

MAGNESIUM [Mg²⁺]

- 50-70% of Mg²⁺ is fixed in bone. Slowly exchangeable.
- Remaining Mg²⁺ is found in ICF (distribution similar to that of K⁺).
- Normal range ~ 0.7-1.1 mmol/L
- Mostly excreted in stool (~60%), remainder in urine.
- Promotes enzymatic reactions within cells, produces ATP, synthesizes protein, neuromuscular activity & assists in coagulation & platelet aggregation.

HYPOMAGNEAEMIA.

- Wide range of causes.
- In adults, often assoc. w/ alcoholism, malnutrition & those w/ cirrhosis, pancreatitis & excessive GIT losses.

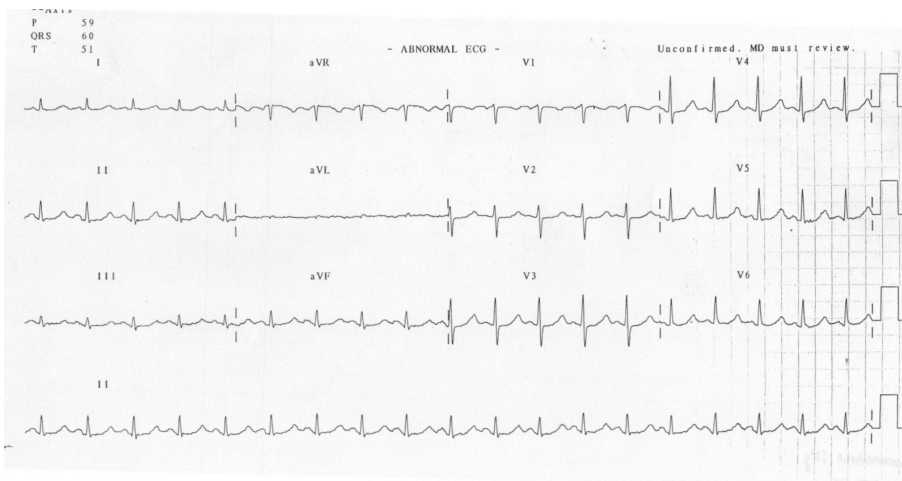
Renal wasting of Mg²⁺ can be seen with loop-diuretic use, hypophosphataemia, ketoacidosis, aminoglycoside use & nephrotoxic chemotherapy agents.

Symptoms & Signs.

- ↑ neuromuscular irritability (hyperreflexia, tremor, tetany)
 - in setting of normal Ca²⁺.
- Confusion, obtundation, coma.
- Paraesthesias.
- Heart failure, dysrhythmias.

Hypomagnesaemia & the ECG.

- Primarily *prolonged QTc*.
- Atrial &/or ventricular ectopy, atrial tachydysrhythmias & torsades.



Management.

- Hypokalaemia, hypocalcaemia & hypophosphataemia can occur concomitantly !
 - Check & replace these.
- Replaced orally or IV.
- May require 40-60mmol MgSO₄ during first 24 hours.

BOX 123-12 CAUSES OF HYPOMAGNEAEMIA

- Alcohol abuse
- Diuretic use
- Renal losses
 - Acute and chronic renal failure
 - Postobstructive diuresis
 - Acute tubular necrosis
 - Chronic glomerulonephritis
 - Chronic pyelonephritis
 - Interstitial nephropathy
 - Renal transplantation
- Gastrointestinal losses
 - Chronic diarrhea
 - Nasogastric suctioning
 - Short-bowel syndrome
 - Protein-calorie malnutrition
 - Bowel fistula
 - Total parenteral nutrition
 - Acute pancreatitis
- Endocrine disorders
 - Diabetes mellitus
 - Hyperaldosteronism
 - Hyperthyroidism
 - Hyperparathyroidism
 - Acute intermittent porphyria
- Pregnancy
- Drugs
 - Aminoglycosides
 - Amphotericin
 - Beta-agonists
 - Cisplatin
 - Cyclosporine
 - Diuretics
 - Foscarnet
 - Pentamidine
 - Theophylline
- Congenital disorders
 - Familial hypomagnesaemia
 - Maternal diabetes
 - Maternal hypothyroidism
 - Maternal hyperparathyroidism

HYPERMAGNESAEMIA.

- Rarely encountered in the ED.
- Most common cause is *renal insufficiency* (or renal failure) on Mg^{2+} replacement.
- Other causes include;
 - Treatment for *eclampsia/pre-eclampsia*.
 - Mag-containing laxatives, antacids, enemas.
 - Tumour lysis syndrome
 - Lithium
 - Volume-depletion

Symptoms & Signs.

- Rarely produces symptoms.
- Caution:
 - Hyporeflexia
 - Respiratory depression (muscle weakness → hypoventilation)

Management.

- Check other electrolytes (esp. Ca^{2+} & K^{+})
- Cease Mg^{2+} administration.
- Maintain urine output.
 - Volume load
 - Consider frusemide.

Calcium directly antagonises the effects of Mg^{2+} . In severe, symptomatic hypermagnesaemia consider 5mL 10% CaCl IV (over 5 minutes).