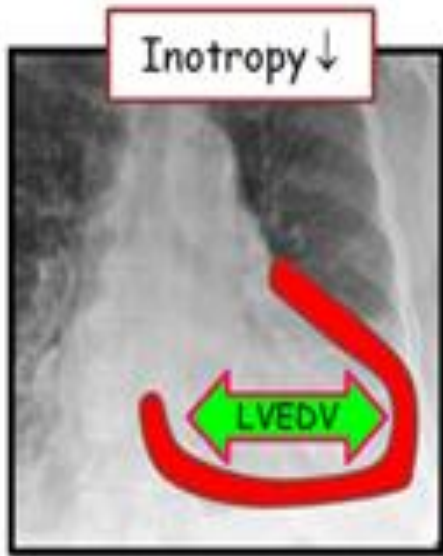


Shock for Step One Scenarios, PharmacoRx

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Part II: Shock-specific scenarios

- Definition: life-threatening, circulatory failure
 - Cardiogenic
 - Distributive (Vasodilatory)
 - Hypovolemic
 - Obstructive
 - Mixed
 - Effects: end organ dysfunction/failure
 - Pulmonary: ARDS
 - Renal: AKI
 - Heme: DIC
 - Consumption/Fibrinolysis/MHA
 - Microvascular thrombosis/Hemorrhage
- Acid-Base Δ



Cardiogenic Shock Scenarios:

AMI

Cardiac Rupture (dead)

Papillary MM Tear

(new murmur)

Tamponade

(Pulsus Paradoxus)

EF%

CO ml/min

VR
(preload)

SVR/TPR



LVEDV

α -1/SNS

PharmacRx

Dobutamine

β -1 agonist

Inotrope, not a pressor



Septic Shock:

Bacterial
Cell Wall
Components
and
Products
(Toxins)

Pharmacorx:

Pressors

Some Volume (but not too much)

Norepinephrine

$\alpha 1 = \alpha 2$; $\beta 1 \gg \beta 2$

EF%

CO ml/min

VR
(preload)

SVR/TPR





Septic Shock:

Bacterial
Cell Wall
Components
and
Products
(Toxins)

Anaphylaxis:

Type I HSN

Pharmacorx:

Pressors

Some Volume (but not too much)

Norepinephrine
 $\alpha 1 = \alpha 2; \beta 1 \gg \beta 2$

Epinephrine
 $\alpha 1 = \alpha 2; \beta 1 = \beta 2$

EF%

CO ml/min

VR
(preload)

SVR/TPR





Septic Shock:

Bacterial
Cell Wall
Components
and
Products
(Toxins)

Anaphylaxis:

Type I HSN

Sneaky

Mast Cell:
Tryptase

EF%

CO ml/min

VR
(preload)

SVR/TPR



Pharmacorx:

Pressors

Some Volume (but not too much)

Norepinephrine
 $\alpha_1 = \alpha_2; \beta_1 \gg \beta_2$

Epinephrine
 $\alpha_1 = \alpha_2; \beta_1 = \beta_2$



Complications of hypoperfusion:

Especially ischemic
ATN v Prerenal azotemia?
(U/A, FENa, BUN/Cr)

Multiple transfusions
and platelets?
(dilutional thrombocytopenia)

Baroreceptors
(same as hypotension)

Pharmacorx:
Volume >>> vasopressors

EF%

CO ml/min

VR
(preload)

SVR/TPR



Φ ml

Φ ml

α -1/SNS

α

Alpha Agonist (Vasoconstrictor)

α

Phenylephrine $\alpha_1 = \alpha_2 \gggg \beta$ [raises BP/TPR; (+/-) CO; used in sepsis and **post-anesthesia hypotension**]

α

Alpha Agonist (Vasoconstrictor)

α

Phenylephrine $\alpha_1 = \alpha_2 \gggg \beta$ [raises BP/TPR; (+/-) CO; used in **sepsis** and **post-anesthesia hypotension**]

β

Beta Agonists (Inotropes, \uparrow CO)

β

Dobutamine $\beta_1 > \beta_2 \gggg \alpha$ (\uparrow CO \therefore cardiogenic shock, \downarrow TPR)

Isoproterenol $\beta_1 = \beta_2 \gggg \alpha$ (vasodilator, decreases BP)

Frequent mention in pharmacology vignettes where it is c/w norepinephrine

α

Mixed Alpha and Beta

β

Epinephrine $\alpha_1 = \alpha_2$; $\beta_1 = \beta_2$

(bronchioles; **anaphylaxis**; TPR \downarrow Low-dose / \uparrow Hi-dose; \uparrow CO)

Norepinephrine: $\alpha_1 = \alpha_2$; $\beta_1 \gg \beta_2$ (TPR \uparrow / \pm CO; **septic shock**)

α

Mixed Alpha and Beta

β

Epinephrine $\alpha_1=\alpha_2$; $\beta_1=\beta_2$

(bronchioles; **anaphylaxis**; TPR \downarrow Low-dose/ \uparrow Hi-dose; \uparrow CO)

Norepinephrine: $\alpha_1=\alpha_2$; $\beta_1 \gg \beta_2$ (TPR \uparrow / \pm CO; **septic shock**)

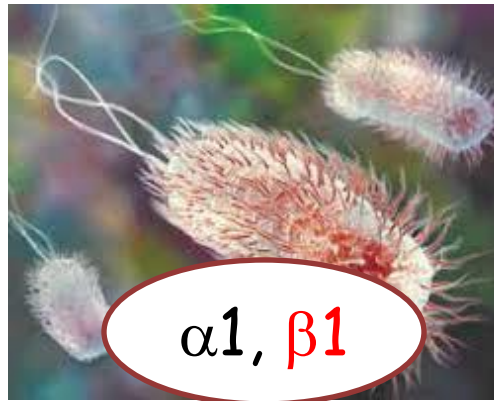
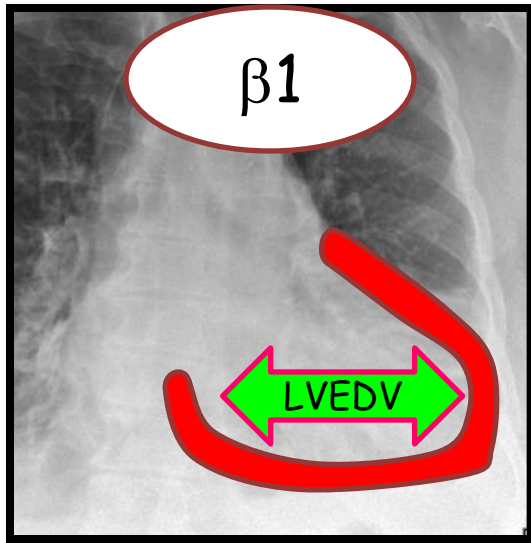
Norepinephrine

Phenylethanolamine
N-methyltransferase

Epinephrine

Primary hormonal product
of the adrenal medulla

Shock 101: Summary of key adrenergic receptors



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