

**Title:** The National Osteoporosis Foundation and American Society for Preventive Cardiology's Position Statement on Calcium Supplementation and Cardiovascular Disease

**Short running title:** NOF and ASPC Position on Calcium and CVD

**Authors:** Stephen L. Kopecky, MD<sup>1</sup>; Douglas C. Bauer, MD<sup>2</sup>; Martha Gulati, MD<sup>3</sup>; Jeri W. Nieves, PhD<sup>4</sup>; Andrea J. Singer, MD<sup>5</sup>; Peter P. Toth, MD, PhD<sup>6</sup>; James A. Underberg, MD<sup>7</sup>; Taylor C. Wallace, PhD<sup>8,9</sup>; Connie M. Weaver, PhD<sup>10</sup>

**Author affiliations:** <sup>1</sup>Department of Cardiology, Mayo Clinic; <sup>2</sup> Departments of Medicine and Epidemiology & Biostatistics, University of California, San Francisco, San Francisco, CA; <sup>3</sup>Department of Cardiology, University of Arizona-Phoenix; <sup>4</sup>Mailman School of Public Health, Columbia University; <sup>5</sup>Department of Obstetrics and Gynecology, MedStar Georgetown University Hospital; <sup>6</sup>Department of Family and Community Medicine, University of Illinois School of Medicine; <sup>7</sup>Department of Medicine, New York University; <sup>8</sup>National Osteoporosis Foundation; <sup>9</sup>Department of Nutrition and Food Studies, George Mason University; <sup>10</sup>Department of Nutritional Sciences, Women's Global Health Institute, Purdue University

**Corresponding author:** Taylor C. Wallace, PhD, National Osteoporosis Foundation, 251 18<sup>th</sup> Street South, Ste 630, Arlington, VA 22202; Email: [taylor.wallace@me.com](mailto:taylor.wallace@me.com); Phone: 270-839-1776.

**Author to receive reprint requests:** Taylor C. Wallace, PhD, National Osteoporosis Foundation, 251 18<sup>th</sup> Street South, Ste 630, Arlington, VA 22202; Email: [taylor.wallace@me.com](mailto:taylor.wallace@me.com); Phone: 270-839-1776.

**Word count:** XXXX

**Abstract:**

Description: Calcium is the dominant mineral present in the bone and a shortfall nutrient in the American diet. Individuals who do not consume adequate calcium from the diet have been recommended supplements as a standard strategy for the prevention of osteoporosis and related fractures. Since publication of the 2009 Evidence Report provided by the Agency for Healthcare Research and Quality (AHRQ) Evidence-based Practice Center at Tufts University, concern has arisen as to whether calcium intake is beneficial or detrimental to vascular health.

Methods: The National Osteoporosis Foundation and American Society for Preventive Cardiology convened an Expert Panel to evaluate the effect of calcium from food and supplements based on the existing peer-reviewed scientific literature. The Expert Panel considered the findings of the accompanying updated Evidence Report provided by an independent Evidence Review Team at Tufts University, as well as animal and mechanistic data provided in the peer-reviewed literature.

Recommendation: NOF and ASPC adopt the position that at this time there is D-level or “insufficient” evidence to suggest dietary calcium intakes from food or supplements have any influence (beneficial or detrimental impact) on the risk of hypertension, cardiovascular disease (CVD), and CVD-specific or all-cause mortality. Dietary intakes from food and supplements that do not result in an individual exceeding the tolerable upper intake level (UL), as defined by the National Academy of Medicine, should be considered safe.

### **Rationale:**

Calcium is the dominant mineral present in the bone and a shortfall nutrient in the American diet (1). Individuals who do not consume adequate calcium from the diet have been recommended supplements as a standard strategy for the prevention of osteoporosis and related fractures. The U.S. Agency for Healthcare Research and Quality (AHRQ) Evidence-based Practice Center at Tufts University published an Evidence Report reviewing the existing data on both vitamin D and calcium on health outcomes, including cardiovascular disease in 2009 (2). Since this time a small number of reports have suggested calcium intake, particularly from supplementation, to have both beneficial and detrimental affects on several cardiovascular outcomes and endpoints. The National Osteoporosis Foundation (NOF) contracted independent Evidence Review Team at Tufts University to update the 2009 AHRQ Evidence Report in regards to cardiovascular disease outcomes and endpoints. The updated Evidence Report informed the Expert Panel assembled by the NOF and American Society for Preventive Cardiology (ASPC). The Expert Panel was ultimately responsible for authoring the position of the two organizations.

### **Position Statement Focus:**

The focus of this position statement is to provide clinicians and health professionals with an evidence-based recommendation around the health risks and benefits of dietary calcium intakes from food or supplements on hypertension, blood pressure, cardiovascular disease (CVD), and CVD-specific or all-cause mortality.

### **Development Process:**

NOF, ASPC and all individuals (including staff) involved in the development of either the Evidence Report or Position Statement have signed conflict of interest disclosures and adhered

to all methods and processes for developing Position Statements as previously published by the NOF (3). The Evidence Report and Position Statement have been subject to a 14-day public comment period.

**Evidence Review and Grading:**

The Evidence Review Team at Tufts University presented the Evidence Report to Expert Panel members, who were able to ask questions specific to the Evidence Report, but not influence the final study design or outcomes. Additional animal and mechanistic data, as well as comments submitted by the general public were considered in the development of the final Position Statement. NOF and ASPC utilized the evidence grading criteria utilized by NOF for position statements, as previously published (3).

**Recommendations:**

It is the current position of the National Osteoporosis Foundation and American Society for Preventive Cardiology that there is D-level or “inadequate” evidence to suggest dietary calcium intakes from food or supplements have any influence on the risk of hypertension, , cardiovascular disease (CVD), and CVD-specific or all-cause mortality. Dietary intakes from food and supplements that do not result in an individual exceeding the tolerable upper intake level (UL), as defined by the National Academy of Medicine, should be considered safe.

Discontinuation of supplemental calcium is not necessary and may be detrimental to bone if intake from food is suboptimal. This position statement is based on the peer-reviewed scientific literature as of May 1, 2016 and supports the findings of the accompanying Evidence Report provided by independently contracted researchers at Tufts University. Aside from the Evidence Report provided by Tufts University (2), the Expert Panel also considered a recent

animal/mechanistic study, which found no detectable effect of high calcium diets (from dairy or calcium carbonate) on coronary artery deposition in swine with diet-induced metabolic syndrome (4). This official position statement has been adopted by the Boards of Directors of both societies as of XX XX, 2016.

#### **Acknowledgements:**

All authors contributed equally to the development of this position statement. TCW lead the drafting of the manuscript.

#### **References:**

1. U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015-2020 Dietary Guidelines for Americans. 8<sup>th</sup> Edition. December 2015. Available at: <http://health.gov/dietaryguidelines/2015/guidelines/>.
2. Chung M, Balk EM, Brendel M, Ip S, Lau J, Lee J, et al. Vitamin D and Calcium: Systematic Review of Health Outcomes. Evidence Report/Technology Assessment No. 183. (Prepared by Tufts Evidence-based Practice Center under Contract No. 290-2007-10055-I). AHRQ Publication No. 09-E015, Rockville, MD: Agency for Healthcare Research and Quality. August 2009.
3. Wallace TC, Bauer DC, Gagel RF, Greenspan SL, Lappe JM, LeBoff MS, et al. The National Osteoporosis Foundation's Methods and Processes for Developing Position Statements. Osteoporos Int. 2016 (accepted; in press).
4. **Phillips-Eakley AK, McKenney-Drake ML, Bahls M, Newcomer SC, Radcliffe JS, Wastney ME, Van Alstine WG, Jackson G, Alloosh M, Martin BR, Sturek M, Weaver CM. Effect of**

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high-calcium diet on coronary artery disease in Ossabaw miniature swine with metabolic syndrome. *J Am Heart Assoc.* 2015;4: e001620.

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