

Afferent Neurons of the Body

Ascending tract –

Descending tract –

Afferent pathway –

1° Neuron -

2° Neuron –

3° Neuron -

Afferent Neurons of the Body

Ascending tract – Sensory neurons

Descending tract – Motor neurons

Afferent pathway – 3 neurons

1° Neuron - Located out in the body.

2° Neuron – Located in the spinal cord

3° Neuron - Located in the post central gyrus

Efferent Pathway to the Body

Upper motor neuron –

Corticospinal tract –

Pre-central gyrus –

Upper Motor neuron –

Starts:

Cell body:

90% Travel:

10% Travel:

Lateral corticospinal tract –

Pyramidal system –

Efferent Pathway to the Body

Upper motor neuron – cell body in the gray matter of pre-central gyrus. Axon goes from there into the spinal cord.

Corticospinal tract – The main tract for almost all voluntary muscle activity. (Efferent motor neurons)

Pre-central gyrus – major area for voluntary muscle control in the cortex.

Upper Motor neuron – Is the efferent 1^o neuron.

Starts: In the pre-central gyrus

Cell body: Is located in the pre-central gyrus

90% Travel: Down the corticospinal tract. 90% of the fibers decussate at the medulla and travel down the lateral corticospinal tract.

10% Travel: Remain ipsilateral and travel down the ventral corticospinal tract. These latter fibers decussate at the level they leave the cord.

Lateral corticospinal tract – where the motor neurons travel after the medulla. These are the ones that have moved to the other side.

Ipsilaterally, 10% of the neurons leaving the medulla travel down the ventral corticospinal tract.

Pyramidal system – the first order neurons are shaped a little like pyramids. So both of the tracts are called the pyramidal system.

Additional Efferent

Suppressor neurons –

If suppressors down work –

Need to know:

Motor pathway is

Upper motor neuron starts

It synapse with a

The whole tract is called

They mostly decussate in the

There are also suppressor cells

Additional Efferent

Suppressor neurons – who's job it is to “slow down” the other motor neurons. Their fibers travel with the rest of the pyramidal tract. They start in an area just in front of the pre-central gyrus.

If suppressors down work – hyperreflexion (an exaggerated reflex) or spasticity (you hit the reflex point, the things moves, and then stops and doesn't go back)

Need to know:

Motor is a two neuron pathway.

Upper motor neuron starts in the precentral gyrus

It synapse with a lower motor neuron in the ventral horn

The whole tract is called the pyramidal tract (it's called that because the cell bodies of the upper motor neurons look like pyramids)

They mostly decussate in the brainstem, some decussate later in the spinal cord.

There are also suppressor cells that are part of the pyramidal system, without these you have hyperflexion or spasticity.

Facial Nerves

I. Olfactory		
II. Optic		
III. Ocular Motor		
IV. Trochlear		
V. Trigeminal		
VI. Abducense		
VII. Facial		
VIII. Acoustic (Vestibular)		
IX. Glossopharyngeal		
X. Vagus		
XI. Accessory		
XII. Hypoglossal		

I. Olfactory	Sensory	Smell from nose to cortex	On
II. Optic	Sensory	Vision from eye to thalamus	Old
III. Ocular Motor	Mixed	To/From Eye & midbrain	Olympus'
IV. Trochlear	Mixed	Muscles of Eye/Pupil to/from midbrain	Towering
V. Trigeminal	Mixed	Face/Scalp to pons Pons to muscles of chewing	Top
VI. Abducense	Mixed	Abduction muscle of the eyeball to/from pons	A
VII. Facial	Mixed	Face/Scalp to pons Pons to muscles of facial expression	Finn
VIII. Acoustic (Vestibular)	Sensory	Hearing and Equilibrium	And
IX. Glossopharyngeal	Mixed	Tastebuds to thalamus Medulla to some salivary glands and muscles of swallowing	German
X. Vagus	Mixed	Visceral organs to/from medulla/pons	Viewed
XI. Accessory	Mixed	Muscles of throat/neck to /from medulla	A
XII. Hypoglossal	Mixed	Muscles of the tongue to/from medulla	Hop

Efferent nerves of the Eyes

Cortibulbar tract

Cranial Nerve III –

These muscles are

x

x

x

x

Cranial Nerve IV –

Moves the muscle:

x

Cranial Nerve VI -

Moves the the

x

Here' s the formula:

Efferent Nerves of the Eyes

Cortibulbar tract goes from the cortex to the bulbar region of the medulla oblongata.

Cranial Nerve III – Ocular Motor Nerve

These muscles are

x Superior Rectus

x Medial Rectus

x Inferior Rectus

x Inferior Oblique

Cranial Nerve IV – Trochlear

Moves the muscle:

x superior oblique nerve of the eye

Cranial Nerve VI - Abducense

Moves the the

x lateral rectus

Here' s the formula: SO₄LR₆3

Efferent Cranial Nerves

Must know:

- CN III –
- CN IV –
- CN VI –
- CN V –
- CN VII –
- CN IX –
- CN X –
- CN XI –
- CN XII –

Efferent Cranial Nerves

Must know:

- CN III – know the four of six muscles
- CN IV – SO muscle
- CN VI – LR muscle
- CN V – mastication
- CN VII – Facial expression (Enervation: bilateral for the top fibers, contralateral for the lower)
- CN IX – just the stylophrangeus
- CN X – parasympathetic and (swallowing and talking – works for IX as well)
- CN XI – shrugs shoulders and moves head (SCM and upper trapezoids)
- CN XII – all the muscles of the tongue except the palatoglossal (enervation: Contralateral only)

Subcortical Motor Areas

Subcortical –

Corticospinal (spinal) or corticobulbar(cranial) nerves

Extrapyramidal system –

Subcortical motor system -

Basal ganglion

Composed of four structures:

x

x

x

x

Groups of cell bodies that work in muscle reflex more than anything else.

Two more structures in the midbrain

x

x

These areas are connected via

They (subcortical motor or basal ganglion) talk to the body via

They descend down the:

x

x

Subcortical Motor Area

Subcortical – beneath the cortex.

Corticospinal (spinal) or corticobulbar(cranial) nerves are voluntary. Both of these have pyramidal upper neurons.

Extrapyramidal system – anything not coming out of the cortex.

Subcortical motor system - A major part of this is called the basal ganglion. Palentologically an “old” system.

Basal ganglion is composed of areas of gray matter (cell bodies)

Composed of four structures:

x Caudate Nucleus

x Globus Pallidus

x Putamen

x Amygdala (means almond)

Groups of cell bodies that work in muscle reflex more than anything else.

Two more structures in the midbrain (Only two area in the CNS that contain pigmented.)

x Red Nucleus

x Substantia Nigra

These areas are connected via sensory nerve fibers or tracts. (There are likely to be association fibers)

They (subcortical motor or basal ganglion) talk to the body via descending (efferent or motor) tracts that come from the red nucleus and the reticular formation.

They descend down the:

x Rubrospinal tract

x Reticulospinal tract

Vestibular System

The vestibular system is part of

The vestibular portion of the CN VIII controls

The vestibular portion of CN VIII is lumped in with

Vestibulocerebellar connection -

The cerebellum

The vestibulospinal tract

The vestibulospinal tract travel

Vestibulo-ocular connection -

Vestibulo-cortical connection –

What to know:

What the vestibular system is.

What the righting reflex/mechanism is.

What the vestibulo portion talks to and receives information from.

x

x

x

x

Vestibular System

The vestibular system is part of CN VIII

The vestibular portion of the CN VIII controls equilibrium. Thru a reflex called the righting reflex (or righting mechanism).

The vestibular portion of CN VIII is lumped in with the extrapyramidal system.

Vestibulocerebellar connection - Vestibular neurons that synapse with the 2^o neurons that travel to the cerebellum. At the place where the 1^o neurons synapse with the 2^o neurons

The cerebellum is the coordination center for motor activity and equilibrium.

The vestibulospinal tract consists of the Medial and lateral vestibulospinal tract.

The vestibulospinal tract travel out to the body to work the muscles for the righting reflex. They discharge reflexively to maintain equilibrium.

Vestibulo-ocular connection - The pathway coordinates eyeball movement when I'm turning.

Vestibulo-cortical connection – Somehow related to the conscious connection of dizziness. It has to be there because if we are getting a stimulation from the vestibular portion there must be a connection with the post-central gyrus, it's the only we we can feel the sensation of dizziness.

What to know:

What the vestibular system is.

What the righting reflex/mechanism is.

What the vestibulo portion talks to and receives information from.

The cerebellum

The rest of the body

The Eyes

Some contact with upper awareness

Cerebellum

Located

Cerebellum does three major things

- x
- x
- x

Cerebellum does not

If it is damaged:

Spinocerebellar pathway –

Cerebellum reads the current state of equilibrium

Cerebellum talks to the precentral gyrus

Cerebellum is monitoring muscle movement in the body so t

Nuclei –

Phylogenetically

- 1 Archicerebellum –
- 2 Paleocerebellum -
- 3 Neocerebellum –

Cerebellum

Located in the brainstems Back behind the pons.

Cerebellum does three major things

- x Coordinates voluntary muscle activity
- x Major player in equilibrium
- x Responsible for muscle tone

Cerebellum does not initiate movement. It only fine tunes movement.

If it is damaged: you don't suffer from paralysis., but instead you are slow, clumsy, uncoordinated movement.

Spinocerebellar pathway – proprioceptive fibers that run up the spine and read the state of the body's muscles.

Cerebellum reads the current state of equilibrium by the vestibulocerebellar tract. This comes from the vestibular portion of cranial nerve 8, because cranial nerve 8 talks to the organs for detecting changes in equilibrium.

Cerebellum talks to the precentral gyrus to read muscle tone from the cerebral cortex from the corticopontocerebellar tract. (It goes from the cortex, through the pons, and to the cerebellum.)

Cerebellum is monitoring muscle movement in the body so that it can fine tune the movement.

Nuclei – a mass of cell bodies.

Phylogenetically (how it developed)

- 1 Archicerebellum – Posture
- 2 Paleocerebellum - anterior and posterior lobes – progressive movement
- 3 Neocerebellum – lateral lobes – speech and manipulative movement

Cerebellum Review

What we need to know:

Where it is : behind the pons.

The phylogenetic progression.

Know who talks to the cerebellum

- x CN 8
- x Cortex
- x muscles of the body

It talks to

- x muscle of the body (via any spinal tract he wants to use... we don't care what they are)