HEREDITARY SENSORY RADICULAR NEUROPATHY: AN ELECTROPHORETIC AND IMMUNOELECTROPHORETIC STUDY OF THE BLOOD SERUM

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Four brothers with hereditary sensory radicular neuropathy (HSRN), from a total of 12 siblings, have been studied, and a disorder of the blood proteins, particularly of the immunoglobulins, has been evidenced.

MATERIAL AND METHODS

A family of 12 siblings descending from first-cousins healthy parents was studied (Table 1 and Figure 1). Four of them showed HSRN. They are from Brazilian origin and white. There is no reference of the same disease in other relatives.

The four patients had trophic and sensory disorders affecting the upper and lower limbs in cases 2 and 3, and only the lower limbs in cases 1 and 4. The subsidiary tests were consistent with the clinical diagnosis.

The blood serum proteins of the patients and their parents were studied through electrophoresis and immunoelectrophoresis. When the blood samples were collected none of them was being submitted to drug therapy.

Case No.	Name	File No.	Age (years)	Sex	Age at the onset of the disease (years)
1	RRP	72253A	18	F	10
2	ARP	8437 E	13	M	10
3	CRP	8520 E	8	M	3
4	MSRP	72252A	6	F	4
5	CRP	Father	44	M	Healthy
6	CP	Mother	38	F	Healthy

Table 1 — Material

From the Neurological Clinic (* Assistant Neurologist; *** Associate Professor) and the Department of Microbiology (** Doctor in Sciences), University of São Paulo School of Medicine, São Paulo SP, Brazil.

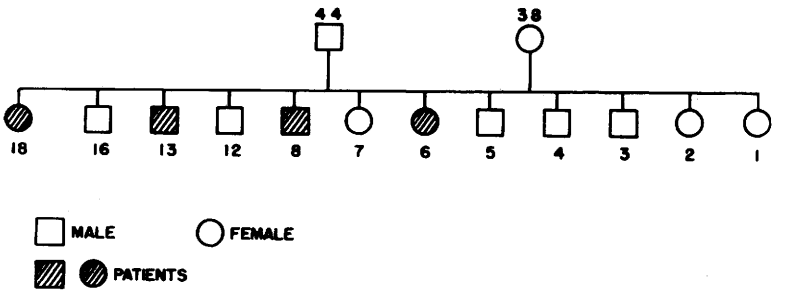

Figure 1 — Pedigree of the family studied.

Total protein was determined by the biuret reaction according to Gornall et al. [3]. Paper electrophoresis was made following roughly the technique of Grassman and Hanning[6] with some minor modification. Immunoelectrophoresis of Grabar and Williams [4-5] was used with the modification described elsewhere by Ferri and Cossermelli [2].

	Case No.					
	1	2	3	4	5	6
Total proteins (g/100 ml)	8,3	8.3	7.7	7.9	8.5	7.9
Albumin						
Per cent	48.4	39.4	45.8	40.1	48.6	49.2
g/100 ml	4.02	3.27	3.53	3.17	4.13	3.89
Alpha$_1$-globulin						
Per cent	5.5	7.6	7.5	6.4	6.6	6.2
g/100 ml	0.46	0.63	0.58	0.50	0.56	0.49
Alpha$_2$-globulin						
Per cent	10.6	10.6	11.1	10.6	11.0	9.2
g/100 ml	0.88	0.88	0.85	0.84	0.93	0.72
Beta-globulin						
Per cent	7.8	13.1	12.0	12.0	11.6	11.8
g/100 ml	0.65	1.09	0.92	0.95	0.99	0.93
Gamma-globulin						
Per cent	27.7	29.3	23.6	30.9	22.2	23.6
g/100 ml	2.29	2.43	1.82	2.44	1.89	1.87
IgA	Normal	Normal	Absent	Normal	Normal	Normal
IgM	Low	Absent	Absent	Low	Low	Low
IgG	High	High	High	High	High	High
Beta$_1$-lipoprotein	High	—	—	High	—	—

Table 2 — Results of electrophoresis and immunoelectrophoresis of the blood.

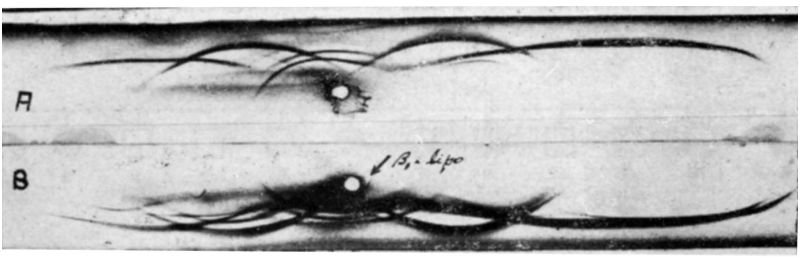

Figure 2 — Immunoelectrophoresis of the blood serum showing immunoglobulin defficiencies. Note IgA and IgM absence in serum A (case 3), serum B (case 4) shows increased beta$_1$ lipoprotein (arrow).

RESULTS

The results are summarized in Table 2. Figure 2 shows the results of immunoelectrophoresis in cases 3 and 4.

Total proteinemia was increased (above 8.0 g/100 ml) in 3 patients, while in case 3 it was close to the upper normal limit.

A slight decrease of albuminemia was observed in 3 of the samples analyzed but, when absolute values were considered (g/100 ml), all the patients presented normal values or very close to the lower limit, as a consequence of the raised proteinemia. The levels of alpha$_1$, alpha$_2$, and beta globulins were within the normal range, either considering the percentage or the absolute value. Gammaglobulin was slightly increased both in its concentration and in the percentual distribution. The presence of paraprotein was not suggested by the electrophoretic study.

The contents of immunoglobulins was evaluated according to the intensity of the corresponding precipitin lines in confront with many samples of normal blood sera. Immunoglobulin A (IgA) was normal in all cases with HSRN except in case 3, where it was not detected. IgG was slightly increased in all cases, like it happened with the electrophoretically analyzed gammaglobulin. The macroglobulin IgM was absent in cases 2 and 3, and markedly lowered in the remaining cases. Only two patients showed increased intensity of the precipitin line of beta$_1$ lipoprotein.

COMMENT

HSRN is a genetic disease with a great variability among the families [8]. In the cases here studied an autosomic recessive heredity was evidenced (Figure 1).

In the literature [11] few references to pathologic studies in HSRN are found. Denny-Brown [1] has observed, especially at L_5 and S_1 and eventually at the cervicothoracic level, a rarefaction of the ganglion cells and the nerve fibres in the spinal roots and corresponding nerves. In the latter demyelination and reactional proliferation of the Schwann cells was found. The sympathetic ganglia exhibited a fibrous, glial and mesenchymal reaction with vascular hyperplasia and congestion. Deposition of a non-amyloid hyaline substance was found in the spinal cord, spinal roots and ganglia, nerves and walls of the low diameter vessels.

Several factors have been incriminated in the etiopathogenesis of HSRN. The disease may start after infectious conditions, vaccinations and undernu-

trition [7]. Local microtraumatisms [12] and the sensory disorders seem to play a significant role in the atrophic process. HSRN could result from an ascending neuritis with involvement of the low diameter vessels [1].

The literature does not record metabolic studies concerning HSRN, except the investigations of Ortiz de Zárate [9, 10], who found a reversion of the albumin-globulin ratio, with an increase of the gammaglobulin content, and suggested that the disease should be related to a metabolic disorder of the paraproteinemia group.

Our results seem to support this view, and point to a disorder of the protein metabolism, particulary of the immunoglobulins.

SUMMARY

The protein metabolism in four cases of hereditary sensory radicular neuropathy was studied through the electrophoresis and immunoelectrophoresis of the blood serum. A slight increase of the gammaglobulin content was found in all cases. The immunoelectrophoresis showed an absense of IgA in a case, a slight increase of IgG in all cases, and an absence of IgM in two cases and a marked decrease of this macroglobulin in two cases of the disease and in their healthy parents. Only two patients showed an increase of beta$_1$ lipoprotein.

RESUMO

Neuropatia radicular sensitiva hereditária: estudo eletroforético e immunoeletroforético do sôro sangüíneo.

Foi estudado, mediante eletroforese e imunoeletroforese do sôro sangüíneo, o metabolismo protêico em 4 casos de neuropatia radicular sensitiva hereditária. Em todos os casos foi encontrado discreto aumento do teor de gamaglobulina. A imunoeletroforese evidenciou ausência de imunoglobulina A em um caso, discreto aumento de imunoglobulina G em todos os casos, ausência de imunoglobulina M em dois casos e acentuada diminuição desta macroglobulina nos dois outros casos, assim como nos outros membros da família aparentemente sadios. Sòmente em dois pacientes foi assinalado aumento de hipoproteina beta$_1$.

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