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Do Calcium Supplements Increase Cardio-Vascular Deaths?

by Ann Gerhardt, MD November 2014

Between 2008 and 2013 various research reports implicated calcium supplements as contributors to death and cardiac and other vascular disease. Fearful patients, often upon advice from doctors, stopped their calcium supplements, regardless of the reason they were taking them.

Did the data justify the response? No. None of those studies were statistically valid trials designed to study the impact of calcium supplements on heart disease.

Coming to some kind of logical conclusion about this issue is difficult, given the seemingly conflicting information available. I'll present much of it, which gets confusing, so please hang on and read to the end.

The 2008 study that started the hullabaloo was a re-analysis of data from a bone (not heart) study by Mark Bolland MD. Of the 1471 post-menopausal Australian women studied, more of those assigned to taking calcium supplements suffered a medically-verified heart attack. The excess was not statistically significant and became even less significant after considering the fact that supplement group had more people with a history of vascular disease, high blood pressure, diabetes, obesity and high cholesterol, all risk factors for heart disease.

Apparently Dr. Bolland's curiosity was picqued, so he pooled data from his and 14 other studies that had examined varied doses of calcium supplements' impact on bone, cancer, blood pressure and total mortality in middle-aged people. He concluded that there was a 24-27% increased risk of heart attack in the people who took calcium supplements, but there were problems with the analysis. None of the studies made sure that heart disease risk was equal in the study groups. None of them controlled for dietary calcium intake or vitamin D levels. The preponderance of subjects were women. When men were included, they were not equally assigned to the supplement and placebo groups. More overweight people were assigned to take calcium supplements, skewing that group to a higher risk of vascular disease. A subsequent analysis that added in women from a more recent trial concluded that the excess risk was no longer statistically significant.

Previous data predicted that extra calcium would be good for the heart. A number of studies, including the Iowa women's health study, the Boston nurses' health study and a study of both sexes in the United Kingdom, all reported that the higher the calcium intake, the lower the risk of coronary disease, stroke and cardiovascular death. Calcium supplements increased the healthy HDL/LDL ratio by 20% in healthy post-menopausal women. Dietary calcium tends to lower blood pressure by small amounts and more dietary calcium is inversely associated with vascular disease. Eating at least two dairy foods daily tends to aid weight loss. People in communities served by a calcium rich water supply seem to have fewer cardiovascular events.

Then there are all the studies whose results deviate from Bolland's conclusions. A large Swedish study found the highest death rates both in women who consumed more than 1400 mg of dietary calcium per day, and in those consuming less than 600 mg per day. Supplements seemed to make no difference: The 6% who took them had no extra risk unless they also ate high calcium diets.

Others, using different study designs and population groups, found that 1) there is no relationship of calcium, from diet or supplements, to heart disease,

stroke or death in men or women; or 2) more calcium reduces risk of heart attack; or 3) calcium doesn't matter, vitamin D does.

Two such studies were presented at the American Society for Bone and Mineral Research 2013 annual meeting. In the Osteoporotic Fractures in Men study, 5,967 men over the age of 65 years were followed for 10 years, noting their calcium intake from diet and supplements. Thirty-four percent of the men died, and 34% of those died of cardiovascular causes. Those who consumed the least calcium had the highest death rate, both from cardiovascular events and other causes. The second study pooled results from 19 studies of women over age 50 years. Of the total 59,844 subjects, 7.8% died. The risk of death and cardiac events in those who took calcium supplements was the same as for those who did not.

An ongoing poll of Americans' health and food intake (NHANES III) linked mortality in men to low calcium intake and in women to high calcium intake. There's the proof – men and women *are* different. Most of the studies linking calcium supplements were done in women, but admonitions against calcium supplementation were broadly applied to both sexes, a generalization that was probably premature.

The fact that we often see calcium deposited in diseased coronary artery walls adds credence to the idea that calcium might increase vascular disease risk. In fact, detecting calcium in cardiac arteries using a special type of CT scanner predicts an increased risk of having or dying from heart disease. The more calcium detected by the scanner, expressed as coronary artery calcium score (CAC), the higher the risk. People with higher CAC scores have more cardiac risk factors, like high blood pressure, smoking, advanced age and diabetes. Do their heart attacks result from the risk factors, calcified arteries, or both?

Calcium deposition is actually one of the body's "fix-it" mechanisms after injury. The most obvious examples are the calcium deposits in healing fractures, injured joints and torn tendons that cause the gnarled and knobby hands and knees of old people. The calcium comes from the bloodstream. If dietary calcium is inadequate, we leach it out of our bones.

Typically we don't think of coronary arteries as breaking or being injured, at least until they clog, causing a heart attack, stroke or other organ failure. But something had to start the clogging, and usually that some-thing is injury at a molecular or cellular level.

Inflammation, high blood sugar, oxidation of fat and cholesterol, and/or jet-like flow from high blood pressure all cause micro-damage to the arterial wall. The artery responds to this damage by fortifying the walls with clot, thickened walls and sometimes, but not always, calcium deposits. (One of the conundrums is why some people with coronary disease have high CAC scores and some don't.)

Arterial calcium deposition is also an age-related phenomenon. Anyone who lives long enough will develop vascular disease and lay down at least some calcium in their arteries' walls. Any coronary calcium is a bad omen in people under age 40, but after age 60 it takes a high score to signal increased risk of vascular disease.

To recap: Calcium in arteries is not good. Calcium from food seems to be good. Calcium from supplements may be bad, or may not be. One has to wonder, if supplement calcium really worsens vascular disease, how it is different from dietary calcium. Food calcium is consumed in relatively small "doses" over the course of the day, and comes from a variety of organic and inorganic forms, while calcium supplements are usually big doses of calcium carbonate. Such large doses can interfere with absorption of other nutrients and medicines. Could that be the problem?

Maybe it's not the calcium, but something else in the pills. Calcium supplements made from unpurified dolomite and bone meal contain varying amounts of lead, arsenic, mercury, aluminum, iron, antimony, nickel, tin, fluoride and cadmium. Lead is bad for blood pressure and may be bad for hearts. Only in the last 15 years have supplement manufacturers succeeded in reducing their lead and heavy metal content. Perhaps lead or other

impurities have caused the adverse effects, rather than calcium.

The issue becomes even more complex when factors affecting bone metabolism are added to the equation. It turns out that blood vessel calcification is affected by many of the same things that are involved in bone growth. Elevations of certain proteins that regulate bone calcification are directly linked to excess vascular calcium and heart disease. Could these be affected by calcium supplements?

Vitamin D is one of those bone-related factors that affect heart and vascular disease. We've known for some time that adequate vitamin D levels reduce the risk of heart disease through a variety of mechanisms. It retards calcium release from bone, lowers bone proteins and hormones that promote calcification, suppresses inflammation and strengthens a healthy immune system (see DrG'sMediSense, Volume 5-1, 2010).

Bolland's meta-analysis specifically omitted studies in which vitamin D was given along with calcium supplements. There was no effort to verify that subjects were equal with respect to vitamin D status. Study results might have been very different if they had made sure that subjects all had optimal vitamin D nutriture.

Conclusion: We can't tell if or which calcium supplements in which doses might be unhealthy for which people. Try to get your calcium from food. If you need to take supplements, use a synthetic form in small doses spread throughout the day to mimic meals. Make sure you have optimal vitamin D levels. Reduce blood pressure, blood sugar, serum cholesterol, smoking and overweight, which all contribute to arterial injury that begets calcification. Then get on with life and enjoy!

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