

## Issue 59

### In a nutshell

Some but not all clinical trials have found that extra calcium lowers blood pressure and in pregnancy reduces the risk of preeclampsia.

However, it seems likely that the calcium-BP story (like the sodium-BP one), involves some genetic element, as well as interaction with other nutrients (e.g. magnesium and potassium).

## Calcium and blood pressure

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## NUTRITION RESEARCH REVIEW

### Study one: Calcium supplements reduce BP

Calcium supplementation reduces diastolic BP in African American adolescents, particularly those with low initial intake, according to the results of a recent American trial.

Subjects: 116 adolescent boys and girls.

Method: Subjects were randomised to receive calcium (1.5 g/d) or placebo for 8 weeks in a double-blind, crossover design.

Results: Supplementation was associated with an overall reduction in diastolic blood pressure (1.9 mm Hg, +/- SE 1.1, one-tailed  $p=0.04$ ). In those subjects with lower initial intake of dietary calcium the reduction was greater - see Table 2.

Ref: *Am J Clin Nutr*, 1998;68:648-55

**Table 1:** Reduction in diastolic BP with supplements in relation to initial dietary calcium intake

Tertile of initial calcium intake	DBP reduction
Lower	-4.9 mm Hg (1.6)
Middle	-2.3 mm Hg (1.6)
Higher	+1.4 mm Hg (1.8)

### Study two: Calcium supplements don't reduce BP

An American study found no benefit on BP from giving calcium supplements to adult women who were consuming low amounts of calcium.

Subjects: 300 female nurses (from the Nurses Health Study II) of average age 39 years whose reported intakes of potassium, calcium, and magnesium were between the 10th and 15th percentiles.

Method: They were given daily supplements of either:

- Potassium (40 mmol)
- Calcium (1200 mg)
- Magnesium (336 mg)
- All three minerals together
- Placebo

Results: There was a significant BP lowering effect for potassium, but not for calcium or magnesium - see Table 2.

Ref: *Hypertension* 1998; 31:131-8

**Table 2:** Mean differences in changes of BP: supplement vs placebo

	Nutrient SBP	Reduction DBP
Potassium (95% CI)	-2.0 (-3.7 to -0.3)	-1.7 (-3.0 to -0.4)
Calcium	-0.6 (-2.2 to 1.0)	-0.7 (-2.0 to 0.6)
Magnesium	-1.3 (-3.0 to 0.4)	-0.9 (-2.2 to 0.4)

### Study three: Calcium and linoleic acid together reduce preeclampsia

A new randomised, placebo controlled trial from Colombia has found that supplements of calcium, when given with the essential fatty acid linoleic acid, significantly reduce the incidence of preeclampsia in pregnant women.

Subjects: 86 primigravidas with risk factors for preeclampsia.

Method: The women were randomised to receive either placebo or linoleic acid (450 mg) together with calcium (600 mg).

Results: There was a 75% reduction in incidence of preeclampsia (9.3% supplemented vs 37.2% controls - relative risk=0.25, 95% confidence interval 0.09-0.69,  $p < .001$ ).

Ref: *Obstet Gynecol* 1998, 91:585-90

### Comments

The relationship between calcium and blood pressure has attracted a great deal of interest, but so far it is hard to draw any definite clinical conclusion.

The original evidence was epidemiological, both in general populations and in pregnant women. This was supported by a good deal of basic science that shows that calcium is involved in BP regulation, and that there are many possible mechanisms for this action. For example, the action of intracellular free calcium on vascular smooth muscle contraction, renal and hormonal effects.

Adding to the complexity of this story are the known interactions of calcium with other dietary elements, such as protein, alcohol, caffeine, phosphorus and magnesium. There is probably also a genetic component, perhaps involving calcitonin.

Most intriguing of all is the interaction with salt. Some experts believe that those people who maintain adequate intakes of calcium, potassium, and magnesium may be protected from the hypertensive effects of higher salt intake.

When it comes to clinical trials on calcium supplementation, a meta-analysis was published in 1996<sup>1</sup> which reviewed 22 such trials involving a total of 1,231 subjects. The authors found that calcium supplementation does produce a statistically-significant decrease in systolic blood pressure (in both hypertensive and general populations), but that the effect is not clinically significant.

The most recent trials discussed above do not resolve our uncertainty about calcium and hypertension. What they do emphasise is that, whatever the calcium-hypertension answer turns out to be, it is likely to include both some element of genetic disposition and a strong dose of interaction with other nutrients (e.g. magnesium and potassium).

The interesting thing is how similar this sounds to the story of salt and hypertension!

References:  
1. *Ann Intern Med* 1996;124:825-31

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