Overview of the Autonomic Nervous System

SUMMARY OF AUTONOMIC FUNCTIONS

SYMPATHETIC

EMERGENCY - Fight Flight Fright

HOMEOSTATIC - Temperature regulation
  Stimulate sweat glands (SUDOMOTOR)
  Erects hairs in skin (PILOMOTOR)
  Selectively constricts blood vessels (VASOMOTOR)

SPECIFIC
  Stimulates suprarenal gland
  Speeds the heart & increases blood pressure
  Bronchial dilatation
  Inhibits the gut & closes sphincters
  Stimulates ejaculation
  Special in head & neck
    Dilates the pupil
    Raises eyelids
SUMMARY OF AUTONOMIC FUNCTIONS

PARASYMPATHETIC

NON-EMERGENCY (at rest)
Stimulates glands (salivary, mucus) to secrete
Slows the heart & minimises blood pressure
Bronchial constriction
Stimulates gut peristalsis & opens sphincters
Contracts the bladder & uterus
Causes erection of penis
Special in head & neck
  Constricts the pupil
  Accommodates the eye
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Sympathetic and parasympathetic often have
antagonistic or complementary functions

Sympathetic speeds heart
Parasympathetic slows heart

Sympathetic dilates bronchi
Parasympathetic constricts bronchi

Sympathetic dilates pupil
Parasympathetic constricts pupil
Sympathetic and parasympathetic may have independent functions

**Sympathetic**
- Stimulates suprarenal gland
- Stimulates ejaculation
- Raises eyelids

**Parasympathetic**
- Eye accommodation
- Erection of penis

**EMERGENCE OF NERVES FROM CNS**

**SOMATIC**

**SYMPATHETIC**
- CN's
- C1
- T1
- L2

**PARASYMPATHETIC**
- CN's
- 3, 7, 9, 10
- S2, 3, 4
DORSAL ROOT GANGLIA
NO SYNAPSES

AUTONOMIC GANGLIA
SYNAPSES

SOMATIC

Sensory

Mixed nerve

Symp
Parasymp

2 NEURONES

SINGLE NEURONES

SYMPATHETIC DISTRIBUTION
BEYOND CHAIN

Homeostatic (skin): sudomotor on spinal & cranial nerves

Homeostatic (other): vasmotor only, on any convenient nerve or vessel

Specific (to organs)
- Direct to heart & lungs
- Splanchnics to gut, adrenals, genitals
- Superior cervical ganglion to head
2 SPECIAL SYMPATHETICS
- Raising eyelids
- Pupil dilatation

PARASYMPATHETIC CONNECTIONS IN HEAD

- Ciliary ganglion
- Pterygopalatine ganglion
- Submandibular ganglion
- Otic ganglion

Eye for accommodation & pupillary constriction
Nose, palate, lacrimal gland
Parotid gland
PARASYMPATHETIC CRANIOSACRAL OUTFLOW

Head and neck
Heart
Respiratory system
Upper intestines
Liver
Lower intestines
Kidneys
Bladder
Uterus

PARASYMPATHETIC

Note that there are 4 specific ganglia in the head but in the rest of the body there are small peripheral ganglia on or near the end-organs.

The vagus reaches to the left side of the transverse colon and then the secral outflow takes over.

2 SPECIAL PARASYMPATHETICS
* Short ciliary ns for pupil constriction via inferior div of III
* Short ciliary ns for accommodation via inferior div of III
TYPES OF GANGLIA

**SENSORY GANGLION** has cell bodies only and NO synapses. Examples:
- Posterior (dorsal) root
- Trigeminal
- Glossopharyngeal
- Geniculate
- Vagal

**SYMPATHETIC GANGLION** has either a synapse or a fibre passing through it to synapse later. Examples:
- Sympathetic chain
- Sympathetic peripheral ganglia (coeliac, renal, superior mesenteric)

**PARASYMPATHETIC GANGLION** has parasympathetic nerves synapsing and both a somatic sensory and a sympathetic nerve passing through it. Examples:
- Ciliary
- Ptergopalatine
- Submandibular
- Otic