# Increased intracranial pressure (normal: 5-15mmHg)

- monro-kellie hypothesis
  - → if one or more of these components increases significantly w/o a decrease in the other ICP will elevate!
  - → skull is a fixed object - only so much room so other factors have to decrease
    - interventions to keep pressure stable or brain tissue is put under pressure & will lose blood flow & eventually be damaged or die
  - → normally, the body can regulate fluctuations using autoregulatory systems
  - → ICP should be 5-15 mmHg to ensure cerebral perfusion (blood flow to brain tissue)
  - → cerebral perfusion pressure should be 70-100 mmHg
- pathophys:
  - dilation or constriction of cerebral blood vessels in response to changes in blood pressure, blood $O_2$ levels, & blood pH maintains constant & consistent tissue perfusion
- causes:
  - brain tumors
  - swelling/bleeding from head trauma (stroke)
  - infectious & inflammatory disorders (meningitis, encephalitis)
- complications:
  - impaired cellular activity
  - temporary/perm neuro dys
  - death
- assessment:
  - ↓ LOC - earliest sign of ↑ ICP!, ↑ systolic, ↓ pulse, ↓ resp (cushing triad!) ↳ widening pulse pressure
  - early:
    - → drowsiness, change in LOC, restless, confusion, weakness
    - → sluggish pupil response
    - → slurred speech
    - → dull headache - more severe in morning; worse w/ coughing, sneezing, straining (constant headache grave sign)
    - → vomiting w/o warning (no nausea)
  - late: cheyne-stokes
    - → unresponsive; GCS < 12; ↓ response to painful stimuli: posturing (decorticate, decerebrate)
    - → dilated pupils; papilledema (swelling of optic nerve)
    - → seizures; hemiparesis
    - → loss of gag reflex & corneal reflexes
  - cheyne-stokes respirations:
    - → period of fast, shallow breathing followed by slow, heavier breathing & moments of apneas
- diagnostics:
  - skull radiography, CT, MRI
  - lumbar puncture, cerebral angiography
  - monitoring ICP: internal device placed in ventricle (can also obtain CSF samples, subarachnoid screw, scalp electrodes
    - ↳ variance of 2° from previous reading - concern!
- med management: immediate tx goal to ↓ ICP by relieving the cause
  - goals: maintain BP, prevent hypoxia, & ensure cerebral perfusion
  - isotonic normal saline, LR, hypertonic (3%) saline (pull large volumes fluid)
    - → AVOID hypotonic solutions & solutions containing glucose → they ↑ ICP
  - supplemental $O_2$: keep $SaO_2$ at 95% - hyperventilation can result in complications b/c it can exacerbate brain injury from cerebral vasoconstriction & cellular necrosis
  - Mannitol: ↓ ICP
  - maintain head in midline at 30° of elevation: promotes venous drainage of blood & CSF
  - avoid hypothermia - shivering can ↑ ICP → hyperthermia is common as pt is unable to regulate temp d/t neuro damage
  - control seizures; adm diazepam (valium)
  - sedate agitated pts (midazolam): hyperactivity = ↑ ICP
- surgical management: emergency surgery may be indicated - skull flap removal craniectomy

MAP: how effective is perfusion of major organs
→ need to be at least 60 for adequate perfusion of brain