



TREATMENT GUIDE FOR PHYSICIANS

Calcium Kidney Stones

OVERVIEW

Kidney stones are common, affecting 1 in 11 people in the United States [1]. The most common form of the condition is the calcium oxalate stone. Current treatments include dietary modification, medications, and surgical treatment. Dietary modifications include increasing fluids, increasing dietary calcium, and decreasing oxalate in the diet (e.g. spinach, rhubarb, potatoes, nuts), and avoiding high dose Vitamin C. Medications may be used to reduce calcium in the urine or to reduce uric acid levels.

Studies suggest that the gut microbiome may play a role in calcium stone formation, and may therefore present a novel treatment approach. A low level of *Oxalobacter formigenes* has been identified as a risk factor for calcium oxalate stone formation [2-3]. *O. formigenes* breaks down oxalates in the gut, and if *O. formigenes* levels are low, oxalate levels can accumulate in the kidneys and potentially form calcium oxalate stones. The presence of *O. formigenes* is associated with a 70% reduction in the risk of recurrent kidney stones [4].

INDICATIONS FOR SMARTGUT TESTING

- History of calcium oxalate kidney stone
- Family history of calcium oxalate kidney stones
- History of antibiotic use (within 5 years) to which *O. formigenes* is sensitive including: azithromycin, ciprofloxacin, clarithromycin, clindamycin, doxycycline, gentamicin, levofloxacin, metronidazole, and tetracycline [5]

RELEVANT SMARTGUT RESULTS

- Low levels of *O. formigenes* [2]

CLINICAL TREATMENT SUGGESTIONS BASED ON SMARTGUT RESULTS

MONITOR THE FOLLOWING CLINICAL MARKERS:

- Level of *O. formigenes*
- Consider monitoring urine kidney stone risk panel (Uro-Risk™)

INTERVENTIONS TO CONSIDER:

- **Recommend a low oxalate diet:** A diet low in oxalate is suggested to reduce urinary oxalate formation [6,7]. Foods high in oxalate include: spinach, nuts/nut butters, beets, potatoes, rhubarb. Research suggests that dietary oxalate consumption must be reduced to 80 - 100 mg/day in order to be effective [6].
- **Avoid calcium in supplement form:** Calcium supplementation has been found to increase kidney stone risk. However, normal calcium intake through dietary sources did not, as this can help bind oxalates in the digestive tract [6,7].
- **Recommend a low-fat diet:** A low-fat diet is suggested to help limit the effects of bile acids on oxalate absorption in the colon [6].
- **Prescribe a probiotic with *O. formigenes*:** This is not yet commercially available in the United States and studies do not demonstrate sustained colonization [8-10]. This may be an area for future intervention.
- **Avoid antibiotics to which *O. formigenes* is known to be sensitive [5], including the following :**
 - Azithromycin
 - Ciprofloxacin
 - Clarithromycin
 - Clindamycin
 - Doxycycline
 - Gentamicin
 - Levofloxacin
 - Metronidazole
 - Tetracycline
- **Check a bone density scan:** Low levels of *O. formigenes* in the gut of patients with calcium oxalate stones are associated with decreased bone mineral density [11].

POTENTIAL OUTCOMES

- Reduced rates of calcium oxalate stones
- Reduced risk of future calcium oxalate stones
- Potentially decrease the need for medications and/or surgical intervention for calcium stones

References

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