

# Hypokalaemia

Sept 2014

## Epidemiology

Most common electrolyte abnormality; present in up to 20% inpatients

Defined as  $<3.5\text{mmol/L}$  (mild 3-3.5, mod 2.5-3, severe  $<2.5$ )

## Normal concentrations

Intracellular 150    Ringer's lactate 4    Interstitial 4.5    N saline 0    Plasma 4

## Causes

### 1. Decreased intake

### 2. Redistribution (ie. Intracellular shift)

Alkalosis (each 0.1 increase in pH causes a 0.6 mmol/L decrease in  $\text{K}^+$ )

hypothermia, incr plasma insulin (DKA trt), hypoK/thyrototoxic periodic paralysis

Drugs: Verapamil, chloroquine, barium, Caffeine, theophylline, salbutamol, drug and alcohol withdrawal

### 3. Loss

**GI (renal K  $<20$ ):** D+V+NGT, malabsorption, fistula, villous adenoma; likely if pH  $>7.4$

**Renal (renal K  $>20$ ):** RTA, osmotic diuresis, post-obstructive diuresis

Hyperaldosteronism (eg. Bartter's, Liddle's, CCF, liver failure, RAS, liquorice, Conns, ectopic ACTH)

Thyrotoxicosis; HypoMg; leukaemia

Drugs: diuretics, aminoglycosides, Lithium

**Sweat:** exercise, heat stroke, fever

### 4. Other drugs

Penicillin, L dopa, dopamine, steroids, beta-adrenergics, toluene

NB: acidaemia + low  $\text{K}^+$  = doesn't fit - means profound whole body  $\text{K}^+$  deficit - explained by RTA

## Symptoms

CVS: HTN, orthostatic hypoT, incr digoxin toxicity, arrhythmias, vasoconstriction. Incr risk VF in AMI

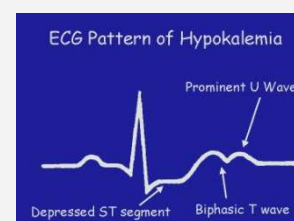
NM: weakness, paralysis ( $<2$ ), hyporeflexia, cramps, rhabdo

GI: ileus, constipation

GU: nephrogenic DI, polyuria, metabolic alkalosis

Endo: glucose intolerance, decr insulin secretion

ECG: long PR, T flattening/inversion, U waves (can mimic prolonged QTc), ST depression, VF/VT, atrial arrhythmias (NOT BRADY)



## HypoK periodic paralysis

K  $<2.9$ ; SE Asia; 2/3 autosomal dominant, others sporadic; M:F 3:1

Precipitated by high carb foods, ETOH, hot humid weather, strenuous exercise, stress, insulin,

Due to Ca channel abnormality

Causes resp paralysis, symmetrical flaccid paralysis (legs  $>$  arms), arrhythmia; lasts 12-48hrs

## Management

Almost invariably assoc with hypoMg, so correct Mg too – give 10mmol in 1<sup>st</sup> hr then 5mmol/hr

Need 100mmol KCl for every 0.3mmol/L it is under norm

K will not normalise until fluid deficit and metabolic alkalosis are corrected; replaced Mg if low



**Give K IV if:** arrhythmia, periodic paralysis, severe myopathy

In cardiac arrest can give 20mmol over 2-3mins and rpt until K  $>4$

Otherwise, no more than 40mmol/L; max 40mmol/hr (0.5mmol/kg/hr)

Monitor if  $>20$ mmol/hr (or  $>0.4$ mmol/kg/hr)

Peripheral vein can tolerate 20mmol/hr but painful; 20mmol will incr K by 0.25

Consider also giving Mg if refractory to treatment