

Alpha-1-Antitrypsin Levels in Lepromatous Blood Serum

A. Baccaredda-Boy, R. Bertamino and E. Nunzi¹

The presence of inflammatory phenomena in leprosy, especially in the course of lepra reactions, has induced us to determine the alpha-1-antitrypsin level in the blood serum of lepromatous patients hospitalized at the Genoa Leprosarium.

Alpha-1-antitrypsin, isolated in its pure state by Schultze *et al.* (8), belongs to the group of alpha-globulins and represents 85-90 per cent of the total antitryptic activity of the human serum.

According to Augener (1) alpha-1-antitrypsin represents 3.2 ± 0.5 per cent of the total serum proteins, while according to Störiko and Schwick (9) the percentage varies between 2.7 and 5.5 per cent.

Alpha-1-antitrypsin increases in erythema multiforme (4) in eczematous erythroderma (4), in dystrophic bullous epidermolysis (4), in rheumatoid arthritis (1), in effusion from liver cirrhosis and glomerulonephritis (1), and in burns proportionally to their extent.

It decreases in new-borns suffering from hemolytic disease (1), and hypo-alpha-1-antitrypsinemia can be recessively transmitted (2, 5).

Alpha-1-antitrypsin, together with alpha-1-acid glycoprotein, aptoglobulin, ceruloplasmin and C-reactive protein, belongs to the group of proteins of the acute phase, which can be found in inflammatory processes of a certain degree (1).

MATERIALS AND METHODS

We determined the alpha-1-antitrypsin in the serum of 45 lepromatous patients, 26 to 77 years old (21 of them with ENL) by radial immunodiffusion in agar according to Mancini *et al.* (6). Samples (0.002 ml.), taken with a 701 Hamilton 10 microliter syringe, from a pool of sera obtained from 20 healthy subjects (10 males and 10 females 26 to 77 years old) were diluted to

1:5, 1:10 and 1:20, and placed in three wells of five agar plates (Partigen alpha-1-antitrypsin Behringwerke). In the remaining nine wells of every plate we placed 0.002 ml. of single lepromatous serum diluted 1:10.

The closed agar plates, containing a fragment of damp spongy material, were then placed in a room at constant temperature, and after 48 hours we measured the surface of the precipitate rings. With respect to the values for these areas, we have given our results, since we had no pure alpha-1-antitrypsin standard.

RESULTS

The average surface of the precipitate rings of the control serum pool diluted to 1:10 was 34.44 ± 1.21 mm.²

The alpha-1-antitrypsin values in 11 inactive lepromatous patients were in the same range as those of the control sera with a minimum of 31.4 mm.² and a maximum of 38.5 mm.², while in 13 active lepromatous patients these values increased (not significantly, however) by an average of 40.4 mm.² with a minimum of 34.2 mm.² and a maximum of 47.7 mm.² (Table 1).

Twenty-one lepromatous patients with ENL showed a significant increase of the average surface of the precipitate rings (82.3 mm.², with a minimum of 63.6 mm.² and a maximum of 113 mm.²) (Table 1).

DISCUSSION

The alpha-1-antitrypsin values have shown to be clearly dependent on the degree of activity of the disease, with a significant increase in active lepromatous patients with ENL. Our results obtained by radial immunodiffusion in agar, which supported a relationship with the presence and degree of the inflammatory processes, confirmed results observed immunoelectrophoretically by Mayama (7).

As in other diseases, in lepromatous pa-

¹ A. Baccaredda-Boy, M.D., R. Bertamino, M.D. and E. Nunzi, M.D., Dermatologic Clinic, University of Genoa, Italy. (Director: Prof. A. Baccaredda-Boy).

TABLE 1. Statistical evaluation of results.

	Control sera pool	Inactive leprosy patients	Active leprosy patients	Active leprosy patients with ENL
	1	2	3	4
No. of determinations	5	11	13	21
Mean mm. ²	34.44	35.45	40.45	81.88
S.E.M.	± 1.210	± 0.679	± 1.228	± 2.782
		2 vs. 1 F = 0.045	3 vs. 1 F = 1.682	4 vs. 1 F = 117,262

tients alpha-1-antitrypsin might well be considered as a specific mark of disease.

Its decrease may indicate a reduction of the extent and activity of the lepromatous lesions, and its increase a worsening of the disease. Also it may precede a lepra reaction.

SUMMARY

The blood serum alpha-1-antitrypsin levels, determined by radial immunodiffusion in agar-gel, showed no significant differences in healthy subjects and active and inactive lepromatous patients, but clearly increased in active lepromatous patients with ENL.

REFERENCES

1. AUCENER, W. Proc. 12th Colloq. Protides biol. Fluids. Brüggé 1964, (Ed. Elsevier, Amsterdam, London, New York, 1965, p. 363). Quoted by Finzi A. F. e Landi G. (3).
2. ERIKSON, S. Pulmonary emphysema and alpha-1-antitrypsin deficiency. Acta med. scand. **175** (1965) 197-205.
3. FINZI, A. F. and LANDI, G. L'alfa-1-antitripsina ematica nel corso della malattia da ustioni. Giorn. Ital. Derm. **109** (1968) 471-478.
4. FINZI, A. F. and LANDI, G. L'alfa-1-antitripsina del siero di sangue in varie dermatopatie. Rass. Derm. Sif. **22** (1969) 11-18.
5. KUEPPERS, F., BRISCOE, W. A. and BEARN, A. G. Hereditary deficiency of serum alpha-1-antitrypsin. Science **146** (1964) 1678-1679.
6. MANCINI, G., CARBONARA, A. O. and HERMANS, J. F. Immunochemical quantitation of antigens by single radial immunodiffusion. Immunochemistry **2** (1965) 235-254.
7. MAYAMA, A. Studies of erythema nodosum leprosum. Ist Report. Immunoelectrophoresis of serum proteins in leprosy. Correlation between the immunoglobulins and the C-reactive protein in leprosy. La Lepro **36** (1967) 140-148. Abstract in Internat. J. Leprosy **36** (1968) 247.
8. SCHULTZE, H. E. and HEIDE, K. Alpha-1-antitrypsin aus Humanserum. Klin. Wnschr. **40** (1962) 427-429.
9. STÖRIKO, K. and SCHWICK, G. Proc. 11th Colloq. Protides biol. Fluids Brüggé 1963 (Ed. Elsevier, Amsterdam, London, New York, 1964, p. 411). Quoted by Finzi A. F. Landi G. (3).