppression of neutrophil chemotaxis and phagocytosis. Scattered anecdotal clinical reports of apparent response to thalidomide in various autoimmune diseases are hardly conclusive, but underline the desirability of appropriate pilot trials of thalidomide in autoimmune diseases, particularly those in which immune complex deposition plays a prominent role. Provided that a contraindication in fertile women is strictly observed, thalidomide therapy appears to be quite safe.—Authors' Abstract

Heng, M. C. Y., Pilgrim, J. P. and Beck, F. W. J. A simplified hyperbaric oxygen technique for leg ulcers. Arch. Dermatol. **120** (1984) 640–645.

A modified technique for administering hyperbaric oxygen with the use of disposable polyethylene bags was evaluated for the treatment of arterial leg ulcers. The potential advantages of the method include fairly low expense, lack of cross-infection, and simplicity in the administration of oxygen. Six men with 27 chronic arterial ulcers were treated with this technique, and 5 men (10 ulcers) served as controls. In the treated group, 18 of 27 ulcers (5/6 patients) were healed within 6–21 days, with 50% to 90% reduction in size of 7 of 9 of the remaining ulcers after a three-week period. None were healed in the control group. The treated ulcers healed by $7.8\% \pm 1.15\%$ per day compared with $-0.5\% \pm 0.37\%$ in the control patients. The results indicate that our technique of administering hyperbaric oxygen for the treatment of leg ulcers is simple and effective. It can be adapted for either inpatient or outpatient treatment.—Authors' Abstract

Levy, H., Lewis, M. and Myburgh, D. P. Isolation of *Mycobacterium chelonei* from a patient with recurrent aspiration pneumonia. S. Afr. Med. J. **65** (1984) 217–218.

Nontuberculous mycobacteria are rarely isolated in South African laboratories. *Mycobacterium chelonei* has previously been shown to cause pulmonary disease, especially in the clinical setting of aspiration and lipoid pneumonia. Isolation of nontuberculous mycobacteria is not proof of pathogenicity; casual cultures may occur from contamination and colonization of the upper airways.

We report a patient with recurrent aspiration and lipoid pneumonia in whom a confluent culture of *M. chelonei* was obtained from bronchial washings. Although the clinical setting for true pathogenicity was present, subsequent investigations led us to conclude that the organism was a casual mycobacterium.—Authors' Summary

Lu Chenghuan, *et al.* Determination of the serum zinc level in healthy individuals and in the patients with dermatoses. Chin. J. Dermatol. **16** (1983) 233–235. (in Chinese)

Serum levels of zinc in 120 healthy persons, 40 patients with acne vulgaris, 30 with alopecia seborrheica, 37 with psoriasis, and 11 with vitiligo in Shenyang District, China, were determined with an atomic absorption spectrometer. The results showed that only the serum level of zinc in the alopecia seborrheic group was significantly lower ($p < 0.05$) than that of healthy persons, while the difference between other patient

groups and healthy persons was not significant.

These patients were treated with zinc sulfate; the clinical responses were as follows: marked improvement for acne vulgaris, some degree of improvement for alopecia seborrheica, and no improvement for psoriasis and vitiligo.—Authors' English Abstract

Mitchell, G. F. Murine cutaneous leishmaniasis: resistance in reconstituted nude mice and several F_1 hybrids infected with *Leishmania tropica major.* J. Immunogenet. **10** (1983) 395–412.

After cutaneous injection of promastigotes of an isolate of the intramacrophage protozoan parasite, *Leishmania tropica major,* mouse strains develop chronic cutaneous lesions or show a resolving pattern of disease. On this basis, they can be classified as resistant (e.g., CBA/H and C57BL/6) or susceptible (e.g., BALB/c, BALB/c.H-2^b and BALB/c.H-2^k). Hypothymic nude (nu/nu) mice of either BALB/c, CBA/H or C57BL/6 genotype are susceptible to chronic disease. However, nude mice of these genotypes, including BALB/c, are resistant to chronic cutaneous leishmaniasis when injected at the time of parasite challenge with small numbers of H-2 compatible lymphoid cells from normal mice. Nude mice remain susceptible when injected with fully H-2 incompatible cells. Using cells from H-2 mutant mice for reconstitution of resistance in C57BL/6.nu/nu mice, evidence was obtained that *I* region compatibility is necessary for cells to mediate host-protective effects. Cells from chronically diseased BALB/c mice do not have protective effects in BALB/c.nu/nu mice at any cell dose and will abrogate the resistance-promoting effect of normal BALB/c lymphoid cells in such mice. In contrast, protective effects of lymphoid cell populations from chronically diseased BALB/c.H-2^k and BALB/c.H-2^b mice can be demonstrated when assayed at certain cell doses in H-2 compatible CBA/H.nu/nu and C57BL/6.nu/nu mice, respectively. The data suggest that chronically diseased (genetically susceptible) mice contain a mixture of resistance-promoting and disease-promoting T cells in their peripheral lymphoid organs and that expression of the resistance-promoting subset can occur in nude mice of resistant genotype. Previous data have indicated that Lyl^+2^- T cells are efficient mediators of both T cell-dependent activities. No evidence for the operation of disease-promoting or resistance-promoting antibodies in perpetuation or resolution of disease has been obtained in extensive serum transfer experiments. Some discrepancies exist in the literature on the question of the dominance of susceptibility or resistance in F_1 hybrid mice. A re-examination of susceptibility/resistance in F_1 hybrids between BALB/c and several other parental strains was undertaken using cloned pathogenic promastigotes derived from a heterogeneous *L. t. major* isolate in order to reduce effects of parasite heterogeneity in the analysis. Resistance was dominant in some but not all F_1 hybrids, with most showing a delayed healing pattern of disease relative to the resistant parental strain. Despite the use of genetically homogeneous parasites, the analysis was complicated by variability within groups of F_1 hybrid mice as well as between males and females and between F_1 hybrids of reciprocal crosses. A hypothesis based on antigen and H-2 expression on infected macrophages is advanced to account for the balance between the effects of resistance-promoting and disease-promoting Lyl^+2^- T cells in mice of various genotypes.—Author's Summary