# Physiologic Effects of Hypothermia

## Cardiovascular

- Ventricular arrhythmias
  - Hypothermic patients are more susceptible to atrial and ventricular fibrillation
- Myocardial depression
- Bradycardia
  - Hypothermia has a negative chronotropic effect on pacemaker tissue, which may lead to bradycardia or AV block.
- Angina
- Increased SVR
- Decreased cardiac output
- Decreased contractility
- Increased PR, QRS, QT intervals
  - Hypothermia may cause repolarization abnormalities, producing ST segment elevation and T-wave inversions

## Respiratory

- Decreased respiratory rate
- Hypoventilation, suppression of cough, and mucociliary reflexes associated with hypothermia may lead to hypoxemia, atelectasis and pneumonia
- Shift in oxyhemoglobin dissociation curve to the left
  - Less oxygen is released from oxyhemoglobin to the tissues
- Increased secretions

## Metabolic

- Decreased basal metabolic rate
  - Hypothermia inhibits insulin release from pancreas, but glucose levels remain normal in mild hypothermia because shivering increases glucose utilization. Shivering increases metabolic rate, $CO_2$ production, $O_2$ consumption and myocardial work
- Decreased drug biotransformation
- Decreased tissue perfusion

## Gastrointestinal

- Decreased motility
- Decreased liver function
- Pancreatitis
- Decreased insulin release
- Ileus
- Stress ulceration

**Renal**

Decreased renal plasma flow
Increased urine output (cold diuresis)
Increased specific gravity
Decreased ADH
Hypokalemia
Hypocalcemia
Hypophosphatemia
Hyperglycemia

**Hematologic**

Increased blood viscosity (hemoconcentration)
Platelet dysfunction
PMN dysfunction

**Neurologic**

Confusion
Decreased level of consciousness
Depressed reflexes
Decreased muscular tone
Coma

*Adapted from Burns, S. (2001). Revisiting Hypothermia; A Critical Concept. Critical Care Nurse, 21(2), 83-86.