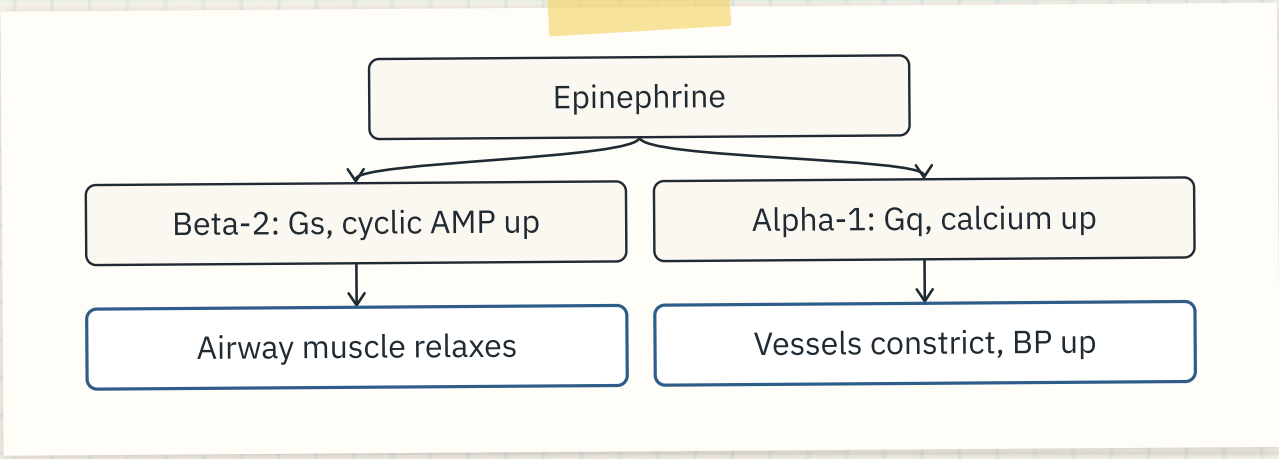
Autonomic receptors: G proteins and effects

Map each receptor to its G protein and tissue effect



Step by step

1. Name the transmitter: norepinephrine, epinephrine or acetylcholine
2. Name the receptor on the tissue
3. Read the G protein from the code
4. Read the second messenger: calcium or cyclic AMP

THE CODE

α1 Q · α2 I · β1 S · β2 S · M1 Q · M2 I · M3 Q

Q = Gq (PLC, IP3 and DAG, calcium up); I = Gi (cyclic AMP down); S = Gs (cyclic AMP up)

Receptor	Main effect
Alpha-1 (Gq)	Vessels constrict; iris radial muscle contracts (pupil dilates)
Alpha-2 (Gi)	Slows norepinephrine release
Beta-1 (Gs)	Heart rate and contraction; renin
Beta-2 (Gs)	Airways relax; muscle vessels dilate
M2 (Gi)	Slows the heart
M3 (Gq)	Smooth muscle, glands, pupil constricts

Main tissue effects

Rule of thumb

The receptor decides the response

Gq raises calcium; the betas raise cyclic AMP

Heart rate: about 100 without vagal input, 120–140 with sympathetic drive, 60–80 at rest

Exam traps

- Do not judge by the transmitter: one drug can act on different receptors with opposite effects.
- Alpha-1 and M3 both use Gq but have different tissue effects.
- Sweat glands get sympathetic nerves that release acetylcholine.

Autonomic receptors: alpha, beta and muscarinic

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/pharmacology-principles-autonomic/autonomic-receptors-alpha-beta-muscarinic-g-proteins

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
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