clofazimine self-administered for 4 months and followed by 2 months of WHO/MDT and the MI remaining high, at this particular time we could only assume that the patient was harboring multiple-drug resistant *M. leprae*. A mouse foot pad sensitivity study to DDS, rifampin and clofazimine was carried out while the patient was continued on daily rifampin, clofazimine, dapsone and ofloxacin in combination, ofloxacin being given only for 3 months.

To summarize, our patient was on brodimoprim monotherapy for 3½ months for trial and, in retrospect, on clofazimine monotherapy for 4 months because she was found to be fully resistant to dapsone at the end. Our patient has never had either rifampin or ofloxacin as monotherapy.

Indeed, our patient had received intensive WHO/MDT with additional ofloxacin. As we have tried to explain here and in the paper, we hope Dr. Pannikar will realize that we did not do a sequential treatment for our patient.

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Status of HBV DNA and HBsAg in Leprosy Patients

TO THE EDITOR:

Hepatitis due to "B" infection and mycobacterial disease are still major problems of the developing world and a possible association between hepatitis B virus (HBV) infection and leprosy has been proposed ([1, 4]). The data available to date are based on HBsAg status alone and are inconclusive, mainly due to the lack of consistency in the methods used for detection ([6, 7]). In the present study we investigated the correlation of HBV infection with different types of leprosy where, in addition to HBsAg, cloned HBV DNA was used as a marker of ongoing HBV infection.

Forty-one patients belonging to different types of the spectrum of leprosy, classified clinically and histologically according to Ridley-Jopling ([8]), were used in the study. HBV DNA analysis was done by a dot blot assay which had a detection limit of 3×10^4 virus particles (0.1 pg DNA) from 200 μl of patient's serum ([2]). HBsAg was assayed by Abbot EIA using a commercial kit according to manufacturer's instructions. The results are summarized in The Table. It is evident that the incidence of HBV infection is more in LL leprosy, suggesting a correlation between the HBV infection and the cell-mediated immune response to *Mycobacterium leprae*. Almost 50% of the patients in the LL category were found to have either HBV DNA or HBsAg in their serum (The Table, E). However, detailed analyses of individual cases indicated that the presence of HBsAg or HBV DNA alone is not sufficient to draw any conclusions about the status of HBV infection. Out of 41 samples analyzed, only 3 were found to be positive to both HBV DNA and HBsAg. In the LL category, five cases were picked up by the DNA probe although they were negative for HBsAg. This was not surprising, and could be due to a higher sensitivity offered by molecular hybridization assays ([2]).

On the other hand, 4 of 13 BL and 3 of 7 BB leprosy patients did not show any detectable HBV DNA in their sera, although they were HBsAg positive. The presence of HBsAg in serum in the absence of HBV DNA has been reported when HBV DNA becomes integrated into hepatocellular chromosomes ([5]). A similar situation also exists in the case of acute viral hepatitis where HBsAg appears in the serum before HBV DNA. In the high cell-mediated immune response category (BT, TT) only 2 of 10 patients showed HBV DNA; all were negative for surface antigen. The HBsAg carrier rate in India is reported to be 4%–6%. In a control study, out of 150 HbsAg-negative, apparently healthy individuals on the basis of clinico-biochemical criteria, 9 were found to be HBV DNA positive ([2]).

THE TABLE. *Study results by leprosy classification.*

Leprosy type (no. patients)	A		B		C		D		E
	HBsAg negative	+ HBV DNA negative	HBsAg positive	+ HBV DNA positive	HBsAg negative	+ HBV DNA positive	HBsAg positive	+ HBV DNA negative	Positive for either HBV DNA or HBsAg
Lepromatus (LL) (13)	5		2		5		1		8
Borderline lepromatous (BL) (11)	5		1		1		4		6
Midborderline (BB) (7)	3		0		1		3		4
Borderline tuberculoid (BT) (8)	6		0		2		0		2
Tuberculoid (TT) (2)	2		0		0		0		0
Total (41)	21		3		9		8		20

Taken together, HBV infection in healthy individuals by HBsAg/HBV DNA criteria is not more than 10%.

The available information on the prevalence of HBV infection in leprosy patients is based on HBsAg detection alone, but without any conclusion. This is due to varying degrees of sensitivity of HBsAg detection ([1, 7]) offered by various techniques used by different investigators, such as CIE, RIA, RPHA, ID, ELISA. Different mechanisms proposed by various investigators include genetic susceptibility to HBV infection, impaired cell-mediated immunity in LL patients, increased risk of exposure to virus due to institutionalization or increased exposure to virus due to its high incidence in the surrounding population. Involvement of genetic factors in acquiring HBV infection also was proposed by Blumberg and his colleagues ([3]). Contrary to this, Fakunle and Whittle ([6]) reported that the exposure rate to leprosy patients was similar to that of a control population, suggesting that these particular leprosy patients did not have any predisposition to HBV infection.

Although the present studies were carried out with a limited number of patients, the observation strongly suggest a high prevalence of HBV infection (about 50%) compared to the controls which had a HBsAg carrier rate between 4%–6% ([2]). This observed high prevalence of HBV infection is more evident in the BL and Ll categories (60%) when compared with the BT and TT categories (20%) and suggests a relationship between decreased cell-mediated immunity and HBV infection. The results further stress the need for using a DNA probe based upon a molecular hybridization assay in addition to HBsAg detection in order to draw a meaningful conclusion.

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Oxidation of Sphingolipids by *Mycobacterium leprae*

TO THE EDITOR:

Mycobacterium leprae is rich in lipids and on a dry-weight basis leprosy bacilli contain up to 40% lipid ([1]). There are several classes of lipids and each class has a specific biological function. The most abundant membrane lipids are phospholipids which serve primarily as structural elements of the membranes. Sphingolipids, an important class of phospholipids, are present in most membranes of animal tissues. Three well-known sphingolipids are sphingosine, sphingomyelin and cerebroside.

Although these lipids seem to be important, nothing is known about their metabolism by *M. leprae.* The key to *in vitro* cultivation of thus far noncultivated *M. leprae* is to find the oxidizable substrate which can be incorporated into the culture medium to achieve its cultivation. Since sphingolipids occur naturally in membranes of animal tissues, it is likely that they are utilized by *M. leprae in vivo* for their growth, multiplication and biosynthetic reactions.

However, like other lipids, sphingolipids (namely, sphingosine, sphingomyelin and cerebroside) are insoluble in water. Therefore, when these sphingolipids are added in the culture media used for cultivation trials of *M. leprae,* they remain immissible and, thus, are not readily available to the bacilli. Szente, *et al.* ([2]) reported a preparation of palmitic acid-heptakis 2, 6-di-*O*-methyl-β-dextrin complex completely soluble in water. Recently, water-soluble preparations of sphingosine, sphingomyelin and cerebroside containing 10 mg of each in a 40% randomly methylated beta cyclodextrin were kindly provided by Professor L. Szente (H-1525 Budapest, P.O. Box 435, Hungary). Crystalline (solid) sphingosine, sphingomyelin and cerebroside were purchased from Sigma Chemical Co., St. Louis, Missouri, U.S.A. It was of interest to know if these water-soluble and -insoluble sphingolipids are oxidized by *M. leprae.*

Oxidation of sphingosine, sphingomyelin and cerebroside was determined by using the standard manometric techniques as described by Umbreit, *et al.* ([3]). During this study, *M. leprae* were isolated from the foot pad lesions of nude mice (athymic) which previously had been infected with human leprosy bacilli, and purified bacillary suspensions were prepared by differential centrifugation in potassium phosphate buffer, pH 6.5.

Our results have shown that whole cell suspensions of *M. leprae* exhibited considerable endogenous respiration. However, the presence of insoluble (about 100 μg per 2 ml) sphingosine, sphingomyelin or cerebroside in cell suspensions showed no enhanced oxygen uptake over endogenous respiration for a period of 24 hr. These results suggested that these sphingolipids were not oxidized by *M. leprae.* However, when soluble sphingosine, sphingomyelin and cere-