ITE 1 Study Guide — CA-1

*Recurring high-yield ITE themes, one line each. The **[Q#]** tags point to questions in ite1-ca1-practice-exam.pdf / ite1-quiz.html that test that fact. Drill the tag, then quiz.*

Physics & Equipment

Gas laws: Boyle P·V=const; Charles V∝T; Gay-Lussac P∝T; Dalton Σ partial pressures. **[Q8]**
E cylinder O2: 2000 psi ≈ 660 L (psi × 0.33). **[Q1]**
Saturated vapor pressures (20°C): sevo 157, iso 238, halo 243, des 669 mmHg. Splitting ratio = SVP/(PB–SVP). **[Q2]**
Desflurane: boils near room temp → heated (39°C) pressurized vaporizer. **[Q3]**
Circle system: unidirectional valves prevent rebreathing; FGF irrelevant unless valves fail. **[Q4]**
N2O 35× more soluble than N2 → expands air-filled spaces (pneumothorax, bowel, middle ear, intraocular bubble). **[Q7]**
Second-gas effect & concentration effect: now clinically negligible but still tested. **[Q7]**

Capnography & Airway

Sudden flat EtCO2 = disconnection/sampling failure; abrupt fall with hemodynamic change = PE. **[Q5]**
Shark-fin (slurred upslope) = bronchospasm/ETT kink/obstruction. **[Q6]**
ASA fasting: clear liquids 2 h, breast milk 4 h, light meal 6 h, fatty meal 8 h. **[Q9]**
RSI cricoid pressure occludes esophagus (controversial — know intent and debate). **[Q48]**
Can-ventilate-can't-intubate (elective) → awaken or supraglottic airway. Surgical airway = can't ventilate. **[Q49]**

Induction Agents & Opioids

Propofol ↓SVR; ketamine ↑HR/BP, bronchodilation (asthma, but ↑secretions); etomidate hemodynamically neutral, inhibits 11β-hydroxylase, myoclonus. **[Q10, Q11, Q23]**
Dexmedetomidine: α2 sedation + analgesia, minimal respiratory depression, poor amnesia, bradycardia. **[Q24]**
Succinylcholine contraindicated: burns/denervation/immobilization 48 h–months → extrajunctional AChRs → hyperkalemia. **[Q12]**
Sugammadex γ-cyclodextrin encapsulates rocuronium > vecuronium. **[Q13]**
Neostigmine ↑ACh at nicotinic AND muscarinic → bradycardia; give glycopyrrolate. **[Q14]**
Remifentanil: ester hydrolysis, context-sensitive half-time ~3–4 min regardless of infusion. **[Q15]**

Local Anesthetics & LAST

Max doses: lidocaine plain 4.5 mg/kg, +epi 7 mg/kg. **[Q16]**
Onset ∝ unionized fraction: pKa close to 7.4 → faster (lidocaine 7.9). **[Q19]**
Bupivacaine most cardiotoxic (slow Na-channel unbinding); lipid rescue works there. **[Q20]**
LAST prodrome: perioral numbness, tinnitus, agitation, seizure. Rx: 20% lipid 1.5 mL/kg bolus + infusion; avoid high-dose epi, vasopressin; propofol is NOT the antidote. **[Q17, Q18]**

Volatile Anesthetics & MAC

MAC = alveolar conc preventing movement in 50% to surgical stimulus. MAC-awake ≈ 0.3–0.5; MAC-BAR ≈ 1.5–2. **[Q21]**
MAC ↑: hyperthermia, chronic EtOH/opioids, red hair. MAC ↓: hypothermia, acute EtOH, opioids, benzos, pregnancy, age, hypoxia, hypercarbia. **[Q22]**

Respiratory Physiology

Hypoventilation and low FiO2 → normal A-a gradient. Elevated A-a = V/Q mismatch, shunt, diffusion. **[Q25]**
Left shift (↑affinity): alkalosis, hypocapnia, hypothermia, ↓2,3-DPG, fetal Hb, CO. Right shift (↑P50): acidosis, hyperthermia, ↑2,3-DPG, altitude. **[Q26, Q27]**
West zones: Z3 (Ppa>Ppv>PA) greatest flow; Z1 = no flow (PA>Ppa>Ppv) only with high PAWP/PEEP or low pressure. **[Q28]**
Anatomic dead space ≈ 2 mL/kg (~150 mL). **[Q29]**
Closing volume > FRC (elderly, supine) → airway closure during tidal breathing → hypoxemia. **[Q30]**
CaO2 = (1.34 × Hb × SaO2) + (0.003 × PaO2); dissolved O2 is negligible. **[Q34]**

Cardiovascular & Neuraxial

Frank-Starling: ↑preload → ↑SV until plateau. **[Q31]**
Oculocardiac reflex: V1 afferent → vagus efferent; stop stimulus + anticholinergic. **[Q32]**
High neuraxial block (≥T4) → hypotension + bradycardia from blocked T1–T4 cardioaccelerators; unopposed vagal tone. **[Q33]**
Total spinal = apnea + profound hypotension: support ventilation, ephedrine/epinephrine, fluids.

Monitoring

Pulse ox: CO-Hb reads ~100% (needs co-oximetry); Met-Hb locks ~85%. **[Q35, Q36]**
Cuff width ≈ 40% limb circumference; too narrow → falsely high, too wide → falsely low. **[Q37]**
Overdamped A-line (air/clot/kink/tubing) → blunted; underdamped (whip) → overshoot. Fast-flush test. **[Q38]**
CVP: cannon a-waves = junctional/AV dissociation; absent a = AF; giant v = TR/tamponade. **[Q39]**
PCWP ≈ LA pressure (normal 8–12). **[Q40]**

Crisis Management

MH: dantrolene 2.5 mg/kg IV, repeat to resolution (up to 10+); stop triggers, 100% O2, cool if >39°C, treat hyperkalemia (CaCl2, insulin/D50); avoid CCBs; MHAUS 1-800-644-9737. **[Q41, Q42]**
Anaphylaxis: remove trigger, epinephrine first-line (IM 0.3–0.5 mg; anesthetized IV 10–100 mcg titrated), fluids; antihistamines/steroids adjuncts only. **[Q43]**
Peds arrest epinephrine: 0.01 mg/kg (10 mcg/kg) q3–5 min. **[Q47]**

OB, Peds & Preop

MgSO4: anticonvulsant (not antihypertensive); toxicity = lost DTRs → respiratory depression → arrest; antidote calcium gluconate 1 g; potentiates NDMBs. **[Q44]**
>20 weeks: left uterine displacement for aortocaval compression. **[Q45]**
Peds ETT: uncuffed 4 + age/4; cuffed 3.5 + age/4. **[Q46]**
Metformin: OK day of surgery absent renal impairment/contrast; blanket 72-h holds outdated. **[Q50]**