

"LYSOSOMAL ENZYME" ACTIVITIES IN SERA DENGUE
HEMORRHAGIC FEVER PATIENTS

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BACKGROUND : The mechanisms whereby increased vascular permeability, intravascular coagulation, and shock are produced in some dengue virus infections are unknown. Previous work at AFRIMS and elsewhere has shown that monocytes and reticulo-endothelial cells, cells with strong phagocytic capacity and rich in lysosomes, are the predominant cell types infected in DHF. Recently we demonstrated that serum acid phosphatase activity (a lysosomal enzyme) is elevated in DHF (AFRIMS Annual Progress Report 1979-1980, pp 110-113). We therefore studied serum levels of other lysosomal derived enzymes, and attempted to biochemically determine the cells of origin of the elevated serum acid phosphatase.

MATERIALS AND METHODS : Plasma samples were collected from 10 patients with secondary seroresponse DHF at Bangkok Children's Hospital on days 1, 2, 3, 7, and 14 after hospitalization and tested for lysozyme activity by the lysoplate method (1) and beta-glucuronidase activity with phenolphthalein-glucuronide (2) (Dr. Canonico).

AP activity in serum was analysed by Dr.'s Yam and Lam by the colorimetric method for total activity in the presence or absence of tartrate and by an enzyme immunoassay specific for band 5. Sera were then fractionated by electrophoresis on acidic acrylamide gel and the intensity of the bands determined (3).

RESULTS : Activities of lysozyme and beta-glucuronidase were normal during both the acute and convalescent stages of disease.

Total acid phosphatase activity in the serum as analyzed by the colorimetric method and by the enzyme immunoassay are shown in Table 1. During the illness, serum acid phosphatase was found to be about twice that at convalescence. Tartrate had little effect on the enzyme activity determined by the colorimetric method. The enzyme immunoassay, which measures only acid phosphatase band 5, gave higher values than the colorimetric method.

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Electrophoresis of the serum of 10 children invariably showed a dominant band 5b and a trace amount of band 5a. The intensity of band 5b was reduced at the time of convalescence.

DISCUSSION : Recent observations have shown that acid phosphatase in the serum of normal children is higher than that of normal adults. The average value of 31.5 mU/ml in the samples obtained at convalescence from DHF patients is within the range of normal value for children described in previous reports (3). However, the serum acid phosphatase activity of 63.7 mU/ml found in serum during the acute stage of DHF was higher than that of normal children. In this study, the colorimetric, electrophoresis and enzyme immunoassay techniques were used to confirm that the majority of acid phosphatase in children during illness and at convalescence is the tartrate resistant acid phosphatase band 5. This type occurs in high amounts in leukemic reticuloendotheliosis cells, in osteoclastic bone tumors, and in Gaucher cells. Very little of the enzyme is present in normal human tissues. Elevation of band 5b in the serum is found in normal children during physiological bone growth, in adults following bone fracture, in osteoclastic bone tumors, and in malignancies metastasized to bone. The identification of predominantly band 5b in the serum of the present study indicates that the elevation of enzyme activity in dengue hemorrhagic fever is probably also derived from osteoclasts.

Table 1. Serum acid phosphatase activity (mU/ml) during illness and at convalescence.

	n	Acid phosphatase activity, mU/ml		
		Colorimetric analyses		EIA
		- tartrate	+ tartrate	
During illness ¹	10	63.0 ± 6.3	63.7 ± 7.2	43.4 ± 4.0
Convalescence ²	10	35.0 ± 2.6	31.5 ± 2.5	25.7 ± 0.6

1 Samples taken at the time of admission to the hospital (usually at the 4th day of illness).

2 Samples taken 12-42 days after the beginning of the illness.

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