Magnesium and Potassium Interaction

The following references strongly support the need to correct Mg deficiency in order to correct potassium serum levels. While the type of MgD present in the following are serum Mg, and since normomagnesemia MgD has not been studied, it seems prudent to me that all types of MgD should be maximally treated if KD is present.

References:

Regardless of the cause, the ability to correct potassium deficiency is impaired when magnesium deficiency is present, particularly when the serum magnesium concentration is less than 0.5 mmol/L (1.2 mg/dL) Magnesium repletion improves the coexistent potassium deficit. (Gennari, NEJMEd; 1988, 339:451-458).

“often the hypokalemia cannot be corrected without adequate Mg replacement” (Found under Bartter’s Syndrome in Wallach, J., 6th edition, 1996, p601).


Experimental and clinical observations support the view that uncorrected magnesium (Mg) deficiency impairs repletion of cellular potassium (K). This is consistent with the observed close association between K and Mg depletion. Concomitant Mg deficiency in K-depleted patients ranges from 38% to 42%. Refractory K repletion due to unrecognized concurrent Mg deficiency can be clinically perplexing. Refractory K repletion as a consequence of Mg deficiency may be operative in patients with congestive failure, digitalis toxicity, cisplatin therapy, and in patients receiving potent loop diuretics. Therefore, we recommend that: (1) serum Mg be routinely assessed in any patients in whom serum electrolytes are necessary for clinical management and (2) until serum Mg is routinely performed consideration should be given to treating hypokalemic patients with both Mg as well as K to avoid the problem of refractory K repletion due to coexisting Mg deficiency. [References: 74]

Comment: Whang also says, that in many of those with normal kidneys, the correction of the Mg deficiency will correct the sK level without additional potassium.

Potassium Facts and signs of K deficiency

The daily intake of K in normal patients is 60 to 100 mEq and the amount eliminated is the same, 90% is excreted in the urine and 10% is in the stool.

The normal serum K is 3.5-5.5 mEq/L, and in children (Nelson Ped. on the Bartter's web page) a value of < 2.5 mEq/L usually means Bartter’s.

Extracellular fluid is only 2-3 % of total body K.

Each 1 mEq/L decrease of serum K reflects a total body deficit of <200-400 mEq. A serum K of <2 mEq/L may reflect a total deficit >1000 mEq, (Wallach, J., 7th edition, 2000, p76).

24 hour urine K content is 40-120 mEq/day (Uptodate, 2002). In France the reference standard is said to be 35-80 mmol per day.

Symptoms of potassium deficiency

Any of the following symptoms should be discussed with your doctor, especially when you are asked how do you feel. This is very important when you have a disease where magnesium deficiency is likely or a disease where potassium deficiency is present.

It would be best if you kept a grading (1, best–10) of the extent of these in a daily diary. Future K dosing by your doctor, in part, is very likely to be decided on this type of information.

<table>
<thead>
<tr>
<th>Chronic fatigue</th>
<th>Irregular or rapid heart (palpitations)</th>
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<tr>
<td>Constipation</td>
<td>Muscle weakness</td>
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Depression | Nervousness
---|---
Headaches | Respiratory distress
Insomnia | Swollen feet and/or ankles (edema)

**TREATMENT of a Low serum Potassium**

Most of this section depends on your doctor knowing how you are doing. You should not be self-managing this part of your treatment, unlike oral magnesium dose adjusting (a Mg over dose only causes diarrhea), except for an increase in your use of high potassium containing foods.

High content of K is found in the following foods:

K is highest in the following foods, > 25 mEq per 100 grams (about 3 ounces) are the following: dried figs, molasses and seaweed. Dried dates and prunes, nuts, avocados, bran cereals and wheat germ (both may bind Mg in bowels), lima beans: all of these in this group contain > 12.5 mEq per 100 grams. Many vegetables, fruits (including bananas), and most animal meats contain > 6.2 mEq per 100 grams. (Adapted from Gennari, F.J., NEJM 1998, p. 339)

Several of these can be added to cooking foods if one also consumes the fluid component.

**Physicians methods**

The IV KCl dose is up to 10 mEq/ hour, need a cardiac monitor if go higher, and some use 20-40 mEq/hr. Each 1 gram of KCl contains 9.8 mEq of K.

The tablet of the product of K-DUR® 10 is an immediately dispersing extended release oral dosage form of potassium chloride containing 750 mg of microencapsulated potassium chloride (slowly released), a USP equivalent to 10 mEq of potassium in a tablet (PDR 2002). So some will need many pills, always in multiple dosing like every 4-8 hours.

If need 1,000 mEq, because sK is less than 2 mEq/L, this is an important reason for IV KCl, besides the cardiac danger of being to low.