

Exercise walk-through

9.5

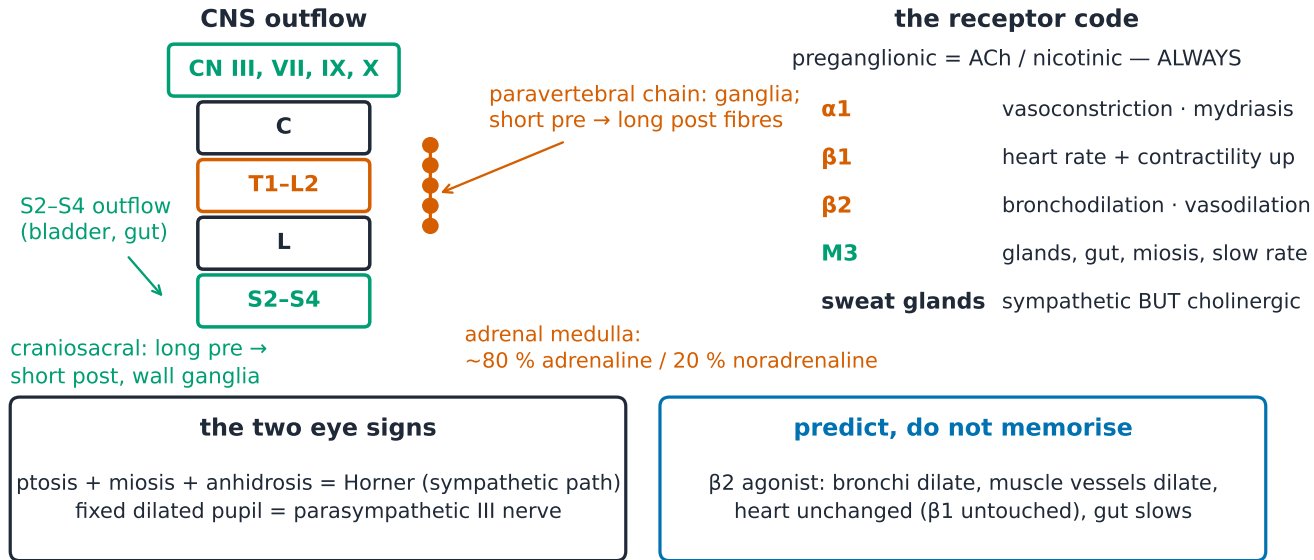
Autonomic nervous system

University Medicine

Autonomic nervous system: two limbs, one code

- 1 Outflow** Sympathetic T1-L2 (chain, short pre $\rightarrow$ long post; adrenal medulla ~80 % adrenaline / 20 % noradrenaline); parasympathetic craniosacral III, VII, IX, X + S2-S4.
- 2 Code** Preganglionic ACh/nicotinic always; $\alpha 1$ constricts, $\beta 1$ drives heart, $\beta 2$ dilates, M3 secretes and slows.
- 3 Eyes** Horner triad (ptosis, miosis, anhidrosis) = sympathetic lesion; fixed dilated pupil = III nerve.

Sympathetic and parasympathetic outflow



T1-L2 versus craniosacral, and the receptor code that predicts organ responses.

Exercises 2.1-2.3

2.1 Name the outflow levels of each limb.

[3]

2.2 Which receptor mediates bronchodilation?

[3]

2.3 Give the Horner triad and the system it implicates.

[3]

Exercises 2.1-2.3

2.1 Name the outflow levels of each limb. [3]

2.1

- Sympathetic T1–L2 (thoracolumbar); parasympathetic craniosacral III, VII, IX, X + S2–S4 ✓.

2.2 Which receptor mediates bronchodilation? [3]

2.2

- β_2 ✓.

2.3 Give the Horner triad and the system it implicates. [3]

2.3

- Ptosis, miosis, anhidrosis – sympathetic ✓.

Exercise 3.1

3.1 A fictional pure β_2 agonist is given as a teaching example.

Predict four organ responses (bronchi dilate; skeletal-muscle vessels dilate; heart unchanged, β_1 untouched; gut motility falls), each read off the receptor table. State one exception where sympathetic postganglionic fibres are cholinergic (sweat glands). [8]

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3.1

- Bronchi dilate (β_2 on airway smooth muscle) ✓.
- Skeletal-muscle vessels dilate; heart unchanged (β_1 not engaged) ✓.
- Gut motility falls (β_2 and sympathetic dominance) ✓.
- Exception: sweat glands are sympathetic but cholinergic ✓.

Exercise 3.2

3.2 A fictional patient has a right Horner syndrome.

Interpret the triad (ptosis, miosis, anhidrosis) as a sympathetic PATHWAY lesion anywhere from hypothalamus to eye. Contrast the opposite pupil sign (fixed dilation = parasympathetic III). State the adrenal medulla's secretory ratio and why it is a modified ganglion.

[7]

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3.2

- Triad = sympathetic pathway lesion, side right ✓.
- Fixed dilated pupil instead = parasympathetic III (or its compression) ✓.
- Adrenal medulla: ~80 % adrenaline / 20 % noradrenaline – a ganglion modified to secrete into blood ✓.