SHOCK

BY MEDMEMO

Definition

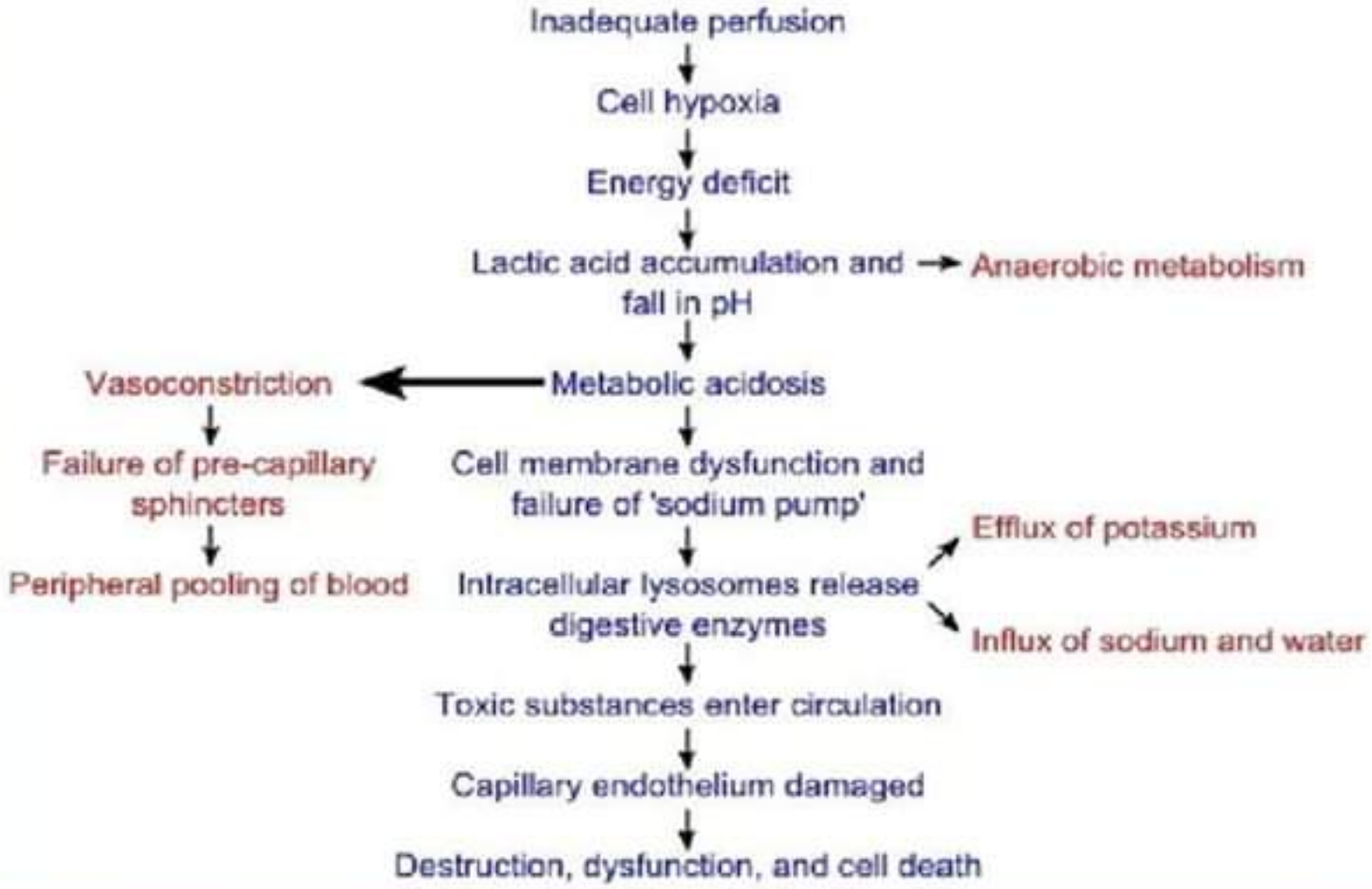
Shock is a physiologic state characterized by systemic reduction in tissue perfusion, resulting in decreased tissue oxygen delivery.

Other Ways

* It's a condition, in which circulation fails to meet the metabolic need of the tissue & at the same time fails to remove the metabolic waste products.

- Inadequate tissue perfusion to meet tissue demands
- Usually result of inadequate blood flow and/or oxygen delivery
- Inadequate peripheral perfusion leading to failure of tissue oxygenation
- Lead to anaerobic metabolism

Pathophysiology of Shock



Cells switch from aerobic to anaerobic metabolism

↓

lactic acid production

↓

Cell function ceases & swells

↓

membrane becomes more permeable

↓

electrolytes & fluids seep in & out of cell

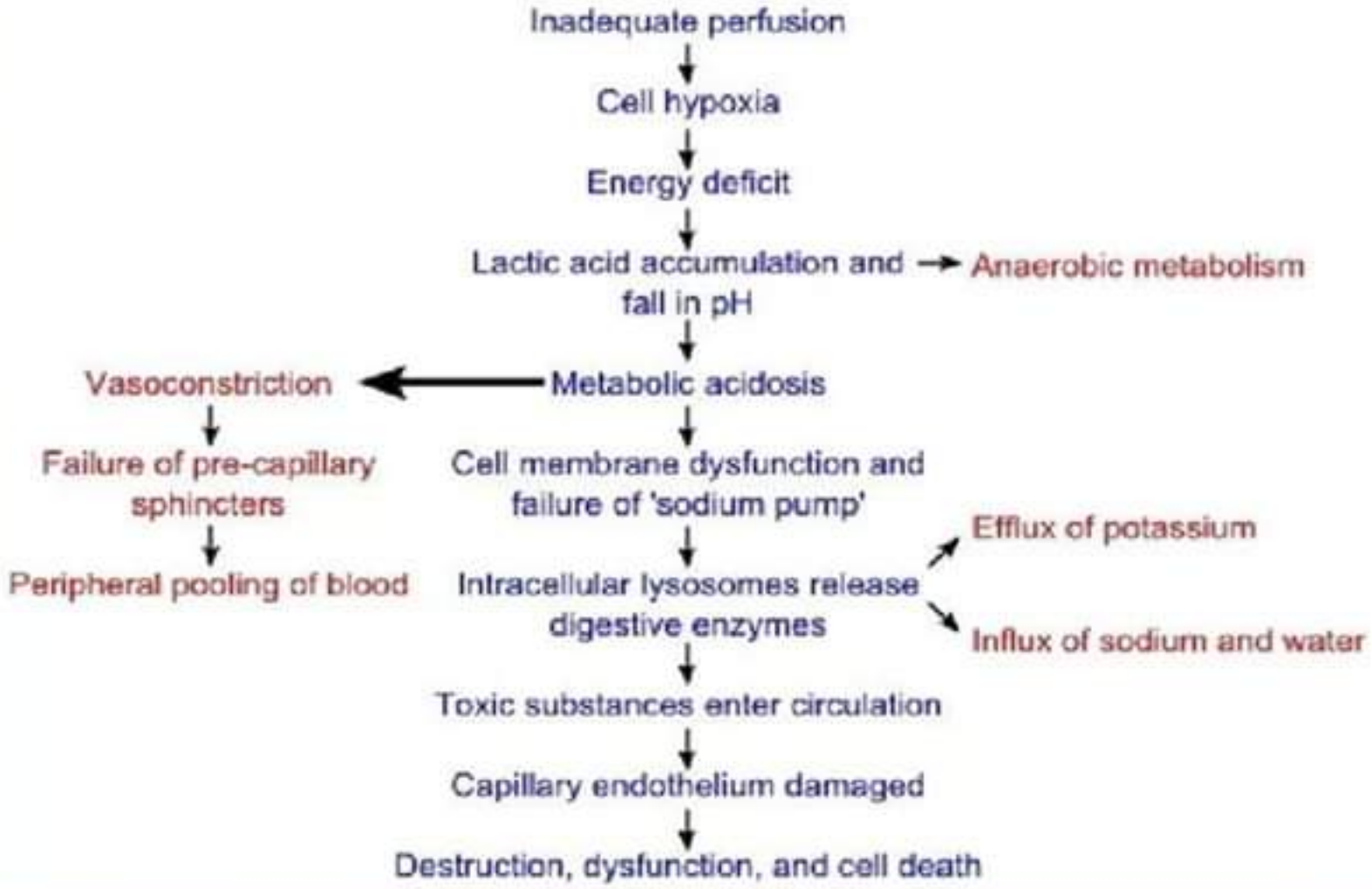
↓

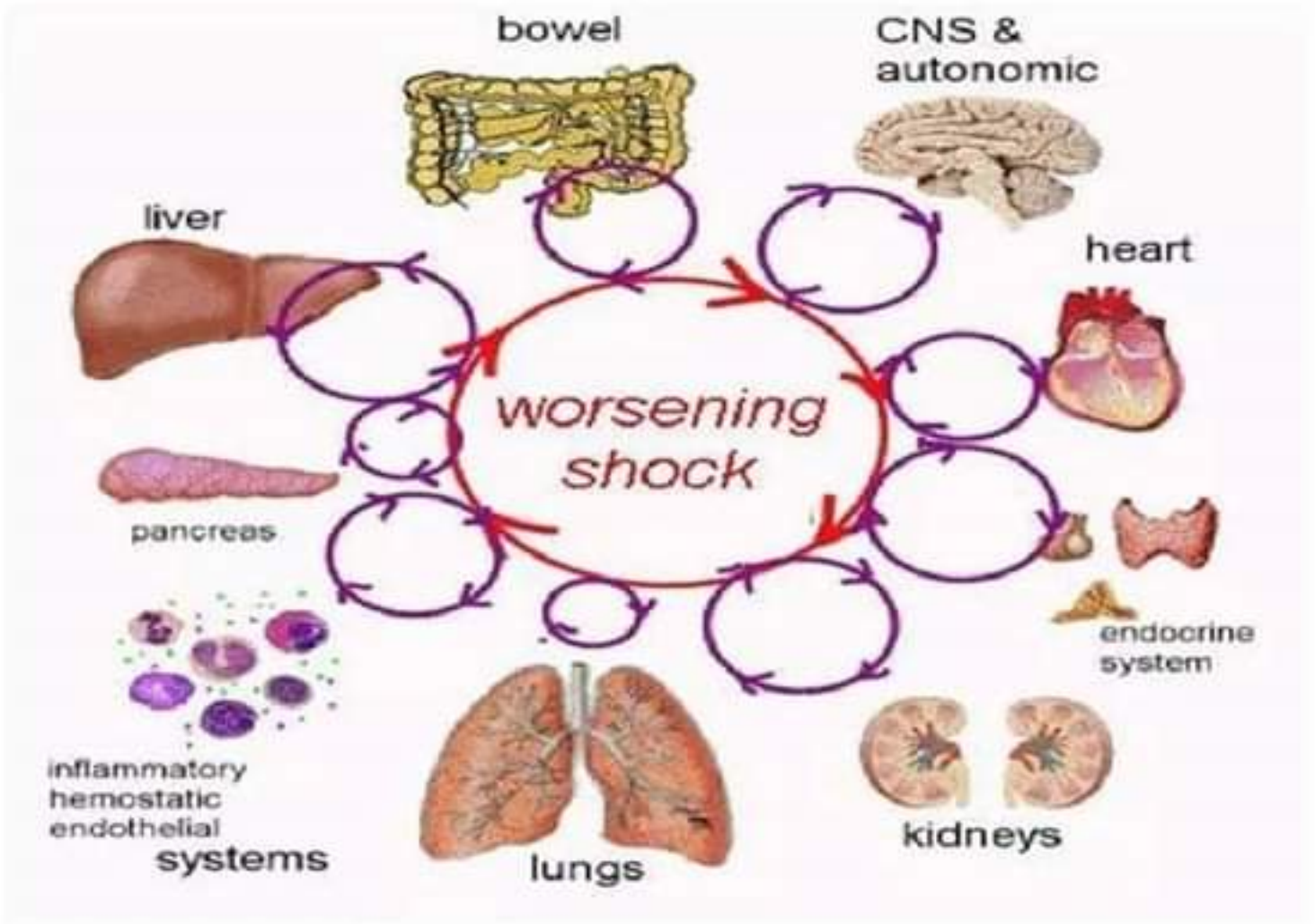
Na+/K+ pump impaired

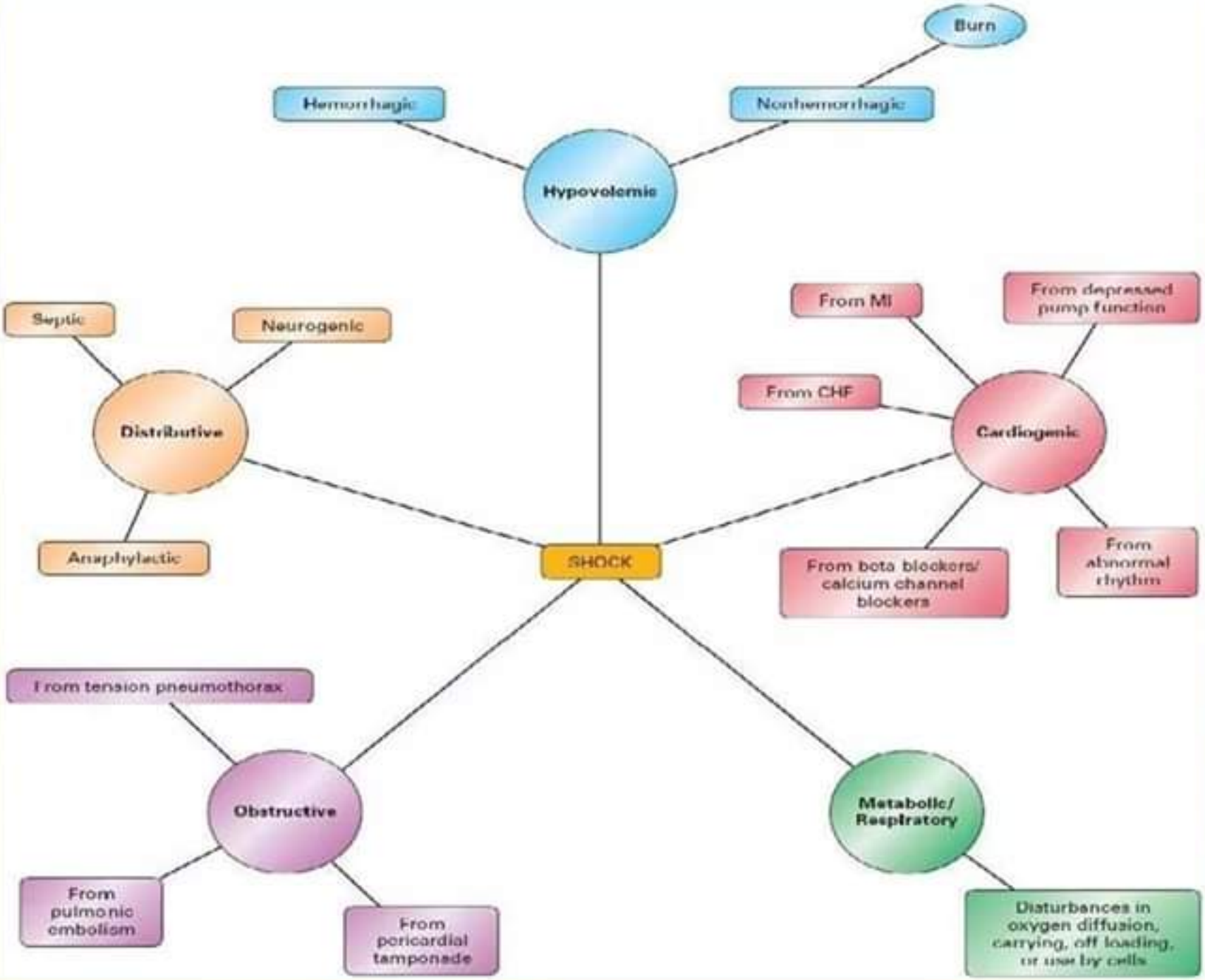
mitochondria damage

cell death

Pathophysiology of Shock




bowel
CNS &
autonomic
liver
heart
worsening
shock
pancreas
endocrine
system
inflammatory
hemostatic
endothelial
systems
lungs
kidneys


Burn
Hemorrhagic
Nonhemorrhagic
Hypovolemic
Septic
Neurogenic
Distributive
Anaphylactic
From MI
From depressed pump function
From CHF
Cardiogenic
From beta blockers/ calcium channel blockers
From abnormal rhythm
SHOCK
From tension pneumothorax
Obstructive
From pulmonic embolism
From pericardial tamponade
Metabolic/ Respiratory
Disturbances in oxygen diffusion, carrying, off loading, or use by cells

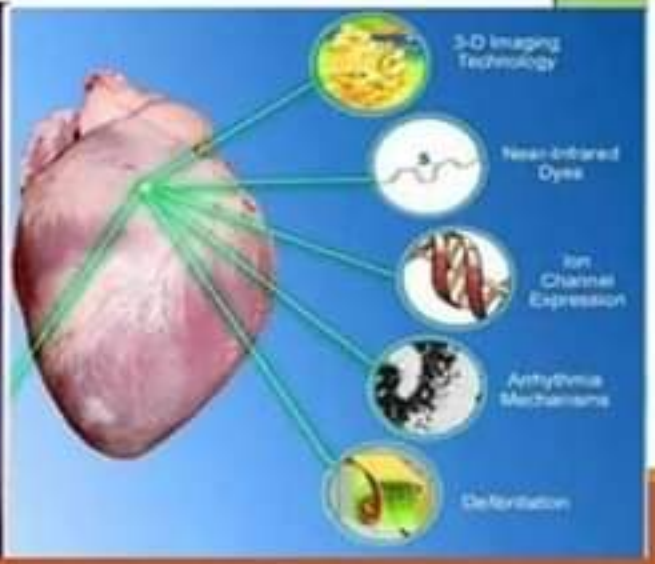
HYPOVOLAEMIC ETIOLOGY

- Blood loss.
  - haemorrhage
- Plasma / body water loss.
- Electrolytes imbalance.
  - Vomiting.
  - Diarrhea.
  - Dehydration.



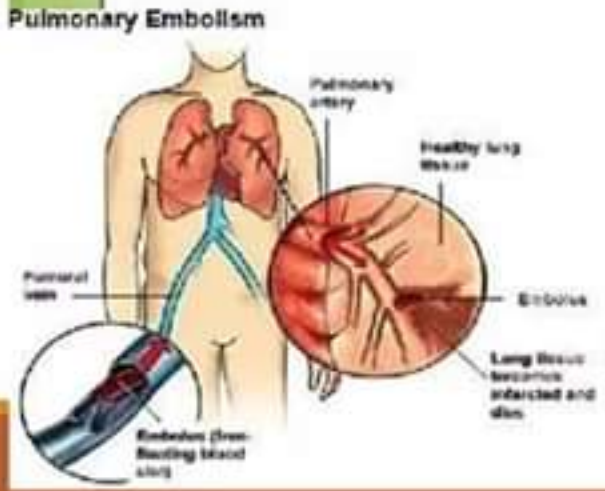
CARDIOGENIC ETIOLOGY

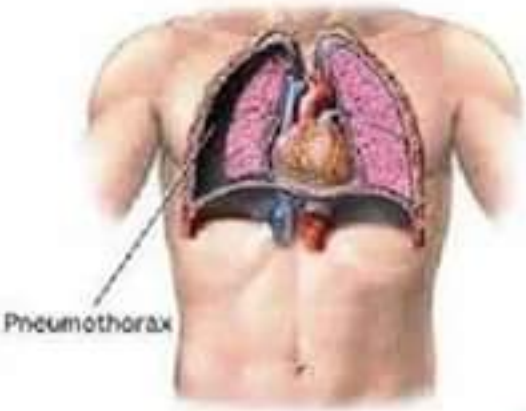
- Valvular heart disease
- Myocardial infarction.
- Cardiac arrhythmias.
- Cardiomyopathy



OBSTRUCTIVE ETIOLOGY

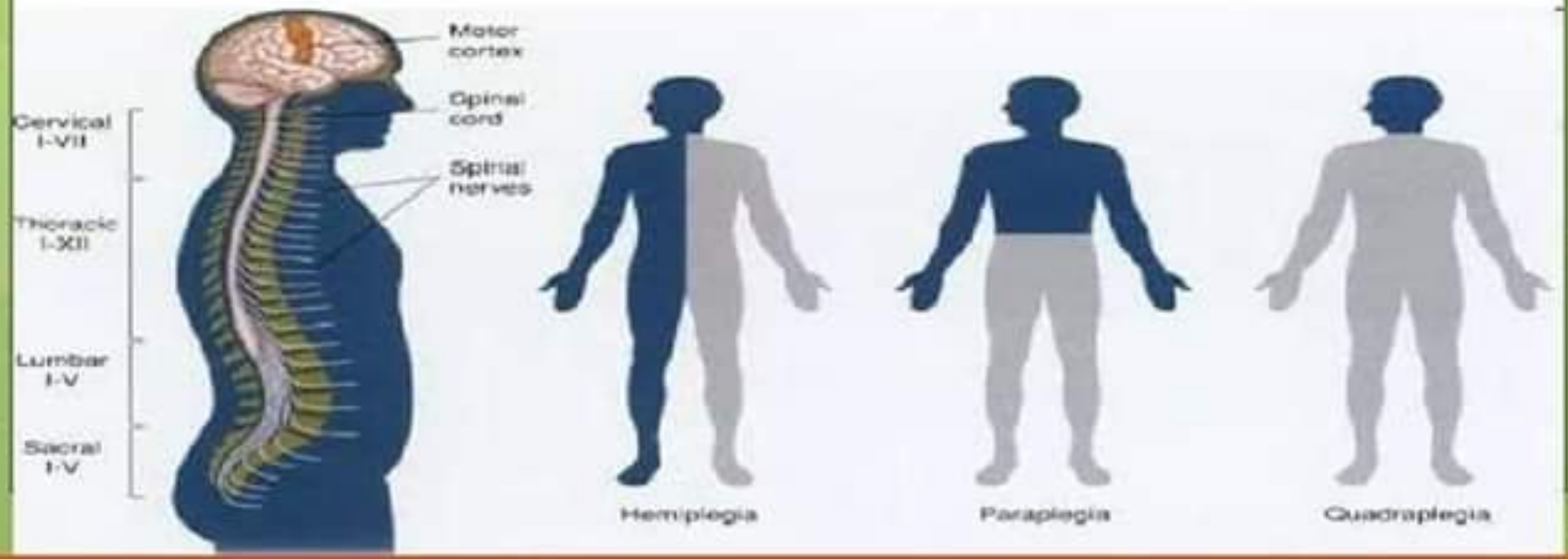
- Cardiac Tamponade
- Pulmonary Embolism
- Tension Pneumothorax
- Air embolism





NEUROGENIC ETIOLOGY

- Paraplegia.
- Quadriplegia.
- Trauma to spinal cord.
- Spinal anesthesia.

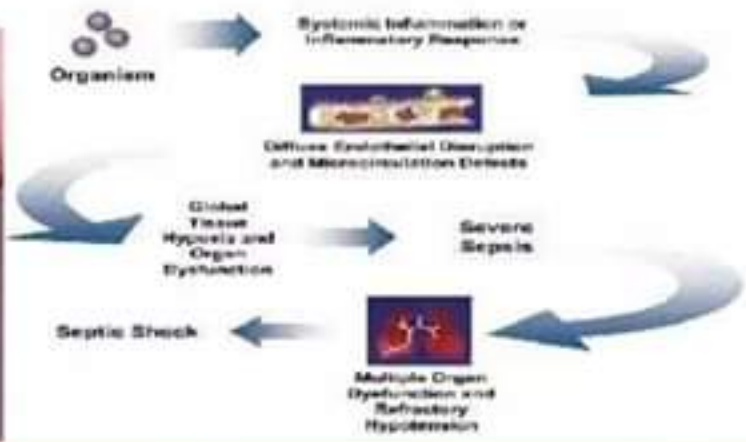


ANAPHYLACTIC ETIOLOGY

- Injections - Penicillins.
- Anaesthetics
- Stings.
- Shelfish.

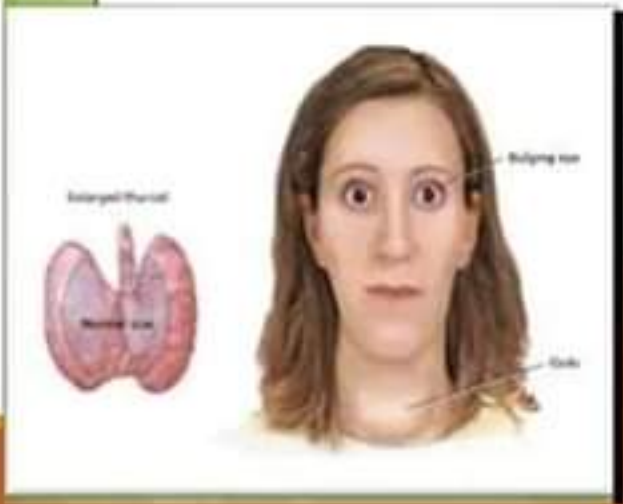
SEPTIC ETIOLOGY

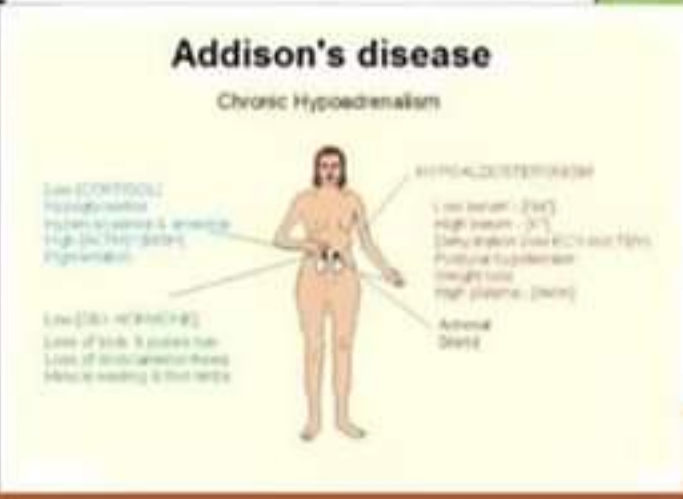
- Gram +
- Gram -
- Fungi / Virus
- Protozoa



ENDOCRINE ETIOLOGY

- Hypo & Hyperthyroidism.
- Adrenal insufficiency.





Clinical Features

- Features of shock depend on the degree of loss of volume & on duration of shock.

- Types
  - Mild shock.
  - Moderate shock.
  - Severe shock.

ENDOCRINE ETIOLOGY

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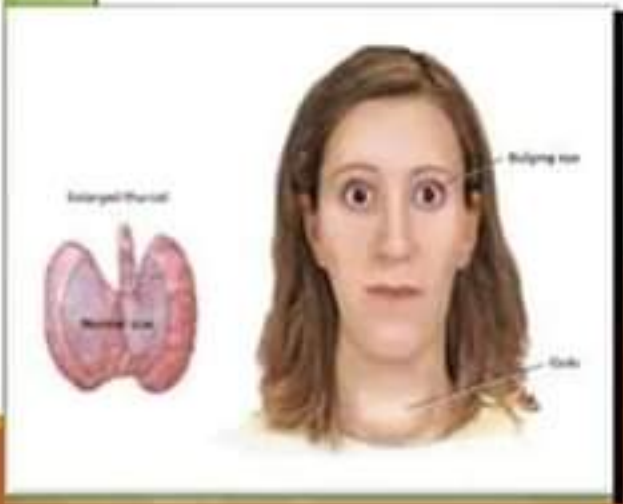
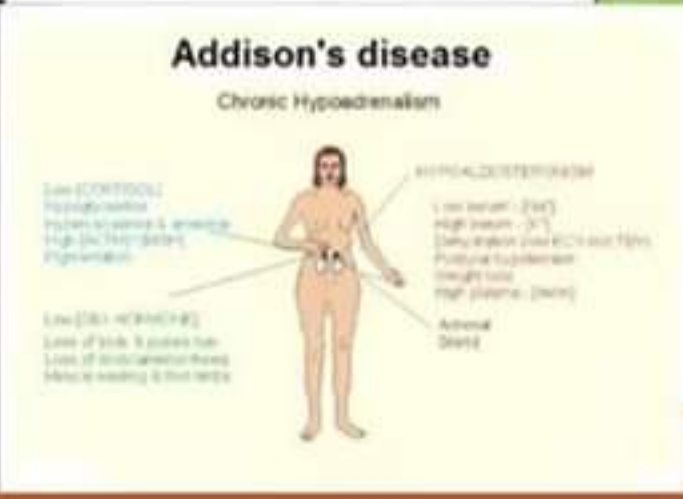




Stages of shock

- **Initial :** The cells become leaky and switch to anaerobic metabolism.
- **Non-progressive:(compensated stage)** Attempt to correct the metabolic upset of shock.
- **Progressive: (decompensated stage)** Eventually the compensation will begin to fail.
- **Refractory :** Organs fail and the shock can no longer be reversed.

RECOGNIZING THE SEVERITY OF SHOCK

EARLY SIGNS (Compensatory Stage)

- Restlessness, anxiety, irritability, apprehension
- Slightly increased heart rate
- Normal or slightly decreased blood pressure
- Pale and cool skin
- Slightly increased respiratory rate
- Slightly decreased body temperature

MAY LEAD TO PROGRESSIVE STAGE

LATE SIGNS (Decompensated Stage)

- Listlessness, apathy, confusion, slowed speech
- Rapid heart rate
- Slowed, irregular, weak, thready pulse
- Decreased blood pressure
- Cold, clammy, pale skin
- Rapid breathing
- Severely decreased body temperature
- Confusion and incoherent, slurred speech, possibly unconsciousness
- Depressed or absent reflexes
- Decreased blood pressure with diastolic pressure reaching zero
- Dilated pupils slow to react
- Slow, shallow, irregular respirations

IF APPROPRIATE EMERGENCY CARE IS NOT GIVEN

IRREVERSIBLE SHOCK AND DEATH

SHOCK
[Management]



Monitoring

- Blood pressure
- Heart rate
- Respiratory rate
- Urine output
- Blood CBC
- Pulse- oximetry
- ECG
- U/S , CT , X-ray

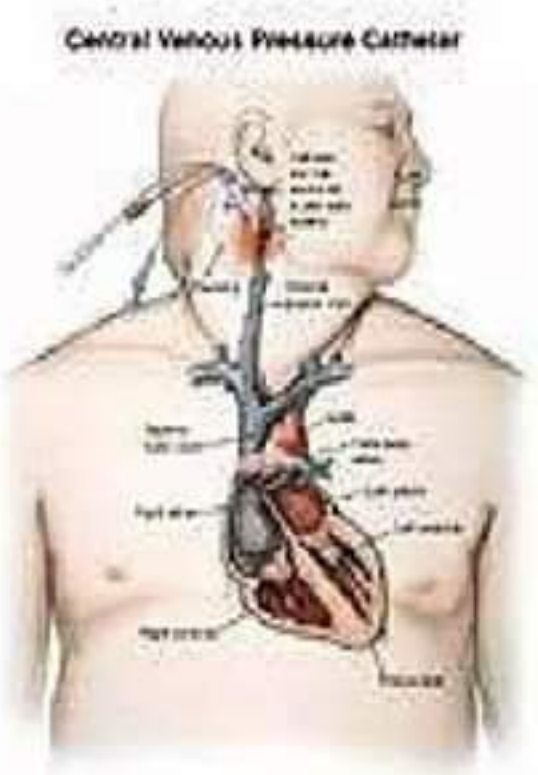
Special Monitoring

- CARDIO – VASCULAR

  - Central venous pressure
    - Normal ; 5-10cmH2O,
    - If CVP<5cmH2O
      - Inadequacy of blood volume
    - CVP>12cmH2O
      - Cardiac dysfunction

  - Cardiac output

    - Pulmonary catheter
    - Doppler ultrasound
    - Pulse waveform analysis



Special Monitoring

- SYSTEMIC & ORGAN PERFUSION
  - Clinical : urine output & LOC
  - Sr. Lactate estimation & Base defecit
  - Blood gas analysis
    - PO2 / PCO2 / ph
  - Mixed venous O2 saturation – N – 50-70%

- Newer methods

- Muscle tissue O2 probes
- Near –infrared spectroscopy
- Sublingual capnometry

Guidelines

- Treat the cause
- Improve Cardiac function
- Improve Tissue perfusion

Goals of Resuscitation

- Overall goal:
- increase O_2 delivery
- decrease demand

Principles of Resuscitation

- A: Airway
  - patent upper airway
- B: Breathing
  - adequate ventilation and oxygenation
- C: Circulation
  - placement of adequate IV access
    - cardiac function
    - oxygenation

Fluid Therapy in Shock

- **Crystalloid Solutions**
  - Normal saline
  - Ringers Lactate solution
  - Hartmann's solution
- **Colloid Solutions**
- **Blood transfusion**

Oxygen Carrying Capacity

- Only RBC contribute to oxygen carrying capacity (hemoglobin)
- Replacement with all other solutions will
  - support volume
  - Improve end organ perfusion
  - Will Not provide additional oxygen carrying capacity

Dynamic Fluid Response

- Infusing 250-500ml of Fluid rapidly in 5 - 10 mts.
  - **Responders** – Improvement
  - **Transient responders** – revert back
  - **Non – responders**

Vasopressors / Inotropic Drugs

- ***Vasopressors – Phenylephrine / NA***
  - Distributive shock states
    - Septic shock / Neurogenic
- ***Inotropics - Dobutamine***
  - Cardiogenic shock / Severe septic shock
    - To increase the cardiac output

Other Treatments

- Correction of Acid – base balance
- Steriods - Hydrocortisone
- Antibiotics
- Catheterisation
- Nasal O2 / Ventilatory support
- CVP Line
- Control of Pain
- ICU – Critical care management

End Points of Resuscitation

Classic / Traditional

- Restoration of blood pressure
- Normalization of heart rate and urine output
- Appropriate mental status

Improved / Global

- All of the above plus
- Normalization of serum lactate levels
- Resolution of base deficit
- Adequate - MVS

Goal directed approach

- Urine output > 0.5 mL/kg/hr
- CVP 5 -10 cm H2o
- MAP 65 to 90 mmHg
- Central venous oxygen concentration > 70%

Practically Speaking....

- Know how to distinguish different types of shock and treat accordingly.
- Look for **early** signs of shock.
- Monitor the patient using the HR, MAP, mental status, urine output.
- SHOCK is not equal to hypotension.
- Start antibiotics within an hour !
  - Do not wait for cultures or blood work.

3. A 19-year-old male is brought to the hospital after sustaining an abdominal injury while playing rugby. He is complaining of left upper abdominal pain and has some bruising over the same area. His pulse is 140/min and his BP is 100/82mmHg. What is the type of shock?

- **A** Septic shock.
- **B** Cardiogenic shock.
- **C** Hypovolaemic shock.
- **D** None of the above.

5.Which of the following is one of the last signs of shock ?

- **A** Profound hypotension.
- **B** Tachycardia.
- **C** Prolonged capillary refill.
- **D** All of the above.