

Comparison of Sympathetic and Parasympathetic Effects

SYMPATHETIC

Vascular effects

- α_1, β_1 \uparrow BP, HR
 α_2 \downarrow BP (CNS effect)
 α_1 Vasoconstriction
 α_1 \downarrow perfusion of kidneys
 β_1 \uparrow AV conduction & contractility
 β_1 \uparrow Renin release by kidney
 β_2 \uparrow Perfusion of skel muscle
 α & β \downarrow Perfusion of GIT
 \uparrow (shut) sphincter tone
 \downarrow Digestion
 \downarrow Motility & Bowel sounds

Lungs

- β_2 \uparrow Efficiency, Resp. rate,
BRONCHODILATION

Other

- α_1 Pupils dilate (Mydriasis)
 α_1 Contract bladder neck & urethra
 α_1 \uparrow Piloerection
 α_1 \downarrow Salivation, lacrimation
 α_1 Ejaculation in males
 β Directly relax bladder smooth muscle & indirectly \downarrow parasympathetic tone
 β_1 Lipolysis \uparrow
 β_2 \uparrow Glycogenolysis in liver (making blood glucose \uparrow)
 β_2 Relaxation of uterine smooth muscle in females
 α_2 \downarrow Insulin & \uparrow Glucagon secretion from Pancreas
 α_2 \downarrow Pain
 α_2 Sedation
Muscarinic \uparrow Sweating

- Nicotinic** Adrenal medulla releases NE, E & cortisol into blood (\downarrow immune function, etc.) (SNS ganglionic synapse)

FIGHT OR FLIGHT RESPONSES

PARASYMPATHETIC

All MUSCARINIC RECEPTORS

- \downarrow HR, contractility
 \downarrow Atrioventricular (AV) node conduction
 \uparrow Bronchoconstriction
 \uparrow Secretions
Bronchial & nasal
Gut (including stomach acid)
Tears
Saliva secretion (copious, watery)
 \uparrow Gut motility and relax sphincters
 \uparrow Urinary bladder contractions
 \downarrow Tone (relax) bladder sphincters
 \uparrow Vasodilation for erection in males
 \uparrow Gall bladder contractions
 \uparrow Liver metabolism
Pupils constrict (Miosis) and lens accommodation occurs (focusing)

SEX, SLEEP AND SANDWICHES

Miscellaneous other notes

In the parasympathetic nervous system, at the end organ, all the receptors are muscarinic and are GPCR.

In the Sympathetic nervous system, all the adrenergic and muscarinic receptors are GPCR. The adrenergic are primarily driven by NE, but can be activated by EPI (β_2) and, in some cases, DA.

All Muscarinic and Nicotinic receptors use ACh. All muscarinic receptors are GPCR; all nicotinic receptors are Ligand-gated ion channels.

Some ACh and NE receptors aren't enervated.

The adrenal gland, piloerector muscles, kidneys and sweat glands are enervated by the SNS.

See the following:

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[http://itc.gsw.edu/faculty/gfisk/anim/autonom
icns.swf](http://itc.gsw.edu/faculty/gfisk/anim/autonom
icns.swf)