Hypothermia causes
- CVS effects:
  - (i) decreased cardiac output below 32 degrees with reduced MAP
  - (ii) vasoconstriction below 32 degrees with increasing afterload & myocardial work
  - (iii) ECG changes including widening QRS complex and increased PR interval with prolonged QT interval & J waves. Risk of ventricular fibrillation below 28 degrees
  - (iv) increased blood viscosity which increases myocardial work
- Respiratory effects:
  - (i) decreased CO2 production
  - (ii) increased anatomical & physiological dead space
  - (iii) diaphragm fatigue
  - (iv) metabolic acidosis causing pulmonary hypertension
- Metabolic effects:
  - (i) decreased metabolic rate by 8% per degree
  - (ii) shivering increases O2 consumption by up to 800% & resultant increase in muscle flow may accelerate heat loss
  - (iii) hypothermia shifts O2 dissociation curve to the left reducing oxygen delivery
  - (iv) increased stress response
  - (v) hyperglycaemia secondary to increased glycogenolysis & reduced insulin
  - (vi) reduced drug metabolism
- Gastrointestinal effects:
  - (i) decreased hepatic blood flow
  - (ii) decreased liver metabolism
- CNS effects:
  - (i) CNS protection
  - (ii) pupils fixed and dilated below 30 degrees
- Haematological effects:
  - (i) increased bleeding time, increased prothrombin time & APTT
  - (ii) decreased platelet count and white cell count
  - (iii) increased DVT & PE
  - (iv) immunosuppression
- Renal effects:
  - (i) GFR is reduced
  - (ii) decreased renal blood flow
- Hypothermia causes
- Passive
  - Warm environment >30°C (rate 0.5–1.0°C/h)
  - Insulating cover (warm blanket)
- Active, external
  - Conduction methods
    - Warmed pads, blanket
    - Convective methods (rate at 2–3°C/h)
      - Hot air blower (e.g. Bair Hugger)
  - Radiant methods
    - Humidified warm inspired gases (rate 0.5–1.5°C/h)
    - Warmed intravenous fluids
    - Body cavity lavage (rate 2–3°C/h)
    - Gastric irrigation
    - Pleural irrigation
    - Peritoneal dialysis
    - Extracorporeal methods
      - Haemodialysis, continuous arteriovenous or veno-venous re-warming (rate 5°C/h)
      - Cardiopulmonary bypass (rate up to 10°C/h)