Serum Levels of C3-activator (Antifactor B) in Leprosy

TO THE EDITOR:

There have been previous reports that during the eruption of crops of erythema nodosum leprosum (ENL) raised C2 and C3 levels in the sera of patients have been observed ([6, 7]). These two components are involved in the classical immune complex pathway of complement activation.

C3-activator (Antifactor B) is involved in the alternative pathway activation of complement ([1]), and recently *Mycobacterium leprae* bacilli have been shown to activate the alternative pathway of complement ([3]). It was considered pertinent to determine how the value of C3-activator varies in the leprosy sera, particularly during ENL when initially immune complexes and *M. leprae* bacilli could activate both paths of complement separately.

Sera were collected from 9 ENL, 3 non-ENL and 1 borderline patients from Japan and Addis Ababa, Ethiopia. The concentrations of C3-activator, the third component of complement (C3c) and immunoglobulins (IgG, IgA and IgM) in the patients' sera were determined by the radial immunodiffusion method of Mancini, *et al.* ([2]), using the standard immunoglobulin sera and the Partigen® immunodiffusion plates manufactured by Behringwerke AG (Marburg-Lahn) of West Germany.

Measured 5 μl volumes of the standards of IgG, IgA, IgM, C3c, and C3-activator were introduced into the first three wells and the same volume of test sera introduced into the remaining nine wells of each plate. The 13 mg/ml protein standard plasma used for C3-activator determination was used neat, diluted 1:2 and diluted 1:4 for the three standard wells. All the plates were allowed to stand at room temperature for 48–72 hr before the diameters of precipitin rings which developed around the wells were measured, using a Behringwerke precision measuring viewer. Graphs were plotted of ring diameters against the logarithm of the standard concentration, and the concentrations in the samples were determined from the plots. The results are given in The Table.

Moderate increases in the serum levels of C3-activator were observed only in ENL cases. The lowest values were observed in

THE TABLE. *Concentrations of C3-activator, C3c, and immunoglobulins in leprosy sera.*

Patient	IgG (I.U./ml)	IgA (I.U./ml)	IgM (I.U./ml)	C3c (mg/dl)	C3-activator (mg/dl)
			Japan		
ENL					
K.O.	501	254	188	204	35
M.W.	479	150	347	94	17
S.I.	468	202	150	108	19
T.E.	309	219	126	138	19
Y.T.	501	159	468	87	22
Non-ENL					
K.N.	490	180	137	69	10
Borderline					
U.K.	437	197	116	62	14
			Addis Ababa		
ENL					
No. 1304	214	206	138	102	28
495	266	127	292	155	35
415	229	337	120	170	38
470	229	197	146	108	28
Non-ENL					
No. 335	295	219	150	55	9
291	339	285	263	62	8
			Local Standards		
	299	148	143	82	19
			Western European Standards		
	125	116	141		

non-ENL cases, being half of the lowest observed levels of ENL cases. There were also corresponding increases in the levels of C3c. Both results suggest that the alternative and classical pathways of complement activation are employed at the height of immune reactions (ENL), indicating that the widespread damage of ENL is the sum total of many immunological processes.

The more common immunoglobulin (IgG, IgA, IgM) levels were also increased in sera from Japan, when compared with local standards. Addis Ababa sera levels were lagging behind generally, and could be considered increases if one took the lower western European mean values as determined by Rowe, *et al.* ([4]), suggestive of the Caucasian origin of most of the Ethiopian population. Local standards of C3c and C3-activator are comparable to western European values ([5]). It is only in the case of long-term workers (upwards of 15 years) in the routine microbiology laboratory that such hand-in-hand increases in C3c and C3-activator with high IgG, IgA, and IgM have been observed ([8]); obviously these professionals are not the healthiest individuals around.

Increases in C3-activator levels in the serum with corresponding increases in C3c, IgG, IgA and IgM should be suggestive of active phases of immunologically chronic conditions.

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Acknowledgment. This work received financial help from the Nigerian Medical Research Council.

REFERENCES

1. GOETZE, O. and MUELLER-EBERHARD, H. J. The C3-activator system: An alternate pathway of complement activation. J. Exp. Med. **134** (1971) 90–108.

2. MANCINI, G., CARBONARA, A. O. and HEREMANS, J. F. Immunochemical quantification of antigens by single radial immunodiffusion. Int. J. Immunochem. **2** (1965) 235–254.
3. RAMANATHAN, V. D., CURTIS, J. and TURK, J. L. Activation of the alternative pathway of complement by mycobacteria and cord factor. Infect. Immun. **29** (1980) 30–35.
4. ROWE, D. S. Concentration of serum immunoglobulin in healthy adult males estimated by assay against the international reference preparation. Lancet **2** (1972) 1232–1233.
5. SCHULTZE, H. E. and HEREMANS, J. F. *Molecular Biology of Human Proteins.* New York: American Elsevier, 1966.
6. SEITZ, E. W., DIERKS, R. E. and SHEPARD, C. C. Complement and the second component of complement in leprosy. Int. J. Lepr. **36** (1968) 400–404.
7. WEMAMBU, S. N. C., TURK, J. L., WATERS, M. F. R. and REES, R. J. W. Erythema nodosum leprosum: A clinical manifestation of the Arthus phenomenon. Lancet **2** (1960) 933–935.
8. WEMAMBU, S. N. C. Immunoglobulin and C3-activator profile of the microbiology laboratory worker. J. Nig. Soc. Microbiol. (1983) (in press).