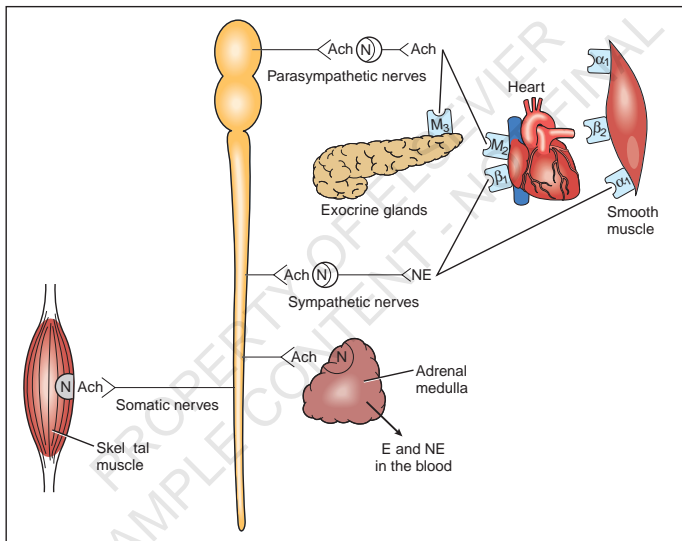


## SECTION 1

## AUTONOMIC AND NEUROMUSCULAR DRUGS



**Cholinergic and adrenergic neurotransmission and sites of drug action.** See back of card for description.

In skeletal muscle, acetylcholine (Ach) activates nicotinic (N) receptors causing muscle contraction. Neuromuscular blockers (rocuronium) compete with Ach for N receptors and cause muscle relaxation. In smooth muscle and glands, Ach and pilocarpine activate muscarinic (M) receptors, causing muscle contraction and gland secretion. M receptor antagonists (atropine) cause muscle relaxation and inhibit secretions. Norepinephrine (NE) and epinephrine (E) activate  $\alpha$  and  $\beta$  adrenoceptors and cause smooth muscle contraction or relaxation, respectively. Activation of cardiac  $\beta$  receptors leads to increased heart rate, contractility, and conduction velocity. Alpha blockers (terazosin) relax vascular and bladder smooth muscle, while  $\beta$ -blockers (propranolol) slow heart rate and decrease cardiac output and blood pressure.

PROPERTY OF  
SAMPLE CONTENT

# Atenolol

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(a-ten-oh-lol)

**Tenormin™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Sympatholytic; antihypertensive
<b>Pharmacologic Class</b>	Selective $\beta_1$ -adrenoceptor antagonist
<b>M.O.A.</b>	Competitively blocks $\beta_1$ receptors; decreases heart rate, cardiac output, renin secretion, blood pressure, and myocardial oxygen demand
<b>Clinical Use</b>	Angina; hypertension; post-myocardial infarction cardio-protection
<b>Special Considerations</b>	Less lipophilic with fewer central nervous system side effects; lacks local anesthetic or partial agonist activity
<b>Adverse Effects</b>	Bronchoconstriction with higher doses because of $\beta_2$ receptor blockade
<b>Interactions</b>	Additive hypotensive effect with nitrates and antihypertensive drugs; additive bradycardia with digoxin; decreases effects of dopamine and dobutamine; unopposed $\alpha$ -adrenergic receptor stimulation with epinephrine and related drugs

**Similar drugs:** Acebutolol, betaxolol, bisoprolol, **esmolol**, nebivolol, metoprolol

# Atropine

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(at-roe-peen)

**Atro-Pen™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

## Atropine

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Anticholinergic agent
<b>Pharmacologic Class</b>	Muscarinic acetylcholine receptor antagonist
<b>M.O.A.</b>	Competitively blocks all muscarinic receptors, increases heart rate and conduction velocity, causes smooth muscle relaxation, and decreases exocrine gland secretion
<b>Clinical Use</b>	Bradycardia and atrioventricular block; irritable bowel symptoms; treatment of anticholinesterase poisoning; antisecretory agent (glycopyrrolate often used for this purpose in surgery); treatment of ocular inflammation (relaxes iris and ciliary muscles)
<b>Special Considerations</b>	Can slow heart rate when first administered due to central vagal stimulation
<b>Adverse Effects</b>	Tachycardia; mydriasis and cycloplegia; warm, dry, flushed skin; delirium; and hallucinations
<b>Interactions</b>	Additive anticholinergic effects with antihistamines (diphenhydramine) and tricyclic antidepressants (amitriptyline); slows absorption of other drugs by delaying gastric emptying

**Similar drugs:** Darifenacin, **dicyclomine**, glycopyrrolate, hyoscyamine, **ipratropium**, oxybutynin, **solifenacin**, scopolamine, tolterodine, trospium

# Dobutamine

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(doe-**bue**-ta-meen)

**Dobutrex™**

## Dobutamine

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Sympathomimetic; cardiac stimulant
<b>Pharmacologic Class</b>	Selective $\beta_1$ adrenoceptor agonist
<b>M.O.A.</b>	Activates $\beta_1 > \beta_2 \gg \alpha_1$ receptors; increases cardiac contractility and cardiac output $>$ heart rate
<b>Clinical Use</b>	Acute heart failure and cardiogenic shock
<b>Special Considerations</b>	Administered by intravenous infusion; must correct hypovolemia before initiating dobutamine treatment
<b>Adverse Effects</b>	Tachycardia and arrhythmia
<b>Interactions</b>	Synergistic effect on cardiac output with nitroprusside (a vasodilator that decreases cardiac afterload)

**Similar drugs:** None

# Edrophonium

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(ed-roe-foe-nee-um)

**Tensilon™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Diagnostic agent
<b>Pharmacologic Class</b>	Cholinesterase inhibitor
<b>M.O.A.</b>	Reversibly binds and inhibits cholinesterase; increases muscle strength in persons with myasthenia gravis
<b>Clinical Use</b>	Diagnosis of myasthenia gravis; differential diagnosis of myasthenic crisis and cholinergic crisis (increases muscle weakness in persons with cholinergic crisis); reversal of curariform-type neuromuscular blocking agents (such as rocuronium)
<b>Special Considerations</b>	Very short-acting after intravenous administration
<b>Adverse Effects</b>	Muscarinic effects (e.g., miosis, salivation) can be treated with atropine
<b>Interactions</b>	None usually significant

**Similar drugs:** Neostigmine, physostigmine, **pyridostigmine**

# Epinephrine

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(e-pi nef-rin)

**Adrenalin™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Sympathomimetic; bronchodilator; vasopressor
<b>Pharmacologic Class</b>	Nonselective adrenoceptor agonist
<b>M.O.A.</b>	Activates $\alpha$ and $\beta$ receptors, increasing inositol triphosphate and cyclic adenosine monophosphate, respectively $\alpha_1$ : vasoconstriction and increased blood pressure $\beta_1$ : increased heart rate, conduction, and contractility $\beta_2$ : vasodilation and decreased diastolic blood pressure; bronchodilation
<b>Clinical Use</b>	Cardiac arrest; ventricular fibrillation; anaphylactic shock; asthma and chronic obstructive pulmonary disease; prolong duration of local anesthetics
<b>Adverse Effects</b>	Hypertension; tachycardia; ischemia; hyperglycemia
<b>Interactions</b>	None usually significant

**Similar drugs:** Norepinephrine (which does not activate  $\beta_2$  receptors significantly)

# Phenoxybenzamine

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(fen-ox-i-benz-a-meen)

**Dibenzylamine™**

<b>Therapeutic Class</b>	Vasodilator
<b>Pharmacologic Class</b>	Irreversible $\alpha$ -adrenoceptor antagonist
<b>M.O.A.</b>	Blocks $\alpha_1 > \alpha_2$ receptors; forms covalent bond with $\alpha$ receptor and causes irreversible receptor blockade
<b>Clinical Use</b>	Presurgical treatment of hypertension caused by pheochromocytoma
<b>Special Considerations</b>	Effects last several days
<b>Adverse Effects</b>	Postural hypotension
<b>Interactions</b>	Hypotensive effect increased by $\beta$ -adrenoceptor blockers and calcium channel blockers

**Similar drugs:** Phentolamine

# Phentolamine

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(fen-toe-la-meen)

**Regitine™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

## Phentolamine

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Vasodilator
<b>Pharmacologic Class</b>	Nonselective $\alpha$ -adrenoceptor antagonist
<b>M.O.A.</b>	Competitive, reversible antagonist of $\alpha_1$ and $\alpha_2$ receptors
<b>Clinical Use</b>	Counteract vasoconstriction caused by accidental injection or extravasation of vasoconstrictors; control of blood pressure during surgical removal of a pheochromocytoma
<b>Special Considerations</b>	Parenteral administration only
<b>Adverse Effects</b>	Hypotension
<b>Interactions</b>	Severe hypotension if given with epinephrine; blocks effects of $\alpha$ -adrenoceptor agonists

**Similar drugs:** Phenoxybenzamine

# Phenylephrine

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(fen-il-**ef**-rin)

**Neo-Synephrine™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Vasoconstrictor; decongestant
<b>Pharmacologic Class</b>	Selective $\alpha_1$ -adrenoceptor agonist
<b>M.O.A.</b>	Activates $\alpha_1$ receptors increasing inositol triphosphate and causing contraction of vascular smooth muscle and vasoconstriction
<b>Clinical Use</b>	Nasal and ocular decongestant; treatment of drug-induced hypotension and spinal shock; dilation of pupil for ophthalmoscopy
<b>Special Considerations</b>	Ocular administration causes mydriasis without cycloplegia (paralysis of accommodation)
<b>Adverse Effects</b>	Rebound nasal congestion if used topically more than 3 days; hypertension
<b>Interactions</b>	May cause severe hypertension if given with monoamine oxidase inhibitors; vasopressor effect increased by tricyclic antidepressants

**Similar drugs:** Norepinephrine, **pseudoephedrine**

# Pilocarpine

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(pye-loe **car**-peen)

**Salagen**<sup>TM</sup>

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

## Pilocarpine

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Antiglaucoma agent; sialagogue
<b>Pharmacologic Class</b>	Muscarinic acetylcholine receptor agonist
<b>M.O.A.</b>	Activates muscarinic receptors in ciliary muscle, increasing aqueous humor outflow; activates muscarinic receptors in salivary gland, increasing salivation
<b>Clinical Use</b>	Treatment of glaucoma (topical ocular administration) and dry mouth (xerostomia) by oral administration
<b>Special Considerations</b>	Useful in patients with xerostomia due to radiation of head and neck and Sjögren's syndrome (arthritis, dry eyes, dry mouth)
<b>Adverse Effects</b>	Miosis, blurred vision (accommodative spasm) due to excessive contraction of iris sphincter and ciliary muscles, respectively
<b>Interactions</b>	Additive effects with other cholinergic drugs; effects decreased by atropine and other anticholinergic drugs

**Similar drugs:** Cevimeline

# **Pralidoxime**

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(pral-i **dox**-ime)

**Protopam™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Organophosphate antidote
<b>Pharmacologic Class</b>	Cholinesterase reactivator
<b>M.O.A.</b>	Binds phosphorus of organophosphate and breaks bond with cholinesterase
<b>Clinical Use</b>	Treatment of organophosphate toxicity (primarily used to reverse muscle weakness)
<b>Special Considerations</b>	Give as soon as possible after organophosphate exposure (before "aging" of organophosphate-cholinesterase bond prevents reactivation)
<b>Adverse Effects</b>	When treating organophosphate poisoning it is difficult to differentiate the toxic effects of pralidoxime from those produced by atropine or organophosphate compounds
<b>Interactions</b>	When used with atropine, signs of atropinization occur earlier than when atropine is used alone

**Similar drugs:** None

# Propranolol

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(proe-pran-oh-lol)

**Inderal™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Sympatholytic; antihypertensive
<b>Pharmacologic Class</b>	Nonselective $\beta$ -adrenoceptor antagonist
<b>M.O.A.</b>	Competitively blocks $\beta_1$ and $\beta_2$ receptors; decreases heart rate, cardiac output, blood pressure, myocardial oxygen demand
<b>Clinical Use</b>	Angina; hypertension; post-myocardial infarction; cardiomyopathy; benign tremor; migraine prophylaxis; thyrotoxicosis
<b>Special Considerations</b>	Highly lipophilic (has greater central nervous system effects); has local anesthetic activity (prevents ocular use)
<b>Adverse Effects</b>	Bronchoconstriction; inhibits glycogenolysis; nightmares and mood depression
<b>Interactions</b>	Additive hypotensive effect with nitrates and antihypertensive drugs; additive bradycardia with digoxin; decreases effects of dopamine and dobutamine; unopposed $\alpha$ -adrenoceptor stimulation with epinephrine and related drugs

**Similar drugs:** Nadolol, pindolol, timolol

# Pseudoephedrine

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(soo-doe-e-fed-rin)

**Sudafed™**

<b>Therapeutic Class</b>	Decongestant
<b>Pharmacologic Class</b>	Indirect- and direct-acting adrenoceptor agonist
<b>M.O.A.</b>	Increases release of norepinephrine and directly activates adrenoceptors, causing vasoconstriction and cardiac stimulation
<b>Clinical Use</b>	Administered orally as nasal decongestant for allergic and viral rhinitis and sinusitis
<b>Special Considerations</b>	Urine acidification or alkalinization may increase or decrease excretion, respectively; use restricted to prevent diversion for methamphetamine synthesis
<b>Adverse Effects</b>	Tachycardia; increased blood pressure; central nervous system stimulation
<b>Interactions</b>	Concurrent use with monoamine oxidase inhibitors may cause severe hypertension

**Similar drugs:** Norepinephrine, phenylephrine

# Pyridostigmine

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(peer-i-doe-**stig**-meen)

**Mestinon™**

## Pyridostigmine

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Antimyasthenic agent
<b>Pharmacologic Class</b>	Cholinesterase inhibitor; cholinergic agonist
<b>M.O.A.</b>	Reversibly inhibits cholinesterase
<b>Clinical Use</b>	Treatment of myasthenia gravis; reversal of nondepolarizing neuromuscular blockers (curariform drugs such as doxacurium)
<b>Special Considerations</b>	Muscarinic effects blocked by atropine
<b>Adverse Effects</b>	Muscarinic effects (e.g., miosis, salivation)
<b>Interactions</b>	Prolongs effects of succinylcholine; effects reduced by atropine, antidepressants, phenothiazine drugs, quinidine, and other drugs with anticholinergic effects

**Similar drugs:** Edrophonium, neostigmine, physostigmine

# Rocuronium

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(roe-cue-roe-nee-um)

**Zemuron™**

PROPERTY OF EVERVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Paralytic agent
<b>Pharmacologic Class</b>	Nondepolarizing neuromuscular blocking agent of intermediate duration of action (30–60 min)
<b>M.O.A.</b>	Competitively blocks nicotinic receptors in skeletal muscle; has little effect on autonomic ganglia
<b>Clinical Use</b>	Skeletal muscle relaxation for intubation, surgery, and electroconvulsive therapy
<b>Special Considerations</b>	Effects reversed by neostigmine, pyridostigmine, and edrophonium
<b>Adverse Effects</b>	Respiratory muscle paralysis and apnea
<b>Interactions</b>	Effects potentiated by anesthetics, Ca <sup>2+</sup> channel blockers, tetracycline, and aminoglycoside antibiotics

**Similar drugs:** Atracurium, cisatracurium, pancuronium, tubocurarine, vecuronium

# Sildenafil

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(sil-den-a-fil)

**Viagra™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

## Sildenafil

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Vasodilator
<b>Pharmacologic Class</b>	Phosphodiesterase inhibitor
<b>M.O.A.</b>	Inhibits type-5 phosphodiesterase and degradation of cyclic guanosine monophosphate, thereby increasing vasodilation in corpus cavernosum evoked by acetylcholine released from sacral parasympathetic neurons
<b>Clinical Use</b>	Treatment of erectile dysfunction
<b>Special Considerations</b>	Concurrent use with organic nitrates can cause reflex tachycardia, angina, and death from myocardial ischemia
<b>Adverse Effects</b>	Headache; nasal congestion; back pain; visual disturbances
<b>Interactions</b>	Potentiates vasodilation produced by organic nitrates; serum levels increased by cytochrome P450 3A4 (CYP3A4) inhibitors

**Similar drugs:** Tadalafil, vardenafil

# Solifenacin

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(sol-ee **fen**-a-sin)

**VESIcare™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Overactive bladder agent
<b>Pharmacologic Class</b>	Muscarinic receptor antagonist
<b>M.O.A.</b>	Competitively blocks muscarinic acetylcholine receptors in the urinary bladder and elsewhere; relaxes urinary bladder smooth muscle
<b>Clinical Use</b>	Overactive bladder: relieves urgency, incontinence, and frequency while increasing voided volume per micturition
<b>Special Considerations</b>	Once daily oral administration with or without food
<b>Adverse Effects</b>	Dry mouth, constipation, blurred vision (accommodation abnormalities), urinary retention, and dry eyes
<b>Interactions</b>	Metabolized by CYP3A4; strong inhibitors of CYP3A4 (ketoconazole) increase serum levels, and lowest dose of solifenacin should be employed if given concurrently

**Similar drugs:** Darifenacin, oxybutynin, tolterodine

# Succinylcholine

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(sux-sin il-koe-leen)

**Anectine™**

<b>Therapeutic Class</b>	Paralytic agent
<b>Pharmacologic Class</b>	Depolarizing neuromuscular blocker with short duration of action (5–10 min)
<b>M.O.A.</b>	Binds to nicotinic receptors, causing persistent depolarization of skeletal muscle and muscle paralysis; rapidly metabolized by plasma cholinesterase
<b>Clinical Use</b>	Short-term skeletal muscle relaxation for intubation and surgery; often preferred for intubation due to short duration of action
<b>Special Considerations</b>	Causes transient muscle fasciculations; effects are not reversed by neostigmine or edrophonium (unlike those of rocuronium and other curariform drugs)
<b>Adverse Effects</b>	Respiratory muscle paralysis and apnea, especially in persons with rare atypical cholinesterase
<b>Interactions</b>	Neuromuscular blockade enhanced by aminoglycoside antibiotics, clindamycin, amphotericin B, quinidine, and cholinesterase inhibitors

**Similar drugs:** None

# Tamsulosin

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(tam-soo-**loe**-sin)

**Flomax™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

## Tamsulosin

## AUTONOMIC AND NEUROMUSCULAR DRUGS

<b>Therapeutic Class</b>	Urologic agent
<b>Pharmacologic Class</b>	Uro-selective $\alpha_1$ -adrenoceptor antagonist
<b>M.O.A.</b>	Competitively blocks $\alpha_{1A}$ receptors in bladder and prostate; relaxes prostatic and bladder smooth muscle and facilitates bladder emptying
<b>Clinical Use</b>	Treatment of lower urinary tract symptoms associated with prostatic hyperplasia: urinary frequency, urgency, and nocturia (the need to urinate more frequently at night)
<b>Special Considerations</b>	Unlike terazosin and doxazosin, tamsulosin and alfuzosin are not indicated for treatment of hypertension
<b>Adverse Effects</b>	Dizziness; headache; postural hypotension
<b>Interactions</b>	Cimetidine may increase blood levels and effects

**Similar drugs:** Alfuzosin, doxazosin, **terazosin**

# Terazosin

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(ter-az-oh-sin)

**Hytrin™**

PROPERTY OF ELSEVIER  
SAMPLE CONTENT - NOT FINAL

<b>Therapeutic Class</b>	Antihypertensive agent; urologic agent
<b>Pharmacologic Class</b>	Selective $\alpha_1$ -adrenoceptor antagonist
<b>M.O.A.</b>	Competitively blocks $\alpha_1$ receptors; relaxes arteriolar smooth muscle and decreases vascular resistance and blood pressure; relaxes prostatic and bladder smooth muscle so as to facilitate emptying of bladder
<b>Clinical Use</b>	Treatment of hypertension and urinary symptoms caused by prostatic hyperplasia
<b>Special Considerations</b>	Less selective for prostatic smooth muscle than tamsulosin and alfuzosin
<b>Adverse Effects</b>	Hypotension; "first-dose" syncope
<b>Interactions</b>	Additive hypotensive effect with diuretics and other antihypertensive drugs

**Similar drugs:** Doxazosin, prazosin, alfuzosin, **tamsulosin**