Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

salbutamol: β_2 (agonist)

tamsulosin: α_1 (blocker)

oxybutynin: **muscarinic** $\mathbf{M_3}$ (blocker)

2.2

propranolol is non-selective, so it also blocks β_2 receptors

β_2 receptors widen the airways, so blocking them can cause bronchospasm

2.3

any three of: dry mouth; constipation; urinary retention; blurred vision; fast heart; confusion

2.4

it blocks acetylcholinesterase, so ACh is broken down more slowly

more ACh stays in the gap to act on the fewer receptors

3.1

(a) BP: α_1, vessels contract; wheeze: β_2, airways widen; swelling: α_1 reduces leaking (and β_2 stops mast cell release)

(b) muscle has a better blood supply, so it is absorbed faster

(c) the β receptors are blocked, so the heart and airway effects are smaller

(d) the dose is repeated

3.2

(a) organophosphates block acetylcholinesterase, so ACh builds up at all cholinergic synapses

(b) atropine blocks **muscarinic** receptors; muscle twitching comes from **nicotinic** receptors, which it does not block

(c) a dry chest (no more wet secretions), or heart rate above 80

3.3

(a) it blocks α_1 receptors, relaxing smooth muscle in the prostate and bladder neck so urine flows

(b) dizziness on standing, because α_1 blocking widens blood vessels and BP falls

(c) it blocks M_3 receptors on the bladder muscle, so the bladder contracts less often

(d) it could cause urinary retention

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(e) it widens the pupil, which can close the drainage angle and raise eye pressure