Lithium Calculations

Lithium is licensed for the acute and long term management of mania in bipolar affective disorder (Sanofi-Aventis, 2014). Lithium has a narrow therapeutic index, and the National Institute for Health and Care Excellence (NICE) recommends regular therapeutic drug monitoring and a plasma concentration between 0.6 – 0.8mmol/L should be aimed for patients initially treated on lithium. For those already on lithium and have relapsed a plasma concentration between 0.8–1.0 mmol/L is recommended. If a patient's lithium plasma concentration is suboptimal they are at risk of relapsing with either a manic or depressive episode. Concentrations above the therapeutic range can result in lithium toxicity.

Each preparation of lithium differs in their pharmacokinetic properties and amount of lithium contained therefore it is important lithium is prescribed by brand name (Joint Formulary Committee, 2014). In addition, when substituting different preparations; it is important to sure the conversion is done correctly.

A patient is diagnosed with bipolar affective disorder and is currently prescribed Priadel® (lithium carbonate) tablets 600mg at night as prophylaxis of manic episodes. They have relapsed and are currently secreting their tablets and you wish to convert them to a liquid preparation. Priadel® tablets contain 5.4mmoles of lithium per 200mg tablet. Priadel® liquid (lithium citrate) has strength of 520mg/5mL and each 5mLs contains approximately 5.4mmoles.

Priadel® 200mg tablets cost £2.30 per 100 tablets per pack, and 400mg tablets cost £3.35 for the same quality per pack. Priadel® liquid costs £5.61 per 150ml bottle.

(a) How much mmoles of lithium does a 600mg Priadel® tablets contain?
(b) How many mg of Priadel® liquid must be given to achieve an equivalent to Priadel® tablets?

(c) How many mLs of Priadel® liquid must be given?

(d) How much does 28 treatment cost for Priadel® tablets (using the least amount of whole tablets)

(e) How much does 28 treatment cost for Priadel® liquid?

Lithium has first order kinetics, and so any changes in doses are proportional to the concentration in the plasma (Cates and Sims, 2005). If the patients lithium plasma concentration is 0.4mmol/L and you want to reach the minimum recommended.

(f) How many mg at night must be given to reach this target?

The patient is now settled and compliant with medication. It is decided to switch the patient back from the liquid preparation to tablets.

(g) How many mg Priadel® tablets should be prescribed at night?

References


Answers

(a) 600mg/200mg = 3, and each 200mg tablet contains 5.4mmoles. Therefore 5.4mmoles x 3 = 16.2mmoles

(b) Since 16.2mmoles are required and each 520mg contains approximately 5.4mmoles, therefore looking back in the previous question; 520mg x 3 = 1560mg

(c) Liquid available in 520mg/5mls
5mLs x 3 = 15mLs

(d)
1 x 400mg and 1 x 200mg = 28 tablets of each strength
Therefore one box of each required
£2.30 + £3.35 = £5.65

(e)
15mLs x 28 = 420mLs
420mLs/150mLs = 2.8 = 3 bottles needed
3 x 5.61 = £16.83

(f) 0.8mmol/L is double the original level and therefore the dose of lithium requires to be doubled. Therefore 1560mg x 2 = 3120mg.

(g) 600mg lithium carbonate is equivalent to 1520mg and (d) asked us to double the dose
Therefore 3120mg lithium citrate = 1200mg lithium carbonate