Chromosome Analysis in Leber's Tapeto-Retinal Dystrophy

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Leber's tapeto-retinal dystrophy, first described in 1869, is classified among the diffuse dystrophies of the retina, and is one of the main causes of congenital blindness.[1-5] Its hereditary and familial character, which is closely related with consanguinity, was also suggested in 1871.[2 3 5-7]

It is quite certain that the importance of genetics in medicine has increased simultaneously with our knowledge of hereditary diseases, and the structure and nature of chromosomes. The discovery of the exact number of human chromosomes in 1956, and the first chromosomal anomaly described in 1959, once again drew world-wide attention to hereditary diseases, for the diagnosis of some of which, chromosome analysis has gained great interest[8-15].

We also carried out chromosome analysis during an investigation on clinical and biostatistical evaluation of Leber's tapeto-retinal dystrophy known as a disease of recessive hereditary character.[16-17].

Materials and Methods

Our series consisted of 39 children from 36 families, in 17 of which there was no consanguinity and in 18 of the consanguineous marriages the husbands and wives were first cousins.

Chromosome analysis were carried out by the micromethod on peripheral blood cells, which is the routine method used for chromosome

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analysis in the Department of Hematology of Hacettepe University School of Medicine.[18] Thirty areas were counted in all cases, karyotypes were made and a thorough search was made for anomalies.

Photographs were obtained by Zeiss Ikon camera, attached to a standard GFL binocular microscope, using 15 D. Isopan IFF black and white films, under immersion objective (8 x 100). As chromosomes appear pale violet with Giemsa dye, various colored filters were used in order to obtain contrast positives. The aperture was left open for approximately 15 seconds (Figures 1 and 2).

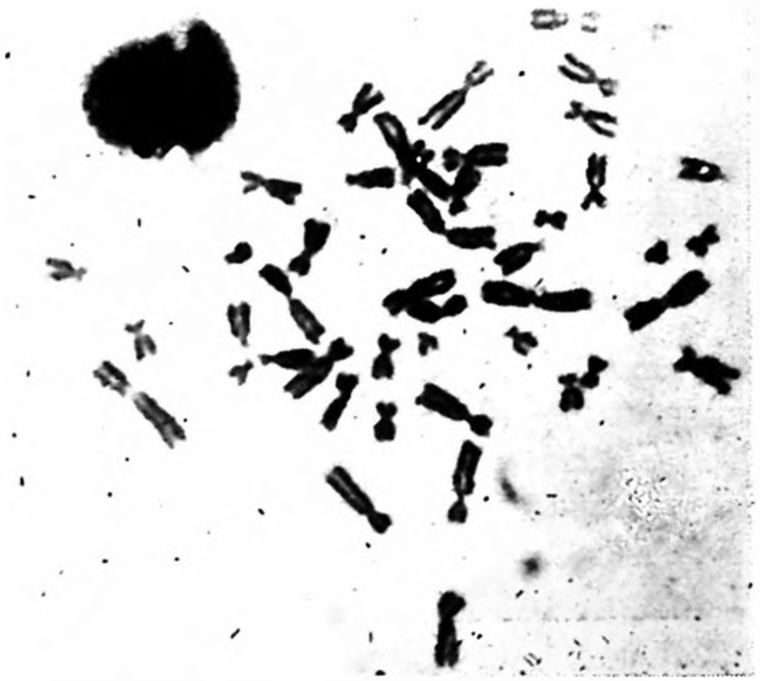

Fig. 1. Normal human chromosomes of one of the patients with Leber's tapeto-retinal dystrophy. (8 x 100).

Results

Chromosome analysis was carried out in 32 out of 39 cases. In 19 (59.37 per cent) a favorable result was obtained, and in four breaking of the chromatides and constriction were observed (Figure 3). This finding was not considered to be an abnormality, but was evaluated as a common occurrence during follow-up of the technique.

Discussion

Only two reports on chromosome analysis in Leber's tapeto-retinal dystrophy have appeared in the literature to date.[19-20] In these investigations, both made in 1967, the first[19] comprised three, and the second[20]

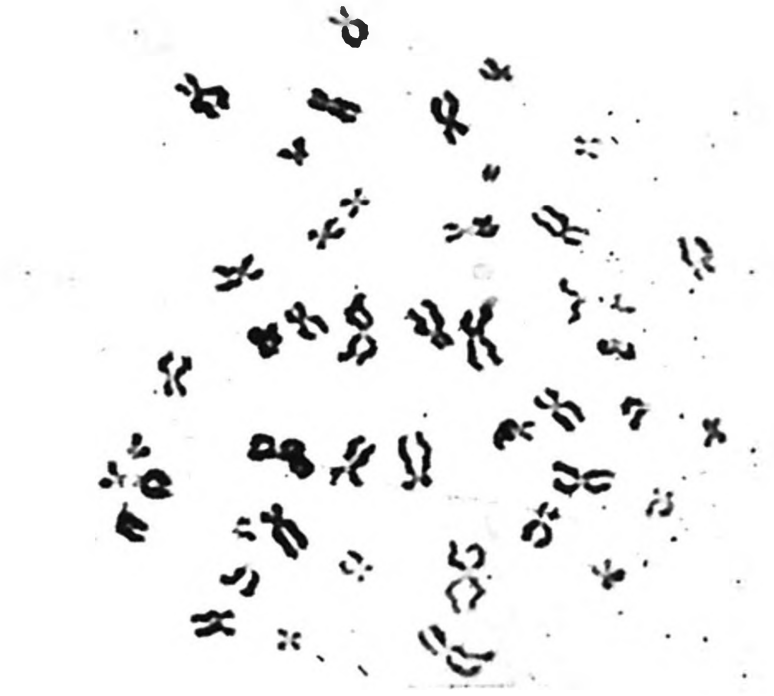

Fig. 2. Normal chromosomes of another patient (8 x 100).

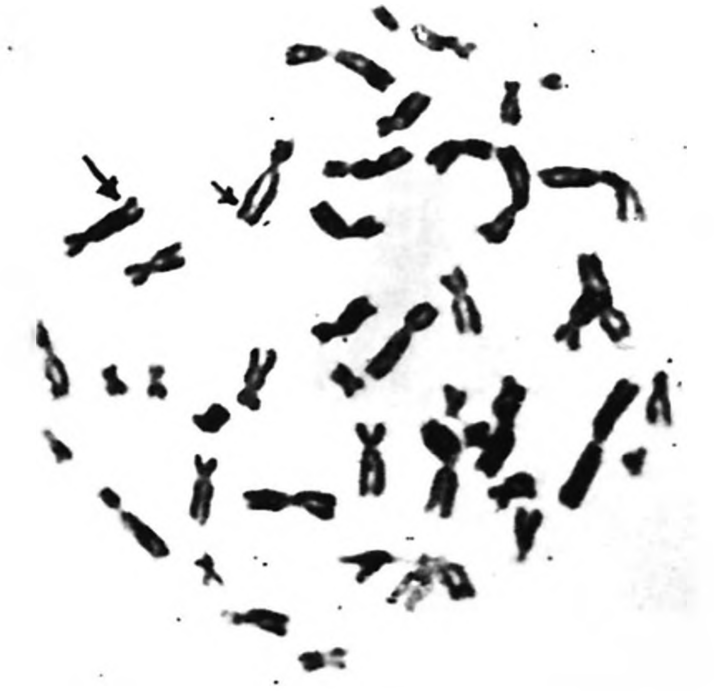

Fig. 3. Constriction and fragmentation in one of the areas of duplication phase (arrows) (800 x).

13 cases, and no chromosomal abnormalities were suggested. Our results with a larger series, which are the first to appear from Turkey, were also in agreement with the previous studies.

Summary

A search was made for chromosome abnormalities in Leber's tapeto-retinal dystrophy using the micromethod on the peripheral blood cells of 32 out of 39 children belonging to 36 families. No abnormalities were observed.

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REFERENCES

1. François, J.: Heredity in Ophthalmology, Mosby Co., St. Louis, 1961.
2. Franchescetti, A., François, J. and Babel, J.: Lés Hérédo-Dégénéréscences Chorio-Rétiniennes, Tome I, Masson et Cie, Paris; 1963.
3. Duke-Elder, Sir W. S.: System of Ophthalmology, Vol. X, Kimpton, London, 1967.
4. Schappert-Kimmijser, J., Henkes, H. E. and van den Bosch, J.: Amaurosis congenita (Leber), Arch. Ophthal. **61**: 211, 1959.
5. Alström, C. H. and Olson, O.: Heredo-retinopathia Congenitalis Monophybrida Recessiva Autosomalis, Lund: Berlingska Boktryckeriet, 1957.
6. François, J., de Rouck, A.: Degenerescence tapeto-rétinienne congenitale de Leber, Bâle: 18 e Cong. Ass. Ped. Lang. Franç., Karger, 1961.
7. Avanza, C.: L'amaurosi o degenerazione tapeto-retinica congenita o infantile di Leber, Boll. Oculist., **41**: 635, 1962.
8. Duke-Elder, Sir. W. S.: Op. cit., Vol. VII, 1962.
9. Robinson, A.: The human chromosomes, Amer. J. Dis. Child. **101**: 379, 1961.
10. Say, B. and Renda, Y.: Genetik ve hekimlik, Çoc. Sağl. Hast. Derg. **8**: 141, 1965.
11. Ford, C. E. and Hamerton, J. L.: The chromosomes of man, Nature **178**: 1020, 1956.
12. Cogan, D. G.: Chromatin, chromosomes and ophthalmology, Arch. Ophthal. **67**: 697, 1962.
13. Patau, K.: The identification of individual chromosomes, especially in man, Am. J. Human Genet. **12**: 250, 1960.

14. Tjio, J. H. and Puck, T. T.: The somatic chromosomes of man, Proc. Nat. Acad. Sc. 44: 1229, 1958.
15. Patau, K.: Chromosome identification and the Denver Report, Lancet 1: 933, 1961.
16. Fırat, T.: Leber tipi tapeto-retinal distrofiler üzerinde genetik araştırma, par Doçentlik Tezi, Hacettepe 1968.
17. Fırat, T.: Clinical and genetical investigations on Leber's tapeto-retinal dystrophy, some characteristic aspects in Turkey, 1970 (in Press).
18. Renda, Y., Dönmez, Ş., Güngör, E. and Say, B.: Kromozem analizleri, Çoc. Sağl. Hast. Derg., 8: 149, 1965.
19. Rougier, J., Ravault, M. P., Beaupere, H., Girod, M. and Dumas, R.: Trois cas familiaux de degenerescence tapéto-rétinienne congénitale de Leber, Bull. Soc. d'Ophtal. France, 67: 321, 1967.
20. Dekaban, A. and Carr, R.: Congenital amaurosis of congenital origin, Arch. Neurol, 14: 294, 1966.