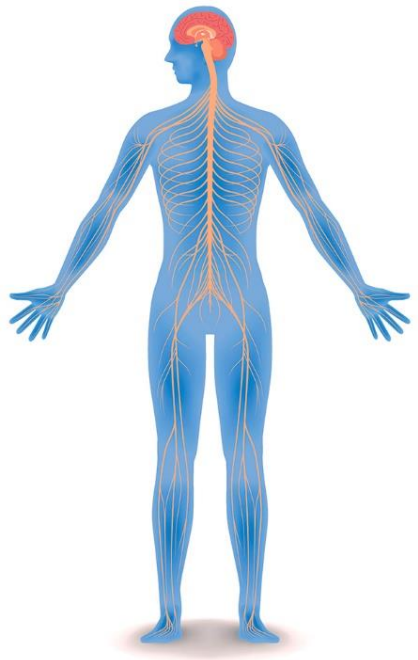
The peripheral nervous system

Conrad.Perry@Adelaide.edu.au

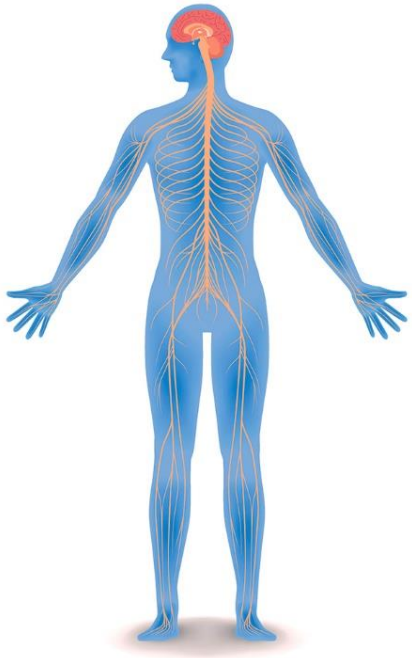


Nervous System

- Central Nervous System
  - Brain
    - Forebrain
      - Thalamus
      - Hypothalamus
      - Cerebrum (cerebral cortex)
      - Limbic system
      - Corpus callosum
    - Midbrain
    - Hindbrain
      - Cerebellum
      - Pons
      - Medulla
  - Spinal Cord
- Peripheral Nervous System
  - Somatic system (voluntary muscle action)
  - Autonomic system (controls smooth muscle, cardiac muscle and glands; basically involuntary)
    - Enteric system (digestive system)
    - Sympathetic (generally activates)
    - Parasympathetic (generally deactivates)

Constant cooperation

CNS and PNS Jargon

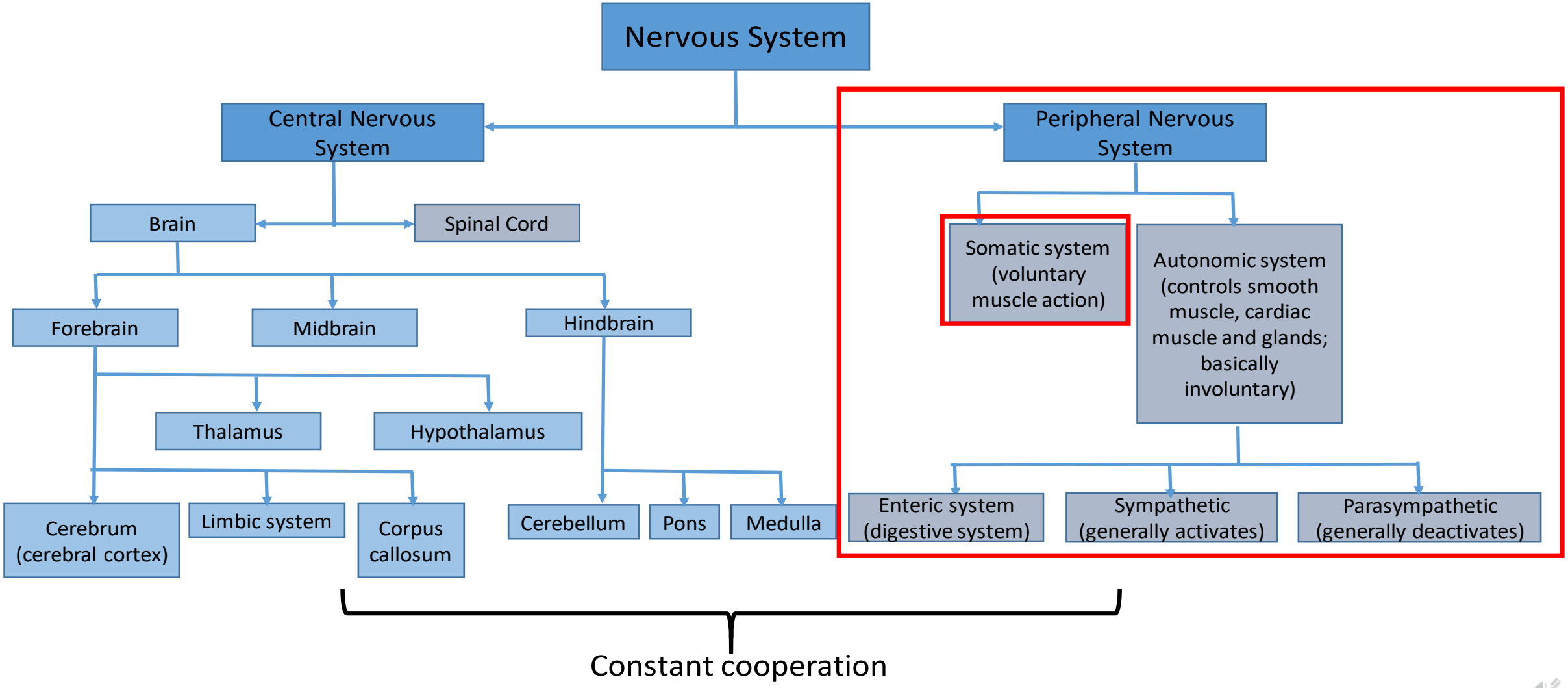


Bundles of axons form **fibres** and multiple fibres the **nerves**

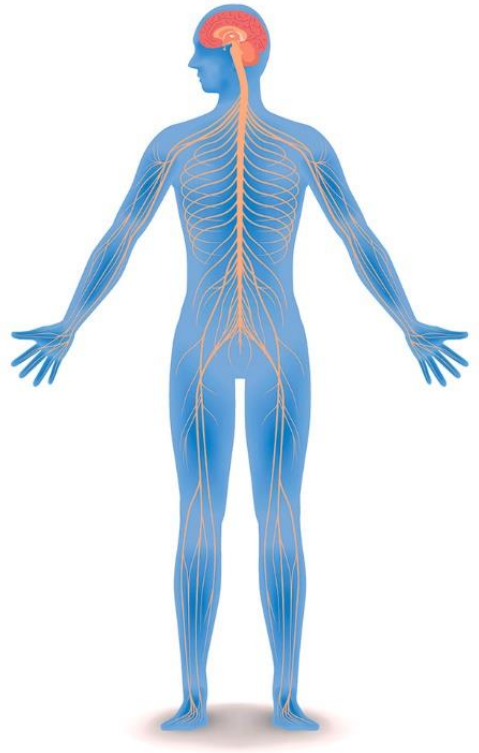
Nerves are classified based on whether they contain just sensory (afferent nerves) or just motor neurons (efferent nerves), or both.

Longer distance connections often use **ganglia** which are bunches of cell bodies that work like relay stations moving information from one structure to another

Let’s look at the peripheral nervous system



Somatic system

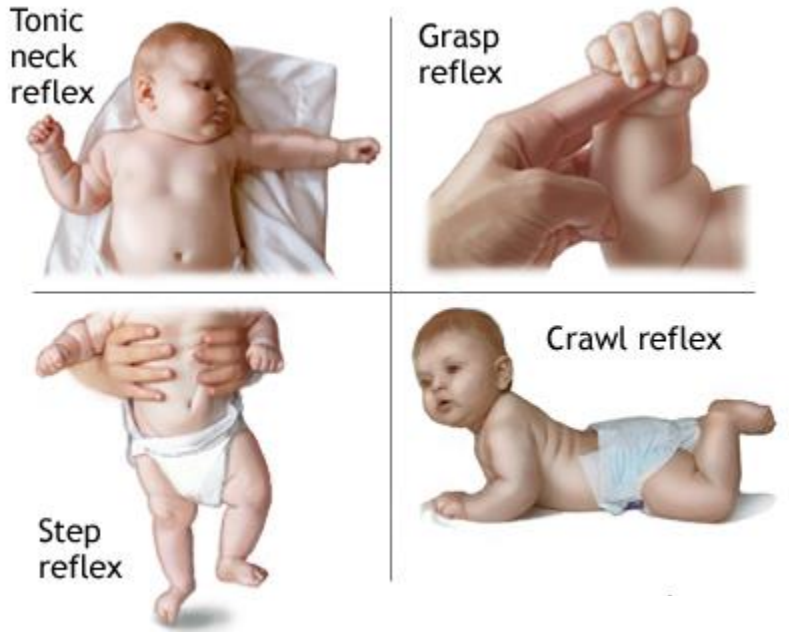


Voluntary nervous system

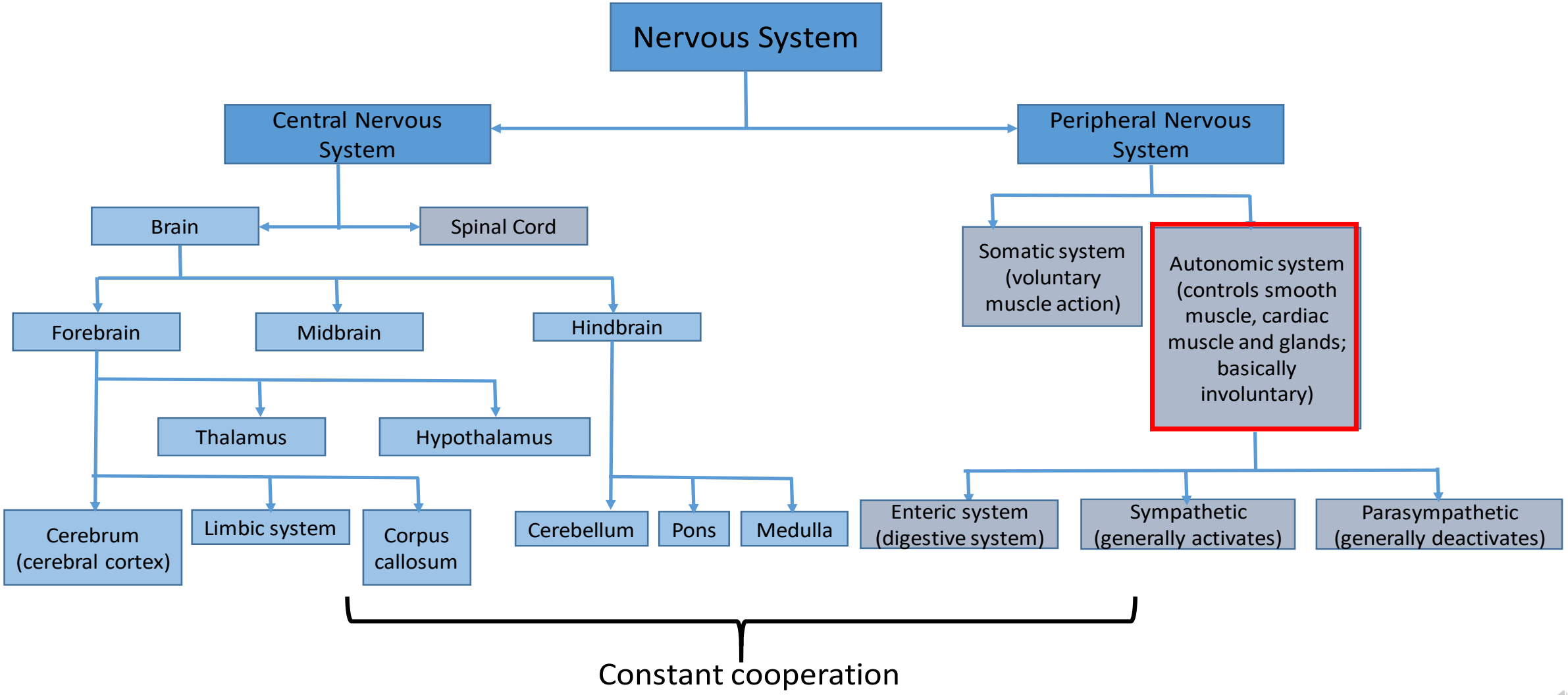
- Afferent neurons for all senses (from senses towards CNS)
- Efferent neurons for sending messages (from the CNS to muscles, causing movement)

Involuntary movements

- Neural pathway **‘reflex arc’**
- One step: a sensory neuron that goes straight to the spinal cord – potentially bypassing brain
- Infant reflexes

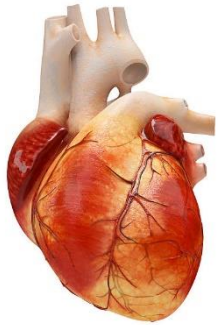


Let’s look at the autonomic nervous system



Autonomic system

Controls involuntary functions



There are three main systems: Sympathetic, parasympathetic and enteric

Enteric system

Regulates the gastrointestinal tract

Gut microbes are associated with various diseases (Alzheimer's and Parkinson's disease)

The gut produces and potentially regulates some neurotransmitters in the brain

- Causal link is not well established

Sympathetic system

Governs responses to emergency situations

- Uses energy for the flight or fight response
- Also activated in other times

Deals with using energy from body's reserve

Tends to work as whole (i.e., most organs will respond)

Correlates include stress and ill health if it is too activated

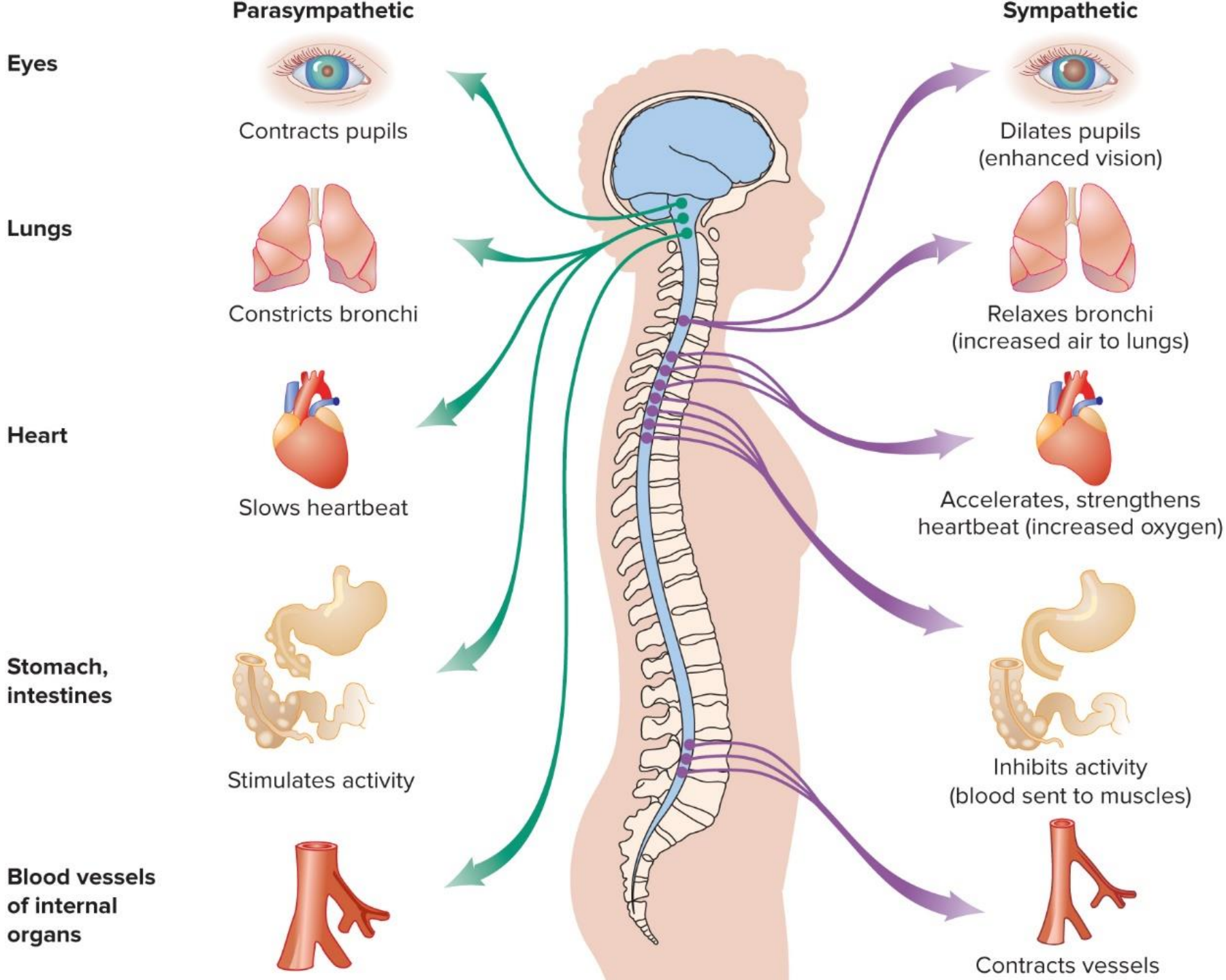
Parasympathetic Nervous System

Calming system

- Energy conservation
- Getting rid of waste products from the body

Often called: “rest and digest system”

Can act upon organs more specifically


Parasympathetic
Sympathetic
Eyes
Contracts pupils
Dilates pupils
(enhanced vision)
Lungs
Constricts bronchi
Relaxes bronchi
(increased air to lungs)
Heart
Slows heartbeat
Accelerates, strengthens
heartbeat (increased oxygen)
Stomach,
intestines
Stimulates activity
Inhibits activity
(blood sent to muscles)
Blood vessels
of internal
organs
Contracts vessels