

GROUP NO: 3

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INTRODUCTION

In the Nervous System, Neurons are the structural unit, the functional unit is the reflex arc. This arc consists of a sense organ, an afferent neuron, one or more synapses within a central integrating station, an efferent neuron, and an effector.

In mammals, the connection between afferent and efferent somatic neurons is generally in the brain or spinal cord. The activity in the reflex arc starts in a sensory receptor with a receptor potential whose magnitude is proportional to the strength of the stimulus. This generates all-or-none action potentials in the afferent nerve, the number of action potentials being proportional to the size of the generator potential. All-or-none responses are generated in the efferent nerve. When these reach the effector, they again set up a graded response. When the effector is smooth muscle, responses summate to produce action potentials in the smooth muscle, but when the effector is skeletal muscle, the graded response is always adequate to produce action potentials that bring about muscle contraction.

The Central Nervous System is usually the connection between the afferent and efferent neurons. Like for example, When a skeletal muscle with an intact nerve supply is stretched, it contracts. This response is called the stretch reflex. The stimulus that initiates the reflex is stretch of the muscle, and the response is contraction of the muscle being stretched.

OBJECTIVES

1. To study the mechanisms underlying the normal and abnormal reflex responses examined in this experiment.
2. To be able to differentiate somatic reflexes from autonomic reflexes
3. To understand the effect of mental distraction and fatigue to reflex response

Animal Reflex Physiology

Cranial Nerve Examination – perform the tasks indicated below on your animals and note your observations.

I Olfactory

- Owner's observation

When i use a food for my dog to smell, at first i showed it to him and when i pulled it away he followed it. When i use an object (water jug) for him to smell, he just smells it and when i move it away, he stopped following it.

II Optic

- Menace reflex is examined by dropping a cotton ball on the eye which normally elicits blinking response

Observations:

When i held my dog's head and dropped the cotton ball in his eye, he blinked and when he opened his eyes, he followed where the cotton ball dropped and smelled it.

- Pupillary reflex

Observations:

When i flashed a light in my dog's eye, his pupils reflex is to constrict and when i put away the light, it dilated.

III Oculomotor

- pupillary reflex

- Oculocephalic reflex is done by moving the head sideways causing the eyes to look at the same direction

Observations:

As i move the dog's head sideways, his eyes also looked at the same direction.

- Stabismus is a defect that causes downward and outward deviation of the eye with the inability to converge

- ptosis is due to innervation to levator palpebrae

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| IV | Trochlear | - strabismus results to upward and outward deviation of the eye |
| V | Trigeminal | |
| | Ophthalmic | <ul style="list-style-type: none"> - Corneal reflex, touching the cornea results to blinking - Palpebral reflex of the upper lid reflex - Vibrissae-palpebral - Touch of pin-prick over the skin muzzle exclusive of the mandible will lead to avoidance <p>Observations:</p> <p>The dog starts to avoid my touch every time i attempt to touch his muzzle, and when i touched it he move his head sideways/backwards just to remove my hand.</p> |
| | Mandibular | <ul style="list-style-type: none"> - Touch or pin-prick over the lateral side of the cranium skin of the mandible and oral mucosa - Ear tickle reflex leads to avoidance <p>Observations:</p> <p>When i touch the lateral side of the dog's cranium skin of his mandible and oral mucosa, he starts to move away from my touch.</p> |
| | Maxillary | <ul style="list-style-type: none"> - Upper lip pinch reflex results to avoidance <p>Observations:</p> <p>As i pinch his upper lip, the dog stats to avoid my touch and move its head backward just to avoid my touch.</p> |
| VI | Abducens | <ul style="list-style-type: none"> - Dropped jaw is an abnormality of this nerve - Strabismus there is medial deviation of the eye with inability to gaze laterally - Corneal Reflex <p>Observations:</p> <p>When i showed him an object and i held his head, his eyes just follows the object and thus he doesn't have medial strabismus.</p> |

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| VII | Facial | <ul style="list-style-type: none"> - Immobilized lids result from abnormality - Palpebral reflex - Vibrissae reflex, by pulling the whiskers result to avoidance - Menace reflex - Corneal reflex - Handclap reflex |
| | | <p>Observations:</p> <p>When i clapped, he looked at me and his ears were somewhat erected.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <ul style="list-style-type: none"> - Signs of defect may show dropped ear with no response to stimulation, lip retracted toward the sound side or dropped ear and lower eyelid |
| VIII | Auditory Cochlear | <ul style="list-style-type: none"> - Handclap reflex or owner's observation <p>Observations:</p> <p>As i clap, the dog turned to me and then ran towards me.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> |
| | | <ul style="list-style-type: none"> - Signs of defect includes head tilting, rolling movements or abnormal nystagmus |
| IX | Glossopharyngeal | <ul style="list-style-type: none"> - Gag reflex |
| X | Vagus | <ul style="list-style-type: none"> - Gag reflex - Oculocardiac reflex is done by pressing the eyeball of the animal causing increased heart rate <p>Observations:</p> <p>When i pressed the eyeball of the dog, his heart starts beating fast.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <ul style="list-style-type: none"> - Effects of stimulation are dysphagia, tachycardia, altered |

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| | | depth of respiration and digestive disturbances |
| XI | Spinal Accessory | - Signs of defects include roaring, voice change, trapezius muscle degeneration |
| XII | Hypoglossal | - Signs of defect includes tongue protruding out of the mouth toward the side of the lesion, or atrophy of the tongue - Pulling the tongue causes retraction |
| | | Observations: |
| | | As i pulled my dog's tongue, he immediately retracts it. |
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Attitudinal and Postural Reactions

These require intact peripheral nerves, local segments of the spinal cord, ascending and descending pathways, brain stem, cerebellum and cerebrum. These occur in all normal animals.

1. *Tonic Neck and eye retraction*

Description: When the nose is elevated, the forelimbs extend and the hindlimb flex. Deviating the head to one side results in increased extensor tonus on that side. As the nose is elevated, the eyes should conjugately adjust to remain in the middle of the palpebral fissure. Normal nystagmus should be observed on lateral deviation of the head (quick phase toward the side of the deviation). Abnormalities of eye movements indicate lesions of the vestibulocochlear system.

Observations

a. Elevation of the nose

As the dog's nose was being elevated, his eyes also moved the same as the direction and when he saw me, he just starts to stare at me.

b. Head deviation to the left

When the dog's head was deviated to the left, his eyes looked to the opposite direction but then it still followed where was his head deviated.

c. Head deviation to the right

When the dog's head was deviated to the right, his head and eyes tried to go to the opposite direction but still it followed where his head was being deviated.

2. *Proprioreceptor positioning*

Description: A normal animal returns the limb to normal position when the following test are done: (1) abduction of one limb from its normal position; (2) crossing of one limb in front of the other; (3) flexion of the carpus or tarsus and the rest of the limb on the dorsum of the paw.

Observations

a. Abduction of the limb

When i abducted my dog's limb, he retracted it back and placed it again to its original position before.

b. Crossing the limb together

When i crossed together my dog's limb, he immediately put it back to its normal position and he curiously stared at my hand as i do it again.

c. Flexion of the limb

When i flexed the limb of the dog, he looked at my hand and was like "what does this hand want?" and he returned to his normal position.

3. *Blindfolding*

This will accentuate the locomotor ataxia if there is lesions in the dorsal white column of the spinal cord of their cranial extensions to the cortex. However, if the lesion is present in the cerebellum, no response may occur.

Observations

When i blindfolded my dog, he responded immediately on trying to take it off from its head.

Placing Reactions

1. *Optic*

Activity: Carry the animal toward the table top. On approaching the surface, the animal will reach out to support itself on the table. This reaction requires intact visual pathways in addition to the central and peripheral areas mentioned.

Observations

He did a position as if he's attempting to jump off the table but he kinda sensed that he is way too far off to the height of the table so he just kept on supporting his self every time he reaches the edge.

2. *Tactile*

Activity: carry a blindfolded animal toward a table. Allow the dorsum of each forepaw to strike the edge of the table. The normal animal will immediately place both forefeet on the table to support its weight.

Observations

When i put my dog and allow him to strike the edge of the table, he did a position as if he was trying to balance himself off to the edge.

3. *Extensor postural thrust*

Activity: Hold the animal up by the thorax and lower its hindlimbs towards the ground. The animal will extend its limbs to support its weight, if the animal is blindfolded, the tactile pathways will be tested instead of the visual.

Observations

When i held up my dog by his thorax and lowered his hindlimbs, he extend his limbs forward towards the ground trying to support his weight.

4. *Hopping*

Activity: Hold the animal with three limbs off the ground. Shift its center of gravity over the fourth limb which is supporting the animal. The normal animal will hop to keep the supporting limb under its body.

Observations

When i did it to my roommate's puppy, it just stand still, but when i tried it my adult dog, he does hopped as if trying to release his limbs off my hand. I think it has something to do with the weight and gravity.

5. *Righting*

Activity: Turn the animal to its lateral recumbency and then release it. Or drop the animal (this applies best for cats) upside down from a height over a padded surface. The normal animal will land on its feet.

Another approach is to suspend the animal by its hip and pelvis and turn its body from side to side. The normal animal will carry and hold its head in the normal position.

Observations

When i held our cat like in a normal baby position (lateral recumbency) in the height level of my chest and when i released her, she did a really fast reflex that making her to land on her feet.

6. *Walking Reaction/Wheelbarrowing*

Activity: Supporting the animal under the abdomen so that the hindlimbs are off the ground surface and then force the animal to walk on its forelimbs. Normally, the animal should walk with symmetry characterized by alternate forelimb movements with head extended in the normal position.

Observations

When i did this to our dog, he walked tried to walk forward normally and his hindlimbs are also moving like they were also on the ground.

7. *Hemistanding and Hemiwalking*

Activity: Hold the opposite hind or forelimbs off the ground and force the animal to walk forward or sideward. Thus, allow the animal to stand or walk with the hind or forelimb of one side only.

Observations

The dog tried to walk but he was like, he knows that he can't do it so he just always attempt to sit down/lie down..

Discussion questions:

1. Which of the above-mentioned cranial nerves have a sensory, motor or both components?

All of the above mentioned cranial nerves which have both components, a sensory and a motor, because these reflexes requires stimulations for the action potential to be elicited or else there would be no response from the animal.

2. Briefly discuss the role of learning in altering the activity of the reflexes above.

The role of learning in altering this activity of the reflexes is for us to know if the animal used projects a normal reflex or is he/she responding normally and do not show an abnormal response to the different activity that has performed.

VPHY 50: General Physiology Laboratory Exercises

And also it is for us to see how this activity affects on how we handle our reflexes,
because we can be used to do things that results in controlling on how would we want our reflex
to react.
