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VITAMIN C DOES NOT CAUSE KIDNEY STONES

By Steve Hickey, PhD and Hilary Roberts, PhD.

(OMNS) It is strange how some medical authors seem desperate to show that vitamin C causes harm. One recurrent scare story is that vitamin C might cause kidney stones. However, although such warnings pop up regularly, these reports do not demonstrate an increase in the number or size of stones; instead, they rely on vague indicators of improbable risk.

The authors of such uncritical papers have probably not read the literature, for this is an old story. Decades ago, the idea that vitamin C causes kidney stones formed part of the medical attack on Linus Pauling. While it was initially a reasonable hypothesis, unexpected kidney stones are not found in people taking large amounts of vitamin C. (1,2)

There is no evidence that vitamin C causes kidney stones. Indeed, in some cases, high doses may be curative. (3) A recent, large-scale, prospective study followed 85,557 women for 14 years and found no evidence that vitamin C causes kidney stones. (4) There was no difference in the occurrence of stones between people taking less than 250 milligrams per day and those taking 1.5 grams or more. This study was a follow up of an earlier study on 45,251 men. This earlier study indicated that doses of vitamin C above 1.5 grams reduce the risk of kidney stones. (5) The authors of these large studies stated that restriction of higher doses of vitamin C because of the possibility of kidney stones is unwarranted.

People with recurrent stone formation may have an unusual biochemistry, leading to increased production of oxalate from vitamin C. (6) Oxalate and urate can accumulate in kidney stones. In practice, there is an increased excretion of both oxalate and urate with gram level doses of vitamin C (ascorbate). Various authors over the years have used this increase to predict that vitamin C will cause kidney stones; however, these predictions have never been confirmed.

Around three quarters of all kidney stones are composed of calcium oxalate; unlike some other stone types, these can form in acidic urine. Although vitamin C does increase the production of oxalate in the body, there is no evidence that it increases stone formation. It could even have the reverse effect, for several reasons. Firstly, vitamin C tends to bind calcium, which could decrease its availability for formation of calcium oxalate. Secondly, vitamin C has a diuretic action: it increases urine flow, providing

an environment that is less suitable for formation of kidney stones. Finally, stone formation appears to occur around a nucleus of infection. High concentrations of vitamin C are bactericidal and might prevent stone formation by removing the bacteria around which stones form.

Vitamin C could also prevent other types of kidney stones. Less common forms of stone include uric acid stones (8%), that form in gout, and cystine stones (1%), which can occasionally be formed in children with a hereditary condition; these stones are not side effects of vitamin C. Other stones include those made from calcium phosphate (5%), which dissolve in a vitamin C solution. Acid urine, produced by ascorbate, will also dissolve the struvite stones (magnesium ammonium phosphate) that often occur in infected urine.

Recently, Linda Massey and colleagues from Washington State University have claimed that vitamin C increases the risk of kidney stones. (7) Their paper illustrates how the claims of risk have little basis in fact. Massey claims that vitamin C supplementation can increase the amount of oxalate. Vitamin C can increase oxalate absorption and, if degraded in the body, ascorbate can be converted into oxalate. However, while oxalate is a constituent of some types of kidney stone, an increase in its concentration does not mean that more or larger kidney stones will be formed. The formation of kidney stones is influenced by many factors and, as we have seen, vitamin C might be predicted to inhibit several aspects of stone generation. Massey suggests that this increase in oxalate may increase the risk of stones. This is a weak suggestion, which is contradicted by substantial evidence, quoted above.

This evidence suggests that a high vitamin C intake has no effect on the number of kidney stones, or may even be protective.

Massey links oxalate to risk by use of a measure called the Tiselius Risk Index or TRI. (8) However, this measure is applied incorrectly. Indeed, in the presence of high doses of vitamin C, this index should be modified to accommodate the formation of calcium ascorbate in urine. The TRI measure was developed for subjects that had not been supplemented with vitamin C and, on the basis of simple chemistry, requires modification for use with ascorbate supplementation. Since vitamin C might affect many stages of stone formation and growth, application of the TRI measure to supplemented individuals is suspect. The TRI is applied in this case as a predictive measure, for which it has not been validated. Furthermore, the TRI is derived from the concentration of calcium oxalate, making the argument for increased risk rather circular. Even more importantly, Massey uses the TRI to predict an increased theoretical risk, which substantial evidence indicates is absent.

In Massey's study, 29 stoneformers and 19 non-stoneformers were supplemented with one gram of vitamin C, twice each day. After five days on a low-oxalate diet, the subjects were challenged before breakfast with 136 mg oxalate, including 18 mg oxalic acid. They remained on the low oxalate diet for the remainder of the day. Of the 48 people, 12 stoneformers and 7 non-stoneformers had an increased total oxalate excretion of greater than 10% after supplementation.

However, the number or size of kidney stones did not increase.

Also, we can note that seven of the subjects who showed an increased level of oxalate were not stoneformers. The important question of why some people form kidney stones, and others do not, was neatly sidestepped.

Massey's argument boils down to the vague idea that there could possibly be an increase in kidney stone formation in some rare people. This might be the case if vitamin C increased oxalate without affecting any other part of the process; this is known to be false. If this is the sort of evidence presented as acceptable, we can be comfortable with the claim that the areas of the moon not yet visited by man may be made of

green cheese.

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