

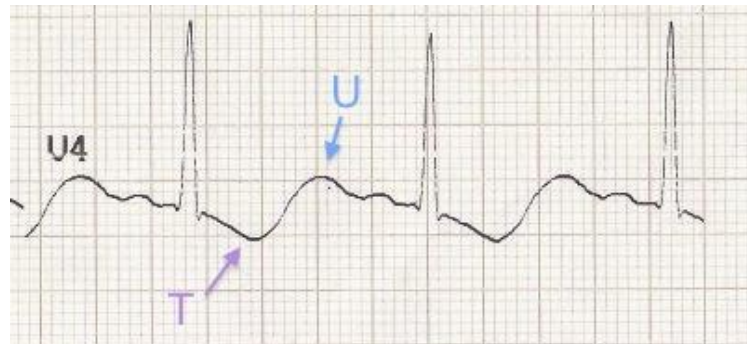
HYPOKALAEMIA

DEFINITION

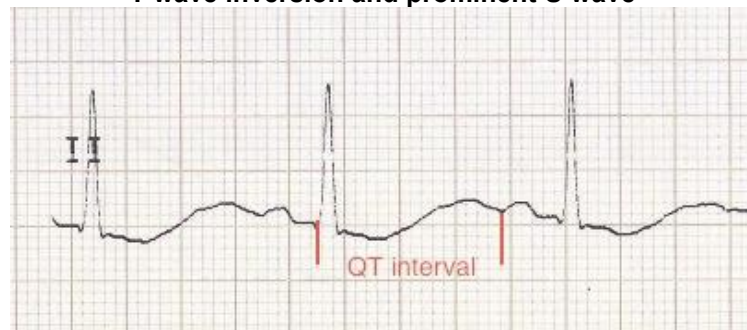
- Plasma potassium level <3.5 mmol/L or below normal level defined by local laboratory
- Symptoms may occur if potassium level <3 mmol/L
- **Note:** low plasma potassium may be a late sign of total body potassium depletion due to mobilisation of intracellular potassium stores

SIGNS

- Muscle weakness and paralysis
- Arrhythmias (premature atrial and ventricular beats, sinus bradycardia, paroxysmal atrial or junctional tachycardia, atrioventricular block, and ventricular tachycardia or fibrillation)
- ECG changes
 - increased amplitude and width of P wave
 - prolongation of PR interval
 - T wave flattening and inversion
 - ST depression
 - prominent U waves (best seen in precordial leads)
 - apparent long QT interval due to fusion of T and U waves



T wave inversion and prominent U wave



Apparently long QT interval (actually T-U fusion)

CAUSES

- Low oral intake/potassium concentration in IV fluids/parenteral nutrition
- Renal loss
 - diuretics
 - bicarbonate administration
 - renal tubular acidosis
 - inherited salt-losing tubulopathies e.g. Bartter Syndrome
- Diarrhoea (**Note:** potassium content of lower GI loss is greater than upper GI loss)
- Alkalosis (approximately 0.4 mmol/L fall in potassium for every 0.1 unit rise in pH)
- Insulin administration
- Refeeding syndrome
- Salbutamol administration (high-dose, nebuliser/IV)

- Liposomal amphotericin (prolonged use)
- Doxapram
- Increased mineralocorticoid activity, due to:
 - hypovolaemia
 - 11- beta-hydroxylase deficiency (rarer form of congenital adrenal hyperplasia – presents with virilization, hypertension, and hypokalemia)
 - primary hyperaldosteronism

INVESTIGATIONS

- Confirm value on venous laboratory sample (**Note:** ‘normal’ value on capillary sample may be falsely reassuring if sample has haemolysed and true value is lower)
- ECG
- Cardiac monitor, if ECG changes present
- Mild hypokalaemia (serum level 3–3.5 mmol/L) does not require investigation.
- if hypokalaemia persists or >2 mmol/kg/day maintenance is required – investigate as for significant hypokalaemia (below)
- If significant hypokalaemia (serum level <3 mmol/L) **and** no obvious cause check:
 - acid/base balance and bicarbonate level on blood gas
 - urinary potassium level. Level >20 mmol/L suggests excess renal potassium losses
 - if baby is hypertensive, measure plasma renin and aldosterone
- If hypokalaemia not responding well to replacement, check magnesium level

IMMEDIATE MANAGEMENT

- Supplement feeds/fluids
- normal maintenance potassium requirement is 2 mmol/kg/day
- higher amounts will be needed to correct hypokalaemia
- Review medications
- if baby is on insulin infusion, consider stopping

Symptomatic babies

- Give rapid potassium supplementation
- ‘Strong potassium’ solution – use with caution/discuss with consultant
 - contains 20 mmol/10 mL
 - must be **diluted at least 50-fold** with sodium chloride 0.9% or a mixture of sodium chloride 0.9% in glucose before administration
 - maximal peripheral concentration 40 mmol/L (1 mmol in 25 mL)
 - maximal central concentration 80 mmol/L (1 mmol in 12.5 mL)
 - rate 0.2 mmol/kg/hr (maximum 0.5 mmol/kg/hr if severe potassium depletion)
- Continuous cardiac monitoring necessary
- Recheck potassium 2–4 hr and assess need for continuing infusion

Asymptomatic babies

- Potassium replacement given according to how baby is being fed:
 - orally fed babies
 - oral supplement e.g. potassium chloride 1 mmol/kg 12-hrly. Titrate dose according to response
 - babies on IV fluids
 - add potassium chloride 3–5 mmol/kg/day to IV fluid, depending on electrolyte levels and titrate according to response
 - babies receiving parenteral nutrition (PN)
 - increase potassium content of the PN to 3–5 mmol/kg/day
 - if modified PN not available, run separate potassium infusion 3–5 mmol/kg/day alongside current PN

SUBSEQUENT MANAGEMENT

- Monitor potassium levels according to clinical need:
- well babies receiving oral potassium check level once to twice weekly

Hypokalaemia 2025–28

- well babies on IV fluids or PN with mild hypokalaemia (potassium 3–3.5 mmol/L) check level daily
- check more frequently if:
 - significant hypokalaemia (serum level <3 mmol/L)
 - symptomatic hypokalaemia
 - concentrations of potassium >5 mmol/kg/day are being given
- Once plasma/serum potassium level is in normal range, continue potassium supplementation to allow replenishment of total body potassium (intracellular) stores:
 - orally fed – continue for a further week
 - IV fluids/PN – reduce potassium to 2 mmol/kg/day as maintenance
 - recheck potassium level following these changes to ensure hypokalaemia does not recur