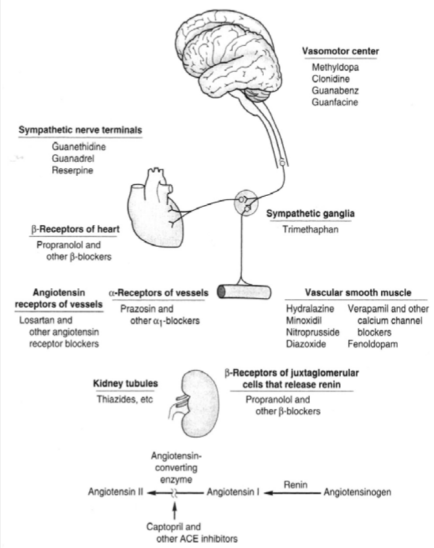
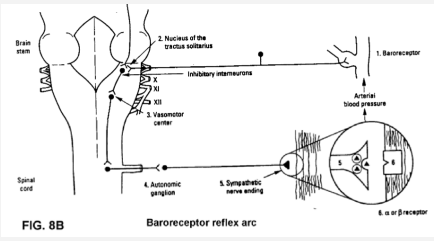
Cardiovascular Effects of Sympathomimetics



Baroreceptor Reflex (General)



The Baroreceptor Reflex is the rapid response system for dealing with BP changes (EITHER increase OR decrease).

1. If the BP is DECREASED, the baroreflex will initiate responses to INCREASE CO, causing vasoCONSTRICTION. End result: INCREASE BP

2. If the BP is INCREASED, the baroreflex will initiate responses to DECREASE CO, causing vasoDILATION. End result: DECREASE BP

The Baroreceptor Reflex (DO and DO NOT)

Barore-ceptor DO	(1) Response to BP change. (2) Dampen any BP changes. (3) Dampen HR changes, reverse/enhance HR changes.
Barore-ceptor DO NOT	(1) NO Response to HR change. (2) NEVER alter direction of BP change

General Hemodynamics

General Equation	Blood Pressure = Cardiac Output x Total Peripheral Resistance
Blood Pressure (BP)	Combination of Systolic & Diastolic BP
Cardiac Output (CO)	CO = Stroke volume x Heart Rate
Total Peripheral Resistance (TPR)	alpha 1 receptor ALWAYS DOMINATE ("alpha dominates")
Integr-ation:	Purpose: Maintain homeostasis & coordinate autonomic state by integrating afferent and efferent components of the SYMpathetic & PARAsympathetic ANS within CNS

Direct Effects of Activating ANS receptors

$Alpha_1$ receptors	vasoconstriction	↑ TPR	↑ BP
$Beta_1$ receptors	↑ heart rate	↑ CO	↑ BP
$Beta_2$ receptors	vasodilation	↓ TPR	↓ BP
M_2 receptors (vagus)	↓ heart rate	↓ CO	↓ BP
M receptors (vascular)	Vasodilation (NO)	↓ TPR	↓ BP

(Note: ANS receptors are ranked based on relative effect)

1. Alpha1 receptors = MAJOR player = BIGGEST action.
2. Muscarinic-2 receptors (vagus) works AGAINST Alpha1 receptor
3. Beta2 & Muscarinic (M, vascular) receptors are NOT attached (innervated) to Baroreceptor Reflex.

Para- & Sympathetic Tone on BP & HR

	BP (mmHg)	HR (bpm)
Normal (resting)	120 / 80	70
No tone*	60 / 40	75

* Central and circulation hormone actions removed
Note: Athletic individuals have lower HR due to higher vagal tone ie. Lance Armstrong (resting HR 32 bpm)

Heart Rate: Vagus nerve (-10 bpm) + Beta1-receptor (+5 bpm) = 5 bpm increase

Influence of BP change on ANS tone

	Resting	After ↑ BP	After ↓ BP
$Alpha_1$	++++	0	+++++++
$Beta_1$	+	0	++
*$Beta_2$	+	++	0
Vagus (M_2)	++	++++	0
* Non-innervated, respond to circulation epinephrine (EPI) Note: Vascular M receptors have no major role in BP regulation (Ach is not a circulating hormone.			

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