ANOMALOSCOPIC SURVEY OF BLUE-YELLOW DEFECTS AMONG SCHOOL CHILDREN IN SANTIAGO

R. CRUZ-COKE, L. RIVERA, J. MARDONES, C.Y. VALENZUELA
Genetic Section, Hospital Aguirre, University of Chile, Santiago, Chile

A survey of color vision defects was performed on a random sample of 138 Santiago male school children aged 14-15 years. Over-all incidence of red-green defects was found to be 4.34 percent. Blue-yellow minor defects were found in 17 cases (12 percent). The following major defects were found: extreme tritanomaly plus extreme tetartanomaly (1 case), and extreme tetartanomaly plus weak tritan defects (2 cases).
These results suggest a probable incidence of 2.16 percent of congenital blue blindness in the general male population of Santiago, Chile.

Classically, congenital blue-yellow blindness, as tritanomaly and tritanopia, has been considered a very rare color vision disturbance (Schmidt 1970). Nevertheless, relative high incidences of blue-yellow defects have been reported among alcoholic individuals and their relatives (Varela et al. 1969, Sassoon et al. 1970, Cruz-Coke and Mardones 1971, Cruz-Coke et al. 1972). Some authors have estimated that these blue-yellow disturbances could be the consequence of chronic abuse of alcohol (McCance 1970). But Ugarte et al. (1970) have demonstrated that blue-yellow disturbance is not correlated with the severity of alcoholic liver damage or with the length of continuous alcohol abuse.

To our knowledge, no systematic survey of the incidence of blue-yellow blindness in a general population has been reported.

The survey was carried out on a random sample of 138 male students, aged 14-15 years, at a secondary school in North Santiago. All healthy students completed a form on the origin of their four grand-fathers. Color vision tests were performed with Ishihara and Hardy-Rand-Ritter plates under standard illuminant. Then a testing with the Pickford Nicolson Anomaloscope, mod. II, was performed according to the method proposed by Lakowsky (1969). All cases with blue-yellow defects passed ophthalmologic examination to discard eye diseases.

Table 1 shows that the distribution of color vision deficiencies was highly associated to the foreign origin of grand-fathers. Table 2 shows the distribution of color vision disturbancies. Red-green blindness shows an incidence of 4.34%, a figure similar to that of 4.74% given by Iglesias and Covarrubias (1962) in the same school district, with Ishihara plates. One tritan and 2 tetartan cases were found, as well as 17 cases of minor defects, deviants and color weak.

The tritan case showed normal Ishihara and Hardy-Rand-Ritter testing. The anomaloscope testing showed an extreme tritan plus extreme tetartan. The 2 tetartan cases were extreme tetartan plus a weak tritan defect. These 3 cases had normal ophthalmologic examination.

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TABLE 1

DISTRIBUTION OF CASES ACCORDING TO THE TYPE OF COLOR VISION DISTURBANCE AND THE NUMBER OF FOREIGN GRAND-FATHERS

Color vision group	Number of foreign grand-fathers					
	0	1	2	3	4	Total
Red-green	2	2	2	—	—	6
Blue-yellow	2	1	—	—	—	3
Normal	98	19	7	—	1	125
Total	102	22	9	—	1	134

Red-green + blue-yellow vs. normal: $\chi^2 = 18.1$; $P < 0.001$.

TABLE 2

ANOMALOSCOPIC SURVEY OF COLOR VISION DEFECTS AMONG SANTIAGO SCHOOL-CHILDREN

Defect	Anomaly	Anopia	Total	%
Protan	2	1	3	4.34
Deutan	3	0	3	
Tritan	1	0	1	2.17
Tetartan	2	0	2	
Color blindness	8	1	9	6.51
Blue-yellow weak			17	12.31
Normal			112	81.17
Total			138	100.00

It was not possible to examine the children's fathers or mothers. One brother shows a weak tritan defect.

We suggest that these 3 cases can be considered as congenital blue-yellow defectives because (1) they were discovered in a random sample of children 14-15 years of age; (2) the children were healthy and had normal ophthalmologic examination; and (3) the blue-yellow defects were classified as extreme anomalous, a very severe defect in the anomaloscope.

We estimate a probable incidence of 2.17% of congenital blue-yellow blindness in the male young population in Santiago.

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Dr. R. Cruz-Coke, Genetic Section, Hospital Clinico J.J. Aguirre, Santiago, Chile.