## SYMPATHETIC

### Vascular effects
- $\alpha_1, \beta_1$ ........... ↑ BP, HR
- $\alpha_2$ ................... ↓ BP (CNS effect)
- $\alpha_1$ ...................... Vasoconstriction
- $\alpha_1$ ↓ perfusion of kidneys
- $\beta_1$............... ↑ AV conduction & contractility
- $\beta_1$ ↑ Renin release by kidney
- $\beta_2$ .............. ↑ Perfusion of skel muscle
- $\alpha$ & $\beta$ ....↓ Perfusion of GIT
- ↑ (shut) sphincter tone
- ↓ Digestion
- ↓ Motility & Bowel sounds

### Lungs
- $\beta_2$.............. ↑ Efficiency, Resp. rate, BRONCHODILATION

### Other
- $\alpha_1$ .......... Pupils dilate (Mydriasis)
- $\alpha_1$ Contract bladder neck & urethra
- $\alpha_1$ ↑ Piloerection
- $\alpha_1$ ↓ Salivation, lacrimation
- $\alpha_1$ Ejaculation in males
- $\beta$.............. ↓ Perfusion of GIT
- Directly relax bladder smooth muscle & indirectly ↓ parasympathetic tone
- $\beta_1$.............. Lipolysis ↑
- $\beta_2$............. ↑ Glycogenolysis in liver (making blood glucose ↑)
- $\beta_2$ Relaxation of uterine smooth muscle in females
- $\alpha_2$ .............. ↓ Insulin & ↑ Glucagon secretion from Pancreas
- $\alpha_2$ ↓ Pain
- $\alpha_2$ Sedation

### Muscarinic
- ↑ Sweating

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

## PARASYMPATHETIC

### All MUSCARINIC RECEPTORS
- ↓ HR, contractility
- ↓ Atrioventricular (AV) node conduction
- ↑ Bronchoconstriction
- ↑ Secretions
  - Bronchial & nasal
  - Gut (including stomach acid)
  - Tears
  - Saliva secretion (copious, watery)
- ↑ Gut motility and relax sphincters
- ↑ Urinary bladder contractions
- ↓ Tone (relax) bladder sphincters
- ↑ Vasodilation for erection in males
- ↑ Gall bladder contractions
- ↑ 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 ($\beta_2$) 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:
Comparison of Sympathetic and Parasympathetic Effects

http://itc.gsw.edu/faculty/gfisk/anim/autonomic.swf