

# SCIENCE SUMMARY: Blood Pressure

Total dairy food consumption is linked to lower risk for high blood pressure



## Overview

Dairy foods such as milk, cheese and yogurt are foundational foods in healthy eating patterns. The dairy group contributes important shortfall nutrients, including calcium, vitamin D and potassium to the U.S. diet. Low-fat and fat-free dairy foods are part of the Dietary Guidelines for Americans (DGA) and American Heart Association (AHA) dietary recommendations. A growing body of research indicates that dairy food consumption is associated with multiple health benefits, and a 2016 review concluded that total dairy food consumption is linked to lower risk for high blood pressure. This research provides further support for consuming low-fat or fat-free dairy foods as recommended in the 2015 DGA.

## Healthy eating patterns can help lower high blood pressure and decrease public health costs

High blood pressure is a major risk factor for cardiovascular disease (CVD).<sup>1</sup> Nearly one-third (32.6%) of American adults have high blood pressure, and total health care costs and lost productivity associated with high blood pressure in 2011–2012 (annual average) totaled \$48.6 billion.<sup>1</sup> Lifestyle guidelines for prevention emphasize weight control, physical activity, smoking avoidance, limited alcohol consumption and healthy eating patterns.<sup>1,2</sup> The Dietary Approaches to Stop Hypertension (DASH) diet, a reduced-fat diet containing up to 3 servings of low-fat dairy foods and 8-10 servings of fruits and vegetables, has been demonstrated to lower elevated blood pressure and is recommended by the AHA to lower blood pressure.<sup>2,3,4</sup> AHA's 2016 recommended eating patterns also include low-fat or fat-free dairy foods as part of a healthy eating pattern to lower blood pressure and CVD.<sup>5</sup> The DGA recommends 3 daily servings of low-fat or fat-free dairy foods for those 9 years and older, 2½ servings for children 4-8 years, and 2 for children 2-3 years in the Healthy U.S.-Style Eating Pattern.<sup>6</sup> The 2015 DGA states that healthy eating patterns are associated with lower risk for several chronic diseases, including CVD (strong evidence).<sup>6</sup>

*Drouin-Chartier, et al., concluded that high-quality evidence indicates dairy food consumption is linked to lower risk for high blood pressure.<sup>7</sup>*

## Research continues to explore links between dairy food consumption and blood pressure

The 2015 DGA recommendation to include dairy foods in healthy eating patterns builds on conclusions that emerged in the 2010 DGA, including that dairy food consumption is associated with lower blood pressure in adults.<sup>8</sup> The 2010 DGA conclusions were based on studies published through 2009, and evidence on the association between dairy food consumption and blood pressure has continued to grow.<sup>i</sup> In 2016, Drouin-Chartier, et al., published a comprehensive systematic review of prospective research on dairy and chronic diseases, including high blood pressure, and rated the quality of evidence.<sup>7,ii</sup> This Science Summary

<sup>i</sup> Research published between 2009 and 2016 (7, 9-12, 14-30) has explored the association between dairy food consumption and blood pressure in two meta-analyses (9, 10) that examined 8 total prospective cohort studies plus 8 prospective cohort studies not included in those meta-analyses (11, 12, 26-31). In addition, 12 clinical trials on the effects of dairy food consumption and blood pressure have been published (14-25).

<sup>ii</sup> Drouin-Chartier et al. reviewed two meta-analyses on blood pressure published (9, 10) and seven of the prospective studies mentioned above (26-31).

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highlights the findings from the Drouin-Chartier review<sup>7</sup> and 12 clinical trials. Current evidence indicates dairy food consumption is associated with lower risk for high blood pressure.

## Total dairy food consumption is linked to lower risk for high blood pressure

The Drouin-Chartier review concluded that moderate- to high-quality evidence indicates the consumption of total dairy, low-fat dairy and milk is associated with a lower risk for hypertension.<sup>7</sup> These conclusions were based on two meta-analyses of prospective cohort studies (PCS). One of these meta-analyses found higher total dairy, low-fat dairy and fluid dairy foods (i.e., milk and yogurt) consumption is associated with lower risk for high blood pressure.<sup>9</sup> The other meta-analysis examined the dose-response relationship between dairy food consumption and blood pressure.<sup>10</sup> It found that total dairy food consumption is associated with a 3% lower risk for high blood pressure for every 200 grams of dairy per day (245 grams milk = one 8-ounce cup).<sup>10</sup> Among different types of dairy foods, the Drouin-Chartier review concluded that moderate-quality evidence indicates low-fat dairy foods and milk (including all fat levels) are also associated with lower blood pressure.<sup>7</sup>

Higher dairy food consumption also has been associated with lower blood pressure in children and adolescents. In Australian children and adolescents, higher dairy food consumption, when comparing highest to lowest quintiles of consumption, was associated with lower blood pressure.<sup>11</sup> Dairy food consumption, when consumed as part of a DASH-type eating pattern, was also associated with lower blood pressure in American children and adolescents.<sup>12</sup>

*The nutrients contributed to the diet by milk, cheese and yogurt, including calcium, potassium and protein, may contribute to beneficial links between dairy foods and blood pressure.<sup>13</sup>*

## Clinical trials find eating low-fat dairy foods helps maintain/lower elevated blood pressure

Clinical trials comparing higher levels of dairy foods (i.e., approximately 3 or more servings per day) to lower levels provide evidence about the amount of dairy foods needed to see an effect on blood pressure or vascular function. Two clinical trials of overweight or obese individuals with metabolic syndrome found that dietary interventions with consumption of up to 3 dairy servings per day can reduce elevated blood pressure<sup>14</sup> or improve markers of vascular function.<sup>15</sup> An acute study of 19 obese adults with metabolic syndrome found that, when compared to rice milk, low-fat milk is a more effective option for maintaining markers of normal vascular function after a meal.<sup>16</sup>

Results from clinical trials in pre-hypertensive or hypertensive, overweight or obese individuals also indicate that consuming at least 3 dairy servings per day lowers or does not change blood pressure.<sup>17,18,19,20</sup> Of note is a randomized trial of 49 adults with hypertension that found the addition of 4 or more servings per day of fat-free dairy foods for 4 weeks reduces systolic blood pressure and improves vascular function when compared to a similar diet without dairy foods.<sup>19</sup> This is the first study to show an effect from changes in dairy food consumption alone; it may help explain the role of low-fat dairy foods in DASH. In another study of 36 adults, when standard DASH was compared with a higher-fat DASH diet including whole milk dairy foods, both the higher-fat and standard DASH diets lowered blood pressure.<sup>21</sup> Studies in overweight and obese adults and those with normal blood pressure found that regular consumption of low-fat dairy foods does not raise blood pressure.<sup>22,23,24,25</sup>

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