USEFUL FORMULAS AND HELPFUL HINTS

In the following formulas, \( s = \text{serum}, \ u = \text{urine} \)

Body Mass Index (BMI) =
\[
\frac{\text{weight (kg)}}{\text{height}^2 (\text{m}^2)} \quad \text{or} \quad \frac{\text{weight (lbs) \times 703}}{\text{height}^2 (\text{inches}^2)}
\]

Body Surface Area (BSA) =
\[
\text{square root of } \left( \frac{\text{height in cm \times weight in kg}}{3600} \right)
\]
Approximate BSA: infant 0.3, 30 kg child 1, adult 1.73

Corrected calcium =
\[
\text{total calcium} + [0.8 \times (4 - \text{albumin})]
\]

Ionized calcium:
In alkalosis, more calcium bound to protein & ionized Ca decreases (total Ca unchanged)
In acidosis, less calcium bound to protein & ionized Ca increases (total Ca unchanged)

Ca clearance ratio =
\[
\left[ \frac{\text{Ca}_u \times \text{Cr}_s}{\text{Ca}_u \times \text{Cr}_u} \right] \quad \text{(first morning sample or 24-hour collection preferred)}
\]
< 0.01 indicative of Familial hypocalciuric hypercalcemia (FHH)

\( \text{Ca}_u/\text{Cr}_u > 0.2 \) (generally higher and more variable in infants*) predisposition to nephrocalcinosis
95th percentile for different age groups (Sargent JD et al. J Pediatr 1993;123(3):393-7):
- <7 months: 0.86
- 7 – 18 months: 0.6
- 19 months – 6 years: 0.42
- Adults: 0.22

Corrected sodium =
\[
\text{sodium} + \{1.6 \times \left[ (\text{glucose} - 100)/100 \right]\}
\]

Fractional excretion of sodium (FENa) =
\[
100 \times \frac{(\text{Na}_u \times \text{Cr}_s)}{(\text{Na}_u \times \text{Cr}_u)}
\]

Free water deficit (liters) =
\[
(0.6 \times \text{kg}) \times \left[ (\text{Na}_s/\text{Na}_{\text{target}}) - 1 \right]
\]
Use 1/2 to 1/3 this volume in SIADH

Glucocorticoid anti-inflammatory equivalence:
- 1 mg Prednisone = 4 mg Hydrocortisone
- 1 mg Dexamethasone = 27 – 50 mg Hydrocortisone
Glucose infusion rate (GIR) in mg/kg/min = 
\[\left(\% \text{ dextrose solution} \times \text{IV rate in ml} \right) \div \left(\text{weight in kg} \times 6\right)\]

LDL cholesterol =
\[\text{total cholesterol} - \text{HDL} - \left(\text{triglycerides ÷ 5}\right)\]

Mid parental height (MPH) =
- **Boy**
  - Inches: \((\text{Father's Height} + \text{Mother's Height} + 5) \div 2\)
  - Cm: \((\text{Father's Height} + \text{Mother's Height} + 13) \div 2\)
- **Girl**
  - Inches: \((\text{Father's Height} - 5 + \text{Mother's Height}) \div 2\)
  - Cm: \((\text{Father's Height} - 13 + \text{Mother's Height}) \div 2\)

Osmolality = \((2 \times \text{Na}) + (\text{glucose ÷ 18}) + (\text{BUN ÷ 2.8})\)


Transtubular potassium gradient = \(\frac{K_u}{K_p} \div \frac{\text{osm}_u}{\text{osm}_p}\)
- Formula only valid if \(\text{osm}_u > 300\) and \(K_u > 25\)
- <7 in the setting of hyperkalemia indicates mineralocorticoid deficiency

Tubular reabsorption of phosphate (TRP) = \(1 - \left[\frac{(\text{phos}_u \times \text{creat}_u)}{(\text{Phos}_s \times \text{creat}_u)}\right]\)
- <0.85 suggests excess phosphorus wasting/hyperparathyroidism