

# **SHOCK**

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# “Shock”

- Shock adalah suatu sindroma klinis yg ditandai dg kegagalan sistem sirkulasi untuk mempertahankan perfusi yg adekuat ke organ-organ vital tubuh

# Klasifikasi Shock

( Menurut Hinshaw and Cox classification)



<b>Hypovolemic</b>	
<b>Cardiogenic</b>	<ul style="list-style-type: none"><li>• Intrinsic</li><li>• Kompresive</li></ul>
<b>Distributive</b>	<ul style="list-style-type: none"><li>• Septic</li><li>• Anaphylactic</li><li>• Neurogenic</li></ul>
<b>Obstructive</b>	

**Hypovolemic**

**Cardiogenic**

- Intrinsic
- Kompresive

**Distributive**

- Septic
- Anaphylactic
- Neurogenic

**Obstructive**

# Definisi

## Hypovolemic shock

- Syok akibat volume darah dalam pembuluh darah yang kurang.

## Cardiogenic shock

- Syok yg disebabkan kegagalan primer jantung dalam memompa. (pada keadaan volume intravaskuler yg cukup)

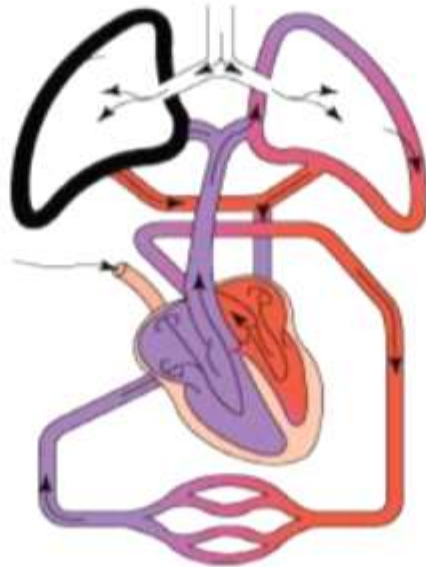
## Distributive

- Syok akibat volume darah secara abnormal berkumpul dlm pembuluh darah perifer. Tjd gangguan distributive aliran darah,

## Obstructive

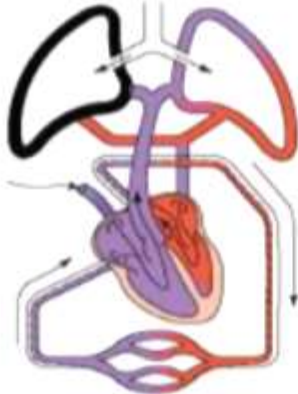
- Gangguan kontraksi jantung akibat di luar jantung

Normal

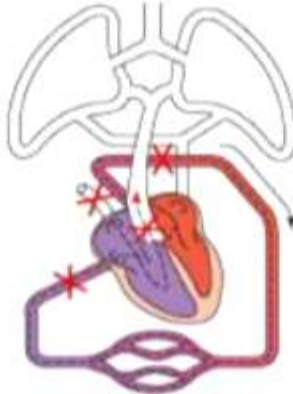


Shock

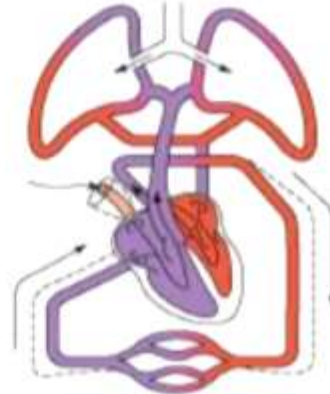
Hypovolemic



Obstructive



Distributive



# Etiologi

## Hypovolemic Shock

- **Non hemmorrhagic:** vomiting, diarrhea, burns, environmental (dehydration)
- **Hemorrhagic**

## Cardiogenic Shock

- Penyebab primer : miokarditis, peny jantung bawaan
- Penyebab sekunder : disfungsi miokard krn toksin, iskhemia

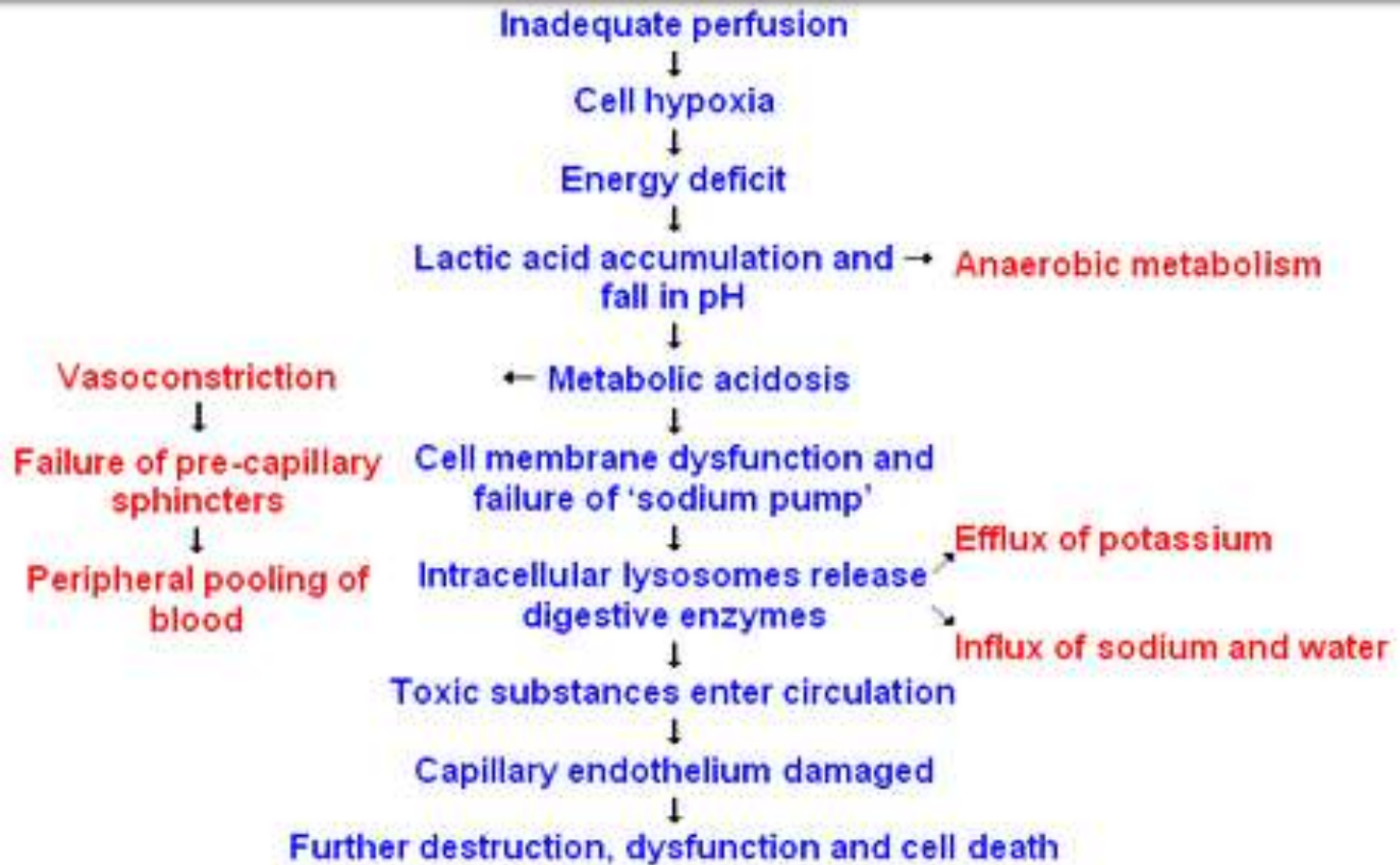
## Distributive Shock

- Septic shock, SIRS, Anaphylaxis, Neurogenic shock, Insufficiency adrenal

## Obstructive Shock

- Tamponade perikardiak
- Perikarditis restriktif
- Emboli paru (masif)
- Koarktasio aorta

# ...Effects of inadequate perfusion on cell function...



# DEVELOPMENT OF SHOCK OR CIRCULATORY INSUFFICIENCY

## EFFECTS

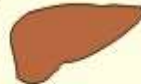
Reduced venous return  
 ↓  
 Reduced stroke volume  
 ↓  
 Reduced arterial pressure  
 ↓  
 Arteriolar- & veno-constriction  
 ↓  
 Reduced bloodflow  
 ↓  
 Hypoxia  
 ↓  
 Metabolic acidosis

## EFFECTORS



Baroreceptors & heart

Vessels



Cardiac-cerebral-hepatic-renal failure

Tissue depression

Chemoreceptors.

Vessels. Kidney



Spleen & blood

## COMPENSATORY REACTIONS

Starling-law-reactions  
 Starling-law-reactions  
 Increased HR & contractility  
 Reduced capillary pressure  
 Hypoxia & glycolysis  
 Renal tubular necrosis  
 Increased ventilation  
 Vasoconstriction.  
 Water retention  
 Vasoconstriction. Salt reabsorption  
 Improved O<sub>2</sub>-transport

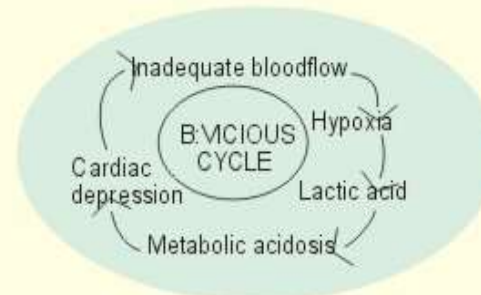
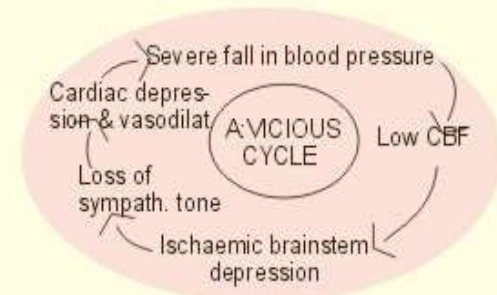
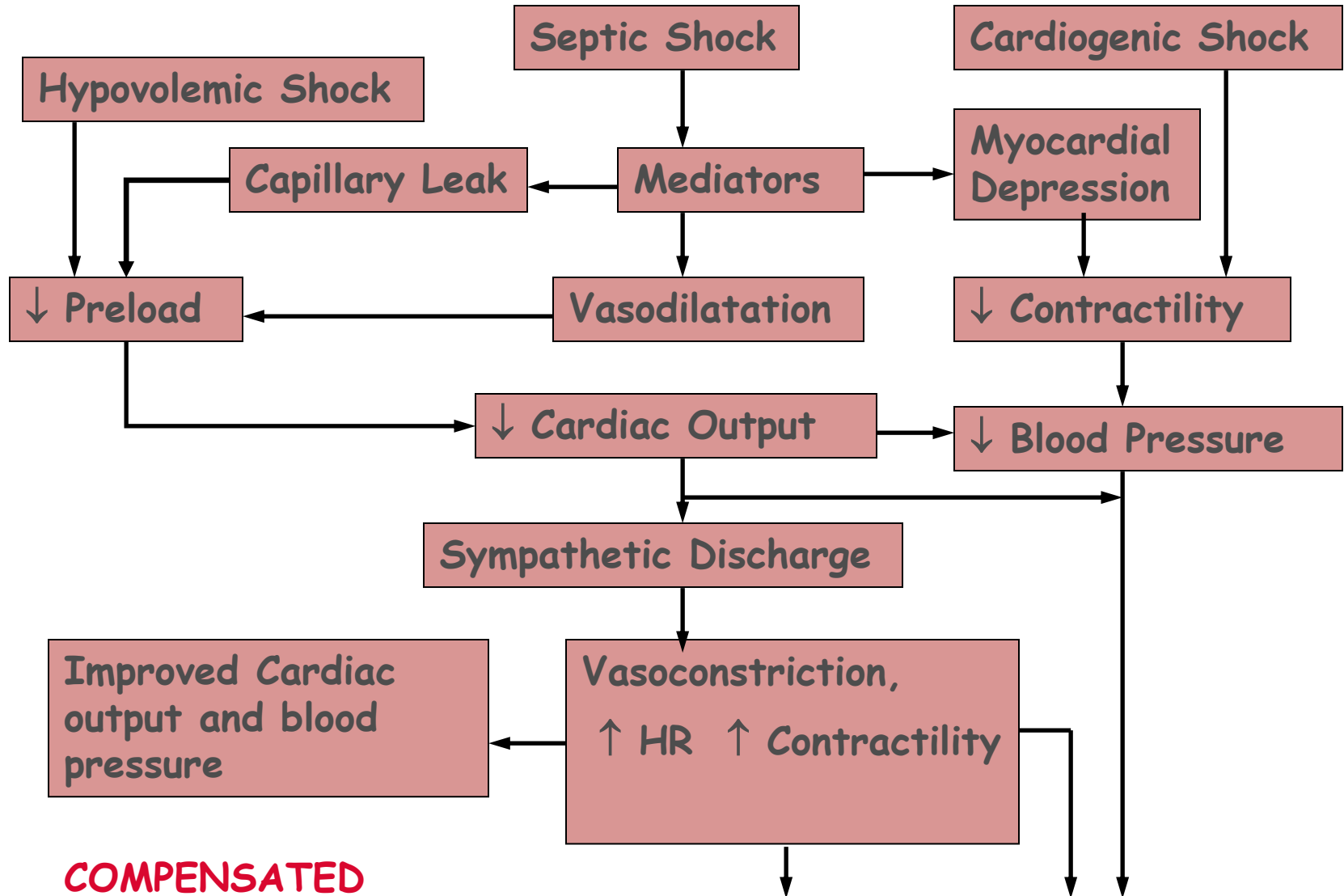
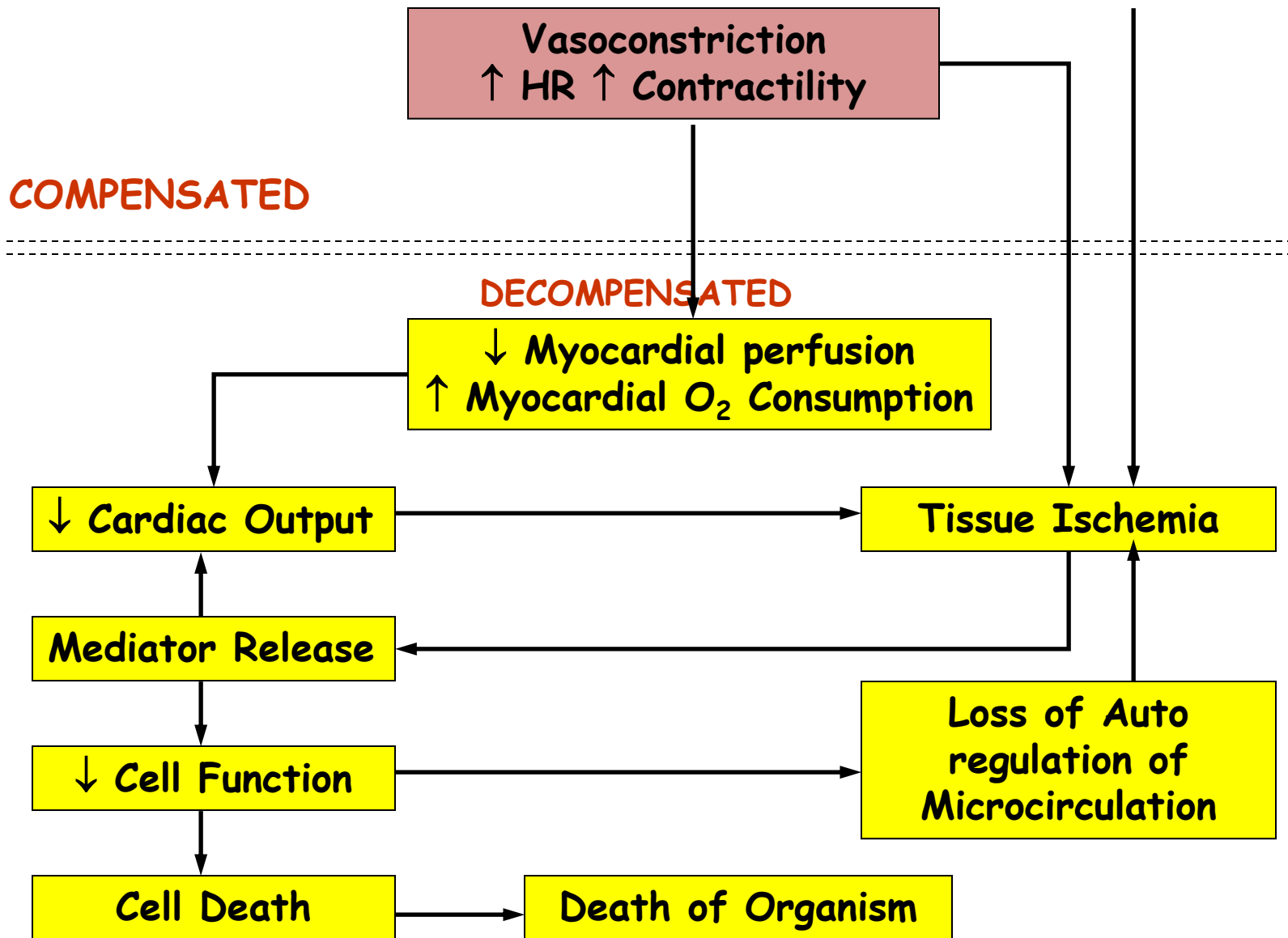


Fig. 12-6



# PERJALANAN PATOFISIOLOGI SYOK

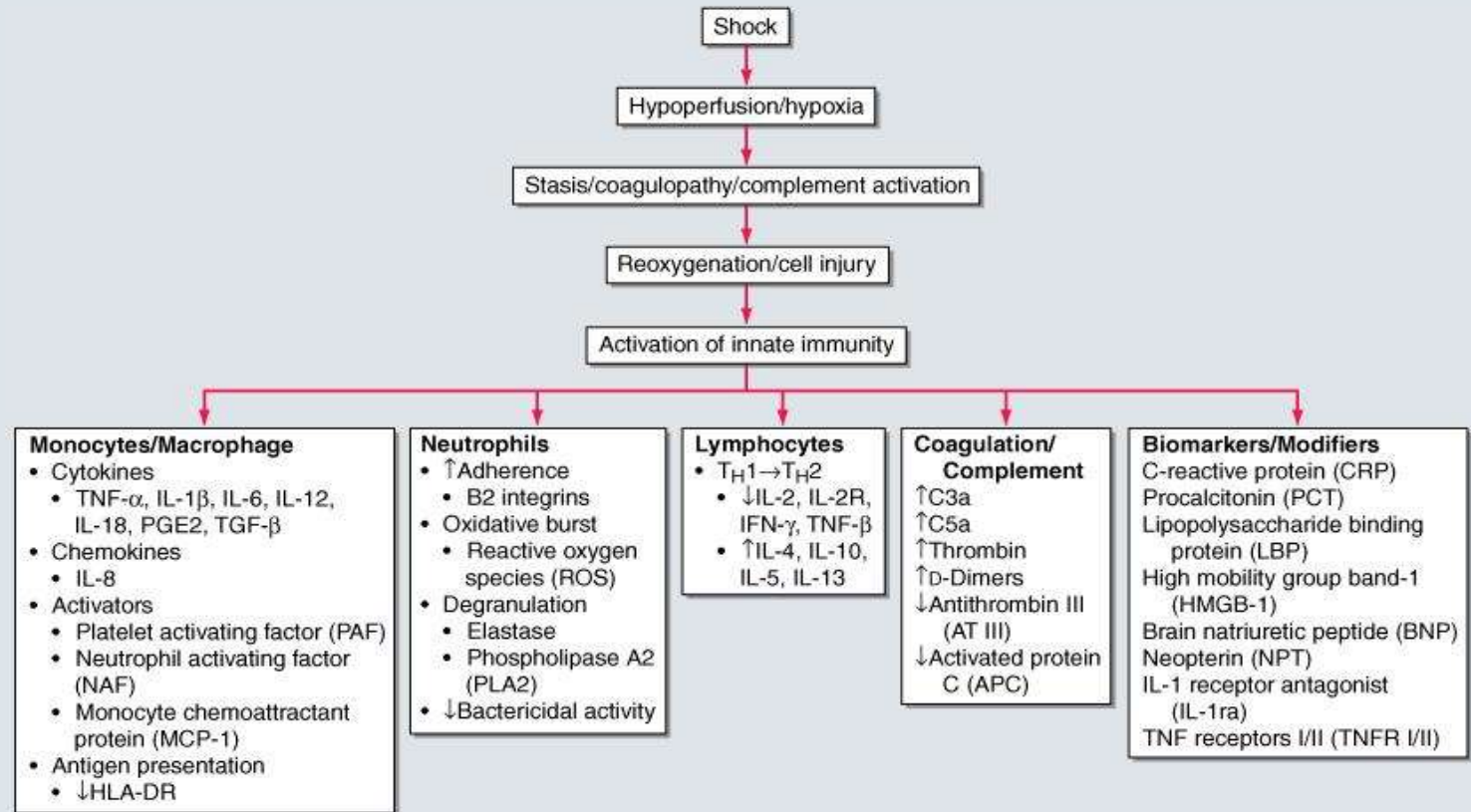




**Table 264-2 Normal Hemodynamic Parameters**

<b>Parameter</b>	<b>Calculation</b>	<b>Normal Values</b>
Cardiac output (CO)	$SV \times HR$	4–8 L/min
Cardiac index (CI)	$CO/BSA$	2.6–4.2 (L/min)/m <sup>2</sup>
Stroke volume (SV)	$CO/HR$	50–100 mL/beat
Systemic vascular resistance (SVR)	$[(MAP - RAP)/CO] \times 80$	700–1600 dynes · s/cm <sup>5</sup>
Pulmonary vascular resistance (PVR)	$[(PAP_m - PCWP)/CO] \times 80$	20–130 dynes · s/cm <sup>5</sup>
Left ventricular stroke work (LVSW)	$SV(MAP - PCWP) \times 0.0136$	60–80 g-m/beat
Right ventricular stroke work (RVSW)	$SV(PAP_m - RAP)$	10–15 g-m/beat

# ...Immuno-inflammatory respon to shock...

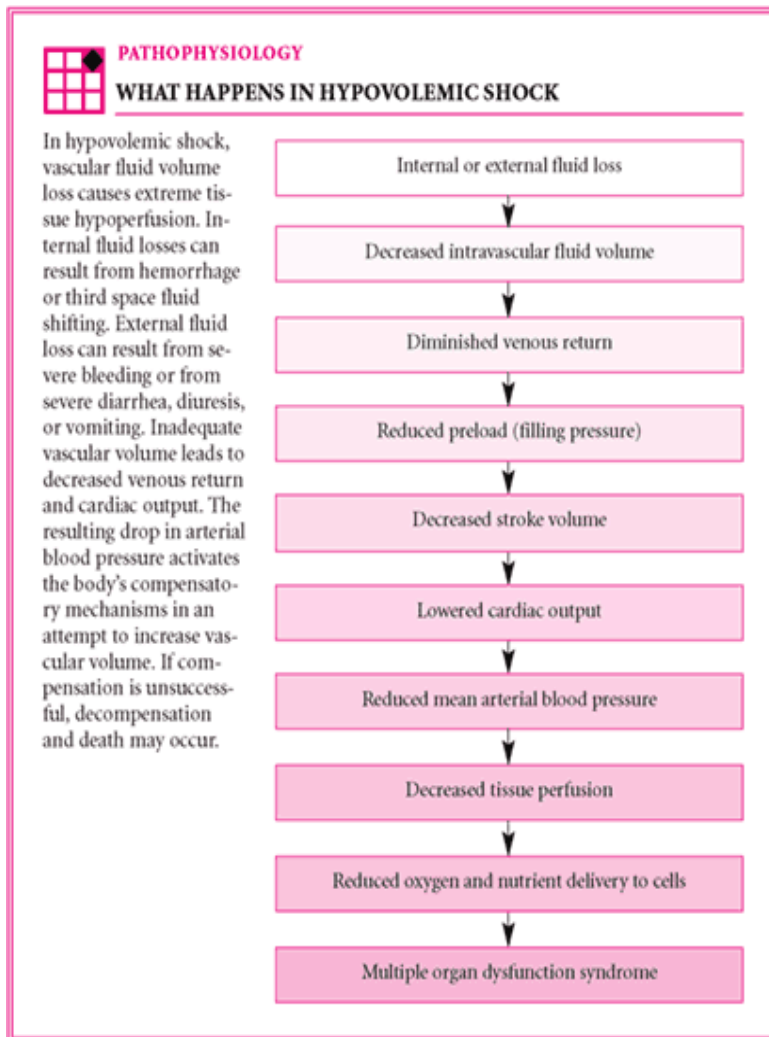


Source: Fauci AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine*, 17th Edition: <http://www.accessmedicine.com>

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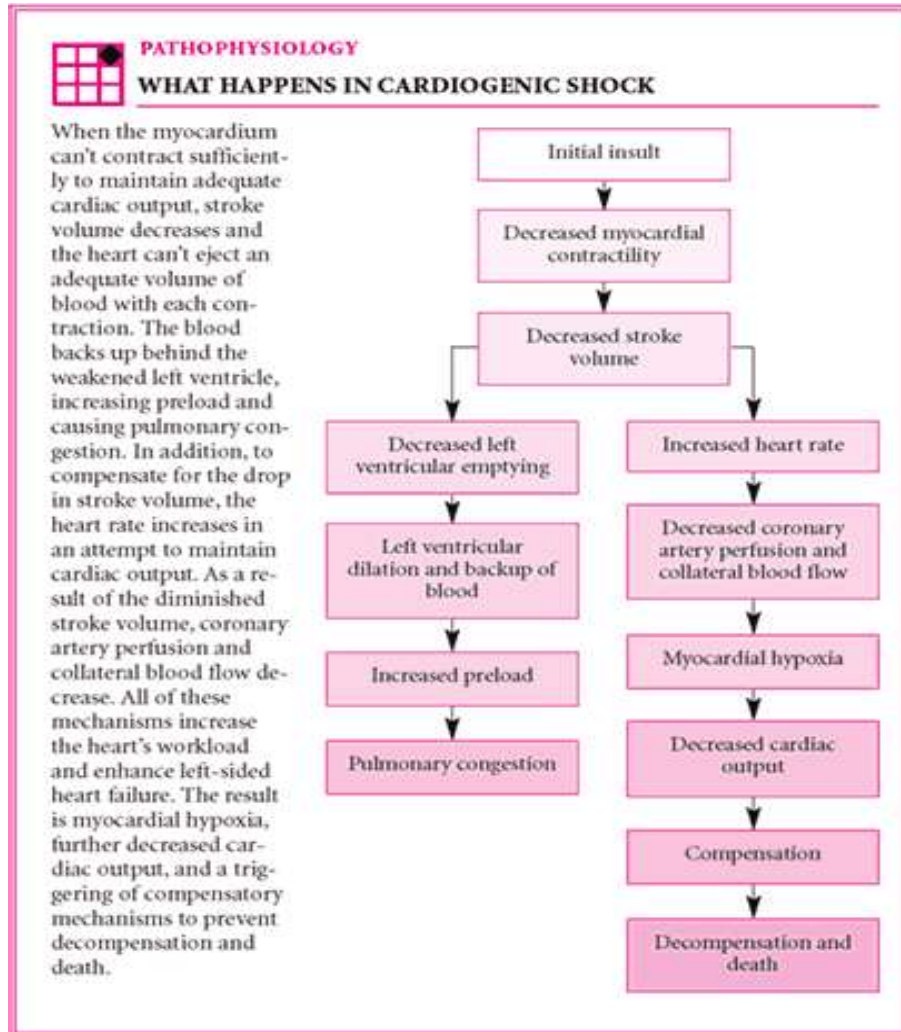
A schematic of the host immunoinflammatory response to shock.

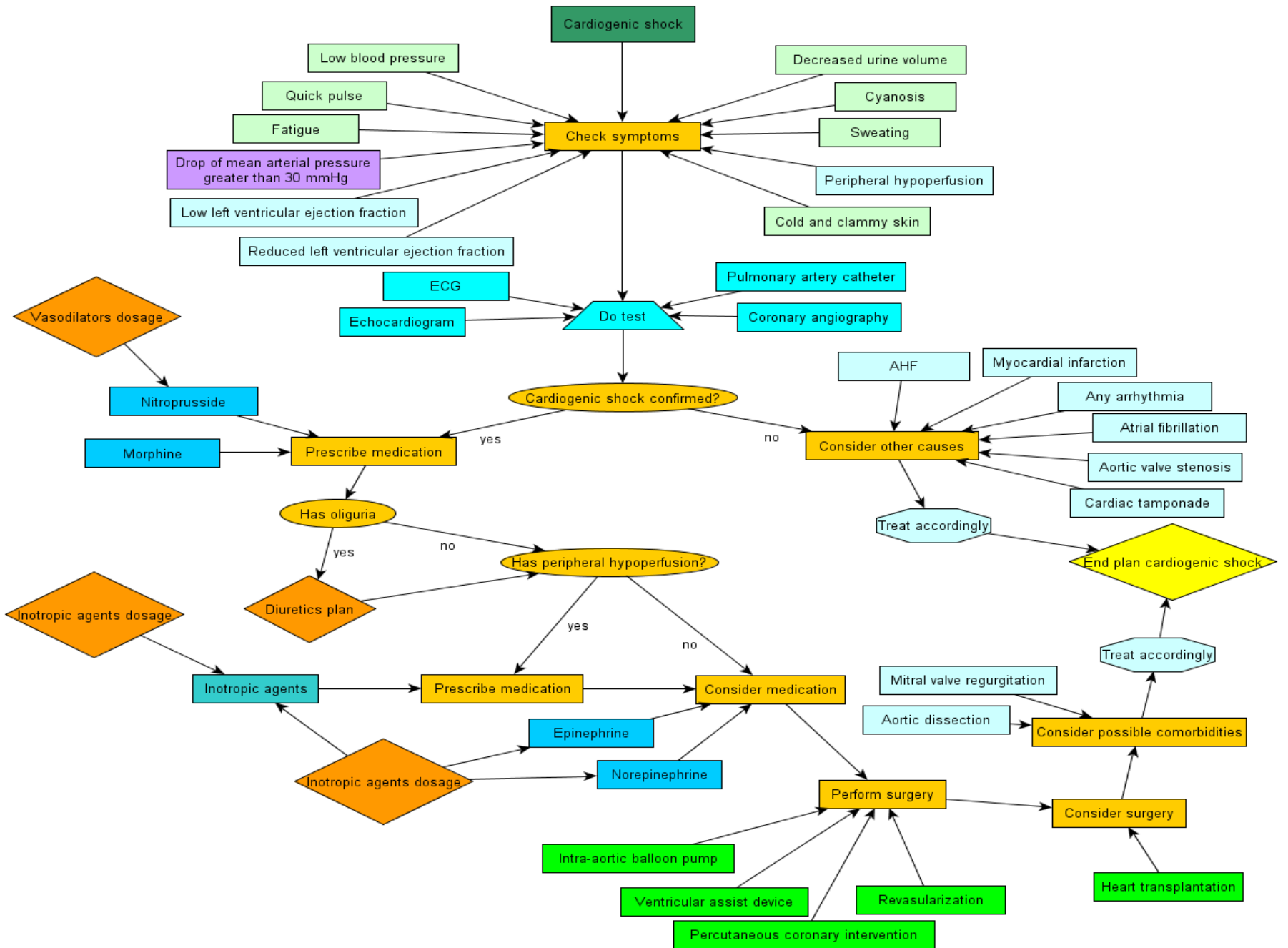
# Hypovolemic shock...



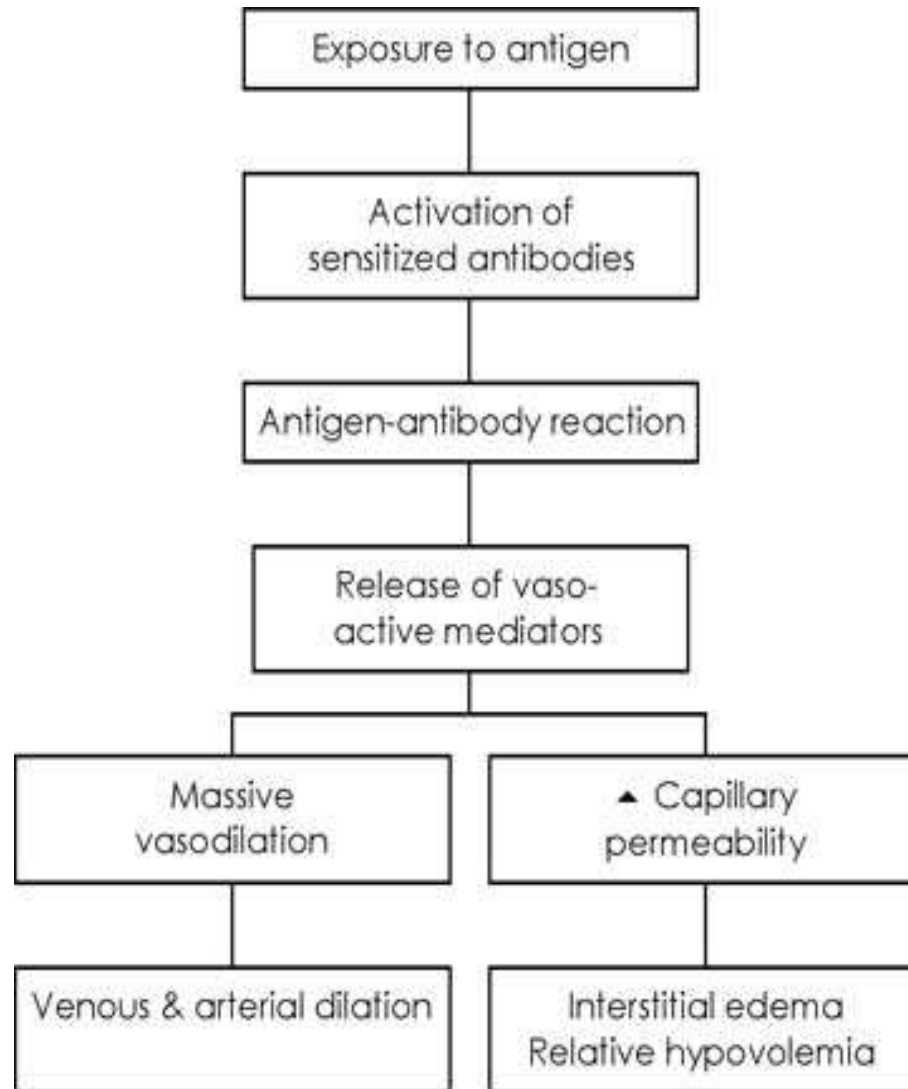
- **Mild ( < 20% blood volume )**
  - Cool extremities
  - Increased capillary refill time
  - Diaphoresis
  - Collapsed veins
  - Anxiety
- **Moderate (20-40% blood volume)**
  - Tachycardia
  - Tachypnea
  - Oligouria
  - Postural changes
- **Severe ( > 40% blood volume )**
  - Hemodynamic instability
  - Marked tachycardia
  - Hypotension
  - Coma

# Cardiogenic shock...



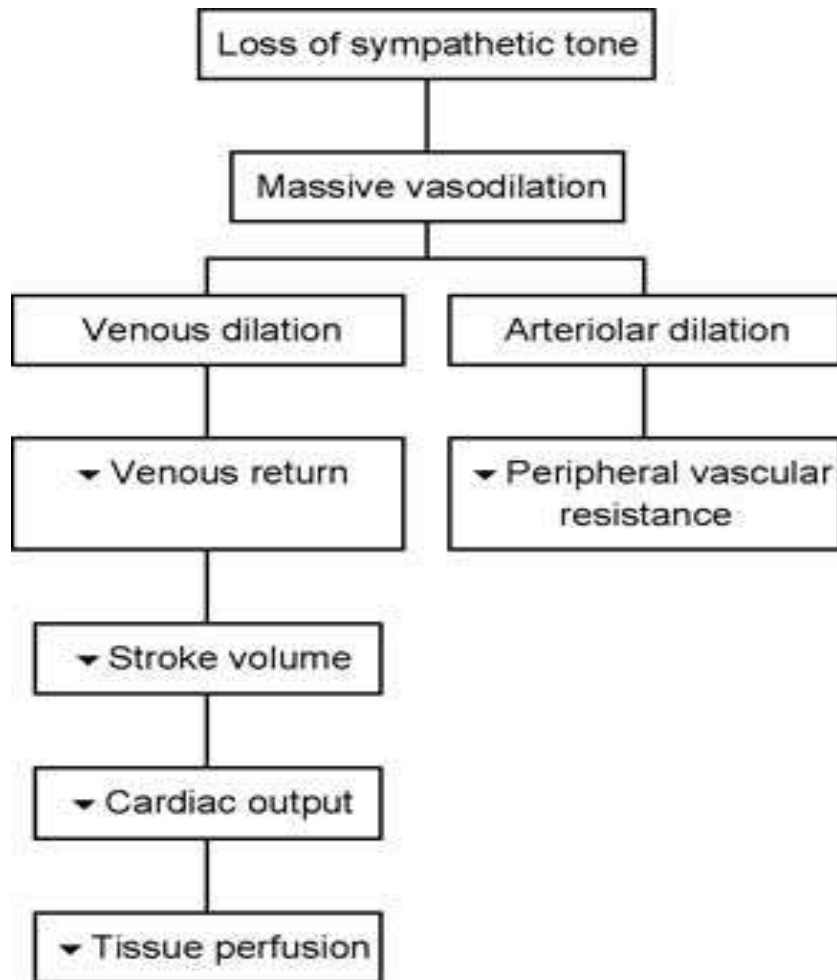


# Anaphylactic shock...





# Neurogenic shock...



- As with hypovolemic shock but in high spinal injuries may also be accompanied by profound bradycardia due to loss of the cardiac accelerating nerve fibres from the sympathetic nervous system at T1-T4.
- The skin is warm and dry or a clear sweat line exists, above which the skin is diaphoretic.
- Priapism due to Peripheral nervous system stimulation

# Septic shock...

- Similar to hypovolemic shock except in the first stages: Pyrexia (fever), due to increased level of cytokines
- Systemic vasodilation resulting in hypotension (low blood pressure)
- Warm and sweaty skin due to vasodilation
- Systemic leukocyte adhesion to endothelial tissue
- Reduced contractility of the heart
- Activation of the coagulation pathways, resulting in disseminated intravascular coagulation
- Increased levels of neutrophils

# ....MOGA BERMANFAAT...

