

Homeostasis and the Autonomic Nervous System

- The autonomic nervous system is the part of the PNS that works together with the endocrine system to help the body to adjust to changes in the internal or external environment
- All autonomic nerves are motor nerves that regulate the organs of the body without conscious control
- Contrast with somatic motor nerves which are under conscious control

- The autonomic system is made of two distinct, often opposing units, the sympathetic nervous system and the parasympathetic nervous system
- The sympathetic system prepares the body for stress and the parasympathetic system restores normal balance (see Table 1, p. 435)
- They also differ in anatomy, most particularly that the sympathetic nerves come from the thoracic vertebrae (ribs) and lumbar vertebrae (small of the back) while the parasympathetic nerves exit directly from the brain or the cervical vertebrae (neck) (see Fig.1, p.436)
- Nerves that exit directly from the brain are referred to as cranial nerves
- An important cranial nerve is the vagus nerve, which has branches that lead into the heart, bronchi (lungs), liver, pancreas and digestive tract

Painkillers

- The body produces a group of natural painkillers, called endorphins and enkephalins, which are manufactured by the brain
- Pain is interpreted by specialized cells in the dorsal part of the spinal cord (called substantia gelatinosa or SG cells)
- When stimulated, these cells produce a neurotransmitter that "informs" the injured organ or tissue of the damage
- The greater the amount of pain transmitter attached to the injured organ, the greater the perception of pain
- When endorphins and enkephalins attach to the receptor sites on the SG cells, the pain transmitter is not produced and the pain is reduced

- Opiates (heroin, codeine and morphine) work in the same way as endorphins (Fig.2, p.437)
- Opiates attach to the SG neurons in the CNS, preventing the production of the pain transmitters
- Heroin and opium not only reduce pain but produce a feeling of tranquillity
- The intake of opiates causes the production of the body's natural painkillers to decrease, so to continue to obtain the effect, the user must continue to take the drug
- When use of the drug stops, the SG receptors are vacant and the pain transmitter is produced in abundance

- Drugs that act as depressants (ex/ Valium), enhance the action of inhibitory synapsis and increase levels of inhibitory neurotransmitters, calming the neurons
- Alcohol is also a depressant, but it works directly on the plasma membrane to increase threshold levels, preventing neurons from firing even when they should

Homework
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