CURRENT LITERATURE

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General and Historical

Jopling, W. H. Leprosy today. Indian J. Dermatol. Venereol. Leprol. **44** (1978) 190-196.

The paper begins with an account of the present world distribution of leprosy and is followed by a description of the clinical features of various types of the disease. Differing views are presented on the mode of spread of the disease; the subject of the management of leprosy with special emphasis placed on the shortcomings of antileprosy drugs which are presently available; the question of bacterial resistance to dapsone; and problems of absenteeism and defaulting on treatment. The outlook for the production of an effective vaccine is discussed, and the paper ends with a tribute to the all important role played by medical auxiliaries in countries where leprosy is endemic.—(*Adapted from* author's summary)

Kandiah, N., Riji, H. M. and Palan, V. T. Current attitudes of the society towards leprosy and the changing role of the National Leprosy Control Centre, Sungei Buloh, Malaysia. Southeast Asian J. Trop. Med. Public Health **9** (1978) 103-111.

There have been few studies regarding the knowledge of, and opinion about leprosy in Malaysia and as such this study was undertaken to bring to light the current attitude of the public about leprosy. Two aspects were studied: 1) the extent of prejudice toward leprosy, and 2) the response expected from the general public towards the changing role of the NLCC.

The study revealed that most people had heard about leprosy and a majority of them were not prejudiced against the disease. However, the Chinese showed a higher degree of prejudice than the non-Chinese, and this could be due to the incidence of leprosy being the highest among the Chinese and that the majority with lepromatous leprosy are also Chinese (NLCC, 1975-1976). On the basis of this, it could be expected that it would be more difficult to reduce the fear of disease among Chinese than in the other races. It was also found that the educational status of the respondents did not have an effect on the degree of prejudice. The degree of prejudice however did depend on age, where the older respondents seemed to be more prejudiced. The acceptance of leprosy patients undergoing treatment into the community is low. This will hinder the modern method of treating leprosy on an outpatient basis, after the initial period of inpatient treatment in the leprosaria.

A majority of the respondents knew about the existence of the NLCC but only a third knew that it catered to all types of illnesses in addition to leprosy. A significant number of people preferred to go to private clinics and hospitals rather than to NLCC for medical treatment, the main reason being fear of getting leprosy and the difficulty of access to the center.

The attendance at the NLCC for medical treatment at present and in the future could be made much greater if the transport facilities to the center from the "catchment areas" are improved and the community is more enlightened about leprosy and the importance of early detection, treatment and rehabilitation. Treatment of the patient's disability should be accompanied by education of the patient, his family, and the public so that he can take his normal place in society while undergoing rehabilitation (WHO, 1960).—Authors' Summary

[*If the majority of the population has no prejudice against leprosy, then why the low acceptance of treated leprosy patients into the community and the reluctance in going to NLCC for treatment because leprosy is also treated there?—OKS*]

Clinical Sciences

El Amin, A. M. Peculiarities in dermatology. Cent. Afr. J. Med. **24** (1978) 118-121.

While the etiology of keloids and leprosy are well defined; that of progressive systemic sclerosis (PSS) and ichthyosis still remains undetermined. However, in the light of our present stage of knowledge, PSS is considered as an auto-immune collagen disorder. On the other hand, ichthyosis is hereditary dermatosis which is transmitted as a simple autosomal dominant characteristic. It is also important to note that leprosy is a disease that can manifest itself in a variety of ways. In the case described in this article, the patient presented with multiple maculo-nodular ulcerative skin lesions not associated with any loss of sensation as is the case with this type of leprosy.

Progressive systemic sclerosis (PSS), ichthyosis, vulgaris, giant keloids arising in tattoo marks, and maculo-ulcerative tuberculoid type of leprosy are reported in this presentation. The diagnosis was based on clinical analysis and the results of relevant investigations. Treatment was employed according to the nature of the skin disease.—Author's Comments and Summary

Furuta, M., Ozaki, M., Harada, N., Matsumoto, S., Nagao, E., Sugiyama, K., Ogasawara, T. and Matsumoto, Y. Frequency of cerebrovascular lesions in leprosaria. Jap. J. Lepr. **47** (1978) 61-65. (In Japanese)

A total of 127 patients died in the Komyoen Leprosarium between January 1962 and June 1971. Autopsy was done on 110 cases. The average age was 62.5 years. Malignant neoplasms (33) were more frequent than cerebrovascular diseases (hemorrhage 9 cases, softening 3, microscopic hemorrhage 11). The major direct cause of death was bronchopneumonia. Investigation of the death certificates in Seisho-en Leprosarium for the years 1967-1976 also revealed that cerebrovascular diseases were not the major cause of death. These results are different from information on the cause of death in Japan published by the Ministry of Health and Welfare. This discrepancy probably comes from inaccurate descriptions on the death certificates and the low autopsy rate in this country.—(*Adapted from* English summary)

Girdhar, B. K. and Desikan, K. V. A clinical study of the mouth in untreated lepromatous patients. Lepr. Rev. **50** (1979) 25-35.

The mouth in 40 consecutive, unselected bacilliferous leprosy patients has been examined. The frequency and various types of lesions are reported. Twenty-three patients showed lesions inside the mouth. Although all parts of the mouth were found to be affected in a varying percentage of patients, the hard palate was involved in all 23 patients. Further, of these 23 patients, 21 showed acid-fast bacilli on the surface of the mouth as judged by surface smears and mouthwash. A review of the literature concerning oral lesions in lepromatous leprosy is also presented.—Authors' Abstract

Karat, A. B. A. and Rao, P. S. S. Hematologic profile in leprosy. Part 2. Relationship to severity of disease and treatment status. Lepr. India **50** (1978) 18-25.

Adult male lepromatous leprosy patients (321) were studied for the relationship between hematologic findings, severity of disease and duration of treatment. Significant changes were noticed in relation to hemoglobin concentration, serum vitamin B12 and serum folate levels, serum albumin and globulin. No significant changes were observed in serum iron levels in relation to disease and treatment status.

With rising bacterial load, there was a trend towards lower hemoglobin concentration, higher vitamin B12 level, and lowered serum folate levels. Serum albumin showed a significant decline, while serum globulin showed a significant rise. The findings are discussed in relation to replacement of bone marrow by lepromatous tissue as well as possible interference in the metabolism of hematinics by *M. leprae*. The exact mechanism of neurologic deficit in leprosy in relation to deficiency of vitamin B12 and folic acid needs to be further elucidated.—Authors' Abstract

Maurus, Jeffrey N. Hansen's disease in pregnancy. Obstet. Gynecol. **52** (1978) 22-25.

Hansen's disease with pregnancy is an uncommon concurrence in the United States.

The clinical courses of 62 pregnancies in 26 treated patients with various types of Hansen's disease are reported. In general, patients with Hansen's disease do well in pregnancy. However, the subgroups of active lepromatous and dimorphous types have an increased incidence of obstetric and disease complications. Additional important observations include a high incidence of false-positive biologic tests for syphilis, with the possibility that the FTA-ABS test may also be falsely positive in pregnant patients with Hansen's disease. Sulfone drugs may be used safely during pregnancy. There is a low incidence of congenital malformations, but an unusually high incidence of twinning in this small group of patients.—Author's Abstract

Radhakrishnan, K., Khattri, H. N., Kaur, S., Kumar, B., Shenoy, K. T. and Wahi, P. L. Autonomic neuropathy in leprosy-a cardiovascular evaluation. Bull. Postgrad. Inst. Med. Educ. Res. Chandigarh **11** (1977) 114-117.

Among ten patients with lepromatous leprosy three showed evidence of cardiac dysautonomia. The cause of this was not established but infiltration of the sympathetic chain and the vagus nerve by *M. leprae* cannot be excluded as a possible cause.—T. F. Davey (*From* Trop. Dis. Bull.)

Ramanujam, K., Sundar, P. R. and Khamnei, A. A. Ocular leprosy in Iran: findings of a random survey at the Baba Baghi Leprosarium, Tabriz. Lepr. Rev. **49** (1978) 231-239.

Ocular manifestations in 100 cases of leprosy, mostly lepromatous, in a racial group susceptible to serious leprosy are presented. The pathogenesis of the eye involvement is discussed. Its prevention and management are recounted solely with a view to emphasize the fact that the institution of simple procedures will go a long way in calling a halt to the ocular tragedy in leprosy.—Authors' Abstract

Ranney, D. A. and Lennox, W. M. The protective value of a neurovascular island pedicle transfer in hands partially anesthetic due to ulnar denervation in leprosy. J. Bone Joint Surg. **60-A** (1978) 328-334.

Neurovascular skin island transfers were performed with the prime objective of protecting vulnerable anesthetic areas on the hands of patients with leprosy. After an average follow-up of eight years on sixteen patients, all had had long-lasting protective benefits without further loss of tissue consequent to injury. At follow-up, two-point discrimination was less than ten millimeters in only one patient, more than twenty millimeters in ten, and indeterminate in five. Sensory misreference persisted in fourteen patients. Axon sprouting was evident in six but only over short distances (4 to 8 mm beyond the island). Compared with the intact side of the donor finger, nine of the sixteen transfers had lost some sensitivity but sensation was rated normal in one, nearly normal in six, and protective only in nine. The loss of sensation in the donor finger was less than expected and was not a problem. Scar contracture occurred in two donor and five recipient fingers, but this could be attributed to placement of the incision too far anteriorly, and hence was an unavoidable complication.

Restoration of protective sensation to the ulnar border of the hand, whatever the cause of anesthesia, is considered extremely worthwhile.—Authors' Abstract

Rodriguez, Jose M. and Stevens, Dwight M. Leprosy: a report of two cases in children. J. Pediatrics **93** (1978) 192-195.

Two patients with tuberculoid leprosy are described. The clinical manifestations, therapy, and differential diagnosis of other common skin conditions are reviewed.

Saul, Amado. Early signs of leprosy in children. Mod. Probl. Paediatr. **20** (1978) 142-150.

Leprosy in children is more frequent than generally thought. Diagnosis is not easily made because early signs of the disease are overlooked. Statistical data from the Dermatologic Clinic Pascua of Mexico City reveal that early signs are cutaneous in 67% of cases: hypochromic and anesthetic infiltration, nodules, and alopecia of eyebrows and eyelashes. Neurologic symptoms such as anesthesis, facial paralysis, thickening of nerves and trophic problems are present in 19.3% of cases. The nose mucosae are congested in

9.2% of cases. Systemic manifestations may be present in 4% of cases.

Examination of contacts living with lepromatous patients is stressed as the best way to discover the early signs of the disease. Dermatologic consultation in general and pediatric hospitals is also recommended. If diagnosis is delayed, leprosy can induce physical, psychological and social disabilitation of the patient.—Author's Summary

Soderstrom, Robert M. and Krull, Edward A. *Erythema nodosum:* a review. Cutis **21** (1978) 806-810.

Erythema nodosum (ENL) is not an uncommon dermatologic entity. Sarcoidosis and streptococcal infection have become the two most common causes, while tuberculosis was the predominant etiology prior to the use of isoniazid. Histoplasmosis and coccidioidomycosis are two important geographic considerations. Laboratory tests should include a PPD test, chest x-ray, throat culture for beta-streptococcus, and ASO titer determinations as a minimum. Symptomatic treatment remains unsatisfactory in many cases, although recent success has been reported with oral potassium iodide.

ENL occurring with leprosy is unique in many respects. It occurs not as an early manifestation of disease but rather in the well established, highly bacilliferous form of leprosy. *Mycobacterium leprae* have been found within and about the lesions, a phenomenon not duplicated in any other infectious disease associated with ENL. Treatment with dapsone may precipitate ENL in 25% to 50% of leprosy patients. This finding is similar to that observed by Rollof (1950) when children with tuberculosis were treated with sulfathiazole. In contradistinction to other clinical patterns, ENL in leprosy rarely affects the pretibial surfaces. The arms are most frequently involved, followed by the anterior surfaces of the thighs and the face, the latter being an extremely uncommon site for ENL from other etiologies.—(*Adapted from* authors' summary and text)

Verma, K. C., Kumar, R. and Bhargava, N. C. Anemia of leprosy. Indian J. Med. Res. **68** (1978) 140-147.

Fifty patients having lepromatous leprosy including those of the dimorphous type were studied to determine if anemia in leprosy is due to chronic infection. Two groups of 25 each, one with no treatment and the other on dapsone treatment, were subjected to serum iron studies, tissue storage iron, and UIBC estimations. Hypoferremia was observed in 58% of cases of both the groups with low tissue storage iron, normal or high UIBC associated with low MCHC, characteristic of iron deficiency anemia. Anemia of chronic infection was observed in only one case. No abnormal sideroblasts could be seen. Anemia is attributed to dietary factors.—Authors' Summary

Chemotherapy

Lara, C. B. DDS chemoprophylaxis for leprosy in children at Culion Sanitarium Palawan, Philippines. Acta Leprol. **70** (1978) 35-58.

The conclusions that can be drawn from the main (Project I) and subsidiary study (Project II) are as follows:

1. The effect of DDS chemoprophylaxis has been temporary and of limited value.

2. The greatest benefit is in the group of children without known direct contacts when protection after four years' prophylaxis may reach 88.4%, declining in the subsequent four years of observation to 62.4%. The next to benefit are the children of lepromatous parents, with 46.8% protection at cessation of prophylaxis and diminishing to 18.9%. Slight to negligible protection appears to be afforded to the children of nonlepromatous families.

3. The investigator considers that although most children start with tuberculoid or indeterminate lesions, as they grow older self-healing is relatively greater among females than males.

4. The main action of DDS chemoprophylaxis is that of reducing the incidence of mild cases and those that have an inherent trend towards self-healing, i.e., which in the natural course affects chiefly females and temporarily reduces the severity of other cases.

5. Chemoprophylaxis may be justified in contact children under the age of five years

(considered the most vulnerable period for both sexes), for a period of not more than six years. A note of caution must be sounded on the toxic effects of DDS, and prophylaxis should be accompanied by a suitable iron preparation. Where expert examination is available twice yearly to this age group, chemoprophylaxis can be considered unnecessary.—Author's Conclusions

Naik, S. S. Irregularity of dapsone intake in infectious leprosy patients attending an urban treatment center: its magnitude and causes. Lepr. India **50** (1978) 45-53.

The dapsone/creatinine ratio in random samples of urine was determined in 910 infectious leprosy patients attending the outpatient department of the Acworth Leprosy Hospital, Bombay during the period 20 September to 20 November, 1976. It was found that 48.7% of patients were not taking regular treatment. The patients who were detected to be irregular in treatment were interviewed when they next attended the clinic to find the reason behind their irregularity. It was noticed that the majority of patients (63%) attended the clinic for DDS treatment but could not come regularly for valid reasons, e.g., no time to attend, no money to travel to the clinic, and absence from Bombay to go to their native village.—Author's Abstract

Peters, J. H., Gordon, G. R., Murray, J. F., Jr. and Meyers, W. M. Metabolic disposition of dapsone in African leprosy patients. Lepr. Rev. **50** (1979) 7-19.

In a preliminary study (Study 1) of 20 African leprosy patients receiving various doses of dapsone (DDS), we found a distribution of capacities to acetylate DDS that suggested the polymorphism of acetylation observed in other populations. A more detailed investigation (Study 2) in a subsequent group of 21 patients using sulfamethazine (SMZ) as the primary drug for determining acetylator phenotype as well as DDS clearly demonstrated that African patients exhibit the polymorphism of acetylation of these drugs. As in other populations studied previously, plasma clearance rates of DDS as expressed by the half-time of disappearance were unrelated to acetylator phenotype. Clearance rates or acetylation capacities were also unrelated to age, sex, or body weight of the patients, or to the dose of DDS administered per week. In five patients who participated in both Studies 1 and 2, no consistent marked differences in acetylation of DDS or plasma clearance rates of DDS were noted even though the two studies were separated by 11 months. A positive linear relationship between the four hour level of DDS after the last dose and total dose of DDS per week was observed.—Authors' Abstract

Pranesh Nigam, S. G. D., Goyal, B. M., Nimkhedakar, K. V., Johsi, L. D. and Samuel, K. C. Leprous hepatitis: clinicopathologic study and therapeutic efficacy of Liv 52. Lepr. India **50** (1978) 185-195.

Fifty cases of leprosy were studied for clinico-biochemical and histological features pertaining to hepato-biliary system involvement. Therapeutic efficacy of an indigenous drug Liv 52 was also studied for its hepatic restorative and protective effects in leprous hepatitis.

Specific granulomatous lesions suggestive of leprous hepatitis were mainly seen in lepromatous leprosy (40%). Granulomata in the liver were seen in all types of leprosy (70%). Some of the hepatic lesions progressed to stellate fibrosis and early cirrhotic changes (40%). Functional derangement was the main feature in lepromatous cases irrespective of the extent and duration of the disease. Uniform elevation of normal levels of total serum proteins was mainly due to increase in the serum globulin with reversal of A:G ratio, indicating deranged hepatocyte function and hyperplasia of reticuloendothelial cells. Hyperbilirubinemia (highest level of serum bilirubin = 5.6 mg%) was chiefly seen in lepromatous leprosy.

A study to evaluate the efficacy of treatment of leprous hepatitis with an indigenous drug Liv 52 was also undertaken in these 50 cases: 20 cases served as controls and 30 cases received Liv 52 along with the antileprosy drug. The clinical and biochemical with histopathological response was significant in group A (Liv 52 treated cases) as it cut short the duration, course and severity of the disease and showed remarkable improvement towards normal values without any untoward side-effects. The authors feel that Liv 52 richly deserves to be used as a routine treatment spe-

cially in all cases of lepromatous leprosy, as incidence of hepato-biliary system involvement is much higher in India.—(*Adapted from* authors' summary)

[*We do not know of, and the authors do not document, any studies supporting the statement implying that leprosy involvement of the hepato-biliary system is much higher in India. Higher than where?—OKS*]

Rightsel, W. A., Sawyers, M. F. and Peters, J. H. Comparative effects of sulfones and rifampin on growth of *Mycobacterium lepraemurium* in macrophage diffusion chamber cultures. Antimicrob. Agents Chemother. **13** (1978) 509-513.

A cell-impermeable diffusion chamber technic has been developed that lends itself to growth studies of *Mycobacterium lepraemurium*. This technic, in which the organism grows within macrophage cultures inside the chambers that are maintained on monolayer cultures of macrophages, provides a method for a strict *in vitro* evaluation of antileprosy drugs without the influence of a multiplicity of host factors. This system was used to compare the effect of three sulfone derivatives and rifampin growth of *M. lepraemurium* within these diffusion chamber cultures. Two sulfones, 4,4′-diaminodiphenylsulfone and 4,4′-diacetamidodiphenylsulfone, as well as rifampin, suppressed the growth of *M. lepraemurium*, but monoacetyl sulfone 4-amino-4′acetamidodiphenylsulfone had no effect. The results indicate that the diffusion chamber technic can be used to evaluate the inhibitory effect of antileprosy drugs on the growth of *M. lepraemurium*. Also, the method provides for the first time a relatively rapid *in vitro* method for directly comparing the effects of drugs or their analogs when outside the metabolic influence of an animal host. This technic may be a useful tool for chemotherapy studies with other antileprosy compounds.—(*From* Trop. Dis. Bull.)

Sheskin, Jacob. Study with nine thalidomide derivatives in the lepra reaction. Int. J. Dermatol. **17** (78) 82-84.

In our studies, three out of nine thalidomide derivatives used to treat lepra reaction of lepromatous leprosy were effective. All three are known to be teratogenic from animal studies. This suggests that the teratogenic and the lepra reaction suppressive properties may be related.—Author's Abstract

U.S. Leprosy Panel (U.S.-Japan Cooperative Medical Science Program) and the Leonard Wood Memorial (collaborative effort). A statistical analysis of two chemotherapy trials in lepromatous leprosy. I. the response to therapy as measured by inoculation of mice. Am J. Trop. Med. Hyg. **27** (1978) 1005-1014.

Two recent trials of chemotherapy in relatively large numbers of patients with lepromatous leprosy generated data that permitted analysis of the effects of treatment regimens and of various pretreatment characteristics of the patients. The results of treatment were measured by inoculation of mice with *Mycobacterium leprae* recovered from skin biopsy specimens obtained from the patients at intervals during the trials. The pretreatment variables - sex, age, histopathological and clinical classifications, logarithmic biopsy index, Bacterial Index, and the common logarithm of the number of *M. leprae* per skin biopsy specimen (LAFB) - were found to be uniformly distributed among the 36 patients treated by regimens, 1, 2, 4, and 5 of trial I. The ten patients treated by regimen 3 were excluded from this analysis. These pretreatment variables were also found to be uniformly distributed among all 21 patients treated by the two regimens of trial II. The effects of the pretreatment variables and of the treatment regimens on the response to treatment were considered in 31 patients treated by regimens 1, 2, 4, and 5 of trial I (5 patients were excluded from this analysis because of evidence of unauthorized dapsone intake) and in the 21 patients of trial II. The treatment regimen itself was the most important determinant of the rate of loss of *M. leprae* infective for mice in both trials. In addition, the pretreatment value of the LAFB was found to be significantly related to the response to treatment in trial I. Had the random allocation of patients to each regimen not resulted in a uniform distribution of the pretreatment LAFB, the results of the trial might have been confounded. Stratification of patients by the number of *M. leprae* in the skin, as indicated by the LAFB, is recommended for future short-term trials of antimicrobial therapy of lepromatous leprosy.—Authors' Abstract

U.S. Leprosy Panel (U.S.-Japan Cooperative Medical Science Program) and the Leonard Wood Memorial (collaborative effort). A statistical analysis of two chemotherapy trials in lepromatous leprosy. II. Interactions among patient variables. Am. J. Trop. Med. Hyg. **27** (1978) 1015-1018.

Interrelationships among six patient characteristics recorded upon entry into the trial were analyzed for 67 patients with lepromatous and near-lepromatous leprosy admitted into two chemotherapy trials. Sex was found to be significantly associated with age and with the histopathologic classification; disproportionately large numbers of older patients and of patients classified as borderline-lepromatous (BL) were males. Classifications of the disease process by clinical and histopathologic criteria were closely associated, but many patients classified BL on histopathological grounds were classified fully lepromatous by the clinical criteria. Measurements of the number of *Mycobacterium leprae* in the patients made by three methods were also significantly correlated. No significant correlations were found between either classification of the disease process on the one hand, and any of the measurements of the numbers of organisms on the other.—Authors' Abstract

Yim, Bung Sung and Kim, Do-Il. A study on combined chemotherapy in leprosy. Korean Lepr. Bull. **11** (1978) 65-72. (In Korean)

Sixteen newly detected patients suffering from lepromatous leprosy were treated with rifampicin (600 mg daily for two weeks), thiambutosine (1 gm twice a day for 6 months), and DDS (100 mg daily continuously). Within six months of observation, all patients became significantly improved clinically and bacteriologically, with no apparent side-effects. Eight relapsed patients with DDS resistance were treated with rifampicin (600 mg daily for one month), clofazimine (100 mg daily continuously), and thiambutosine (1 gm twice a day for six months). Within six months of observation all had improved clinically and bacteriologically. There were no complaints about the skin discoloration due to clofazimine treatment. ENL reaction and side-effects were not evident in the cases studied under combined chemotherapy during the six month observation period.—(*Adapted from* Korean Med. Abstr.)

Immuno-Pathology

Agarwal, Satish K. and Saha, Kunal. Serum alpha-1-antitrypsin in various forms of leprosy. Indian J. Med. Res. **68** (78) 136-139.

Serum alpha-1-antitrypsin (AAT) levels were estimated by single radial immunodiffusion technic using monospecific antiserum in 55 patients of various forms of leprosy and compared with its levels found in 60 healthy controls and 50 patients having chronic obstructive airway disease (COAD). Although progressive increase in serum AAT level was observed in normal controls (225 ± 84 mg %) through tuberculoid (236 ± 67) to lepromatous (247 ± 95) leprosy patients, a significant elevation was noticed only in cases complicated with ENL (351 ± 97). On the contrary, the patients of COAD demonstrated a significant decline (183 ± 73) of serum AAT. It has been postulated that AAT is an acute phase reactant and is released during the reactive phase of the illness to counteract various endogenous as well as exogenous proteases.—(*Adapted from* authors' summary)

Bharadwaj, V. P., Venkatesan, K., Ramu, G. and Desikan, K. V. Serum iron and total iron binding capacity in leprosy patients. Lepr. India **50** (1978) 11-17.

Serum iron and total iron binding capacity were estimated on the sera collected from 45 leprosy patients attending the outpatient department of the Central JALMA Institute for Leprosy, Agra. The sera from 15 healthy subjects were included in the study as controls. Hypoferremia was observed in lepromatous leprosy and was particularly marked during the reactive phase. Further investigations to elucidate the pathogenesis of anemia in leprosy are being planned.—Authors' Abstract

Faber, W. R. and Leiker, D. L. Immunofluorescence studies across the leprosy spectrum. Arch. Dermatol. Res. **26** (1978) 45-53.

Forty biopsies from skin lesions of untreated (24) and treated (16) leprosy patients, representing the whole leprosy spectrum, were examined by means of immunofluorescence (IF) methods. Only a few or no cells staining with FTC-labeled antihuman immunoglobulin antisera were found in the lesional skin of all patients examined. Sparse IgM-deposits along the basement membrane of the epidermis were observed in a few borderline lepromatous and lepromatous patients. Complement deposits along the basement membrane of the epidermis and in the vessel walls were found in tuberculoid as well as in lepromatous patients. Complement and in a lesser number IgG-deposits were observed around sweat glands and sometimes around sweat gland ducts and other skin appendages.

Autofluorescing macrophages were noted in patients at the lepromatous side of the leprosy spectrum; approximately half of these patients showed complement deposits in and around these cells.—Authors' Summary

Faber, W. R., Leiker, D. L. and Cormane, R. H. Immunofluorescence studies in reactional leprosy with relevance to treatment. Arch. Dermatol. Res. **261** (1978) 323-330.

Twenty-three biopsies of skin lesions of patients with various types of leprosy, showing a recent reaction, were examined by means of immunofluorescence (IF) methods. The patients were divided into two groups according to the number of inflammatory cells, staining with various FTC-labeled anti-immunoglobulin antisera, in representative areas of the biopsies. It was found that the presence of these cells was correlated with a good response to thalidomide treatment.—Authors' Summary

Goihman-Yahr, M., Convit, J., Rodriguez-Ochoa, G., Aranzazu, N., Villalba-Pimentel, L., Ocanto, A. and Gomez, M. E. Significance of neutrophil activation in reactional lepromatous leprosy: effects of thalidomide *in vivo* and *in vitro*. Activation in adjuvant disease. Int. Arch. Allergy Appl. Immunol. **57** (1978) 317-332.

A proportion of circulating neutrophils is able to reduce nitroblue tetrazolium (NBT) *in vitro*. Such cells show blue formazan precipitates in their cytoplasm (FP cells). The proportion of FP cells is raised in many bacterial infections because of increased oxido-reductive activity (activation). This may also be induced *in vitro* by incubation with endotoxin. We have previously reported that, while in lepromatous leprosy (LL) there was no activation, a significant elevation in proportion of FP cells took place in reactional lepromatous leprosy (RLL). RLL is reported to be a form of immune complex disease, therefore neutrophils would be involved in tissue damage.

Signs and symptoms of RLL are dramatically improved by thalidomide. We have now studied neutrophil activation in patients with RLL just before and during treatment with thalidomide. Clinical improvement produced by this drug took place before lowering the proportion of FP cells. Concomitant infectious processes induced activation even if patients were under thalidomide treatment. Thalidomide, tested *in vitro*, did not affect spontaneous reduction of NBT by neutrophils, nor did it block endotoxin-induced activation. The therapeutic effect of thalidomide is not related to properties inhibiting neutrophil activation.

RLL has features that resemble those of adjuvant disease (ADJ). The latter is induced in the rat by injecting killed mycobacteria suspended in an oily vehicle. Inflammatory lesions, owing mainly to delayed hypersensitivity, appear in joints, skin and eyes. Thalidomide has suppressive properties concerning the signs of ADJ. We now studied neutrophil activation in rats of two strains: one susceptible to ADJ and the other refractory. Neutrophils from rats of both strains were able to become activated by *in vitro* incubation with endotoxin, latex particles and *Staphylococcus aureus* suspensions. After injection of mycobacteria, rats from the refractory strain showed little or no ADJ or neutrophil activation, despite the presence of inflammation at the injected site and gross enlargement of draining lymph nodes. Susceptible rats had a very intense ADJ. There was also a significant increase in the proportion of FP cells, but this took place shortly after injection of mycobacteria and before signs of ADJ or the acme of local inflammation had taken place. Activa-

tion disappeared by the time that ADJ became apparent. Significant neutrophil activation did not occur when susceptible rats received the oily vehicle alone.

Our findings do not support the hypothesis that tissue damage in RLL is due solely to neutrophil action by a mechanism similar to that of immune complex disease. Activation may be in RLL as in ADJ a specific phenomenon induced by a lymphokine.—Authors' Summary (*From* Trop. Dis. Bull.)

Greiner, J., Schleiermacher, E., Smith, T., Lenhard, V. and Vogel, F. The HLA system and leprosy in Thailand. Hum. Genet. **42** (1978) 201-213.

To investigate immunogenetics of leprosy, 205 leprosy patients (26 tuberculoid, 57 borderline-tuberculoid, 21 borderline, 31 borderline-lepromatous, and 70 lepromatous) were typed for HLA antigens, and compared with 183 healthy controls from the same region (Northern Thailand). There was no significant difference between the overall group of leprosy patients or the three borderline classes and the controls. The two polar forms, tuberculoid and lepromatous leprosy, however, showed significant associations: HLA-A2 decreased and HLA-Bw17 increased in tuberculoid leprosy; HLA-B7 increased in lepromatous leprosy. When both polar forms were compared with each other, HLA-A2 was significantly higher, and HLA-Bw40 lower in patients with lepromatous than in those with tuberculoid leprosy. The results were discussed with respect to the different immune responsiveness in the two polar forms of leprosy.—(*Adapted from* authors' summary)

Gupta, J. C., Panda, P. K., Shrivastava, K. K., Singh, S. and Gupta, D. K. A histopathologic study of lymph nodes in 43 cases of leprosy. Lepr. India **50** (1978) 196-203.

Eighty cases of leprosy including 60 lepromatous and 20 tuberculoid, were examined for evidence of lymph node enlargement during the period from 1974-1975. Of the 52 cases with enlarged lymph nodes, lymph node biopsy was done in 43 cases including 38 cases of the lepromatous type and 5 cases of the tuberculoid type. The lymph nodes were studied for evidence of any pathologic changes and the presence of acid-fast bacilli. In lepromatous cases lepromas and acid-fast bacilli were seen in 92.2%, and patchy fibrosis was noted in 23.6%. No amyloid could be demonstrated. In tuberculoid cases only nonspecific reticular hyperplasia was noted. No specific granuloma or acid-fast bacilli could be demonstrated. The findings are described in detail and discussed in the light of previous published data.—(*Adapted from* authors' summary)

Hastings, Robert C. and Job, C. K. Reversal reactions in lepromatous leprosy following transfer factor therapy. Am. J. Trop. Med. Hyg. **27** (1978) 995-1004.

Five patients with active leprosy, four with polar lepromatous (LL), and one with borderline lepromatous (BL) disease, were each treated with transfer factor (TF) from approximately 7.4×10^9 lymphocytes given in 36 divided doses over a 12-week period. The TF was prepared from blood donated by normal, healthy, lepromin skin test-positive individuals. During treatment all four of the LL patients, but not the BL patient, developed clinical reversal reactions. Histopathologically, skin biopsies in these four LL patients showed evidence of transformation of collections of multibacillary macrophages into paucibacillary epithelioid cells and giant cells. To our knowledge, this is the first histopathologic documentation of reversal reactions occurring in polar LL. To the extent that reversal reactions are evidence of effective cell-mediated immunity to *Mycobacterium leprae*, these results indicate that TF is capable of at least partial correction of the immunologic deficit of lepromatous leprosy.—Authors' Abstract

Hiramalini, S., Joseph, N. A. and Chacko, C. J. G. Concentration and persistence of bacilli in the fingers and toes of patients with lepromatous leprosy. Lepr. Rev. **49** (1978) 223-229.

In 41 patients with lepromatous leprosy, the fingers and toes were found to be the site with the highest bacillary load, the fingers being more productive than the earlobe or buttock and the toes being more productive than the buttock. Neither was the bacillary index at the finger significantly different from that at the toe, nor was the bacillary index at the terminal

phalanx significantly different from that at the middle phalanx in either the finger or the toe. However, the terminal phalanx of the finger harbored more solid bacilli than the middle phalanx. In 14 long-treated low index cases where the BI had registered a fall, and was not more than 2+ at any of the routine smear sites, the fingers and toes harbored more bacilli than the earlobe. In one long treated smear negative case, the terminal phalanges of the fingers and toes proved to be the only skin sites positive for bacilli, all other routine sites, being acid-fast bacilli negative.—Authors' Abstract

Hubscher, S., Girdhar, B. K. and Desikan, K. V. Discharge of *Mycobacterium leprae* from the mouth in lepromatous leprosy patients. Lepr. Rev. **50** (1979) 45-50.

A bacteriologic study of the mouths of 40 lepromatous patients, 35 of them untreated, has been undertaken. In each case a mouthwash was done and acid-fast bacilli were counted in the washing. Surface smears taken from three sites (tongue, palate and gums) were examined for acid-fast bacilli. Inoculation of surface scrapings into Lowenstein-Jensen media was also performed. The results show that noncultiviable acid-fast bacilli were present in the mouths of 85% patients with a mean count of 1.59×10^6 per mouthwash. The possible significance and the epidemiologic implications of these findings in communities where spitting is a common habit are discussed.—Authors' Abstract

Job, Charles K. Immunology and the changing profile of leprosy. Lepr. India **50** (1978) 214-230.

Leprosy has been an enigma for many centuries. The advances made in the basic medical sciences during the last two decades have been phenomenal. Application of this knowledge to leprosy research has been a very welcome change in the recent past. Our country [India] has many health problems and leprosy is a major one. At the present time, doctors working among leprosy patients are few and those engaged in leprosy research are even fewer. Governments can plan, make available funds for medical services, promote research, but to translate these into action and to bring the benefits to the common man medical personnel are needed especially doctors who are willing to utilize the opportunities offered.

There are several drugs available now to cure leprosy at any stage. True, it takes several years before complete cure is brought about, but even in lepromatous patients, if they take regular antileprosy therapy the cure rate is 97.8%, a rate better than in many other diseases. I would like to emphasize here regular antileprosy therapy: regular therapy for a few weeks is easy, for a few months not so easy, for a few years very difficult indeed, and this regularity in leprosy treatment is surely lacking. We need in our country hard working doctors and paramedical personnel dedicated to the cause of leprosy who are willing to teach the public the facts about leprosy, who would patiently persevere and in spite of the dreary monotonous schedule carry the patients through the long duration of treatment. Knowledge is advancing particularly in immunology and genetics. Maybe in the not too distant future we will understand more about the immunology of leprosy. A vaccine against leprosy may be discovered. The present profile of leprosy will change, and the problem of leprosy will find an easier solution.—(*Adapted from* author's conclusion)

Kaur, S. and Kumar, B. Study of apparently uninvolved skin in leprosy as regards bacillary population at various sites. Lepr. India **50** (1978) 38-44.

Slit smears from 16 LL and 4 BL patients were taken from the scalp, axilla, inguinal regions, and apparently involved skin patches. The bacilli were found in 100% LL and 75% BL patients at all sites. The scalp showed AFB in all LL and three out of four BL cases. No lesions were seen on the scalp. Bacterial morphology showed no uniform pattern. Contrary to belief, no immune zones were found on the skin as judged by results of bacteriologic examination. Our studies do not support the view that the leprosy bacillus has a predilection for sites with relatively low temperature as far as human leprosy is concerned.—Authors' Abstract

Koranne, R. V., Singh, R. and Iyengar, B. Bone marrow in tuberculoid leprosy. Lepr. India **50** (1978) 181-184.

Twenty-four untreated patients with tuberculoid leprosy and five healthy controls were investigated for the involvement of the bone marrow. The cytology was essentially normal and no acid-fast bacilli were seen in the bone marrow smears of the tuberculoid cases.—(*Adapted from* authors' summary)

Mukherjee, A., Girdhar, B. K. and Desikan, K. V. The histopathology of tongue lesions in leprosy. Lepr. Rev. **50** (1979) 37-43.

A histopathologic study of the tongue lesions in eight cases of lepromatous leprosy is presented. The salient histopathologic changes in these lesions are described and the implication of the findings discussed.—Authors' Abstract

Prabhakaran, K., Harris, E. B. and Kirchheimer, W. F. Absence of β-glucuronidase in *Mycobacterium leprae* and elevation of the enzyme in infected tissues. Lepr. Rev. **49** (1978) 203-213.

β-Glucuronidase activity was determined in mouse foot pads infected with *M. leprae* in the leprosy organisms separated from the liver and spleen of experimentally infected armadillos, and in the armadillo tissues. Enzyme assays in the mouse foot pads were initiated one week after inoculation with *M. leprae* and continued at monthly intervals for twelve months. In the mouse foot pads and in the armadillo tissues, *M. leprae* infection resulted in remarkable elevations of β-glucuronidase levels. The leprosy bacilli seemed to be devoid of the enzyme. In its properties like pH optimum, reaction velocity and effect of inhibitors, the activity detected in *M. leprae* resembled the host tissue enzyme rather than bacterial β-glucuronidase; and the activity was found to be superficially adsorbed on the bacilli. It is well established that phagocytes are rich in lysosomal enzymes. Evidently, the increased β-glucuronidase of the infected tissues is not derived from the invading organisms, but from the different types of phagocytic cells infiltrating the tissues.—Authors' Abstract

[*If the biochemical technic of histochemistry is applied by light and electron microscopy, as has been reported (Ethiop. Med. J.* ***13:*** *111-120, 1975; IJL* ***42:*** *399-411, 1974), β-glucuronidase is readily visualized surrounding and within* M. leprae.—*OKS*]

Saha, K., Dutta, R. N., Dutta, A. K. and Mohan, T. K. Reversal reaction in patients with lepromatous leprosy after transplantation of human fetal thymic grafts. Vox Sang. **35** (1978) 81-90.

An attempt was made to reconstitute impaired cell-mediated immunity in one patient with indeterminate, four patients with borderline, and two patients with polar lepromatous leprosy by grafting three thymus glands obtained from human fetuses of 14 to 19 weeks gestation. Most of these patients had severe ulcerative *erythema nodosum leprosum* (ENL) and were intolerant to dapsone. After thymus transplantation these patients were followed for 1.5 years. During this period all conventional chemotherapy had been withdrawn. In most cases, there was dramatic improvement of the clinical condition, resolution of skin lesions, subsidence of ENL, clearance of bacteria from skin and reconstitution of several immunologic deficits; but late lepromin reactivity returned in none, which indicated permanent loss of resistance to *Mycobacterium leprae.*—(*Adapted from* authors' abstract)

Saoji, Arun M. and Mene, Aruna R. Persistence of Australia antigen in leprosy. A frustrating puzzle in immunology. Lepr. India **50** (1978) 7-10.

This study deals with the relationship of Australia antigen (Au) to various subgroups of leprosy in a total of 200 cases. The Au antigen was found to be present in up to 4% of lepromatous cases, 2% of tuberculoid leprosy and lepra reaction, and 3% of antibody in lepromatous cases. The presence of antibody denotes past antigenemia. The quantitation of the antigen was done by using the new technic of electroimmunodiffusion (EID) of Laurell, which is synonymous with the rocket technic. The persistence of the antigen is explained in the light of deranged immunologic mechanisms.—(*Adapted from* authors' abstract)

Saoji, A., Mene, A. and Sharma, K. D. Electrophoresis and immunoelectrophoresis in leprosy. Lepr. India **50** (1978) 161-165.

Fifty cases of leprosy belonging to various subgroups (10 tuberculoid, 25 lepromatous, 10 lepra reaction, 5 dimorphous) and 25 normal individuals were subjected to agar gel

electrophoresis. The slides were scanned by densitometry. It showed profound departure from normal in various fractions of electrophoretic patterns. All of them showed an increase in gamma globulin. Albumin was markedly decreased in lepromatous leprosy and lepra reaction. In dimorphous leprosy alpha-1 was decreased. Qualitative immunoelectrophoresis was done by using antihuman serum raised in the laboratory by immunizing rabbits. It revealed changes in the IgM and IgG arcs. Results are discussed with an explanation on immunological derangement.—(*Adapted from* authors' summary)

Sheskin, Jacob and Zeimer, Ran. *In vivo* study of trace elements in leprous skin. Int. J. Dermatol. **16** (1977) 745-747.

The skin of leprosy patients at various stages of the disease was investigated by diagnostic x-ray spectrometry. In the active stage raised iron and slightly raised zinc levels were found. The usefulness of the method in skin investigation is foreseen.—Authors' Abstract

Sinha, S. N., Gupta, S. C. and Bisht, D. Serum calcium and magnesium in different types of leprosy. Lepr. India **50** (1978) 54-56.

Serum calcium and magnesium were studied in 200 leprosy patients and in 25 apparently healthy individuals. Serum calcium was found to be significantly decreased in all types of leprosy except tuberculoid. The decrease in serum magnesium was highly significant in tuberculoid, lepromatous and borderline lepromatous cases.—Authors' Abstract

Smelt, A. H. M., Liew, F. Y. and Rees, R. J. W. Lymphocyte response of leprosy patients to human-derived and purified armadillo-derived *Mycobacterium leprae*, BCG and PPD. Clin. Exp. Immunol. **34** (1978) 164-169.

The lymphocyte transformation test was applied to compare *in vitro* lymphocyte responses of tuberculoid (high resistant) and lepromatous (low resistant) leprosy patients to purified *Mycobacterium leprae* derived from experimentally infected armadillos and crude *M. leprae* derived from man, as well as to bacille Calmette-Guérin (BCG) and purified protein derivative (PPD). It was found that the purification procedure using enzymic digestion did not affect the immunogenicity of armadillo-derived *M. leprae* as compared with the crude human-derived preparation, although 2.5-5-fold higher doses of the purified organisms were required to elicitate equivalent lymphocyte responses. The result indicated the suitability of purified armadillo-derived *M. leprae* as the standard antigen for lymphocyte transformation tests in leprosy. The cross-reactivity studies show a close relationship between PPD and BCG, but not between *M. leprae* and PPD or BCG.—Authors' Summary

Venkatesan, K. and Bharadwaj, V. P. Sequential biochemical investigations in lepromatous leprosy. Lepr. India **50** (1978) 166-172.

Sequential biochemical investigations were conducted in cases of lepromatous leprosy in the reactive as well as subsided phases. Low levels of blood sugar and serum cholesterol were indicated in the reactive phase of lepromatous leprosy. Significant increase in thymol turbidity and decrease in A/G ratio were noted in most cases of lepromatous leprosy. Enhancement of serum levels of transaminases were observed in the reactive phase of lepromatous leprosy. Serum protein electrophoresis indicated increases in alpha-2-globulin and r-globulin, and decreases in albumin in the reactive as well as subsided phases. The results are discussed in this paper.—Authors' Summary

Microbiology

Bapat, C. V. and Modak, Madhuri S. Growth of the ICRC bacilli in the foot pad of mice. Lepr. India **50** (1978) 144-155.

The ICRC bacilli are acid-fast bacilli cultivated from *M. leprae* isolates of lepromatous tissue. The ICRC bacilli from C-44 in the conditioned medium were subjected to the foot pad test in both normal and T/900r mice. The bacilli exhibited a limited multiplication in normal mice and a continuous growth in T/900r mice. The maximum yield for normal and T/900r mice was 10^7 and 10^9/foot pad,

respectively. The infiltration of voluntary muscle tissue as the main localization site was common for both normal and T/900r mice with evidence of dissemination in the latter. The spread of AFB to the sciatic nerve, induction of liver granuloma, and foot drop was observed only in T/900r mice. These experiments show that the growth of ICRC bacilli in the mouse foot pad is very similar to that of *M. leprae*, confirming a test for identification. —(*Adapted from* authors' summary)

Grange, J. M. and Redmond, W. B. Host-phage relationships in the genus *Mycobacterium* and their clinical significance. Tubercle **59** (1978) 203-225.

Progress made during the last 15 years in the studies on the relationships between mycobacteria and their bacteriophages is reviewed. The basic biology of the phages and the applications of studies on adaptation and host range are discussed in relation to the development of phage typing systems for epidemiological purposes. The nature of lysogeny, its natural occurrence, its experimental establishment, the effect of the lysogenic state on the host bacterium and the evidence that lysogenic mycobacteria are involved in human disease, especially sarcoidosis, is reviewed.—Authors' Summary

Khanolkar, S. R., Ambrose, E. J., Chulawala, R. G. and Bapat, C. V. Autoradiographic and metabolic studies of *Mycobacterium leprae*. Lepr. Rev. **49** (1978) 187-198.

Highly purified suspensions of *Mycobacterium leprae* show a progressive increase in incorporation of [^{3}H]thymidine and [^{3}H]DOPA in short-term cultures as shown by scintillating counting. The intact bacilli are known to have a high permeability barrier. The experiments described suggest that [^{3}H]DOPA becomes trapped within this barrier and oxidized inside the bacilli. Tests by pretreatment with diethyl dithiocarbamate (DDC inhibitor of DOPA), cold DOPA or hyaluronidase distinguish the uptake of [^{3}H]DOPA by bacilli from the effects of connective tissue contamination. Similar increases in labeling of bacilli by scintillation counting of cultures, have been observed by autoradiography of the organisms.

The scintillation method shows promise for rapidly identifying drug resistance in lepromatous patients relapsing while on treatment with dapsone (DDS), rifampicin, clofazimine or other antileprosy drugs.—Authors' Abstract

Massalski, W. K., Shukla, R. R., Lewenstein, W. and Wierzbicki, R. Culture of Hansen's bacilli *in vitro* in a case of lepromatous leprosy. Materia Medica Polona **1(34)** (1978) 35-37.

Lepromatous leprosy was diagnosed in a 16 year old boy by direct bacteriologic and histopathologic studies. Cultures of biopsy material on Sabouraud's medium (containing penicillin and streptomycin) yielded growth of Hansen's bacilli and blastomycetes. Cultures of Hansen's bacilli on the same medium enriched with extract of dried thyroid tissue were positive after five days and three times more abundant.—Authors' Summary

Murohashi, Toyoho and Yoshida, Konosuke. Isolation of *M. leprae* using semisynthetic solid agar medium. Acta Leprol. **70** (1978) 3-21.

The primary isolation of *M. leprae* from leprous nodules was carried out using agar slant prepared by solidifying the basic compositions of M-Y series to confirm the reproducibility of the preliminary studies. Results revealed that the L-Feb-75 strain presented thin membraneous growth from about the 20th week and it crept up the culture tube wall at about the 30th week of incubation at 37°C. L-Jun-75 strain, on the other hand, exhibited numerous white, rough colonies of submiliary size on various places of the lustreless, thin membraneous structure at the inoculation site. Thus, it was clearly demonstrated again that *M. leprae* could be isolated very well on the surface of agar slant of M-Y series. It is very interesting bacteriologically to note that L-Feb-75 strain formed a thin wrinkled pellicle floating on the surface of the liquid medium. Furthermore, the fact that L-Jun-75 strain was isolated from a leprous nodule, preserved for more than three months at -20°C, was very suggestive indicating a standard for the preservation conditions of pathological materials for at least three months from removal to cultivation without destroying the viability of the *M. leprae* contained.—(*Adapted from* authors' summary)

Murohashi, Toyoho and Yoshida, Konosuke. Stimulating effect of leucine on the growth of *M. leprae*. Acta Leprol. **70** (1978) 23-33.

M-Y 16j agar slant was prepared by modifying M-Y 14b which has hitherto been widely used in our experiments by increasing the amount of Na pantothenate and adding leucine; the growth stimulating effect was investigated referring to the foregoing subculture experiments. The results revealed that the growth of *M. leprae* was remarkably stimulated in the primary isolation which was very similar to the subculture. This seemed to result from stimulated biosynthesis of fatty acids by leucine metabolism.—(*Adapted from* authors' summary)

Ogawa, Tatsuji. Observations on a case of supposed contamination with another acid-fast bacillus. I. The isolation culture of a contaminated acid-fast bacillus and *in vitro* examination of isolates. Jap. J. Lepr. **47** (1978) 1-6. II. *In vivo* examination of isolates (Bacillus No. 4). Jap. J. Lepr. **47** (1978) 53-60.

Our attempts to grow *Mycobacterium leprae* in mice were conducted in the midst of studies on the cultivation of *Mycobacterium lepraemurium*. The supposed contamination occurred in experimental 4 in which intravenous injection of a bacterial suspension of *M. leprae* had been carried out four times. At the 12th month an autopsy was done: the superficial lymph nodes exhibited varying degrees of macroscopic enlargement, one mouse (no. 8) revealed gross involvement also in the spleen, liver and lungs. Microscopically, all the animals at this stage harbored acid-fast bacilli in the tissues of various organs such as spleen, liver, lungs, kidneys and pooled superficial lymph nodes; the tissues of mouse no. 8 had the highest number of bacilli. Results of the cultivation test were as follows: macroscopically rough, reddish-violet colored colonies were isolated from the spleen and lung tissues of mouse no. 8. Primary growth occurred only on STC-mixed egg yolk medium after two months of incubation. These colonies changed to a pale yellow color by subcultivation on egg yolk medium. When stained and examined microscopically, the isolate was found to be an acid-fast bacillus similar to *Mycobacterium tuberculosis*. This is hereafter referred to as Bacillus No. 4.

Bacillus No. 4 is very similar to *M. lepraemurium* in many respects, such as colony appearance, cell morphology, pyridine extraction, growth response on the egg and egg yolk media, growth temperature and niacin test. This bacillus is now under examination, therefore no final conclusion can be made at present about its taxonomic position.—(*Adapted from* English abstract)

The second report (part II) continues this study and reports morphologic changes in infected mice comparable to those found in murine leprosy but cultural appearances differed somewhat from *M. lepraemurium*. Indirect immunofluorescence determinations were not conclusive in identification of this bacillus.—OKS

Experimental Infections

Bullock, W. E., Carlson, E. M. and Gershon, R. K. The evolution of immunosuppressive cell populations in experimental mycobacterial infection. J. Immunol. **120** (1978) 1709-1716.

Immunosuppressor activity of considerable potency and complexity was generated during the course of chronic, progressive infection of C3H/Anf mice by *Mycobacterium lepraemurium*. From the 5th through 10th week after inoculation, spleen cells from infected mice mildly but reproducibly suppressed the direct plaque-forming cell response of normal spleen cell cultures to sheep erythrocytes. Suppression at this stage of infection was mediated by cells with macrophage-like characteristics. A marked increase in splenic suppressor activity at 10 to 11 weeks was associated with the appearance of a second suppressor cell subpopulation composed of T lymphocytes. The appearance of these cells was closely related in time to the onset of rapid splenic enlargement and a loss of cutaneous delayed-type hypersensitivity to antigens of *M. lepraemurium* in mice at 10 to 11 weeks of infection. Suppressor cells were not present in peripheral lymph nodes until termination infection at 22 to 25 weeks.

Suppressor spleen cells depressed the T-dependent antibody response most severely, but there was also a direct effect upon B cells as shown by moderate suppression of responses to TNP-LPS and DNP-Ficoll. Spleen cells from 14-week-infected mice generated a soluble suppressor factor(s) that induces depression of moderate severity, however, the immunosuppression by intact cells was far greater.—Authors' Abstract

Delville, J. and Jacques, P. J. Therapeutic effect of yeast glucan in mice infected with *Mycobacterium leprae*. Arch. Int. Physiol. Biochim. **85** (1977) 965.

The recent report of a host-mediated therapeutic effect of β-1,3 glucans from various sources in experimental tuberculosis (US patent application, 1976), and the hypothesis that particulate yeast glucan might require activation within the host's lysosomes (Di Luzio and Riggi, 1970) prompted us to evaluate the possible interest of such polysaccharides against an infection where the parasite, e.g., *M. leprae*, is an obligate intralysosomal resident.

Mice from a local breed of Tb/Gif strain were first inoculated in the hind foot pads with two different strains of *M. leprae* (strains A and DS). Several months later particulate β-1,3 glucan from *Saccharomyces cerevisiae* was injected locally and intraperitoneally on days 0, (2) and 5 at the combined dose of 20 mg/kg each time. At various times ranging from the 8th to the 104th day after onset of treatment, the foot pads were collected and processed for enumeration of total acid-fast bacteria (AFB) and for determination of the ratio of solid versus granular stained ones (Shepard, 1960; Rees and Valentine, 1962).

In control animals the usual slight macrophage infiltration in the foot pads was associated with a large number of total AFB; amongst the latter, about 7% were solid stained. In treated mice an important inflammatory reaction developed, and histologic examination revealed numerous polymorphonuclear as well as mononuclear leukocytes but without pus formation. In contrast, the total number of AFB was decreased ($p < 0.02$) to nearly 65% of values in control mice, and that of the solid stained mycobacteria was about 38% ($p < 0.05$) of control values.

Since solid stained *M. leprae* are classically equated with live bacteria (Rees and Valentine, 1962), it can be concluded from the present exploratory experiments, that glucan treatment resulted in an important bactericidia and in acceleration of subsequent intracellular destruction of antigenic remnants of the dead bacilli.—Authors' Abstract

Delville, J., Pichel, A. M. and Bouckaert, A. Influence de la pénicilline sur l'infection expérimentale a *Mycobacterium leprae* chez la souris. [Effect of penicillin on experimental infection with *M. leprae* in mice.] Ann. Soc. Belge. Med. Trop. **58** (1978) 125-131. (In French)

After a brief survey of the literature on the use of penicillin as a therapeutic agent in leprosy, the influence of this drug on the experimental *M. leprae* infection of mice is investigated. Statistically significant reduction of *M. leprae* is observed in penicillin treated mice. The infection develops normally again after stopping of treatment. This is in accordance with a bacteriostatic effect of penicillin.—English Summary

Kawaguchi, Y., Matsuoka, M. and Kawatsu, K. Pathogenicity of cultivated murine leprosy bacilli of Hawaiian-Ogawa strain in mice. I. The pathogenicity of bacilli from rough colonies. Jap. J. Exp. Med. **48** (1978) 17-26.

This paper deals with the pathogenicity of cultivated murine leprosy bacilli from rough colonies of Hawaiian-Ogawa strain in mice. This strain was isolated by Ogawa in 1970 on Ogawa's 1% egg yolk medium, from mice previously inoculated with Hawaiian strain of murine leprosy bacilli which has been maintained by passages from mice to mice.

The pathogenicity of Hawaiian-Ogawa strain was found to belong to the same pattern as the Hawaiian strain when the subcutaneous inoculation test was carried out in C57BL/6 and C3H mice, the former being representative of the benign type and the latter being representative of the malignant type. In KK mice of the intermediate type with Hawaiian bacilli, however, Hawaiian-Ogawa bacilli produced the lesions with malignant features in almost all the male mice, while the female mice were divided into two groups roughly half showing the intermediate or malignant

type. In DDD mice of the benign type with Hawaiian bacilli, some cases of male mice showed malignant features, whereas almost all female mice were of the benign type in the same experimental conditions. The pathogenicity of Hawaiian-Ogawa bacilli in mice did not revert into that of Hawaiian bacilli even after serial mouse passage. There are slight but definite differences in the mouse pathogenicity between the Hawaiian-Ogawa and Hawaiian strains.—Authors' Summary (*From* Trop. Dis. Bull.)

Kohsaka, K., Makino, M., Mori, T. and Ito, T. Establishment of experimental leprosy in nude mice. Jap. J. Bacteriol. **33** (1978) 389-394. (In Japanese)

A lepromatoid lesion developed in a nude mouse inoculated with *Mycobacterium leprae* was previously reported by the authors. The secondary passage of *M. leprae* which had proliferated in the lesion of the first infected nude mouse into other nude mice was confirmed experimentally. The reproducibility of animal transmission with nude mice was also proved.

Successive transmission of *M. leprae* was carried out three times by the foot pad technic with the organism which had proliferated in a nude mouse. *M. leprae* derived from five lepromatous patients were also inoculated into foot pads of nude mice. Infected animals were maintained in vinyl (plastic) isolators under an SPF condition. Swelling was found microscopically in infected foot pads of all the animals in the tenth month after infection. A lepromatoid lesion was seen at the site of inoculation. At the same time, a bacterial harvest amounted to 3.6×10^8 from a foot pad of the mouse. The nude mouse (BALB/c-nu/nu) and its normal littermate (BALB/c-nu/+) were examined for body temperature with an electronic thermometer. There was no significant difference in body temperature between the nude mouse and the normal. *M. leprae* were detected from the skin of low temperature parts of the body, but not from the skin of high temperature parts, in the tenth month after infection. The bacilli were seen in the lung, liver and spleen, but not in the kidney. *M. leprae* organisms derived from five different patients were successfully transmitted into the foot pads of nude mice. The maximum yield of *M. leprae* was 1.1×10^{10} in a foot pad in the eight month after infection.—Authors' English Summary (*Adapted from* Trop. Dis. Bull.)

Levy, L., Aizer, F., Ng, H. and Welch, T. M. The effects of tilorone on mycobacterial infections of mice. Lepr. Rev. **49** (1978) 215-222.

Tilorone (2,7-bis[2-diethylaminoethoxy] fluoren-9-one dihydrochloride), administered in a concentration of 0.05 gm per 100 gm in the mouse chow, was found to inhibit multiplication of *Mycobacterium leprae* in the mouse foot pad. Infection was enhanced in mice inoculated with *M. marinum* or *M. lepraemurium* to which the drug was administered in the same dosage. Tilorone appears to have exerted an antimicrobial effect on *M. leprae* that outweighed the immunosuppressive effect of the drug on the mouse host.—Authors' Abstract

McKeever, P. E., Walsh, G. P., Storrs, E. E. and Balentine, J. D. Electron microscopy of peroxidase and acid phosphatase in leprous and uninfected armadillo macrophages: a macrophage subpopulation contains peroxisomes and lacks bacilli. Am. J. Trop. Med. Hyg. **27** (1978) 1019-1029.

Lepromatous tissue from armadillos inoculated 24-36 months earlier with *Mycobacterium leprae* was obtained for electron microscopic studies. Cytochemically stained lepromas revealed a subpopulation of macrophages containing peroxisomes. These peroxidase reactive macrophages were not infected with bacilli. Acid phosphatase was present in macrophages and many of these were infected with bacilli and contained vacuoles and lipid globules. Within the membrane-bound vacuoles, acid phosphatase surrounded bacilli. However, the reaction product ended abruptly at a 15-40 millimicron thick zone of low electron density surrounding intact bacilli. Acid phosphatase was more intensely reactive and localized less precisely in heavily infected and vacuolated macrophages than in lightly and noninfected cells. The effectiveness of this bacillary barrier and the numerous infected macrophages with substantial acid phosphatase argue against the ability of acid phosphatase to protect host cells from leprosy bacilli. Evidence suggests a protective action

of peroxidase or the rapid turnover of macrophages within lepromas. Granular and membranous debris were commonly seen within vacuoles of infected macrophages. A portion of the debris was ultrastructurally similar to bacillary matrix and was nonreactive for peroxidase and acid phosphatase. Following homogenization and centrifugation, similar materials banded with bacilli above 60% sucrose. Another portion of the debris was ultrastructurally similar to host lysosomal matrix and was reactive for acid phosphatase. Results support the concept of dual host and parasitic origins of the debris found in phagolysosomes of infected macrophages. Transparent, oval Epon defects remained eccentric to the majority of intact bacilli in centrifuged fractions. Apparently, an intrinsic property of leprosy produced these Epon defects.—Authors' Abstract

Nabarra, B., Cavelier, J. F., Dy, M. and Dimitriu, A. Scanning electron microscopic studies of activated macrophages in the mouse. J. Reticuloendothel. Soc. **24** (1978) 489-498.

The object of the present study was to determine whether the *in vitro* activation of mouse macrophages, by mixed lymphocyte culture supernatant in an allograft system, was accompanied by morphological modification of these cells. Eight macrophage populations were studied. They were composed of activated and control macrophages which were obtained either with or without thioglycollate injection and were observed alone or in the presence of target cells. In all groups, a distinct difference was observed between activated and control macrophages. Control macrophages showed little membrane activity and spread on the slide with few microvilli, whereas activated macrophages demonstrated an increase in membrane activity and more finger-like pseudopods and microvilli. Some attachment between macrophages and target cells was also observed.—Authors' Abstract

Patel, P. J. and Lefford, M. J. Specific and nonspecific resistance in mice immunized with irradiated *Mycobacterium leprae*. Infect. Immun. **20** (1978) 692-697.

Following subcutaneous inoculation of irradiated *Mycobacterium leprae* (I-ML) into the left hind foot pad of mice, there was increased resistance to *Listeria monocytogenes*, indicative of macrophage activation at the immunization site. In spite of the high level of localized macrophage activation which was proportional to the immunizing dose of I-ML, no such activity could be demonstrated systemically in these mice, as evidenced by the absence of increased resistance to an intravenous challenge with *L. monocytogenes*. Under these conditions, I-ML immunized mice were nonetheless resistant to intravenous infection with either *M. tuberculosis* or *M. bovis* BCG, and this immunity was transferred to normal recipients using spleen or lymph node cells. Neonatal thymectomy completely abolished the development of antimycobacterial immunity after vaccination with I-ML but immunity was restored by an intraperitoneal infusion of syngeneic thymocytes. Systemic nonspecific resistance could be generated in I-ML immunized mice by an intravenous injection of disrupted I-ML. This study reveals that, after subcutaneous vaccination with I-ML, there is local accumulation of activated macrophages at the inoculation site and a widespread distribution of lymphocytes which are sensitized to mycobacterial antigens. Nonspecific resistance is mediated by the former cells and specific antimycobacterial immunity by the latter.—Authors' Abstract

Pattyn, Stefaan R. Further data on the effect of ethionamide and prothionamide in experimental leprosy. Lepr. Rev. **49** (1978) 199-202.

Experiments carried out in mice using intermittent administration of ethionamide and/or prothionamide indicate that the efficacy of these drugs are substantially impaired if they are given less frequently than three times a week. Irregular administration of these drugs could lead more rapidly to the emergency of resistance than is the case for dapsone. Results of the total minimal inhibitory test show that treatment of paucibacillary leprosy with prothionamide during 9 or 12 weeks can be envisaged.—Authors' Abstract

Poulter, L. W. Systemic immunological reactivity in the absence of delayed-type hypersensitivity during murine leprosy. Cell. Immunol. **40** (1978) 117-127.

The generation of cell-mediated immunologic reactivity has been examined following systemic infection of mice with *M. lepraemurium* (MLM). It has been found that although delayed-type hypersensitivity to MLM is ablated within two weeks of infection, resistance, as determined by a containment of the multiplication of the organism at various sites, persists for at least seven weeks. During this time it was found that a population of lymphocytes sensitized to MLM antigens appeared within these animals and that DTH could be generated if these cells were focused at a foot pad site.

The possibility that these changes in immunologic status are determined by increasing levels of antigen, resulting from a systemic killing of MLM is discussed. It is postulated that persistent desensitization eventually results in anergy to MLM.—Author's Summary

Poulter, L. W. and Lefford, M. J. Relationship between delayed-type hypersensitivity and the progression of *Mycobacterium lepraemurium* infection. Infect. Immun. **20** (1978) 530-540.

The relationship between the level of delayed-type hypersensitivity (DTH) and the progression of *Mycobacterium lepraemurium* infection was examined after inoculation of mice with 10^8 *M. lepraemurium* in the left hind foot pad. The expression of DTH developed over the first four weeks of infection, remained high up to week eight, and then dropped to a low level at which it remained for twelve more weeks. The development of DTH was concordant with an initial swelling of the inoculated foot, the appearance of a mononuclear infiltrate at this site, and a prevention of any increase in the number of mycobacteria in this foot and in other tissues studied. A decay of DTH reactivity was associated with a progressive increase in the number of *M. lepraemurium* initially at the original site of inoculation and subsequently in all other tissues. Although the expression of DTH was lost, adoptive immunization experiments showed that a population of sensitized lymphocytes persisted within the host. Further experimentation offered evidence to suggest that the level of systemic antigen may be in part responsible for the loss of DTH reactivity.—Authors' Summary

Smith, J. H., File, S. K., Nagy, B. A., Folse, D. S., Buckner, J. A., Webb, L. J. and Beverding, A. M. Leprosy-like disease of wild armadillos in French Acadiana, Louisiana. J. Reticuloendothel. Soc. **24** (1978) 705-719.

An independent survey of wild armadillos in the French Acadiana section of Louisiana revealed that approximately 10% of trapped armadillos had a leprosy-like disease indistinguishable from experimentally produced infections of armadillos with *Mycobacterium leprae* from human sources. Detailed description of pathologic findings in two afflicted animals and a proposed model of the pathogenesis are reported.—Authors' Abstract

Storrs, E. E., Binford, C. H. and Migaki, G. Animal model of human disease: lepromatous disease. Am. J. Pathol. **92** (1978) 813-816.

This presentation is one of a series presented by this journal on animal models in disease. It briefly presents the characteristics of the armadillo thought to be significant for its susceptibility and briefly describes the occurrence of disseminated infection following inoculation with *M. leprae*. No immunologic or other studies are presented.—OKS

Sushida, Kiyo. Attenuation of drug-treated murine leprosy bacilli in mice. A. Examination of acid-fast bacilli isolated from murine leprous mice administered with drugs (*in vivo*). B. Examination of drug-resistant murine leprosy bacilli (*in vitro*). Jap. J. Lepr. **47** (1978) 13-23. (In Japanese)

From previously reported findings the author concluded that in animal inoculation studies it might be best to use untreated leprosy bacilli. The hypothesis was accordingly tested in the mouse/*M. lepraemurium* model.

Accordingly, *M. lepraemurium* (Hawaiian strain) infected mice were treated with INH or rifampicin. Nodules at the site of inoculation appeared respectively two months and three months later than in control mice.

In a second set of experiments, *M. lepraemurium* were grown on Ogawa yolk medium containing stepwide increases in streptomycin

up to a concentration of 50 mcg/ml. These bacilli were then inoculated into mice. In all mice thus inoculated no nodules developed within 11 months, whereas in control mice with untreated bacilli nodules developed by 5 months. It was concluded that drug-treated bacilli (here regarded as streptomycin resistant) whether from treated infected mice or from drug-containing medium, are attenuated with respect to mouse infection.—OKS

Sushida, Kiyo and Nakano, Hisao. Distribution in pregnant mice of radioactivity after injection of ^{131}I and immunosuppressive effects by whole body irradiation. Jap. J. Lepr. **47** (1978) 7-12. (In Japanese)

In previous studies globi were found in the testes of ^{131}I-treated mice which had been inoculated with *M. leprae*. This suggested that the RES was debilitated by the ^{131}I treatment.

In the present study the distribution of ^{131}I-NI in fetuses and offspring from ^{131}I-treated females was compared with that in the parents. Likewise homograft survival was compared in ^{131}I treated and irradiated mice. ^{131}I-NaI was rapidly distributed in pregnant mice reaching highest levels in the thyroid. In fetuses and offspring levels were lower in the thyroid, comparable to levels found in the organs of the parents. It was concluded that transfer of ^{131}I had occurred to the offspring through the mothers' milk. Mouse homograft study and lymph node weights were interpreted as indicating immunosuppression by the ^{131}I treatment.—OKS

Waters, M. F. R., Bakri, H. I., Rees, R. J. W. and McDougall, A. C. Experimental lepromatous leprosy in the white-handed gibbon (*Hylobatus lar*): successful inoculation with leprosy bacilli of human origin. Br. J. Exp. Pathol. **59** (1978) 551-557.

Leprosy bacilli of human origin were inoculated into a white-handed gibbon by the i.v. and i.p. routes, and also locally into ears, testis and around an ulnar nerve. The animal was observed closely during a period of nearly 15 years and did not exhibit any clinical evidence of cutaneous or neurological disease. At death, a wide range of tissues was taken for bacterial counts and histological examination, and a disseminated and progressive infection was demonstrated. Acid-fast bacilli were found in many sites; their morphological appearance, distribution in nerves, and pattern of multiplication in mouse foot pads, and also the presence of antimycobacterial antibody in the serum and the absence of specific lymphocyte transformation were all in keeping with an infection by *Mycobacterium leprae*, at an early lepromatous stage. This is probably the first fully documented report of experimental lepromatous infection in a primate. The findings are discussed in relation to the long incubation period of lepromatous leprosy and the difficulties of diagnosing the disease at an early stage in man.—Authors' Summary

Epidemiology and Prevention

Diaz Almeida, J., Fernandez Baquero, G., Menendez Garcia, V. G., Sagaro Delgado, B., Munoz, H. and Toledo, G. Estudio clinico-epidemiológico de los enfermos ingresados en el hospital "El Rincón." [Clinico-epidemiologic study of (leprosy) patients admitted to the "El Rincon" hospital.] Rev. Cuba Med. Trop. **28** (1976) 143-155. (In Spanish)

Data were collected under the following headings in response to a questionnaire to be completed in respect to 207 leprosy patients: province and area of birth; age groups; civil status (single, married, etc.); sex distribution, generally and in relation to clinical disease forms (lepromatous 179 cases, tuberculoid 27 cases); color; domicile of relatives (urban or rural); habitual residence of patients; whether working or not and type of employment; time of diagnosis of leprosy (before 1950 to after 1970); bacillary status of patients; Mitsuda test results; previous use of BCG vaccine; previous incidence of pulmonary tuberculosis; results of screening; analysis of initial symptoms; localization of primary symptoms; previous contact with leprosy sufferers; family and other contacts before contracting the disease; and time of contact with a possible source of infection. The survey was conducted to study clinical symptoms and possibilities of

an epidemic.—M. de O. Tollemache (*Adapted from* Trop. Dis. Bull.)

Enna, C. D., Jackson, R. R., Trautman, J. R. and Sturdivant, M. Leprosy in the United States, 1967-1976. Public Health Rep. **93** (1978) 468-473.

A leprosy control program consisting mainly of surveillance of the contacts of persons in the United States with leprosy apparently has been reasonably successful in achieving its goal of expeditious treatment for those few contacts who become infected. Cases in the U.S. native-born have decreased; in the foreign-born, however, they have increased. In this paper the implications and significance of the increased number of cases in the foreign-born are explored, and data on leprosy are compared for 1967-1976 with those for 1947-1968. The staffs of the Leprosy Register and the clinical branch of the Public Health Service Hospital at Carville, Louisiana conducted the control program.—(*Adapted from* article)

Narayanan, E., Sreevatsa, Daniel Raj, A., Kirchheimer, W. F. and Bedi, B. M. S. Persistence and distribution of *M. leprae* in *Aedes aegypti* and *Culex fatigans* experimentally fed on leprosy patients. Lepr. India **50** (1978) 26-37.

Laboratory reared *Aedes aegypti* and *Culex fatigans* were experimentally fed on untreated lepromatous leprosy patients, and the proboscides, guts and feces of the mosquitoes were examined at 12 hour intervals to determine the persistence and distribution of *M. leprae*. In *Aedes aegypti*, bacilli persisted in the proboscis up to 156 hours, in the gut for 96 hours, and in the feces for 72 hours after feeding. In *C. fatigans*: proboscis 144 hours, gut 96 hours, and feces 72 hours after feeding. In *A. aegypti* solid bacilli were present in the proboscis up to 96 hours, gut 48 hours, and feces 42 hours after feeding. Corresponding figures for *C. fatigans* were: 144 hours for the proboscis, 48 hours for the gut, solid bacilli were absent in the feces. The results are discussed from the point of view of arthropod transmission.—(*Adapted from* authors' abstract)

Piamphongsant, Thada. Perspectives in dermatology: Thailand 1973-1977. Int. J. Dermatol. **17** (1978) 394-397.

Few investigative studies have been performed in Thailand although the country is served by fifty dermatologists in Bangkok. Five residents in dermatology are trained per year at the Institute of Dermatology and University Hospitals in Bangkok. Hence the dermatological care provided is still inadequate even for the six million people in Bangkok. A three-week short course in practical dermatology for 25 general practitioners from provincial areas is conducted twice yearly to provide some dermatological care for the other 35 million people in Thailand.

A paucity of leprologists and immunologists means that little leprosy research has been done in Thailand. The levels of immunoglobulins were high in lepromatous leprosy cases who had the disease for more than five years. In *erythema nodosum leprosum* there was an increase in the percentage of antinuclear antibodies and rheumatoid factor. The levels of IgM, IgA and C_3 were increased. The incidence of HL-A BW_{40} was increased in cases of tuberculoid and lepromatous leprosy. Deposition of immunoglobulins and complement was observed at the dermoepidermal junction in a few cases of leprosy but there were no intercellular antibodies (personal unpublished data). Histologic studies were made of the sites of BCG vaccination in leprosy. In tuberculoid leprosy the histology showed granulomatous inflammation while in lepromatous leprosy it showed nonspecific inflammation. In cases of borderline leprosy, the histology resembled that found in healthy persons.—(*Excerpted from* article)

Terencio de las Aguas, Jose. Epidemiologia de la lepra en Espãna. [Epidemiology of leprosy in Spain.] Rev. Leprol. **11** (1978) 493-501. (In Spanish)

This article presents a historic recapitulation of the origin of leprosy in Spain and the beginning of official statistics, methods of leprosy control, the division of leprosy into four focal infections and number of patients, and prevalence and incidence indexes.—(*Adapted from* English summary)

Wkly. Epidem. Rec. Leprosy. Volume **53** (1978) 147.

Leprosy cases totaling 1,832 were reported in Bolivia in 1977. Of these, 855 came from the department of Santa Cruz, and the remainder in approximately equal numbers, from Beni and Chuquisaca. Of the total cases, 807 were of the lepromatous type, 561 tuberculoid, 303 indeterminate, and 161 borderline. The total number of cases in the country is estimated at 3,907; a prevalence of about 1 per 1,000 inhabitants. In the three departments mainly affected, surveillance is carried out by a total of five leprologists, in another department it is undertaken by a dermatologist, and elsewhere in the country by the provincial medical officers.—F.I.C. Apted (*From* Trop. Dis. Bull.)

Other Mycobacterial Diseases and Related Entities

Choi, Sung Hyup. Clinical observations on 122 inpatients with renal tuberculosis. Korean J. Urol. **18** (1977) 395-400. (In Korean)

Clinical observations were made on 122 cases of renal tuberculosis who were admitted to the department of urology at the Presbyterian Medical Center, Taegu, Korea during the period from 1 August 1970 through 31 January 1977. Results were as follows: 1) incidence of renal tuberculosis was 9.8% of all inpatients; 2) initial symptoms were mostly those of vesical symptoms such as heamturia (77%), frequency (77%), and pain on urination (46.7%); 3) urinalysis revealed hematuria in 67.2%, pyruia in 68.8%; 4) tubercle bacilli were demonstrated by staining in 22%, by culture in 36.8%; 5) most of the pyelograms revealed nonvisualization with or without contralateral hydronephrosis, and cystoscopy showed active lesions of cystitis in 65%; 6) patients were treated with chemotherapy only in 34%, chemotherapy with nephrectomy in 53%, chemotherapy with reconstructive surgery in 8%; 7) urine findings following nephrectomy were satisfactory and morbidity was low and negligible.—(*Adapted from* Korean Med. Abstr.)

Chung, Tai Ho, Kim, Song Myung and Lee, Sung Haing. Effects of Tubercin-3 on rifampicin induced T-lymphocytopenia in tuberculosis patients. Kor. J. Thor. Cardiovas. Surg. **11** (1978) 12-17. (In Korean)

Rifampicin has been widely hailed as the most effective antituberculosis antibiotic since the clinical use of streptomycin, but its immunosuppressive side effect is still an annoying problem to be eliminated.

This study was carried out to determine the effect of Tubercin-3, a tuberculous bacilli extraction with water, on rifampicin induced T-lymphocytopenia, in five cases of pulmonary tuberculosis which had never been exposed to antimetabolites or steroid compounds. After two weeks of rifampicin treatment, all cases showed T-lymphocytopenia, active 13.0 ± 2.3% and a total of 43.1 ± 4.4%. This was followed by another two weeks of treatment with rifampicin combined with Tubercin-3. T lymphocytes in peripheral blood returned to normal limits, active 21.6 ± 3.3% and total 56.3 ± 1.7%. Tubercin-3 revealed the restoring activity of suppression of T-lymphocyte rosettes by rifampicin.—(*Adapted from* Korean Med. Abstracts)

Kim, Hak Sul. Clinical observations of renal tuberculosis. Korean J. Urol. **18** (1977) 503-509. (In Korean)

Clinical observations were done on 135 cases of renal tuberculosis in the department of urology at the Catholic Medical College during the period from 1971 to 1975. The diagnosis was dependent on intravenous pyelographic findings and AFB staining in the urine. The results were as follows:

1. The incidence of renal tuberculosis was 0.8% of all urological outpatients, and 9.4% of inpatients. Male to female ratio was 1.4:1. Age distribution showed that 29.6% of cases were in their 20's, and 26% were in their 30's.

2. The total number of cases affected bilaterally was 7.4%, right side 40%, and the left side 52.6%.

3. The intravenous pyelographic findings in 95 cases were nonvisualization (53.7%), moth-eaten appearance (36.8%), caliectasis (32.6%), delayed visualization (27.4%), cavity formation (25.3%), and ureteral stricture (24.2%).

4. Intravenous pyelographic findings of contralateral kidney and contralateral ureter-bladder in 85 cases of unilateral renal tuberculosis were normal in 60%, hydronephrosis due

to ureterovesical junction stricture in 24.7%, contracted bladder in 29.4%.

5. Out of 135 cases, 55 had undergone nephrectomy (91.8%), ureteral reimplantation (11%), nephrostomy (23.7%), cutaneoureterostomy (1.8%) and ileocystoplasty (12.7%). —(*Adapted from* Korean Med. Abstr.)

Marsch, W. C., Nurnberger, F. and Stuttgen, G. The ultrastructure of *Mycobacterium marinum* granuloma in man. Arch. Dermatol. Res. **262** (1978) 205-217.

Three biopsies of three to five week old nodular lesions in two patients with so-called swimming-pool (aquarium) granuloma have been examined by electron microscopy. The cytohistological spectrum simultaneously comprises acute exudative as well as chronic proliferative phenomena. Epithelioid cells and collagen producing fibroblasts are already conspicuous in three week old granulomas. According to cytological composition the *Mycobacterium marinum* granuloma represents a high turnover granuloma with immunogenic origin. It is comparable to mycobacterial diseases in the presence of well-developed cell-mediated immunity (lupus vulgaris, tuberculoid leprosy).

Degrading mycobacteria have been rarely detected in phagocytes and are compared with viable bacilli in macrophages of experimentally infected mice. Curved and annular parallel membranes ("worm-like structures") in the cytoplasm of transformed macrophages and in fibroblasts presumably originate from the membranes of endoplasmic reticulum. Cord-like structures with transverse bands (periodicity 170-180 Å) in the lumen of RER of some fibroblasts are interpreted as intracellularly aggregated collagen precursors.—Authors' Summary

Yoon, C. Y., Kim, K. J., Cho, K. K., Park, H. B. and Huh, C. D. A clinical study of miliary tuberculosis in adults. Korean J. Int. Med. **21** (1978) 157-163. (In Korean)

A clinical study was done on 72 cases of miliary tuberculosis from the Kwang Ju Christian Hospital from January 1970 to November 1976.

The following results were obtained: 1) 72 cases were found among a total of 11,218 pulmonary tuberculosis patients (0.64%); 2) 43% of patients were between 15 and 25 years of age with the incidence decreasing as the age increased; 3) anorexia and general weakness were the main constitutional symptoms, with coughing and dyspnea as the main respiratory symptoms; 4) duration of illness before diagnosis was almost always less than two months; 5) 38% were sputum positive for tubercle bacilli; 6) on admission, miliary tuberculosis was most commonly confused with typhoid fever, acute hepatitis and acute glomerulonephritis; 7) positive family history for TB was 17%; 8) almost all patients had mild anemia and elevated erythrocyte sedimentation rate on admission; 9) the tuberculin skin test was positive in 54%, patients who had negative skin tests were in the high mortality group; 10) the most common sites of concomitant extrapulmonary tuberculosis were the meninges, spine and other bones and joints; 11) treatment regimens were INH, SM, rifampicin, prednisolone, etc.; 12) 48 patients were followed-up, 5 died of meningitis and one died of peritonitis; 13) clinical improvement was usually seen after two months of treatment and radiological improvement within four months.—(*Adapted from* Korean Med. Abstr.)