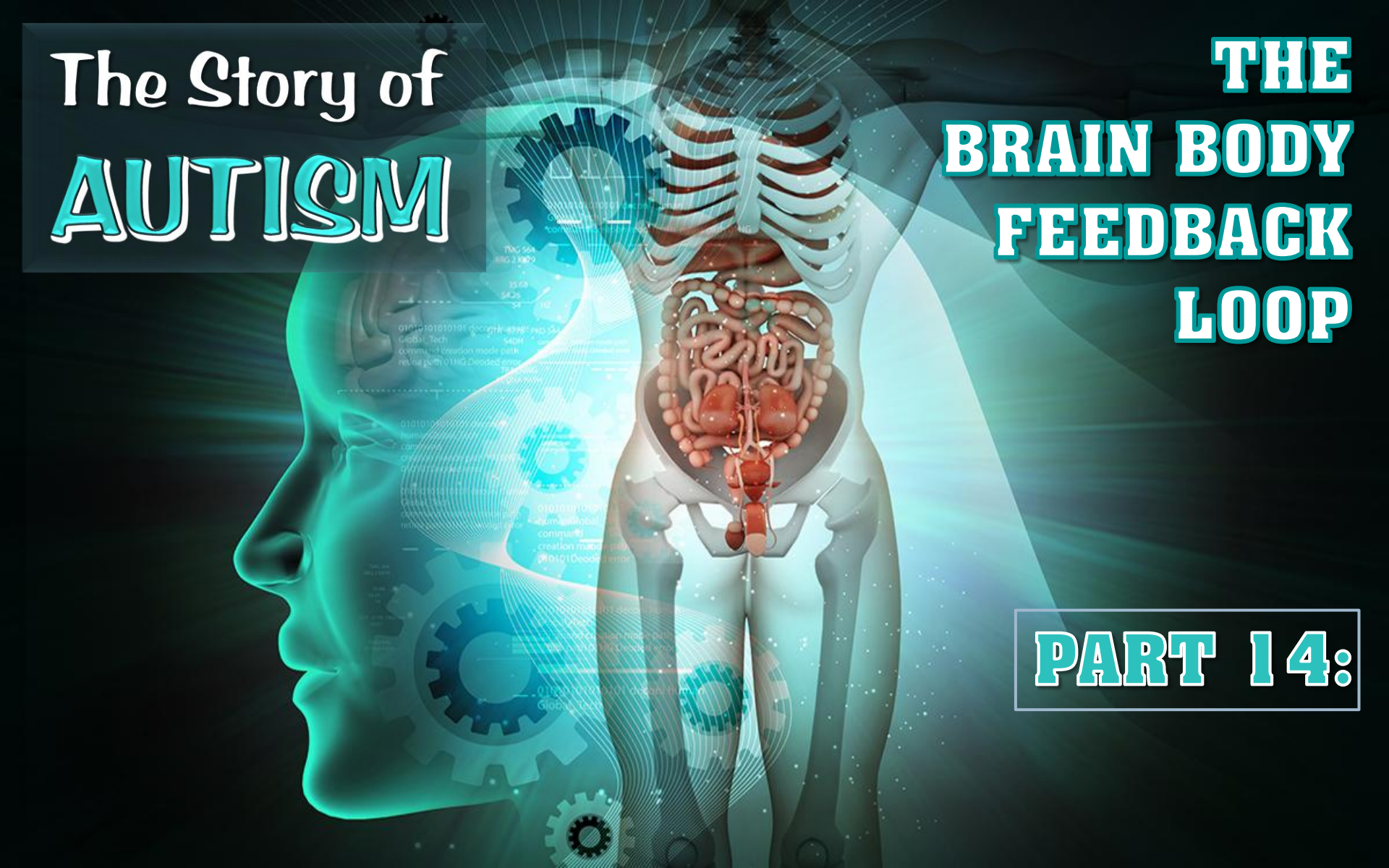

The Story of
AUTISM
THE
BRAIN BODY
FEEDBACK
LOOP
PART 14:

THE STORY OF AUTISM: Brain Body Feedback Loop

Our central nervous system (CNS) has three main functions:

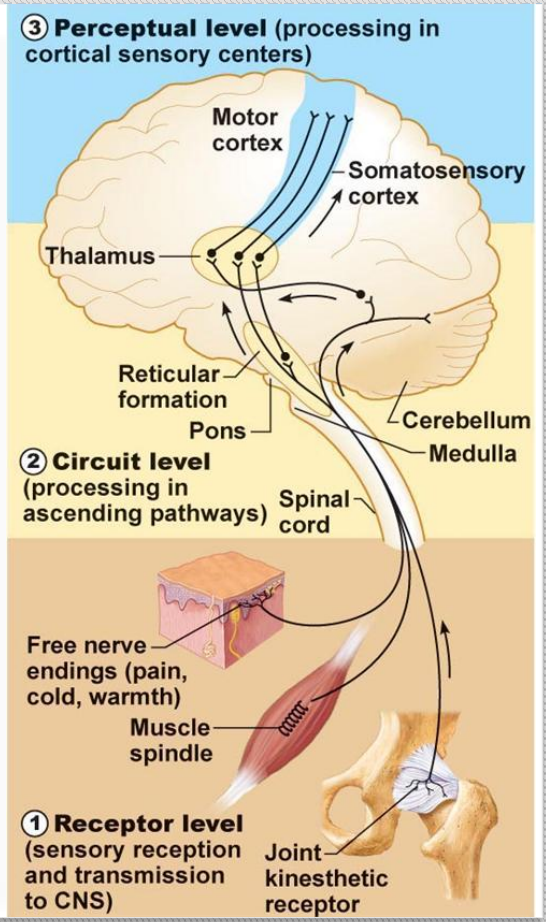
1. It takes in sensory information
2. It integrates and organizes the data it takes in
3. It plans and carries out motor output

The CNS processes information using ascending and descending sensory pathways.

THE STORY OF AUTISM: Brain Body Feedback Loop

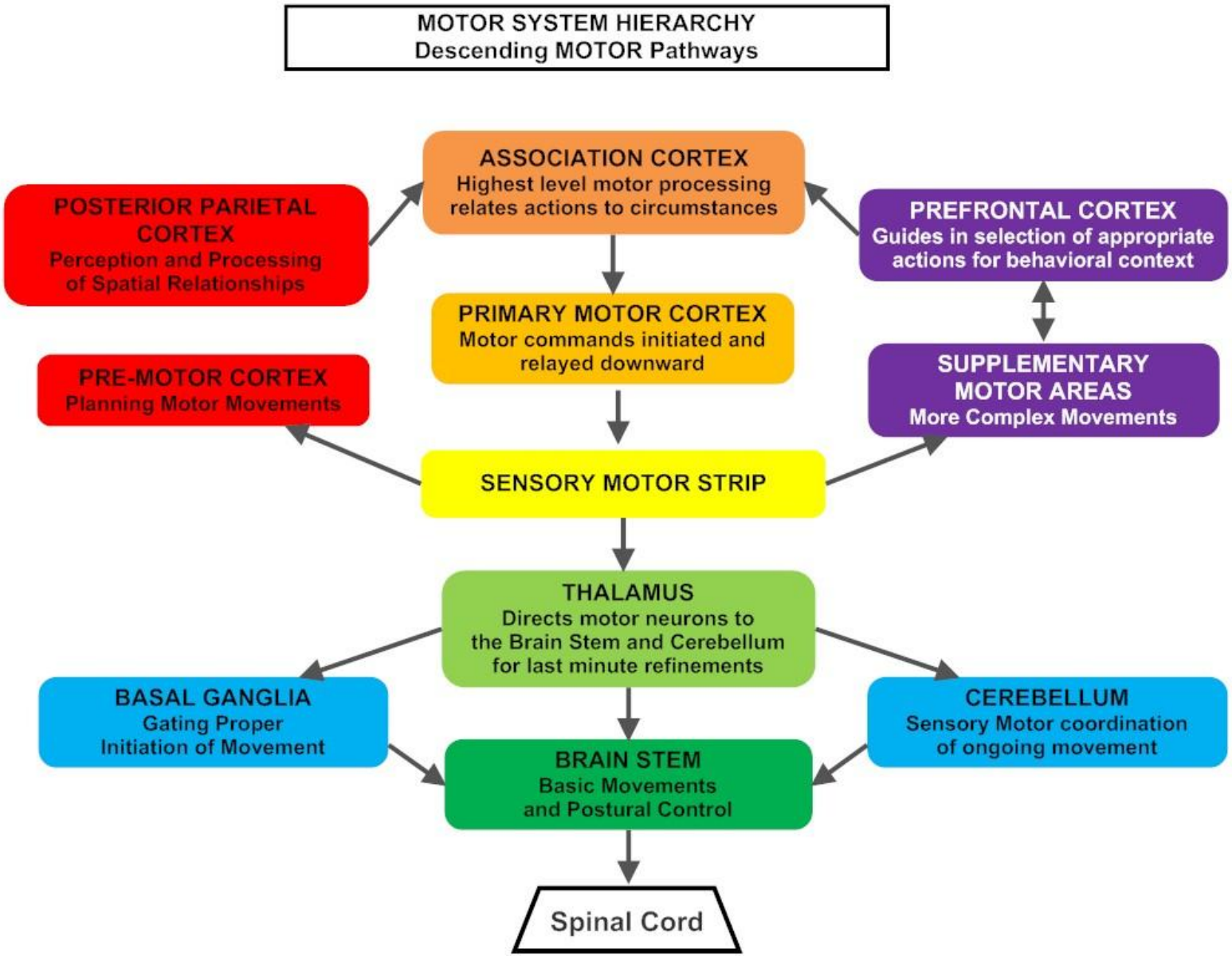
The basic structures of the **ascending sensory pathway are:**

1. muscle spindles and nerves
2. spinal cord
3. brainstem
4. cerebellum
5. reticular formation
6. thalamus
7. somatosensory cortex
8. motor cortices



THE STORY OF AUTISM: Brain Body Feedback Loop

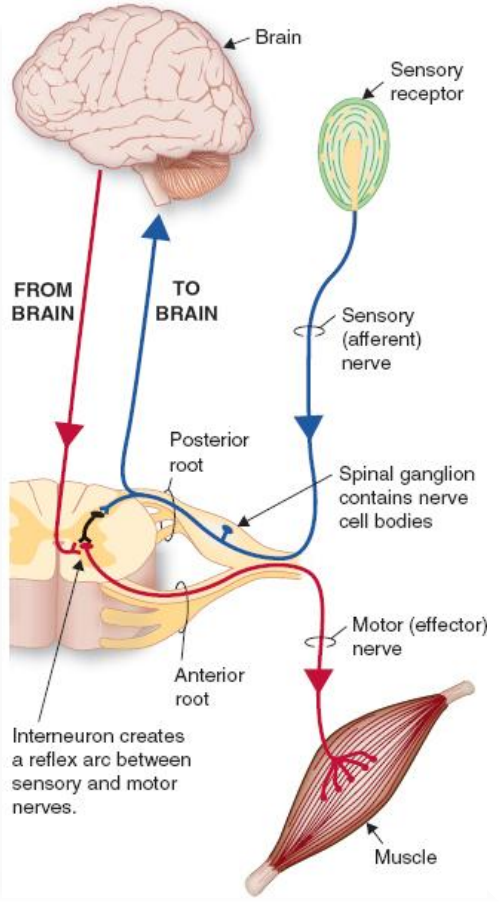
The **descending motor pathway** is a bit more complicated, which makes sense when you think of all the things your body is capable of doing, not just the gross motor things, like walking, running and sports, but the intricate fine motor things like typing, drawing and talking.


MOTOR SYSTEM HIERARCHY
Descending MOTOR Pathways
ASSOCIATION CORTEX
Highest level motor processing relates actions to circumstances
POSTERIOR PARIETAL CORTEX
Perception and Processing of Spatial Relationships
PREFRONTAL CORTEX
Guides in selection of appropriate actions for behavioral context
PRIMARY MOTOR CORTEX
Motor commands initiated and relayed downward
PRE-MOTOR CORTEX
Planning Motor Movements
SUPPLEMENTARY MOTOR AREAS
More Complex Movements
SENSORY MOTOR STRIP
THALAMUS
Directs motor neurons to the Brain Stem and Cerebellum for last minute refinements
BASAL GANGLIA
Gating Proper Initiation of Movement
CEREBELLUM
Sensory Motor coordination of ongoing movement
BRAIN STEM
Basic Movements and Postural Control
Spinal Cord

THE STORY OF AUTISM: Brain Body Feedback Loop

Note that the further upward you go in the brain, the more complex the processing circuitry gets.

It simplifies again, the lower you go until you get to the specific muscles, tendons and nerves.



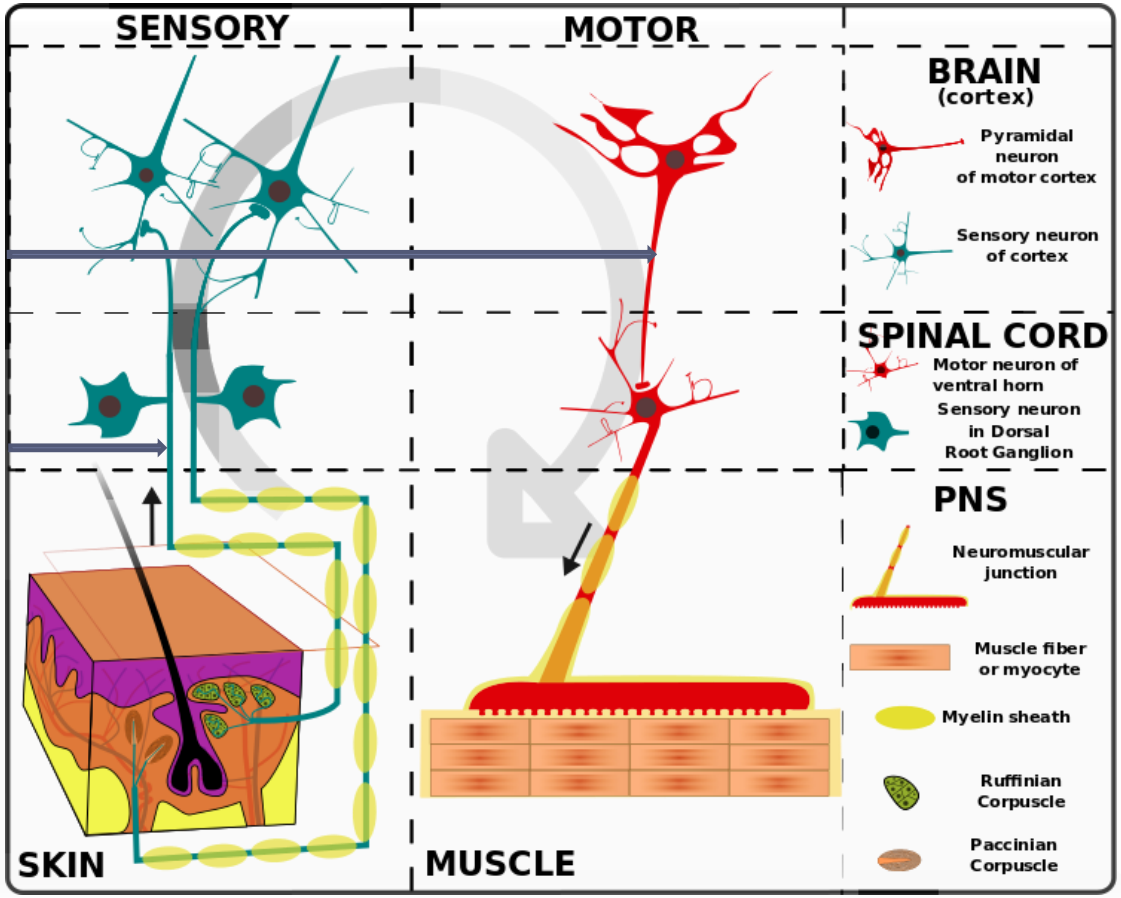
THE STORY OF AUTISM: Brain Body Feedback Loop

- **Sensory neurons:** send information from sensory receptors (e.g., in skin, eyes, nose, tongue, ears) TOWARD the brain.
- **Motor neurons:** send information AWAY from the brain to muscles or glands.
- **Interneurons:** send information between sensory neurons and motor neurons. Most interneurons are located in the central nervous system.

THE STORY OF AUTISM: Brain Body Feedback Loop

A delayed or retained **BC Reflex** will cause functional or myelination problems with this tract

Any primitive reflex retainment could cause proprioception problems that would throw off much of this input data.

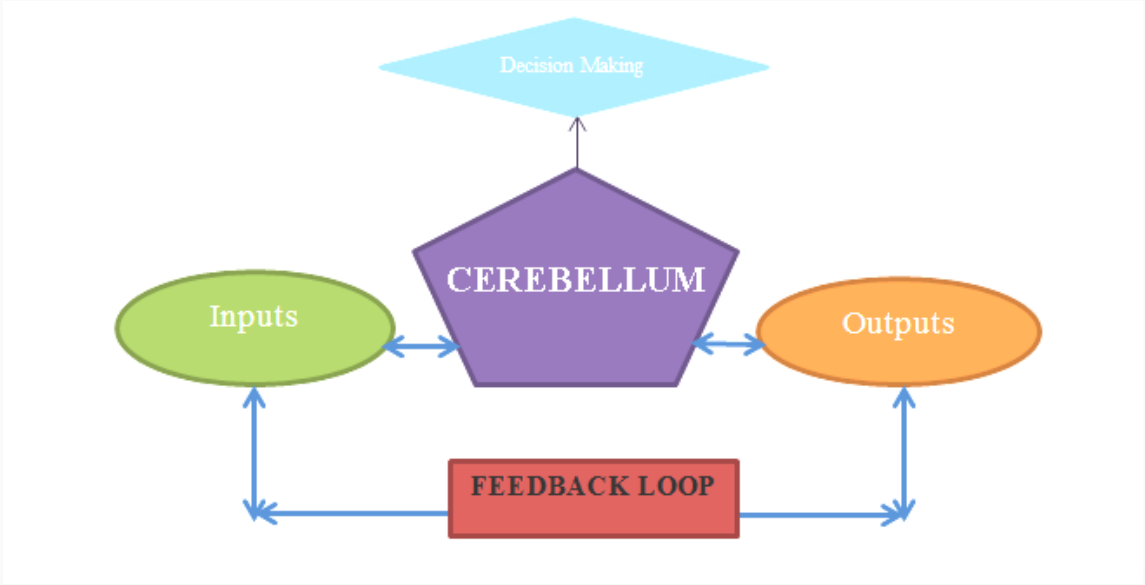


THE STORY OF AUTISM: Brain Body Feedback Loop

The reason we can do just about anything we want to do is because **our brain takes the information our senses provide it and turns it into a motor plan.**

THE STORY OF AUTISM: Brain Body Feedback Loop

Picture the operation of the brain and central nervous system (CNS) as a closed system feedback loop with the cerebellum as the central, control cog.



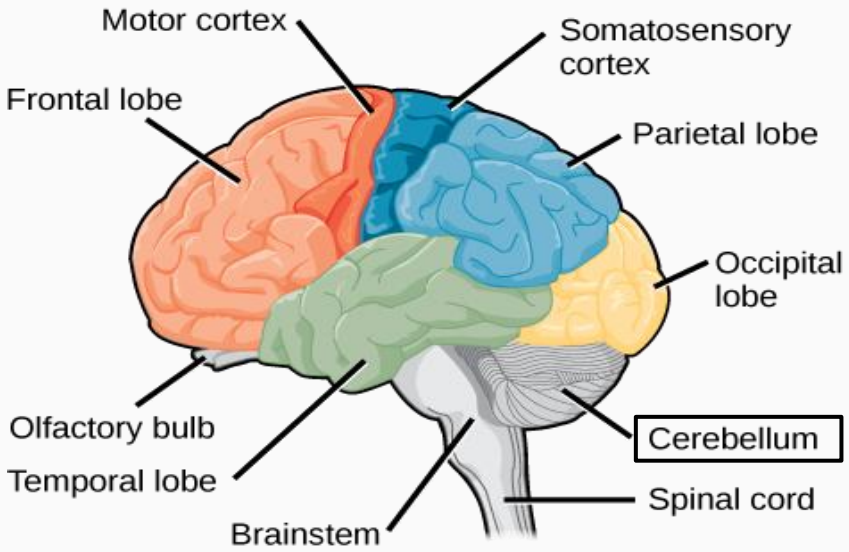
THE STORY OF AUTISM: Brain Body Feedback Loop

Now, let's take a simple activity that we all do every day, like walking. We don't think about it. When we want to get from one place to another we just stand up and go.

But… **inside our brains a lot is happening.**

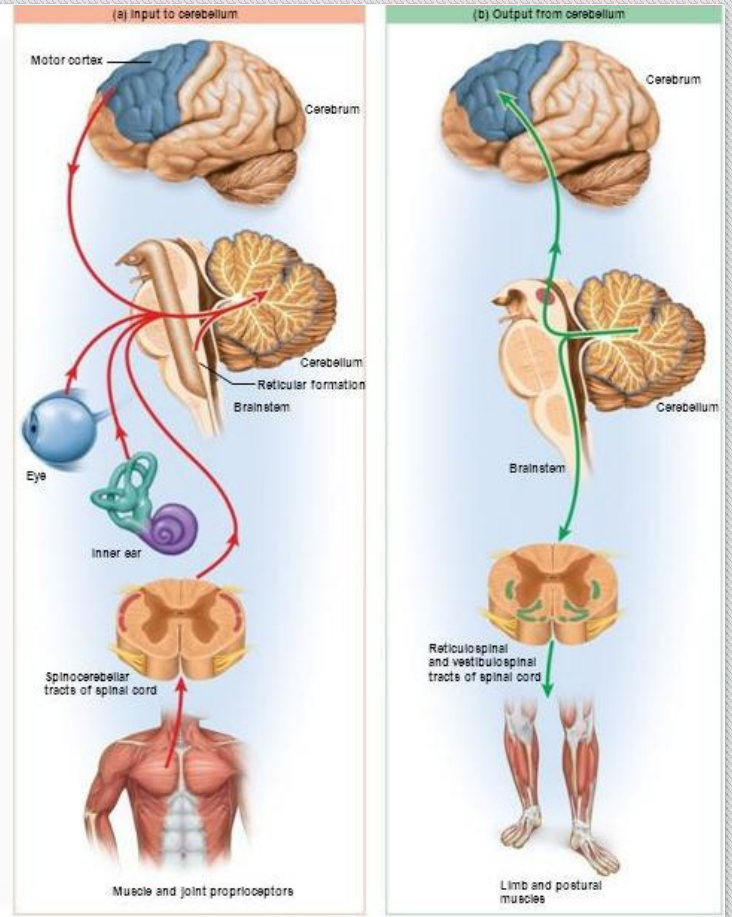
THE STORY OF AUTISM: Brain Body Feedback Loop

The primary motor cortex is sending a command down to the spinal cord to initiate walking, and a copy of that instruction is being sent to the cerebellum.



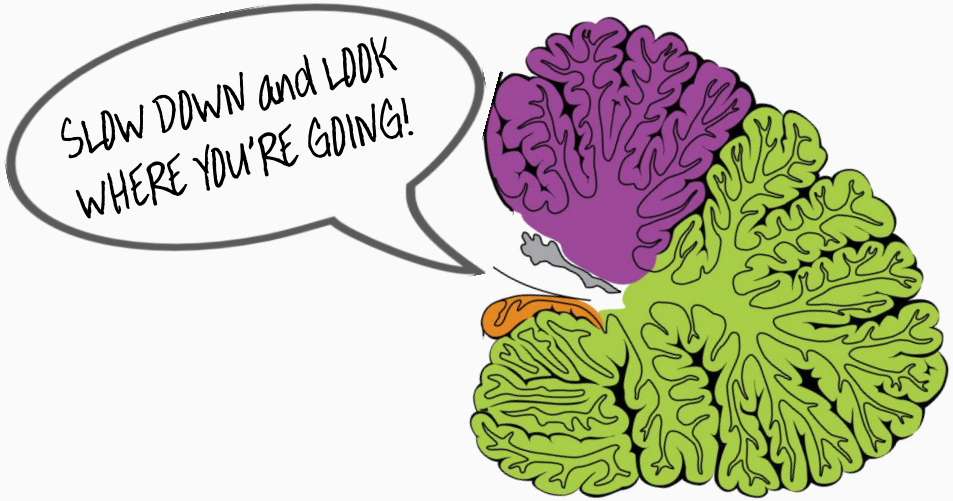
THE STORY OF AUTISM: Brain Body Feedback Loop

Sensory feedback from the muscles and joints, proprio-ceptive information about our arm and leg movements and balance sensations are also being sent to the cerebellum for it to compare with the motor cortex command.



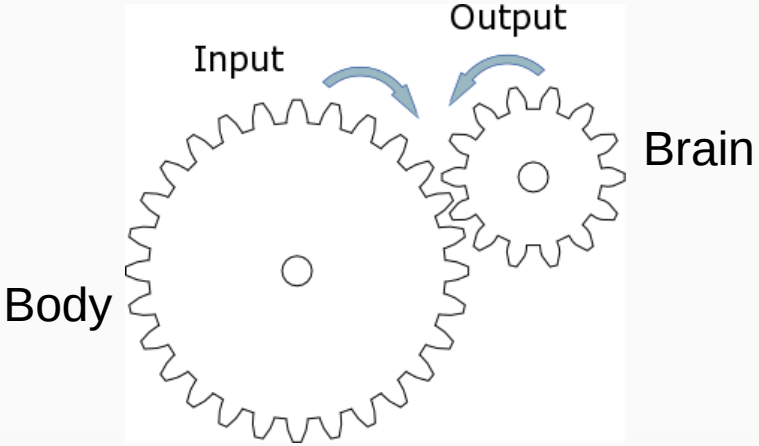
THE STORY OF AUTISM: Brain Body Feedback Loop

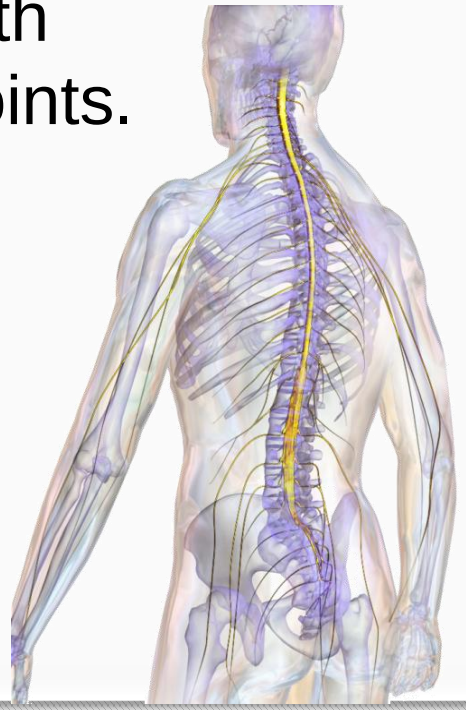
If our walking is not coordinated, perhaps because the ground is uneven or there are a lot of people in our way, then the cerebellum puts out a corrective command to adjust our balance and steps accordingly.



THE STORY OF AUTISM: Brain Body Feedback Loop

The brainstem then sends descending feedback to the spinal cord to correct the messages going to skeletal muscles and the loop begins again with sensory input from the muscles and joints.

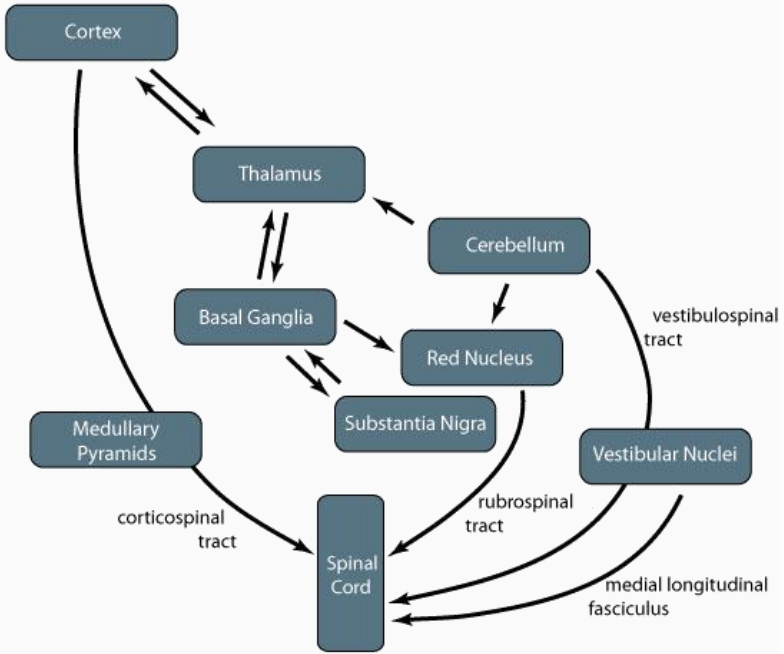




THE STORY OF AUTISM: Brain Body Feedback Loop

All this happens in the time it takes us to put one foot in front of another. Pretty amazing, isn't it?

This feedback loop goes on every minute of the day, with everything we do.



GO ON TO THE NEXT PRESENTATION