

Physiology Lab

☒ Sheet

☐ Slide

☐ Handout

Number

2

Subject

Cranial nerves examination

Done By

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Corrected by

.....

Doctor

Date: 19/03/2017

Cranial nerve examination

Requirements for any physical examination :

- 1- Permissions, introduce yourself
- 2- Privacy
- 3- Exposure

Cranial nerves:

Cranial nerve #1 ; olfactory

Pure sensory nerve

First, I need to examine if there is anything blocking the passage for the scent I'm going to let the patient smell, no constriction or obstruction .

Then I ask the patient to close their eyes, I introduce for him familiar objects, with distinctive smells that can be recognized, coffee, chocolate.. etc.

#The condition of losing this sensation is called **anosia**

Cranial nerve #2; optic

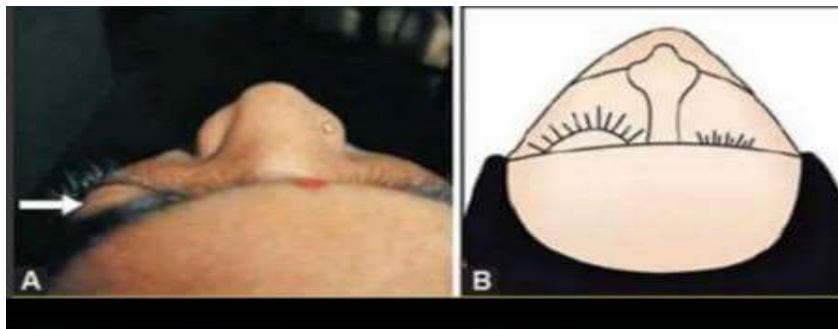
Pure sensory nerve

Usually when examining the optic nerve, I examine with it the cranial nerves #3,4,6 (oculomotor, trochlear, and abducent respectively)

Inspection

examine the eye in general by just looking at it, notice any asymmetry, ptosis, proptosis (means abnormal protrusion of the eye, to examine it , you stand behind the patient while him sitting down, making him at lower level than you, then look at him from above and notice any bulging of the eye (like in the picture) ,nystagmus .

Proptosis = exophthalmos



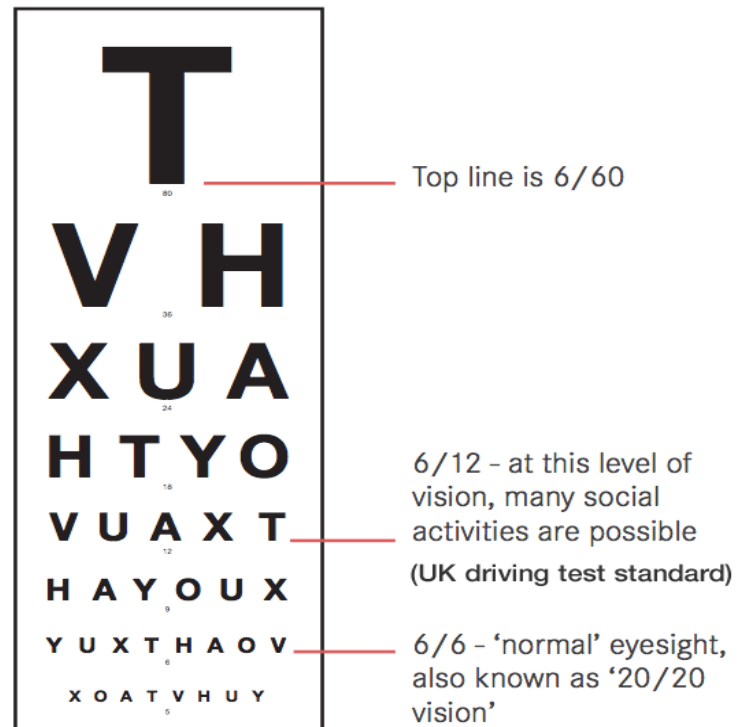
Vision acuity

We examine vision by Snellen chart. The chart is placed 6 meters away from the patient(usually it's hard to have this distance, so doctors put the chart behind the patient, and a mirror away from him by 3 meters, by looking at the charts reflection, this makes it 6 meters). Normal people see the line above the last one(line number7) when they are 6 meters far from the chart. Each line there is a number written under it; for example the first line it has the number 60, it indicates that a normal person can read it from 60 meters away.

Now I start asking my patient to read each line, for example if my patient was able to read only to the fifth line (and as said the patient is 6 meters away) while a normal person can read it from 12 meters ,so his vision is noted 6/12 ,and my patient has myopia(قصر نظر). Another vision problem hypermetropia (طول نظر).

If my patient wasn't able to see the first line, my next step is letting the patient come closer to the chart and record at what meter he was able to read it, lets say he saw it at 1 meter, then his vision is noted 1/60.

What if he got closer and still wasn't able to see? I let him count how many fingers I'm holding up, if he can't see my fingers, I turn the lights on/off, and ask him if he can see the light.



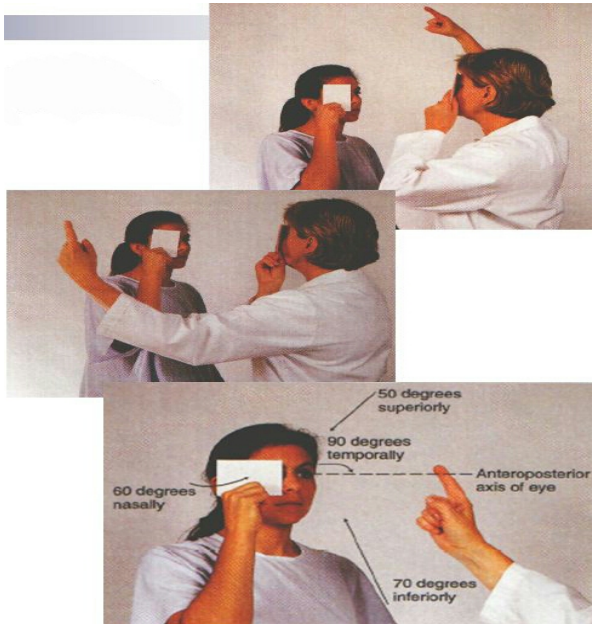
Visual field

We are done with acuity. Let's talk about the visual field, it is examined by *confrontation test*.

- 1•Stand in front of your patient 1 meter away.
- 2•Ask your patient to look directly at you.
- 3•Advance your finger from periphery and ask him patient to say "now" when he sees it, the movement should be from periphery to 2 o'clock, then from periphery to 4 , same thing for 8,10 o'clock, this is used to detect if there is Homonymous hemianopsia .

After that examine each eye alone, to examine the **peripheral vision** (the same previous steps but for each eye at a time), the patient covers his right eye while you cover your opposite , and start comparing when you see your finger and when the patient sees it, if he patient has no problem both of you should see it at the same time(considering you are normal) , the same as point 3 check each quadrant for each eye(2,4 o'clock for the left eye, 8,10 o'clock for the right eye)

To test the **central vision**, use a red hand pen, move it the same way as before (2,4 o'clock for the right eye, 8,10 o'clock for the left eye)



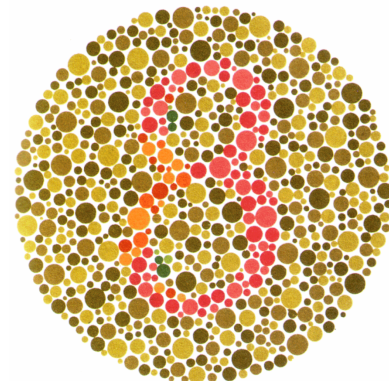
Color vision

The receptors responsible for color vision are cones, the most common disease is red-green color blindness, it's X-linked recessive, making it more common in males, with an 8% percent prevalence in the population. Normal people have red, green and blue cones, the integration between them make us see colors with different wave lengths. People with red-green color blindness see the color and name it red or green but that doesn't mean they are actually seeing what we are seeing.

To test color vision, colors with different highlights organized with each other, forming a number inside another color. Depending on what the patient was able to see, gives me what kind of color blindness the patient has, for example , in this picture normal people see it 8 but red-green color blind see it 3, people with complete color blindness see nothing.

Try this test to check if you have color blindness or not, and what type it's really fun

<http://enchroma.com/test/instructions/>



Pupil

Inspection

Check for miosis and mydriasis

Reflexes

First we test *pupillary reflex*

Afferent; optic

Efferent ;oculomotor

Test : with a torch in a dim room, start moving it lateral and inferior to reach the eye. For a healthy person constriction will happen to both eyes , the reflex of eye with the light pointed at it is called direct reflex, and the other eye called indirect.

Lesions

If I pointed a light source at the left eye but no response in both eyes, then there is an optic nerve lesion in the right. If the left eye didn't respond alone, this means left oculomotor lesion. If the right eye didn't respond alone, oculomotor lesion in the right eye.



**normal -
both pupils
constrict**



**CN III lesion -
loss of consensual
pupillary light reflex**



**CN II lesion -
loss of direct pupillary
light reflex**

Cranial nerve #3 oculomotor

Innervates extra- ocular muscles

Cranial nerve #4 , trochlear

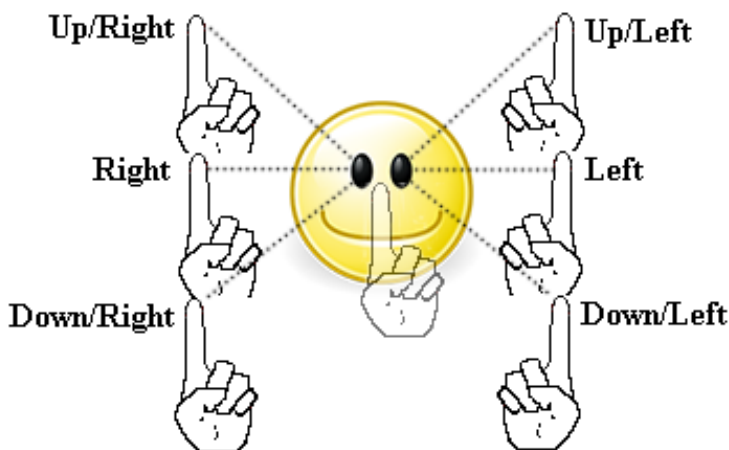
Innervates SO4= superior oblique

Cranial nerve #6 ; abducent

Innervates lateral rectus

To examine nerve #3/4/6

Ask the patient not to move his head, and keep up with your moving finger, by only moving their eyes. The movement of your finger should be as if you are drawing the letter H. While doing that check for any abnormal movements, or patient complains of diplopia or nystagmus.



Cranial nerve #5; Trigeminal

Motor and sensory

To examine the *sensation* for the Trigeminal, I need to test it's 3 divisions, ophthalmic, maxillary and mandibular. While your patient closing his eyes, with a piece of cotton move it across his forehead, cheeks with upper jaw and mandible(where the divisions innervate respectively)bilateral, and ask him if he feels it.

The *motor* part is responsible for the muscles of mastication, first inspect any jaw deviation or atrophy. Then ask the patient to clench their teeth to check the masseter muscle.

Reflexes

It has two reflexes, corneal and jaw reflex.

Corneal reflex

Afferent; Trigeminal n.

Efferent ;facial n.

Test: Ask the patient to look up and with a piece of cotton gently touch his eye, normal response would be blinking in both eyes.

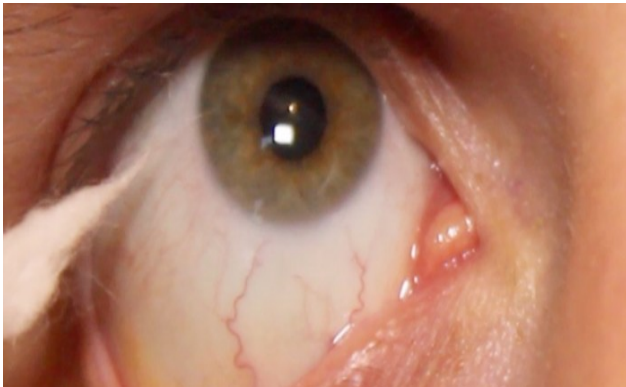
Jaw reflex

Afferent; Trigeminal(sensory)

Efferent; Trigeminal(motor)

Test: Ask your patient to lower his jaw, and place your finger on his jaw , gently with a hammer tap on your finger NOT his jaw. In response, the masseter muscles will jerk the mandible upwards. Normally this reflex is absent or very slight. However, in individuals with upper motor neuron lesions the jaw jerk reflex can be quite pronounced.

It's *sensory* part also responsible to bring sensations from the **anterior 2/3 of the tongue**, with a piece of cotton let it touch his tongue, and ask him if he can feel it.



Cranial nerve #7; facial

Motor and sensory

Inspection

First thing about facial it is responsible for all facial expressions, so when I want to examine the patient I look for asymmetry, if wrinkles can be notice on the forehead, nasolabial fold present, ability to blink and any deviation of the mouth.

To notice the later, ask the patient to raise his eyebrows to see the wrinkles, show you his teeth to notice any deviation, close his eyes to see any problem in orbicularis oculi, fill his cheeks with air against force you apply on his cheeks to check orbicularis oris.

Facial is also responsible for taste. While your patient closing his eyes, you let him taste familiar things (the 4 types of taste sensation) and tell you what they are.

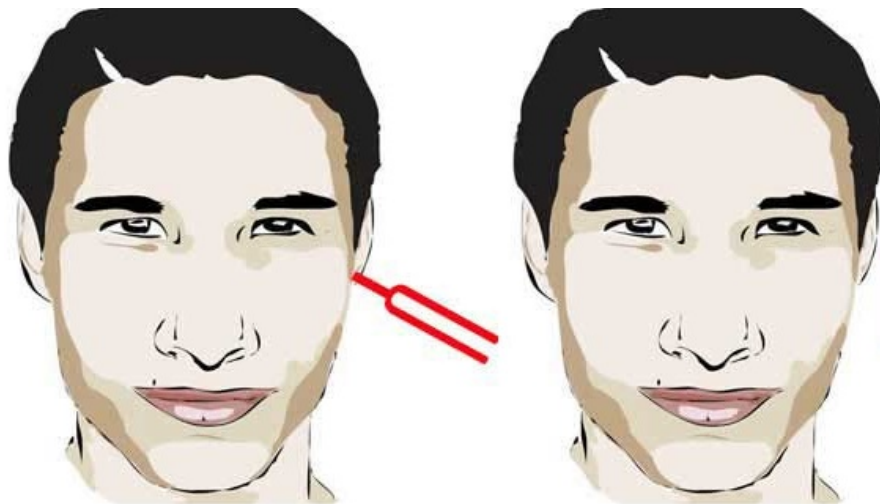


Cranial nerve #8; vestibulocochlear

First test, whisper test(general), by standing behind the patient start whispering, if the patient doesn't hear you, get closer and closer till he hears you.

More specific tests, *Weber and Rinne tests*

Rinne test, by using a 500 or 256 Hz tuning fork, tap the fork and put its solo end on the mastoid process, ask the patient if he can feel it and to tell you when it disappears, as soon as he informs you it disappeared, put its two ends near his ear, normally he will be hearing it again because air conduction is better than bone, so the patient is normal then the test is positive.

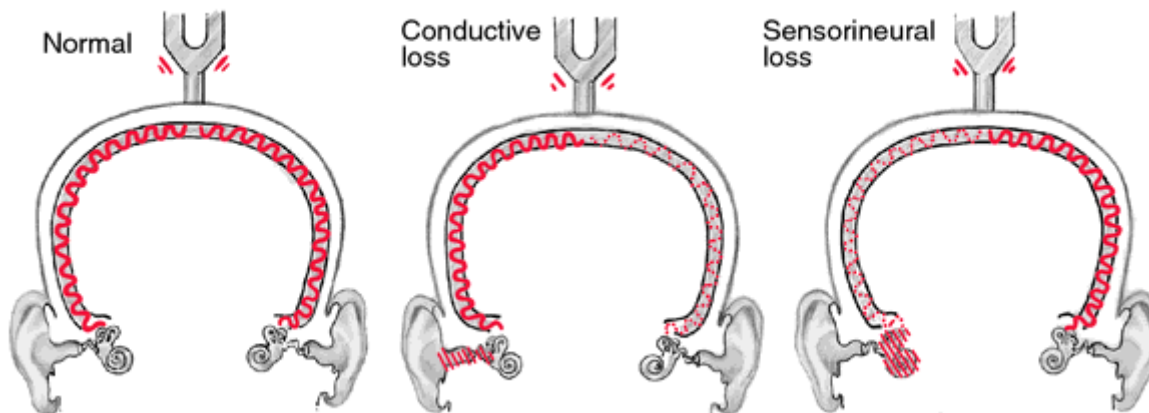


Rinne's Test

With a 512 Hz tuning fork press against the mastoid bone and then hold it 1cm away from the ear.

'Which is louder, behind the ear or in front?'

As for Weber test, after tapping the tuning fork put its solo end on the head in the midline. Normal patients will feel it normally in the midline or symmetrical in both ears, but if the patient had air conduction loss in the right, it will be heard **louder in the right** because all the noise around him will not be heard by his right ear. But if he had a sensory neural hearing loss in the right, he will be hearing it **better in the healthy ear**, in this case the left.



To check if the patient has vertigo, while he is sitting on the bed, flip him on his back and the head should be dangling off at a level lower from the bed (turn his head 45°) for 20 seconds and ask him if he got dizzy or notice his eyes for nystagmus. Then let him rest for a little bit and redo it on the other side.



Cranial nerve #9 ; glossopharyngeal

Motor and sensory

Carries general sensation and taste from the posterior third of the tongue

Cranial nerve #10 ; Vagus

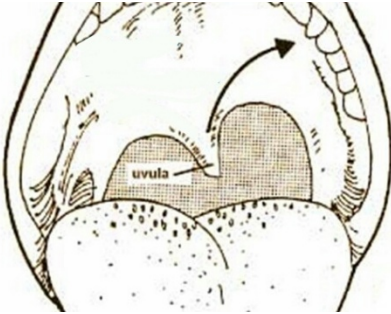
Motor and sensory

Carries taste from epiglottis

Both 9 and 10 usually examined together , ask the patient to swallow anything, or drink water, cough, speak (arthralgia can be noticed)

To examine Vagus alone, ask the patient to fill his mouth with air, if the Vagus was abnormal , air will become less and escape from his nose (his speech will be nasal speech due to a problem in the palate).

Ask the patient to open his mouth, and notice his uvula and palate for any deviation. Deviation of the uvula away of the side of lesion .



Reflexes

Gag reflex

Afferent; glossopharyngeal

Efferent; Vagus

Test : with the tongue depressor, scratch the posterior third of the tongue and a little of the palate, normal response coughing and initiation of vomiting .



Cranial nerve #11; accessory

Supplies two muscles, sternocleidomastoid and trapezius,

Inspection

notice any asymmetry, shoulder drop, then put them in action. Ask your patient to look to the right while with your hand apply opposing force, by that you examined the left sternocleidomastoid.

Ask your patient to rise their shoulders up and by your hands apply an opposing force down.



Cranial nerve #12; hypoglossal

Inspection

Wasting, fasciculation, ask him to protrude his tongue and move it.

If a deviation was noticed, a lesion to the nerve on the same side.

Facilitation on the same side of the nerve lesion (LMN) .



Clinical application

Facial palsy

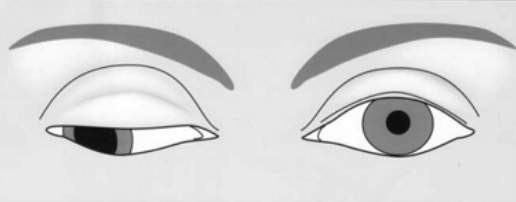
If it resulted from LMN lesion in the facial nerves.

- unable to blink, leading to dryness and ulceration ,must use refreshing tears and covering it.
- No wrinkles and nasolabial fold
- Drooling and dropping of the angle of the mouth

UMN lesion--> only lower part of the face affected

Injury of the oculomotor

- Complete ptosis (levator superioris)
- Iris downward and lateral, due to only active superior oblique and lateral rectus (innervated by trochlear and abducent, respectively)
- Pupil dilated (oculomotor carries parasympathetic, with its loss sympathetic takes over)



☆Partial ptosis, Horner syndrome, due to loss of sympathetic fibers that partially supply levator superioris , and pupil constriction.



Bilateral ptosis due to a disease of acetylcholine receptors , myasthenia gravis .



Visual field defects

-look at the figure next page:

Blue = nasal fibers

Red= temporal

-Each part on the retina receives from the opposite site on the visual field.

-Nasal part of retina receives from temporal part of the visual field .

-Temporal part receives from the nasal part of visual field.

-Decussation only happens to the nasal fibers.

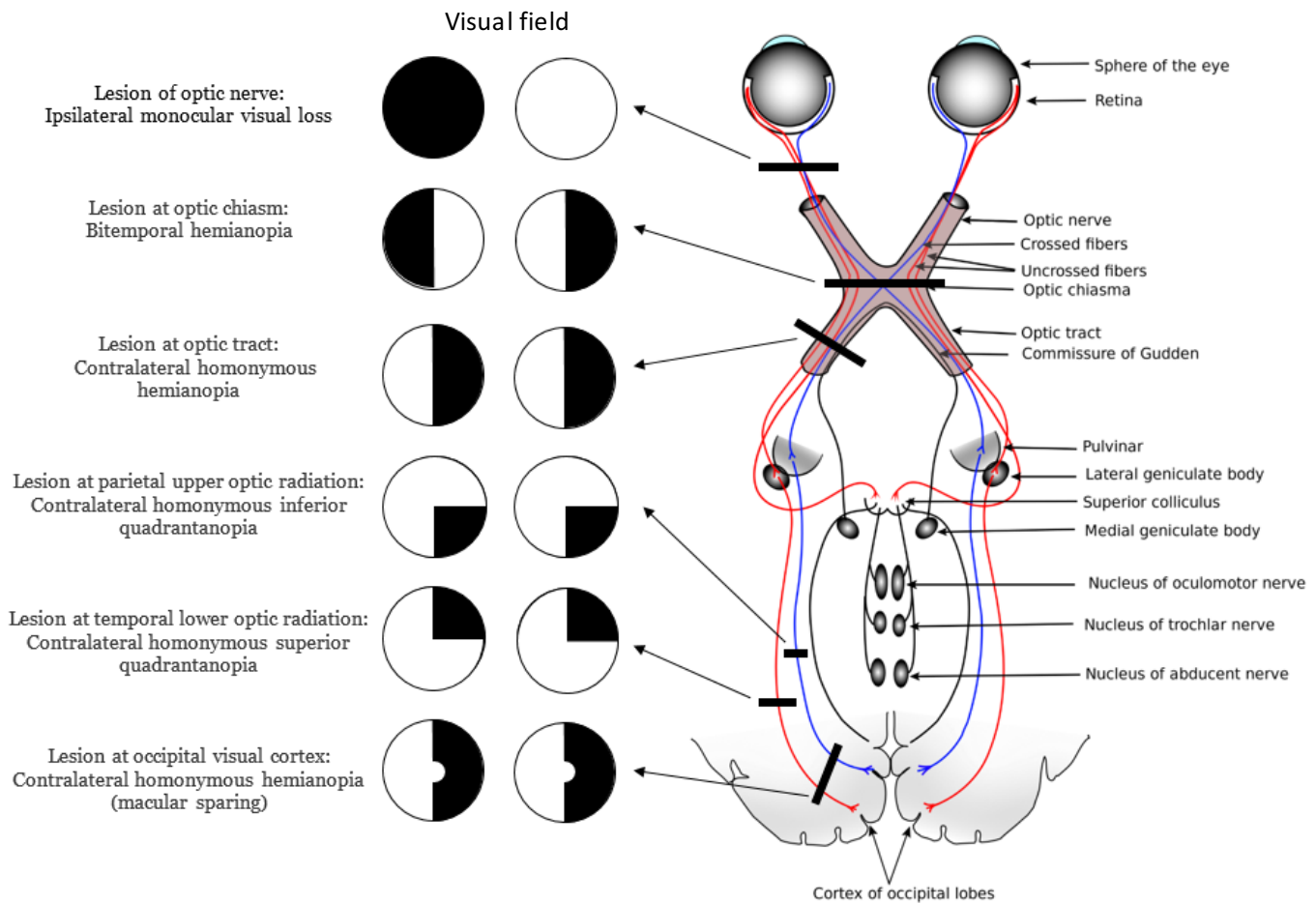
-Optic radiation pass in the temporal and parietal lobe.

-To easily memorize it, after chiasma lesion is opposite to its affected visual field .

The pathway the fibers go through:

Retina --> optic nerve --> optic chiasma(nasal decussation) --> optic tract-->lateral geniculate body --> temporal and parietal optic radiation-->occipital lobe.

The picture summaries the defects



"Don't be yourself, be a pizza. Everyone loves pizza."