BHARATHIDASAN UNIVERSITY

Program: M.Sc., Biomedical Science

Course Title : Neurobiology

Neurodevelopment

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Normal sensation, movement, and homeostasis depend on long-distance connections within the CNS

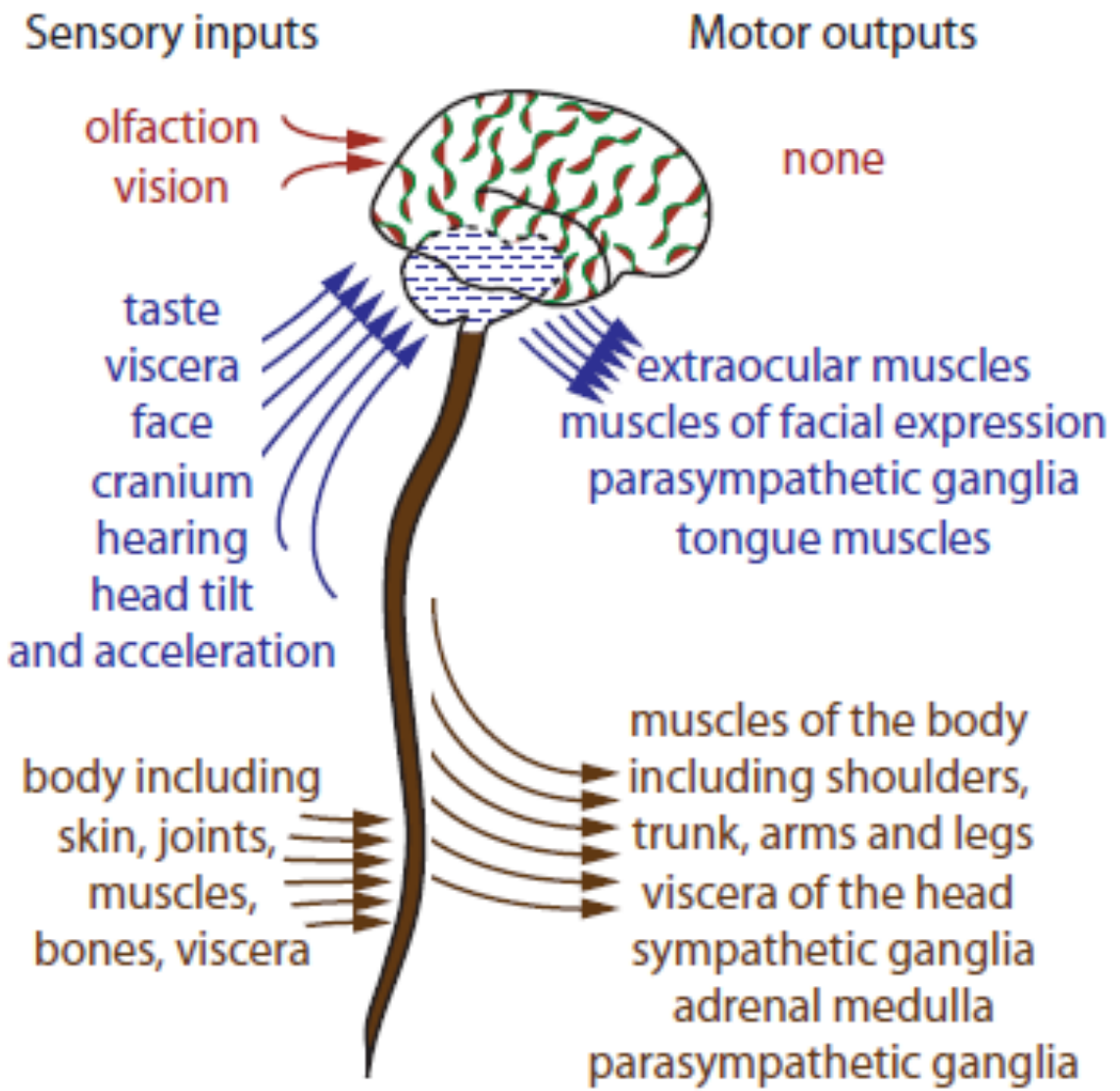
Sensory information comes **INTO** the nervous system

- The forebrain receives sensory information from the eyes and nose.
- The brainstem receives sensory information from the
  - face,
  - oral cavity,
  - ears, and
  - Internal viscera
- The spinal cord receives sensory information from the body;

*Motor signal **SEND** **OUT** via the nervous system*

- The spinal cord and brainstem send signals out to control muscles and glands.
- The forebrain has no direct connection to muscles and can only reach the body through controlling the release of hormones from the pituitary

Sensory and Motor communication



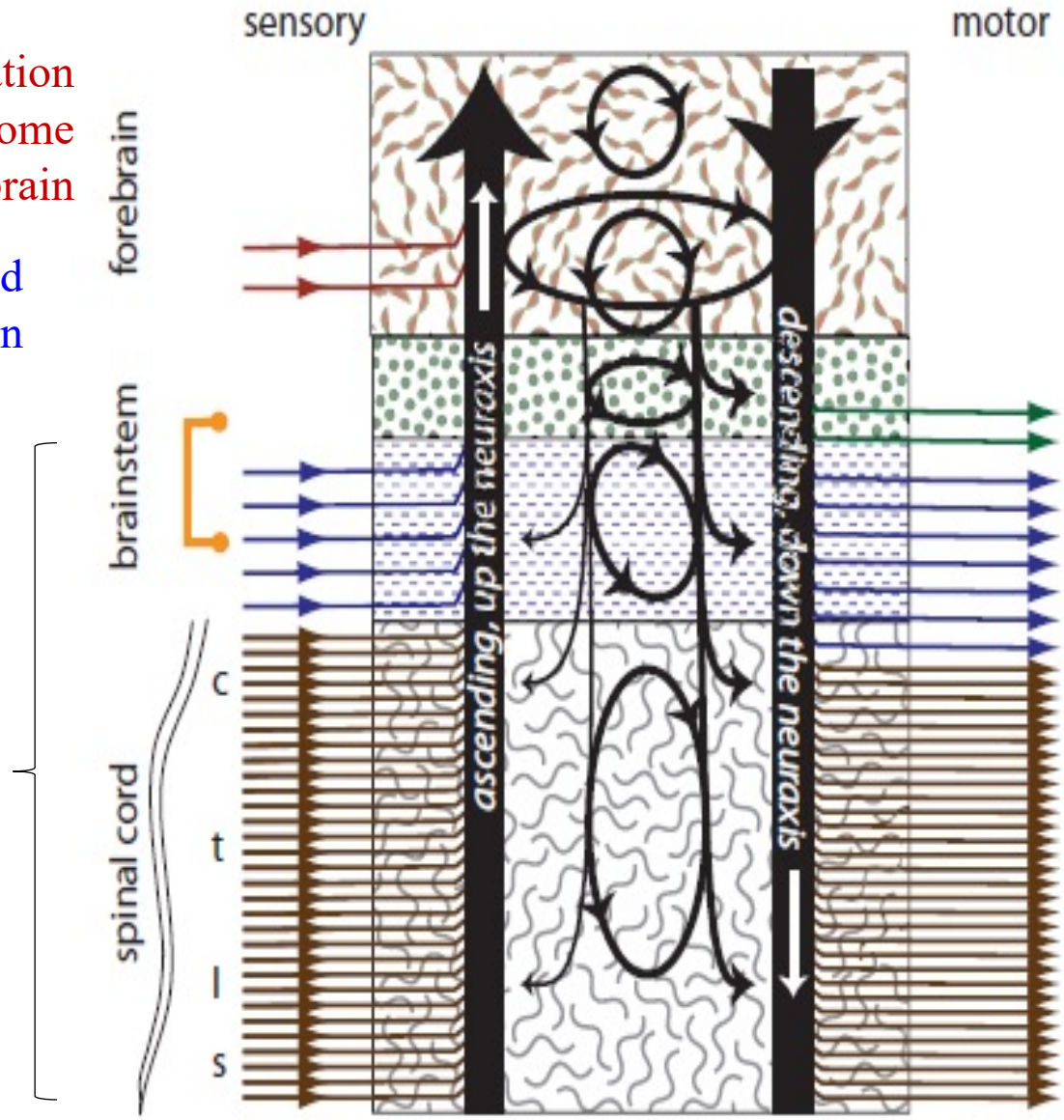
Brain functions traverse the spinal cord, brainstem, & forebrain

Visual and olfactory information from the eyes and nose come directly into the forebrain

auditory, gustatory, and somatosensory perception

to the forebrain to give rise to

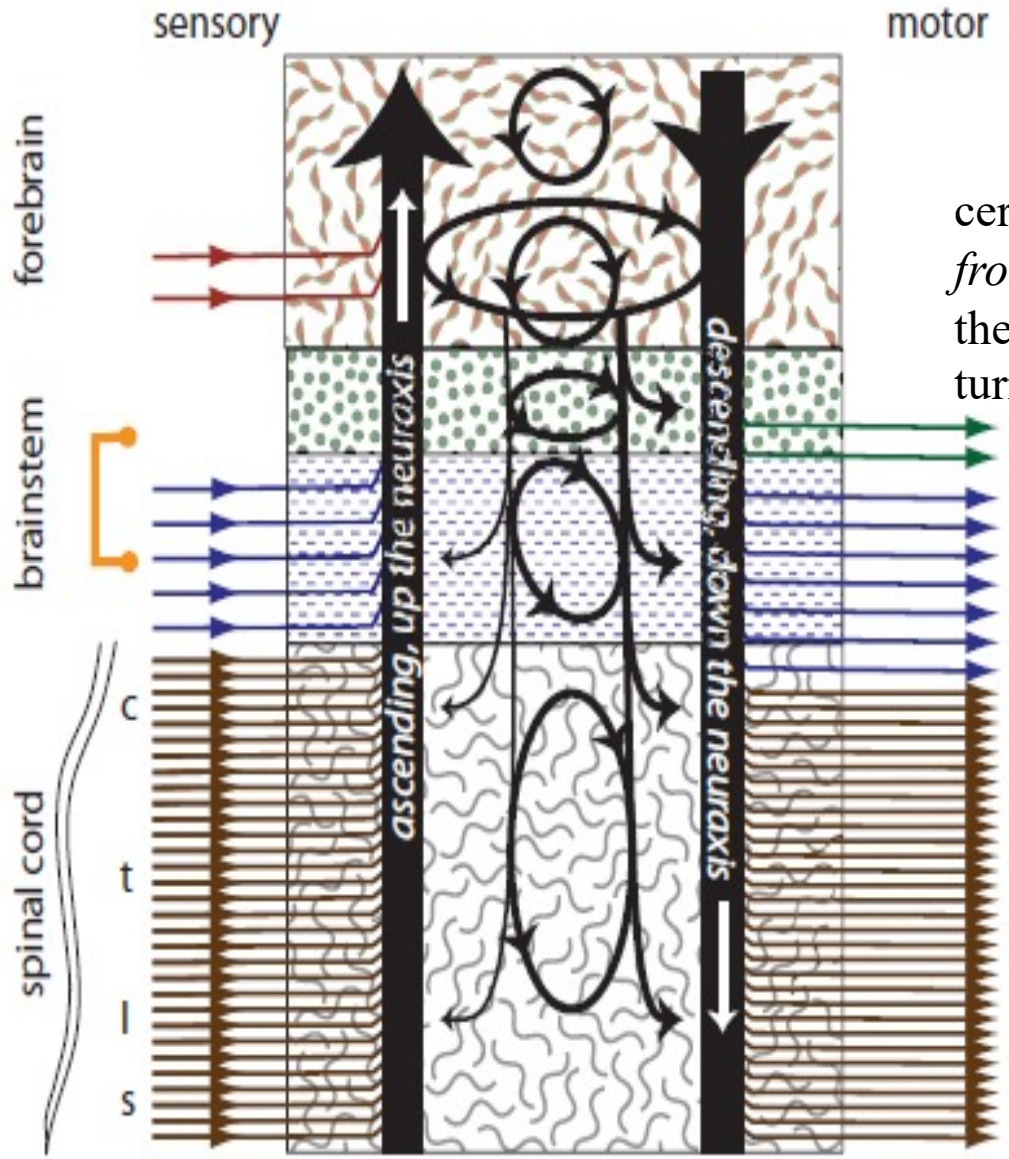
information from the ears, oral cavity, skin, and viscera



Somatosensory system

- supports a wide variety of conscious and unconscious sensations.
- Conscious:- carries information, such as the perception of touch, pressure, vibration, pain, temperature, tickle, itch, wetness, and so on, from skin, viscera, muscles, and joints
- critical to a variety of unconscious functions, such as adjusting a grip, preventing stumbling (losing balance), and maintaining blood pressure.

Brain functions traverse the spinal cord, brainstem, & forebrain



cerebral cortex, projections *descend , or travel from rostral* to caudal, to reach motoneurons in the brainstem and spinal cord that in turn innervate skeletal or voluntary muscles

In order to maintain homeostasis,

- sensory information from the body enters (ascending) the spinal cord and brainstem, where it triggers automatic or unconscious reactions.

Ex. a mild decrease in ambient levels of oxygen, we automatically breathe more rapidly and elevate our blood pressure.(happen in passenger cabin of airplane)

*automatic or unconscious reactions: either we cannot intentionally produce or we are not aware of it.

- Sensory information ascend to the forebrain to engage more conscious reactions. (adjustment)

Ex. donning a windbreaker in response to cool sea breezes during a walk on the beach.

- Sensory messages descending from the forebrain and brainstem reach neurons that control muscles and glands to coordinate body functions with intended actions.

Ex. as a frightened person runs from a growling dog, heart rate increases, digestion stops, and blood flow to the leg muscles increases.