

Practical Manual for Color Vision Test Plates

1. Color vision anomaly in clinic

People with abnormal color vision are called color vision anomaly, or color vision defect. According to the color blindness statistic in China from 1932 to 1957, male patients are about 5.14% to the total population, and female patients are about 0.73%. Male patients are more about 7 times than that of female. In Japan, male patients are about 4%-5% of the total population; female patients are about 0.5%. And in Europe, male patients are about 8% to the total population; female patients are about 0.4%. The numbers of every kind of color blindness are different. According to the methods for classifying color blindness of Von Kries, the types of color blindness classified by Wright shows on the following table:

The types and percentage of color vision anomaly

Type		Percentage
Anomalous trichromat	Red color vision anomaly	1.0
	Green color vision anomaly	4.6
Anomalous dichromat	Red blindness	1.2
	Green blindness	1.4
Monochromat		0.003
Total		8.2

Based on this table, we can see that the patients with green color anomaly are more than that with red. The monochromat patients have been founded rarely.

Color vision defect can be grouped as color vision weakness and color blindness. Patient with color weakness, whose ability of recognizing colors has degenerated or lacked, can read the colors in the condition of bright light, deep hue, extensive visual angle, and need more time, otherwise, the patient can't recognize color as normal person. The patients with color weakness can be rated as different degrees and their eyesights are independent of the color weakness degrees. Some of weakness patients are better than color blindness, and they may remain some parts of color identifying ability. Some of them whose ability of recognizing color is not as good as normal person, can't recognize color that is in lower saturation and chromatism. Some patients' symptoms are just between the above two kinds of weakness. Therefore, the experts categorized the color weakness into three types earlier which are degree A, degree B, degree C to show the severity of the weakness. And there are three degrees too in this

book that are strong, medium, and mild degrees.

Color blindness means person can't recognize different colors, i.e. lacking the ability of recognizing colors. Patients with red or green blindness are more common in clinic and yellow or blue blindness patients are fewer. Total color blindness patients can't distinguish colors completely, who can only recognize the shape, bright and dark of objects, and sense red and green colors darker, yellow and blue brighter, and also have photophobia, frequent nictation and bad eyesight which will be more serious in blazing light and be better in weak light. The central scotoma will be found in perimetry and the peripheral visual field is natural. The central scotoma which can cause intermittent nystagmus will be founded when doing visual field examination. To the ability of adaptation for scotopic vision, the one with total color blindness is better than normal person. The normal person usually needs 5-10 minutes to adapt the dark condition, but the total color blindness patient only needs 1-2 minutes. To the total color blindness, the brightest area in spectrum is the band of green color, which is different to the normal person whose brightest area is band of yellow generally but is green band only in the condition of lacking light. Therefore, the sense of total blindness is the same as the sense of the normal eye when they stayed in dark room for a long time.

Patients with red, green color blindness or weakness are the most common in color vision anomaly who can distinguish yellow and blue color when the two colors' aberrations are obvious enough. But they read red or green color as grey or brown which is the same as the middle color mixed by red and green to normal person.

The patient with red blindness whose ability of recognizing green color is abnormal too, read the red band of the spectrum as grey which looks shortened, and the brightest band of spectrum is yellow-green band.

The patient with green blindness, who can't recognize red and green colors but with any