

<u>Lecture Date</u>	<u>Topic</u>	<u>Reading in Marieb, Mallatt, and Wilhelm</u>
L22	Thur 4/9	Peripheral and autonomic nervous system II
		Ch. 15, pp. 459-474

**The autonomic nervous system**

*the general visceral motor division of the peripheral nervous system*

**Introduction to the autonomic nervous system**

*preganglionic neuron*

*preganglionic axon (preganglionic fiber)*

*thin, myelinated*

*ganglionic neuron (autonomic ganglion)*

*postganglionic axon (postganglionic fiber)*

*very thin, unmyelinated*

*autonomic ganglia are motor, NOT sensory like the dorsal root ganglion*

**Divisions of the autonomic nervous system****Sympathetic division (thoracolumbar division)**

*functions*

*fight-or-flight response*

*sympathetic input to smooth muscles in blood vessels servicing skeletal muscles  
causes vasodilation*

*sympathetic input to smooth muscles in other blood vessels stimulates  
contraction, causing vasoconstriction*

*increased heart rate*

*increased blood pressure*

*preganglionic fibers are short*

*postganglionic fibers are long*

*sympathetic fibers branch profusely*

*allows each sympathetic neuron to influence a number of different visceral  
organs*

*preganglionic neurons release acetylcholine (ACh)*

*postganglionic neurons release norepinephrine (noradrenaline)*

*T<sub>1</sub> – L<sub>2</sub>*

*preganglionic visceral motor neurons located in the lateral horn*

*innervates visceral organs, visceral structures including sweat glands, arrector pili  
muscles, smooth musculature in the walls of all arteries and veins*

**Sympathetic trunk ganglia (chain ganglia, paravertebral ganglia)**

*sympathetic trunks (sympathetic chains)*

*22-24 ganglia per side*

*joined to ventral rami of spinal nerves by*

*white communicantes (myelinated preganglionic fibers)*

*gray communicantes (unmyelinated postganglionic fibers)*

*cervical ganglia*

*superior cervical ganglia*

*middle cervical ganglia*

*inferior cervical ganglia (usually fuses with the first thoracic ganglion to form the stellate ganglion)*

**Collateral ganglia (prevertebral ganglia)**

*not paired, not segmentally arranged*

*occur only in abdomen and pelvis*

*lie anterior to vertebral column (mostly on abdominal aorta)*

*head and neck region*

*celiac*

*superior mesenteric*

*pelvic organs*

*inferior mesenteric ganglia*

*inferior hypogastric ganglia*

**Adrenal medulla**

*largest, most specialized sympathetic ganglion*

*modified ganglionic neurons that lack processes*

*secrete epinephrine (adrenaline) and norepinephrine (noradrenaline)*

**Parasympathetic division (craniosacral division)**

*rest and digest*

*preganglionic fibers are long*

*postganglionic fibers are short*

*ganglia are in or near the organs innervated*

*parasympathetic fibers have minimal branching*

*preganglionic neurons release acetylcholine (ACh)*

*postganglionic neurons release acetylcholine (ACh)*

*cranial outflow*

*oculomotor (III)*

*facial (VII)*

*glossopharyngeal (IX)*

*vagus (X)*

*sacral outflow*

*S<sub>2</sub>-S<sub>4</sub>*

*Innervates visceral organs, but not sweat glands, arrector pili, or (with minor exceptions) blood vessels*

**Visceral sensory neurons**

*monitor stretch, temperature, chemical changes, irritation within visceral organs*

*brain interprets as feelings of hunger, fullness, pain, nausea or well-being*

*almost all free nerve endings*

*cell bodies in the dorsal root ganglia, sensory ganglia of cranial nerves*

**Visceral reflexes arcs**

*defecation reflex*

*micturition reflex (urination)*

*enteric nervous system*

**Central autonomic control**

*reticular formation of the brain stem*

*cardiac centers*

*vasomotor center*  
*hypothalamus*  
*main integration center*  
*amygdala*  
*cerebral cortex*