

higher centers to institute widespread bodily changes.

Table 10-1

Functions of the Sympathetic and Parasympathetic Divisions

Structure	Sympathetic Function (Adrenergic Receptors)	Parasympathetic Function
Eye		
Sphincter muscle	–	Contraction → Constricts
Dilator muscle	Contraction → Dilates (α_1)	–
Ciliary muscle	Relaxes (slightly; far vision) (β_2)	Contracts (near vision)
Heart		
Rate and force of atrial and ventricular contractions	Increases (β_1)	Decreases
Coronary vessels	Contraction → Vasoconstriction (α_1) Relaxation → Vasodilation (β_2)	–
Lungs		
Bronchial muscle	Relaxation → Dilates airway (β_2)	Contraction → Constricts airway
Glands	–	Stimulates secretion
Pulmonary vessels	Contraction → Vasoconstriction (mild)	–
Skin		
Sweat glands Of body	Increases secretion (cholinergic)*	–
Of hands and feet	Increases secretion (α_1)	–
Arrector pili muscle	Contracts (α_1)	–
Glands of Head		
Lacrimal	Modulates secretion	Increases secretion
Salivary	Modifies chemical composition	Increases secretion Vasodilation mediated by endothelial factors
Systemic Blood Vessels		
Arterioles Skeletal muscle	Relaxation → Vasodilation (β_2) Contraction → Vasoconstriction (α_1) Relaxation → Vasodilation (muscarinic)	–
Abdominal viscera	Contraction → Vasoconstriction (α_1, β_2)	–
Skin	Contraction → Vasoconstriction (α_1)	–
Veins	Contraction → Vasoconstriction (α_1) Relaxation → Vasodilation (β_2)	– –
Gastrointestinal Tract		
Motility/tone	Inhibits ($\alpha_1, \alpha_2, \beta_2$)	Stimulates
Sphincters	Constricts (α_1)	Relaxes
Secretion	Vasoconstriction → Inhibits secretion (α_1)	Stimulates
Liver	Breaks down glycogen (glycogenolysis), gluconeogenesis, decreased bile secretion (α, β_2)	Glycogen synthesis; increases bile secretion
Gallbladder	Relaxes (β_2)	Contracts
Pancreas	Inhibits secretion of digestive enzymes, glucagon, and insulin (α_2); increases secretion of insulin and glucagon (β_2)	Secretion of digestive enzymes, insulin, and glucagon
Spleen Capsule	Contraction (α_1) Relaxation (β_2)	– –
Adipose	Lipolysis (β_1); release of fatty acids into blood (β_1, β_3 ; β_3 in brown adipose tissue)	–
Kidney (juxtaglomerular cells)	Secretion of renin (β_1)	–
Blood vessels	Contraction → Vasoconstriction (α_1)	–
Urinary Bladder		
Detrusor muscle	Relaxes (minimal role) (β_2)	Contracts
Sphincter (nonstriated)	Contracts (α_1)	Relaxes
<i>Continued</i>		
Sex Organs	Contracts smooth muscle of vas deferens, seminal vesicle, prostate → Ejaculation (α_1)	Vasodilation → Erection of clitoris (females) and penis (males)
Uterus	Variable (depends on hormonal status, pregnancy, and other factors) (α_1, β_2)	Minimal effect
Adrenal Medulla	Stimulates secretion of epinephrine and norepinephrine (nicotinic ACh receptors) via preganglionic fibers	–
Pineal	Increases melatonin synthesis and secretion (β)	–