

Nervous System Crash Course Highlights

As you have time it would be good to work your way through all the Nervous System Crash Course videos, and other of their videos as you are inclined. They condense essentials into memorable segments and are a good fit for our need-to-know level of detail. You can slow the speed under the “settings” gear icon. Below are some highlights from the Nervous System segments assigned, i.e. Crash Course A&P numbers: 8, 10, 13, 14, 15.

Some Very Basic Things to Know from:

The Nervous System, Part 1: Crash Course A&P #8.

Sensory neurons – input, motor neurons – output, interneurons – integration/relay

Central Nervous System = brain and spinal cord

Peripheral Nervous System = all sensory nerves going inward/toward (afferent) + all motor nerves going outward/away (efferent).

General kinds of nerve cells:

Neurons – communicators nerve cells (Beyoncé)

Glial cells (neuroglial) – supportive cells (Beyoncé’s hair and make-up team)

Neurons need lots of energy/High metabolic rate: 25% of calories taken in are used by brain!

Parts of a Neuron: dendrites, cell body, axon, in different varieties: multipolar, unipolar, bipolar. They are a one-way street: sensory or motor.

The Nervous System, Part 3: Crash Course A&P #10. Synapses

There are trillions and trillions of synapses in the nervous system, very complex.

Synapse – a gap between two nerve cells in which communication takes place; a structure that permits a neuron to pass an electrical or chemical signal to another neuron or to the target efferent cell.

A synapse consists of:

- * the synaptic terminal of the sending neuron – sending electrical or chemical signal
- * a postsynaptic ending of the receiving cell that contains receptor sites
- * the space between them (the synaptic cleft).

Two messaging “styles”: electrical or chemical.

Electrical is hard to refine, like buckshot or a group text (heart)

Chemical can be very specific, like a single text to one person

Depending on numerous factors, the message can be transmitted with various levels of excitation. Also, the signal can be in terms of excitation or inhibition (or a little of both!)

Chemical neurotransmitters once having met their target do not remain there, and are released back into the synaptic cleft. They are recycled, go back to the original terminal, or diffused or broken down.

Drugs are sometimes used to redirect what happens to these chemicals. Ex. cocaine, SSRIs (selective serotonin reuptake inhibitors.)

Serotonin – “The happy molecule.” Part of regulation of mood, appetite, sleep. (5-hydroxytryptamine)

Dopamine – “The reward neurotransmitter.” Pleasure especially unexpected.

Norepinephrine – (is both a stress hormone in blood stream [+HR, + glucose to blood, + flow to muscles] and a neurotransmitter). As a neurotransmitter it increases alertness, arousal, focus, mood, and speeds reaction time.

Autonomic Nervous System: Crash Course A&P #13

Two parts of this nervous system division, sympathetic and parasympathetic are like foils, or contrasting characters, in an epic novel of panic and peace! Sherlock Holmes and Dr. Watson.

ANS – regulated functions of internal organs and glands and is not under conscious control. Allows for fine-tuned adjustments to body functions based on moment to moment lived experience.

Sympathetic – amps up the body for activity. (Stress, fear, panic, defense). Exits spine at thoracolumbar area. Ganglia close to spinal cord.
Bat signal! One small signal creates overall response in many receptors throughout body-reaction is all-encompassing!

Parasympathetic – undoes sympathetic, rest & digest, relaxation. (peace, calm, restoration). Exits spine sub-cranial and sacral areas. Ganglia far from spinal cord near or in target.
One-to-one private phone call, reaction is specific to one organ, like needing to urinate.

Ganglia (knot) – both systems require two neurons to send a message. They synapse in ganglia = clusters of nerve cell bodies, with millions of synapses.

Sympathetic Nervous System: Crash Course A&P #14

Focuses on the physiology of stress – stress is helpful to get through an imminent threat. Modern life triggers threat a lot even when not in physical danger. Body’s signaling system is the same, whether real or imagined threat.

To amp up to meet stress, the body uses two chemicals: neurotransmitters (in NS) and hormones (glands into blood).

Autonomic Nervous System signals have to cross two synapses: one in ganglia and other at effector organ. At ganglia, SNS uses Ach = acetylcholine. At target SNS uses norepinephrine.

Some chemicals, like norepinephrine, act as both a neurotransmitter and a hormone depending on how and where they are used. Also, the same chemical can have opposite effects depending on the RECEPTORS of the target tissue. (Example: Alpha in stomach contracts, lessens blood flow/beta in muscles relaxes increases blood flow so you can go!)

Too frequent activation of sympathetic nervous system means parts of body kept in overdrive, while others deprived. Effects are: high blood pressure, suppression of immune system, digestive issues. Find ways to relax: feed and bread, to balance! Duh - Yoga! ☺

Parasympathetic Nervous System: Crash Course A&P #15

PNS – calming side of autonomic nervous system: takes care of “the business of life”: digestion, reproduction, fight off infection

Its uses the neurotransmitter, acetylcholine at both synapses.

Features 12 cranial nerves that run direct from brain to very near effector organ. Cranial nerves vary in terms of their function: some are sensory, sensory + motor, motor only.

The 12 Cranial Nerves:

1. **Olfactory** (Smell) **sensory**
2. **Optic** (Sight) **sensory**
3. **Oculomotor** (Moves eyelid and eyeball and adjusts the pupil and lens of the eye) **motor**
4. **Trochlear** (Moves eyeballs) **motor**
5. **Trigeminal** (Facial muscles incl. chewing; facial sensations) **but**
6. **Abducens** (Moves eyeballs) **motor**
7. **Facial** (Taste, tears, saliva, facial expressions) **both**
8. **Vestibulocochlear** (Auditory) **sensory**
9. **Glossopharyngeal** (Swallowing, saliva, taste) **both**
10. **Vagus** (Control of PNS e.g. smooth muscles of GI tract) **both**
11. **Accessory** (Moving head & shoulders, swallowing) **motor**
12. **Hypoglossal** (Tongue muscles - speech & swallowing) **motor**

How to remember the 12 cranial nerves:

“Oh! Oh! To Touch And Feel Very Good Velvet! Ah Heaven!”

Sensory, motor or both:

“Some Say Marry Money But My Brother Says Big Brains Matter More!”