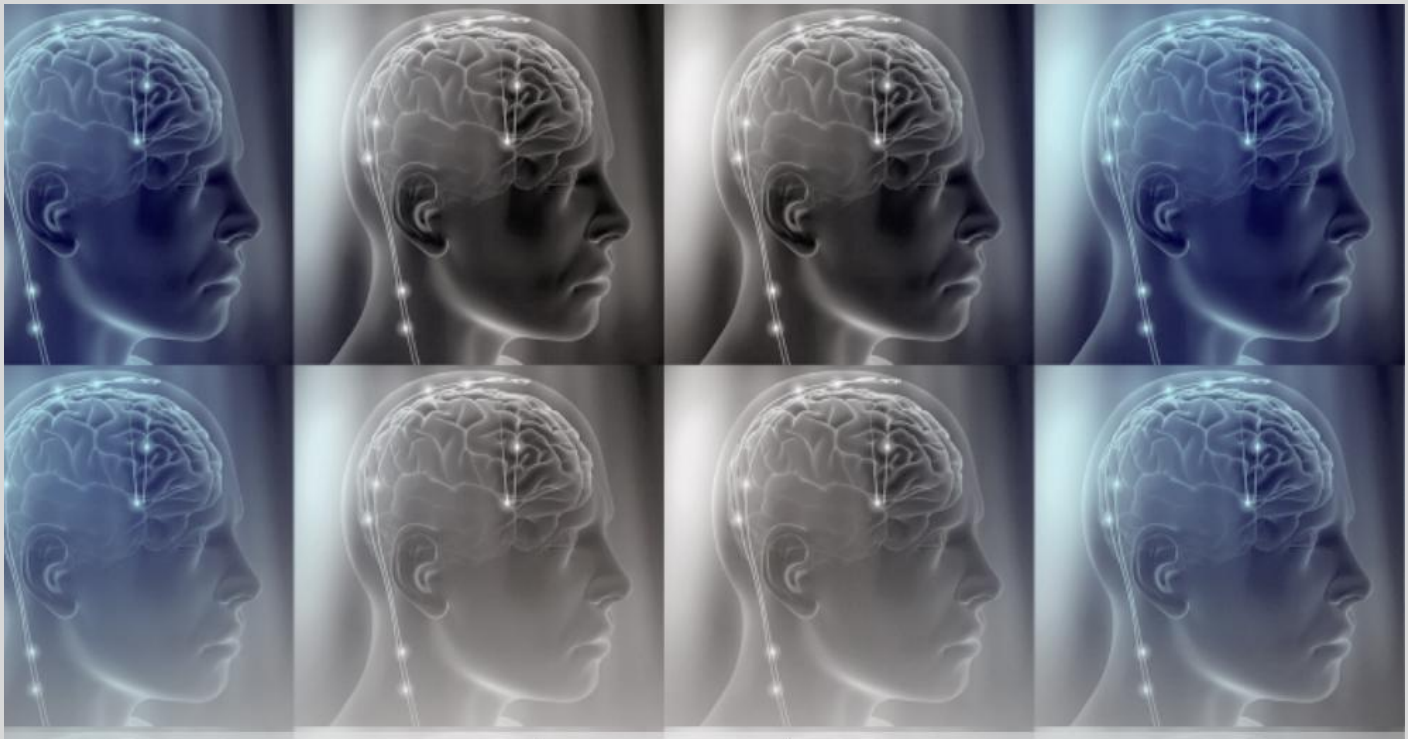

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CNS Central Nervous System

Block

Physiology Team

	Female Side	Male side
Done By:	**Manar Al-Jebreen**	**Meshal Al-Otaibi**
Revised By	**Nour Al-Khawajah**	**Mohammed Asiri**

CNS Central Nervous System

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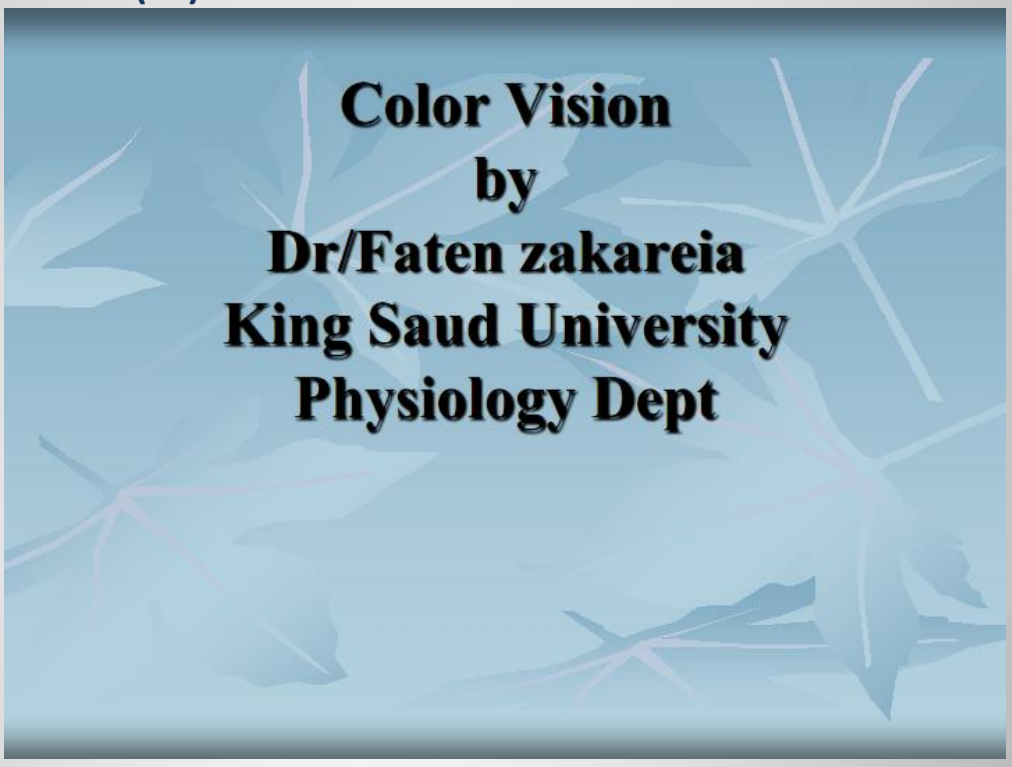
Slide No.(1)



CNS Central Nervous System

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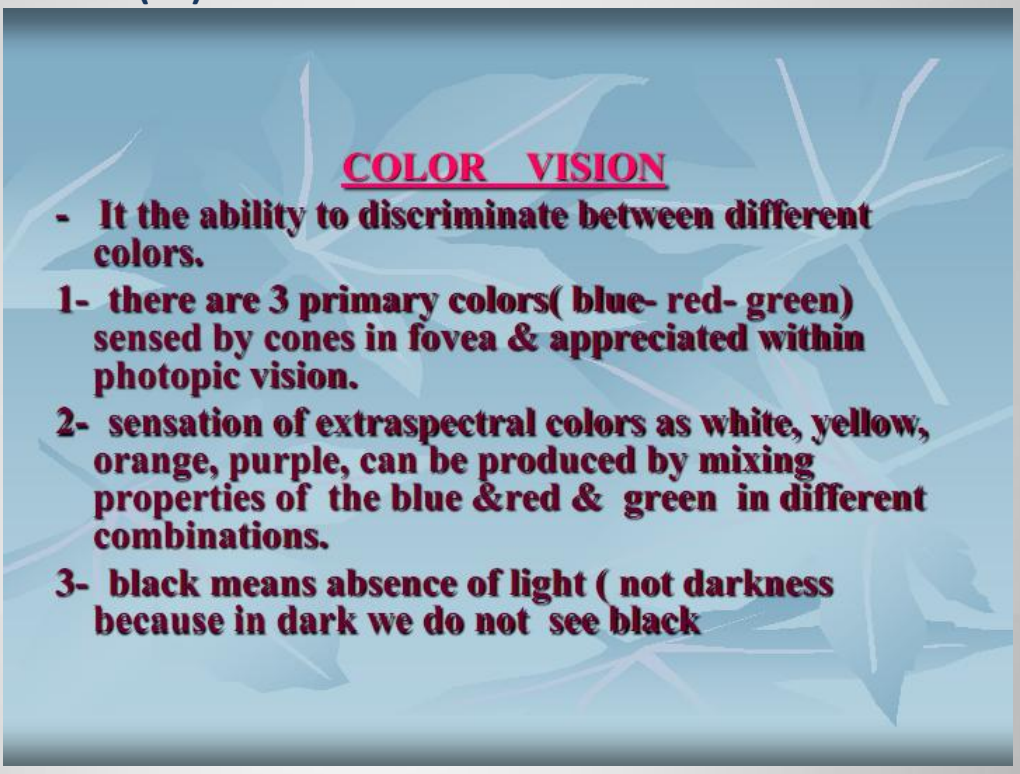
Slide No.(2)



Team Notes :

*No cons in the peripheral.

*Extrasepectral colors : Colors other than red ,blue and green.

*Black means absence of light which means no wave length is coming out from an object.

*In darkness we can see gray black and white so there are some waves coming out from some objects.

Fovea: It's a part of the eye, located in the center of the macula region of the retina, the area of the most visual acuity.

CNS central Nervous System

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Slide No.(3)

- Color vision theory : (Young- Helmholtz theory)
- 1- we have 3 kindes of cones each has a specific photopigment (rhodopsin)& is sensitive to one of the 3 primary colors
- a- Blue cone system:- has S pigment (blue sensation pigment) which respond to short wave length (440 nm senses the blue color)
- b- Green cone system:- has M pigment (green sensation pigment) which respond to middle wave length (535 nm senses the green color & less to yellow) & absorb light at the green portion.

Slide No.(4)

c- Red cone system:- has L pigment (red sensation pigment) which respond to large wave length at or
> 535 nm so senses the red & yellow color & absorb light at the red portion.

CNS central Nervous System

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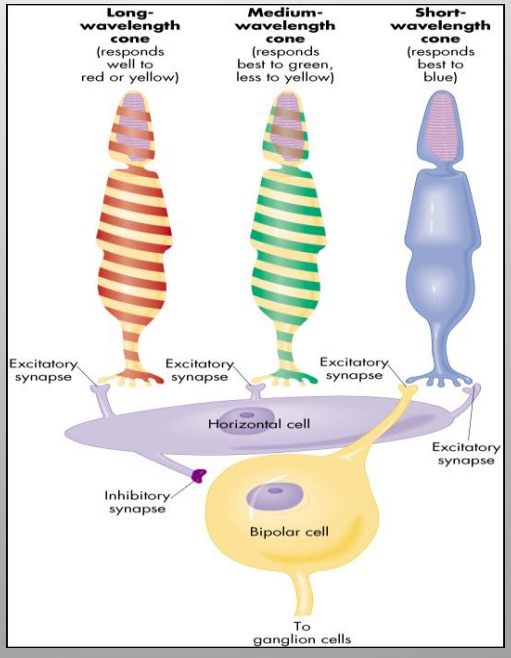
Cones' type	Sensation Pigment (the rhodopsin)	Wave length	
Blue cone system	S pigment *Blue = (s)ky*	Short wave length	440nm
Green cone system	M pigment *Green=Far(m)*	Medium wave length	535nm
Red cone system	L pigment *red=App(L)e*	Large wave length	At 535nm or more =>535



CNS central Nervous System

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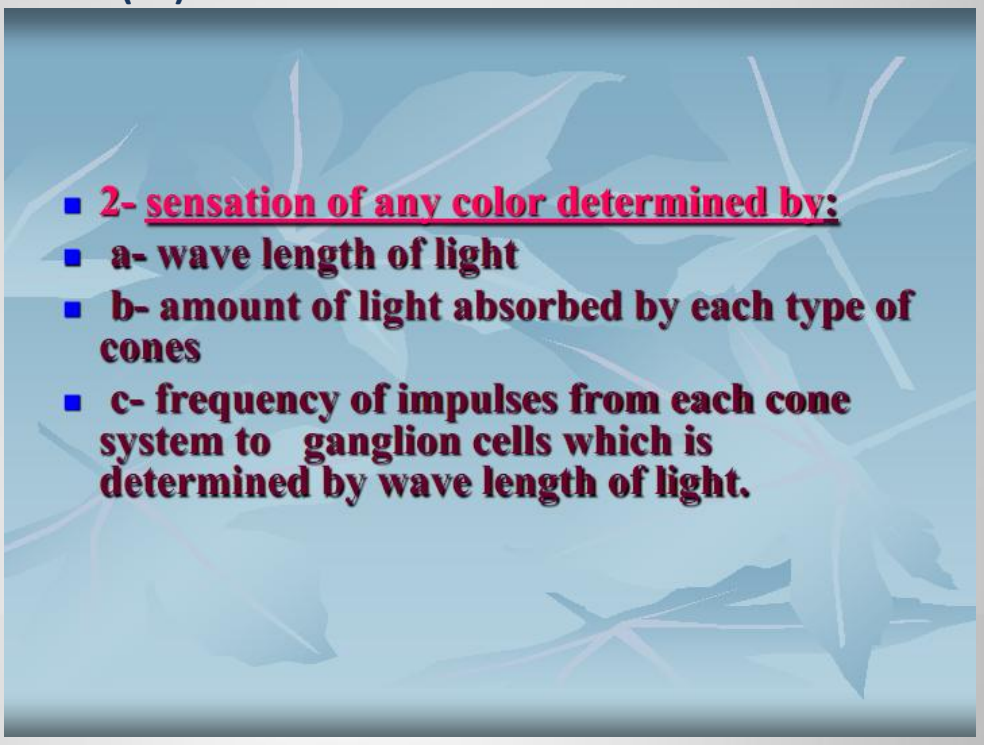
Slide No.(5)



Team Notes :

Sensation of color :

Certain wave length ⟶ stimulate certain cones ⟶ stimulate nerve impulses with a certain frequency to ganglion cells then to the brain.

*The frequency of the impulses depends on the wave length.

CNS Central Nervous System

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Slide No.(6)

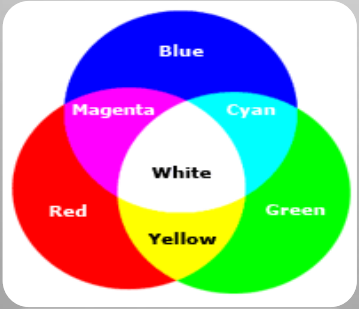
3- each cone system respond to its color at a lower threshold than needed to sense other colors (red cones respond to red or yellow color at a lower threshold than to green color)

5- perception of white is due to equal stimulation of blue & red & green cones.There is no wave length corresponds to white, white is a combination of all wave lengths

Team Notes :

White color = blue cones + Green cones +Red cones (Equal amount of each system mixed together)

So there is no wave length for the white color.



CNS central Nervous System

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Slide No.(7)

- #- color vision is coded by :- different responses in ganglion cells that depends upon :-
- - the wave length of stimulus which determine frequency of impulses in ganglion cells
- - the color perception in the brain depends on the amount of activity in each of the 3 cone systems as mentioned above.

Slide No.(8)

- 6-perception of orange is due to stimulation of 99% of red cones & 42% of green cones & 0% of blue cones(so ratio is 99:42: 0)
- 7--perception of yellow is due to stimulation of 50% of red cones & 50% of green cones & 0% of blue cones(so ratio is 50:50: 0)
- 8-perception of blue is due to stimulation of 0% of red cones & 0% of green cones & 97% of blue cones(

CNS Central Nervous System

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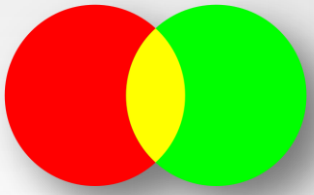
White = same amount of each system

Orange= 99% red + 42% green + 0 Blue

=99:42:0

Yellow = 50% red+ 50% green + 0 blue



=50:50:0

Blue = 97% Blue

=0:0:97

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Slide No.(9)

- **COLOR BLINDNESS:-**
- - There is gene for rhodopsin on chromosome(3)
- - There is gene for blue sensitive S cone pigment on chromosome(7)
- - There is gene for red & green sensitive cone pigment on x chromosome.
- - when a single group of color receptive cones is absent (due to absence of there gene) the person can not see or distinguish some colors from others

CNS Central Nervous System

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Slide No.(10)

- - red – green blindness:-
- -Green & red cones see different colors between wave length 525-675 nm & distinguish them.
- -If either of these cones are absent, the person can not distinguish 4 colors (red – green- yellow- orange)& he can not distinguish red from green (primary colours) so called
- (red – green blindness).

Slide No.(11)

-It is x- linked disease transmitted from females to their male sons, never occure in females as they have 2 x chromosomes

- Males have one x & one y chromosome so if this one x chromosome miss the gene for color vision , he will get red-green color blindness.

-Females show the disease only if both x chromosomes lack the gene

- Females from color blind fathers are carriers transmit the disease to ½ of their sons.

The names are impotent

Slide No.(12)

- **Trichromats** :- have 3 cone pigments(normal or have slight weakness in detecting red or green or blue color
- **Dichromats:-** have only 2 cone pigments systems only so he is completely blind to red or green or blue (so they may have protanopia, deuteranopia,or tritanopia) they get color by mixing only 2 of the primary colors.

Slide No.(13)

Monochromats :- have only one cone system or loss of all so see only white or black or grey or have no color perception.

CNS Central Nervous System

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Slide No.(14)

- Nopia = blindness, nomaly =weakness
- 1-Protanopia(red- blindness) :- no red cones system so person has shortened spectrum wave length,
- if only weakness in red color vision is called protanomaly.

Slide No.(15)

2-Deutranopia (green - blindness) :-
no green cones system
-so person see only long & short wave length)
- if only weakness in green color vision is called deutranomaly.
- has normal spectral width because green cones operates in the middle

3-Tritanopia (blue - blindness) :- no blue cones system , if only weakness in blue color vision is called tritanomaly.

CNS Central Nervous System

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Type	
Trichromats	Have 3 cone pigments systems (Normal)
Dichromats	Have only 2 cone pigments Systems: *depending on the absent system : 1)Protanopia(red-blindness) — no red cones shortened spectrum 2)Deutranopia (green - blindness) — no green cones only long & short wave length 3)Tritanopia (blue - blindness) — no blue cone
Monochromats	Have only one cone system or loss of all so see only black or grey or have no color perception. EX: Red-Green blindness.

Nopia=blindness .

Nomaly=weakness.

Tri= 3

Di=2

Mono=1

CNS central Nervous System

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*Red color is the commonest color blindness !

*IF there is **Protanamoly** which mean " weakness in red color" the person still be **Trichromats** because he can see the red color .

*IF there is Protanopia which mean " total loss of red color " the person is **Dichromats ,,**

*Color blindness in male is 8% while in female is 0.4%

***Inheritance:**

sex-linked due abnormal gene in the X chromosome

*Persons with red-green blindness (Monochromats) have difficulty distinguishing between reds, greens and yellows but can discriminate between blues and yellows.

CNS Central Nervous System

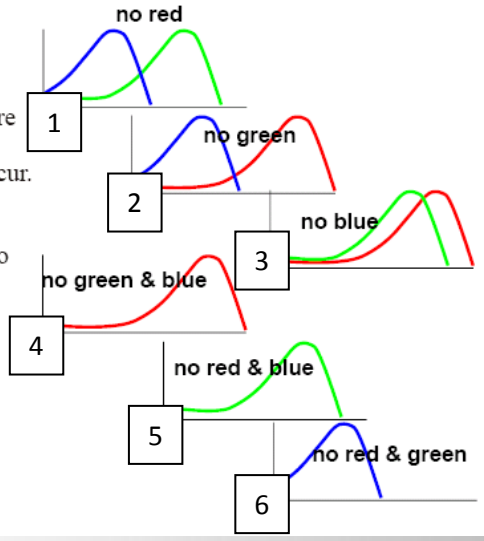
Block

Examine yourself

Colour blindness.

Each cone type contains a different light sensitive photo pigment. Colour blindness occurs when there is a defect in the genes that produce these photo pigments. Various combinations of defects can occur.

1) Missing one cone type
2) Missing two cone types
3) Missing all three cone types (vision is limited to the rods)
4) A cone type is made with a photo pigment different from normal.



The answers :

1= No red =Protanopia (Dichromat)

2=No green=Deutranopia (Dichromat)

3=no blue= Tritanopia (Dichromat)

4=Monochromat

5=Monochromat

6=Monochromat (Red-green blindness)

CNS Central Nervous System

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Questions :

Q1)Which is correct about color blindness?

a)Trichromats means red color blindness

b)Dichromats means one of the color is lost

c)Protanomaly means red color blindness

d)protanomaly means blule color weakness

Q2)The frequency of the nerve impulses depends on ?

a)Type of the cone system

b)Wave length

C)the type of the nerve

D) A & B are correct

Answers : 1=B

2=B