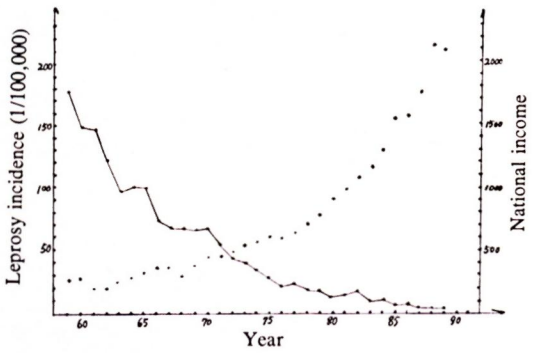

THE FIGURE. Economic growth and leprosy incidence in Guangzhou District, 1960–1990. (– – –) = Leprosy incidence (per 100,000); (· · · · ·) = economic growth (per capita income corrected for price changes).

relation between leprosy incidence and the economic index.

From the economic viewpoint, we can explain why leprosy in Norway was eradicated before any antileprosy drug was found and why leprosy in Japan was not eradicated at that time even though its strict isolation policy was being carried out but afterward leprosy naturally passed away along with development of the Japanese economy.

Naturally we think that the economy itself has no direct association with leprosy incidence from the medical viewpoint. The actual elements affecting leprosy incidence should be environmental factors. Human activities and their productive ability control the living environment of human beings (such as the conditions of the rooms, living habits, food sources and variety, etc.). The living environment also controls the health conditions of human beings who live in this environment. Health and environment affect each other and form a human-environment system with the feature of mutual feedback. Leprosy incidence is only a representation of the level of the system in a way. Because the economic index can be regarded as an approximate indicator for the level of the living environment of human beings, leprosy incidence is highly inversely related to the economy. Of course these thoughts are only speculations, and there is a long way to go to reveal the precise relationship between leprosy and the living environment. Maybe it is beyond our present ability.

For many years, people have been looking for a valid and simple indicator to predict leprosy incidence in order to plan for leprosy control. As a result of our research, is it possible to predict leprosy incidence by using an economic index? If it is true, data on an authoritative economic index published by the government every year can be very useful. We made a logarithmic model to predict the leprosy incidence in Guangzhou, and the result showed that leprosy incidence will decrease to below 0.5/100,000 by 1996 in Guangzhou according to present economic development trends and the government plan. Our research might also suggest that, due to economic development, leprosy in Guangzhou will be eradicated in the near future. One is reminded of an old Chinese proverb which says, "Daybreak will be coming whether the cock calls it or not."

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Lack of Response to WHO/MDT; A Case Report

TO THE EDITOR:

We report a 25-year-old Ethiopian girl first seen at ALERT Hospital on 21 May 1991 with a diagnosis of subpolar lepromatous leprosy. She was enrolled in the brodimoprim short-course clinical trial and received the drug from 3 June through 19 September 1991. Prior to starting the trial and again at the end of the trial mouse foot pad viability tests were performed and in both instances showed growth in 8 of 8 inoculated mice.

She showed no clinical response to brodimoprim. She was then placed on a modified World Health Organization multidrug

therapy (WHO/MDT) regimen consisting of an initial intensive phase of 21 days of daily rifampin, supervised, at a dose of 600 mg daily, together with 100 mg daily of clofazimine and 100 mg daily of dapsone. The patient was then continued on clofazimine 100 mg daily and dapsone 100 mg daily until 23 December 1991 when she developed erythema nodosum leprosum (ENL). She was treated with systemic prednisolone and 100 mg three times daily of clofazimine for her ENL with good response.

Two months later her ENL recurred. This time she was treated with systemic corticosteroids and was placed on standard WHO/MDT. Two months after the start of WHO/MDT her ENL had responded but the response to the antibacterial treatment was poor, i.e., there was no clinical regression of nodules and the reduction in the bacterial index and morphological index was poor.

At this point the possibility of multiple-drug resistance was considered. Mouse foot pad drug sensitivities were set up and the patient was treated with clofazimine 100 mg daily and rifampin 600 mg daily. The results of the mouse foot pad drug sensitivity studies are given in The Table. In the next 6 months her response to therapy was good clinically and bacteriologically. Because of the suspicion of multiple-drug resistance she was also given ofloxacin 200 mg twice daily for 3 months. The patient was discharged 4 June 1993 on clofazimine 100 mg daily and rifampin 600 mg once monthly, to be continued for 1 year, with an appointment to return for follow up.

THE TABLE. *Results of dietary concentrations of dapsone, clofazimine and rifampin on multiplication of* M. leprae *in mice.*

Drug concentrations % w/w in diets		No. mice showing multiplication/ total
None		8/8
Dapsone	0.0001	6/6
	0.001	5/5
	0.01	3/5
Clofazimine	0.0001	2/5
	0.001	0/6
	0.01	0/6
Rifampin	0.003	3/6
	0.03	0/6

CONCLUSIONS

Several reports have been made of *Mycobacterium leprae* resistance to dapsone and rifampin ([1-3]) when the drugs were administered individually. There is one report of resistance to clofazimine developing after monotherapy ([4]). On clinical grounds the patient presented here was resistant to all three drugs. She is the first patient we have seen with such a problem.

The mouse foot pad studies showed viable organisms 6 months after being treated with rifampin 600 mg daily under supervision for 21 days, after 6 months of daily clofazimine, and after dapsone 100 mg daily for 4 of the preceding 6 months including the 2 months immediately prior to the mouse foot pad study. The drug sensitivity studies show full resistance to dapsone, sensitivity to clofazimine, and probable sensitivity to rifampin. She responded to clofazimine and rifampin following the biopsy for drug sensitivity studies.

Our experience with this patient has caused us concern. Harboring *M. leprae* strains resistant to the three standard drugs for MDT is a threat to the management of the patient in particular and to the community in general. Very careful surveillance of primary and secondary resistance to the existing WHO/MDT regimen should be undertaken. With this patient presenting clinically as a case of primary resistance to dapsone, clofazimine and rifampin combined, and with other cases presently occurring at ALERT with dapsone resistance, the question arises as to how advisable it may become to continue to treat paucibacillary leprosy with only two drugs.

New combinations of antileprosy drugs should be worked out in advance for the possibility of full resistance to all three of the components of WHO/MDT. Until these new antileprosy regimens are worked out, we suggest that some of the earlier drugs, such as ethionamide and streptomycin, might be re-evaluated for the management of multidrug-resistant leprosy.

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An Investigation of Mast Cells in Two Basic Leprosy Groups

TO THE EDITOR:

Leprosy is a spectral disease, the clinical and histopathological features of which depend upon the level of the cellular immune response to *Mycobacterium leprae* ([7,8]). The immunopathogenesis of leprosy skin lesions has not been clarified completely. It is, however, believed that several cell populations may participate. The aim of this study was to investigate the role of mast cells in the histopathogenesis of leprosy.

The mast cell population in skin specimens from 28 untreated Greek leprosy patients was investigated. The patients initially were classified according to the criteria of Ridley and Jopling ([8]). Two basic groups were studied, tuberculoid and lepromatous. The first group comprised 9 cases (2 tuberculoid, TT; 7 borderline tuberculoid, BT) and the second one, 19 cases (4 borderline lepromatous, BL; 15 lepromatous, LL). Four out of 15 LL cases had features of histoid leprosy (HL). The chloracetate esterase (Fast Blue RR) method in paraffin sections was used for the detection of mast cells ([7]).

THE TABLE. *Mast cell population in leprosy skin lesions.*

Grades	Tuberculoid leprosy group[a]		Lepromatous leprosy group[a]		
	TT (N = 2)	BT (N = 7)	BL (N = 4)	LL (N = 11)	HL (N = 4)
+	–	5	–	–	1
++	1	2	3	1	–
+++	1	–	–	5	2
++++	–	–	1	5	1

[a] Significant difference ($p < 0.001$) was found between the two groups.

The mast cell count was done by light microscopy using the following scale: + was given for 0–50 cells, ++ for 50–120 cells, +++ for 120–200 cells and ++++ for > 200 cells. Ten high-power fields were studied in each specimen.

The results are presented in The Table. The mast cell count in the first group was lower than that in the second (Figs. 1 and 2). This difference was found to be statistically significant ($p < 0.001$) according to the Mann-Whitney rank sum test. A lower number of mast cells also was observed in the borderline forms of leprosy. The distribution of mast cells in the tissues of the two groups was similar. Mast cells also were found under the epidermis in the Grenz zone in the majority of the lepromatous cases.

We did not note any important differences between the mast cell count in histoid leprosy specimens and those from other cases of the lepromatous group. We did, however, observe intensive degranulation

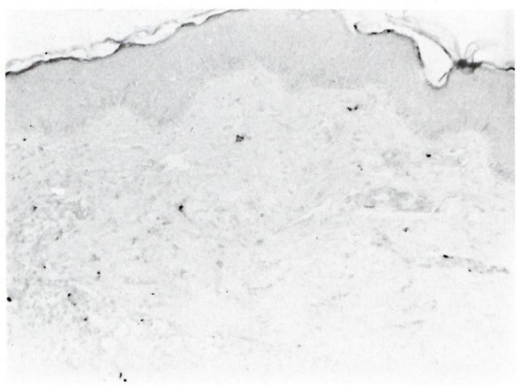

FIG. 1. Borderline tuberculoid leprosy, showing few scattered mast cells in the dermis (Fast Blue RR x250).