SYMPATHETIC

Vascular effects α1, β1↑ BP, HR α2↓ BP (CNS effect) α1 Vasoconstriction α1 ↓ perfusion of kidneys β1↑ AV conduction & contractility β1 ↑ Renin release by kidney β2↑ Perfusion of skel muscle α & β↓ Perfusion of GIT ↑ (shut) sphincter tone ↓ Digestion ↓ Motility & Bowel sounds Lungs β2↑ Efficiency, Resp. rate, BRONCHODILATION Other α1 Pupils dilate (Mydriasis) α1 Contract bladder neck & urethra α1 ↑ Piloerection α1 ↓ Salivation, lacrimation α1 ↓ Salivation, lacrimation α1 Եjaculation in males β Directly relax bladder smooth muscle & indirectly ↓ parasympathetic tone β1 Lipolysis ↑ β2↑ Glycogenolysis in liver (making blood glucose ↑) β2 Relaxation of uterine smooth muscle in females α2↓ Insulin & ↑ Glucagon secretion from Pancreas α2 ↓ Pain α2 Sedation Muscarinic↑ Sweating		
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↑ (shut) sphincter tone ↓ Digestion ↓ Motility & Bowel sounds **Lungs** β2		
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β2↑ Efficiency, Resp. rate, BRONCHODILATION Other α1	Lunas	
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$	<u>Other</u>	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	α1	Pupils dilate (Mydriasis)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\alpha 1$	Contract bladder neck &
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		urethra
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\alpha 1$	↑ Piloerection
 β	$\alpha 1$	↓ Salivation, lacrimation
smooth muscle & indirectly parasympathetic tone β1	$\alpha 1$	Ejaculation in males
$\begin{array}{c c} & \downarrow \ parasympathetic \ tone \\ \beta1 & Lipolysis \uparrow \\ \beta2 & \uparrow \ Glycogenolysis \ in \ liver \\ & (making \ blood \ glucose \uparrow) \\ \beta2 & Relaxation \ of \ uterine \\ & smooth \ muscle \ in \ females \\ \alpha2 & \downarrow \ Insulin \ \& \uparrow \ Glucagon \\ & secretion \ from \ Pancreas \\ \alpha2 & \downarrow \ Pain \\ \alpha2 & Sedation \\ \end{array}$	β	Directly relax bladder
 β1Lipolysis ↑ β2↑ Glycogenolysis in liver (making blood glucose ↑) β2 Relaxation of uterine smooth muscle in females α2↓ Insulin & ↑ Glucagon secretion from Pancreas α2↓ Pain α2↓ Sedation 		smooth muscle & indirectly
β2↑ Glycogenolysis in liver (making blood glucose ↑) β2 Relaxation of uterine smooth muscle in females α2↓ Insulin & ↑ Glucagon secretion from Pancreas α2↓ Pain α2↓ Sedation		↓ parasympathetic tone
(making blood glucose ↑) Relaxation of uterine smooth muscle in females α2 ↓ Insulin & ↑ Glucagon secretion from Pancreas α2 ↓ Pain α2 Sedation	β1	Lipolysis ↑
(making blood glucose ↑) Relaxation of uterine smooth muscle in females α2 ↓ Insulin & ↑ Glucagon secretion from Pancreas α2 ↓ Pain α2 Sedation	β2	↑ Glycogenolysis in liver
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
$\begin{array}{ccc} \alpha 2 & & & \downarrow \text{Insulin \& } \uparrow \text{Glucagon} \\ & & \text{secretion from Pancreas} \\ \alpha 2 & & \downarrow \text{Pain} \\ \alpha 2 & & \text{Sedation} \end{array}$	β2	Relaxation of uterine
$\begin{array}{ccc} & & secretion \ from \ Pancreas \\ \alpha 2 & & \downarrow \ Pain \\ \alpha 2 & & Sedation \end{array}$		smooth muscle in females
$\begin{array}{ccc} \alpha 2 & & \downarrow \ Pain \\ \alpha 2 & & Sedation \end{array}$	α2	↓ Insulin & ↑ Glucagon
α2 Sedation		secretion from Pancreas
	$\alpha 2$	↓ Pain
<u>Muscarinic</u> ↑ Sweating	$\alpha 2$	Sedation

Nicotinic Adrenal medulla releases NE, E & cortisol into blood

(\precipi immune function, etc.)

(SNS ganglionic synapse)

FIGHT OR FLIGHT RESPONSES

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 (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:

Comparison of Sympathetic and Parasympathetic Effects

http://itc.gsw.edu/faculty/gfisk/anim/autonom icns.swf