Lipids and Lipoprotein Profiles in Leprosy

To the Editor:

Since very little data are available on lipoprotein patterns in leprosy, an attempt was made to study lipoprotein profiles in various types of leprosy. Eighty-two cases of leprosy were classified as per Ridley and Jopling ([2]). The majority of the cases are from middle and upper income groups of society, collected at a private clinic, and the rest of the cases are from a rehabilitation center. This was done to rule out nutritional deficiencies which might influence serum lipid patterns. Twenty-five healthy persons were taken as controls. Their nutritional status and age were almost the same as those of the leprosy cases. Blood samples were collected in the post-absorptive state, and serum cholesterol ([6]) and serum triglycerides ([1]) were measured. Lipoprotein electrophoresis was done on agarose gel ([3]).

All the cases were classified with regard to their lipoprotein profile according to the WHO classification ([5]). The upper limits of normal were considered to be the mean values in controls plus two standard deviations. In cases where the increase was marginal, the electrophoretic pattern of the serum lipoproteins on agarose gel was taken into consideration to determine the lipoprotein profile.

The lipoprotein profiles are given in the Table. Borderline leprosy patients seem to have more cases of hyperlipoproteinemia. Toward either of the two polar types, lepromatous and tuberculoid, there is a tendency to revert to a normal lipid profile. Type IV hyperlipidemia is the major abnormal lipid profile, occurring in most of the cases. The unusual type III-like hyperlipoproteinemia with a broad beta band was found in one of the two borderline lepromatous leprosy cases. In borderline leprosy, two cases of type V hyperlipoproteinemia were also observed.

These changes may be due to infection with *Mycobacterium leprae*. Alterations in the lipoprotein profile in rabbits infected with certain bacteria have been reported ([4]).

Further studies are needed to determine the mechanism of hyperlipoproteinemias in leprosy, particularly in the early stages.

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The Table. *Lipid profiles in various types of leprosy and control cases. The number (percentage) of cases of each lipid profile in each group are given.*

Type of leprosy	Total number	Lipoprotein profile						
		Normal	I	IIa	IIb	III	IV	V
Lepromatous	23	12 (52)	—	1 (4)	—	—	10 (44)	—
Borderline lepromatous	19	10 (53)	—	—	1 (5)	1 (5)	7 (37)	—
Borderline	11	4 (36.4)	—	1 (9)	—	—	4 (36.4)	2 (18.2)
Borderline tuberculoid	13	9 (69)	—	1 (8)	1 (8)	—	2 (15)	—
Tuberculoid	16	9 (56.2)	—	2 (12.5)	3 (18.8)	—	2 (12.5)	—
Control	25	25 (100)	—	—	—	—	—	—

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Nine-banded Armadillos in Captivity: Prevention of Losses Due to Parasitic Diseases. Some Remarks on Mycobacteria-free Maintenance

TO THE EDITOR:

As with other free-living animals, a number of parasitic diseases occur in nine-banded armadillos (*Dasypus novemcinctus*.) Through changes in the living conditions of the animals after capture (confined space, change of diet, long transport), their resistance may be reduced to such an extent that death can result. Especially lung strongyloidoses are often observed.

It has been useful to treat the newcomers with CITARIN L: 2.5% (Bayer), a broad-spectrum anthelminthic. A subcutaneous injection of 0.2 ml/kg is given twice at weekly intervals (1 ml of the 2.5% aqueous solution contains 29.5 mg levamisol-HCl). This agent possesses high activity both against full-grown lung worms and their larval stages. Besides, a number of nematodes invading the gastro-intestinal tract are effectively combated by this treatment which is well tolerated by the armadillos. It can also be applied successfully in the case of parasitic invasion at an advanced stage. The influence on the course of an infection cause by *M. leprae* has not been investigated. Only an increase of PPD-induced lymphocyte proliferation due to levamisol has been reported (1).

As with other experimental animals, a special standard is required if the armadillos are kept for immunological studies. Our experience with guinea pigs indicates that the mycobacterial contamination of drinking water, litter, and food may lead to non-specific Jones-Mote-reactions (2). Such a contamination is also observed with armadillos kept under conventional conditions. To prevent mycobacterial contamination, the following measures have been taken:

1) **Diet**. The armadillos are fed a standard, mycobacteria-free diet consisting of granulated fish food (TROUVIT 100 Bio 00 Granulat, produced by Milkivit Werke A. Trow GmbH, D-8859 Burgheim, West Germany). A 5 kg animal receives 1 cup of food daily (100 ml of cold [previously boiled] water is added with stirring to 100 g of the granular material and offered in a one-way soup dish). The following composition of Trouvit 100 (which is mainly used as food for trout fry) is indicated by the producer:

50%	raw protein (mainly from sea animals)
7%	raw fat
2%	raw fibers
10%	raw ash
1.5%	calcium
1.5%	phosphorus
0.5%	sodium
38,000	I.U./kg vitamin A
2,000	I.U./kg vitamin D_2
50	mg/kg vitamin E 50
	vitamins of the B-complex in the composition usual for trout fry (no details are given).

This diet was recommended to us by Dr. Leiker of the Royal Tropical Insitiute Amsterdam and by J. L. Schuurman, Univer-