

A LOT TO LOVE:

Frozen Raspberries and their Role in
Cardiovascular Function



Research now points to multiple ways that raspberries may contribute to helping maintain normal cardiovascular function:

Antioxidant Defenses

Oxidative stress develops when reactive oxygen species (ROS) build up beyond the body's ability to manage them. This can promote chronic low-grade inflammation, damage cell structures and increase oxidation of LDLs (low-density lipoproteins). Oxidized LDLs seem particularly involved in foam cell and plaque formation leading to atherosclerosis.

- Vitamin C is a vital antioxidant, and raspberries are rockstar sources, supplying 60% of Daily Value in one cup.
- According to a comprehensive review of the available scientific literature published in the January 2016 issue of *Advances in Nutrition*¹, evidence suggests that the action of vitamin C (an antioxidant), fiber, and phytochemicals in red raspberries may be the key to their health promoting properties, including anti-inflammatory, anti-oxidative and metabolic stabilizing activity. These properties shed light on the potential role of red raspberries in helping to reduce the risk of metabolically-based chronic diseases, including cardiovascular disease, diabetes mellitus, obesity, and Alzheimer's disease: all of which share critical metabolic, oxidative, inflammatory links. However, more research is needed, especially through human clinical trials.

Endothelial Health

A key factor in cardiovascular health lies in the endothelium, the inner lining of blood vessel walls. Endothelial dysfunction prevents blood vessels from dilating properly, which can lead to high blood pressure and may be the first stage of atherosclerosis. Nitric oxide produced in the endothelium is a vasodilator with antihypertensive and antithrombotic properties.²

- Emerging data from in vitro, animal and limited human studies suggest that polyphenol compounds found in raspberries may support endothelial function by increasing nitric oxide production and reducing its degradation.²⁻⁴

Insulin Function & Metabolic Health

Insulin resistance, leading to elevated insulin levels and ultimately to unhealthy elevations in blood sugar, raises risk of both type 2 diabetes and cardiovascular disease. Resulting changes in gene expression and signaling pathways promote increased serum triglycerides and associated atherogenic dyslipidemia.

- Collectively, research suggests that anthocyanins and ellagitannins found in raspberries may promote insulin sensitivity.^{1,5} For now, much of this data comes from pre-clinical rather than human studies; future research, especially involving people with or at risk of insulin resistance, will be vital.
- Raspberries are among fruits lowest in natural sugar content, and raspberry compounds that inhibit enzymes necessary for carbohydrate digestion may further contribute to helping to mitigate post-prandial blood glucose elevations.¹

Anti-Inflammatory Protection

Chronic low-grade inflammation seems to play a central role in multiple stages of cardiovascular disease. Reducing oxidative stress, maintaining endothelial function, promoting healthful levels of insulin and signaling proteins, and controlling calorie intake to avoid excess body fat can all contribute anti-inflammatory effects.

- Observational population studies link higher intake of anthocyanins, polyphenols that lend raspberries their red color, with lower levels of C-reactive protein (CRP, a marker of inflammation). A small number of cell and animal studies show multiple potential reasons for anti-inflammatory protection, with further research needed to clarify what can be expected in people.⁵

FROZEN RASPBERRIES & HEALTHY WEIGHT

For people with excess body fat, especially around the waist, even a 3 to 5% weight loss is clinically meaningful, and can reduce blood pressure, triglycerides, LDL and inflammation.^{6,7} Increasing fruits and vegetables as replacements for foods more concentrated in calories is a primary step to lower overall calorie density, allowing decreased calorie consumption while enhancing satiation.⁸

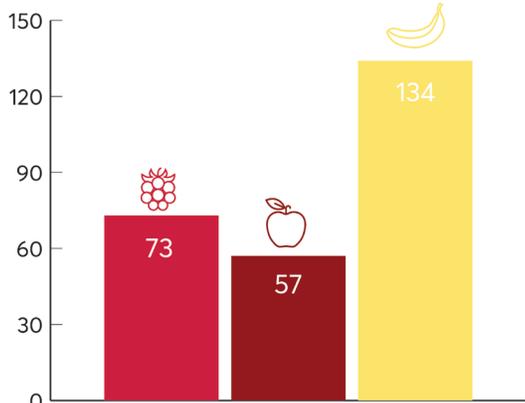
Frozen unsweetened raspberries have just 80 calories and nine grams fiber per cup – concentrated in nutrients and fiber, not calories.

Using unsweetened frozen raspberries makes it simple to enjoy raspberry-flavored yogurt, drinks and other favorites without a high calorie and sugar load....deprivation avoided!

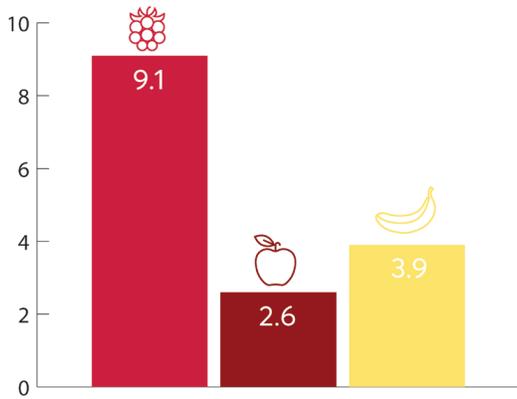
RASPBERRIES: RAISING THE BAR ON FRUIT CONSUMPTION

Eating patterns recommended to promote overall health and reduce risk of heart disease call for increased consumption of fruit, especially whole fruit, compared to current average intake.⁹ Yet latest USDA data shows that just two fruit choices (apples and bananas) account for more than a third of U.S. fruit consumption.¹⁰ Given the importance of boosting fiber consumption and the multi-dimensional potential raspberries offer through vitamin C, and other nutrients, encourage people to expand both the amount and the variety of fruit they eat.

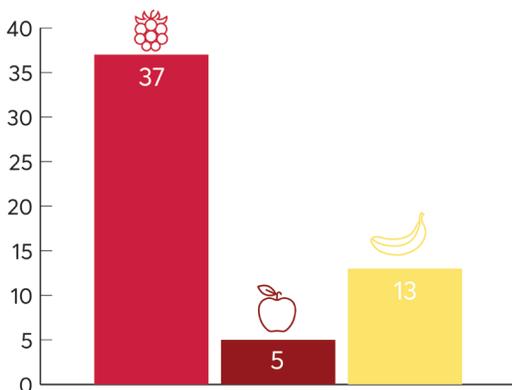
FROZEN RED RASPBERRIES COMPARED TO TOP-CONSUMED FRUIT CHOICES IN U.S.



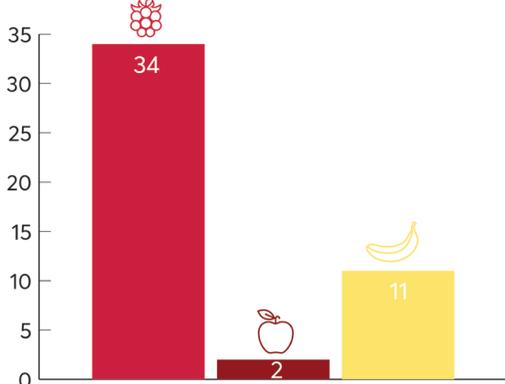
CALORIES ONE CUP SERVING



DIETARY FIBER (g) ONE CUP SERVING



VITAMIN C (mg) ONE CUP SERVING



ANTHOCYANIDINS (mg) ONE CUP SERVING

TOP 10 TIPS FOR INCORPORATING FROZEN RED RASPBERRIES IN YOUR DIET

- **Make high-fiber breakfasts even better** by adding frozen red raspberries to quick-cooking (one-minute) oatmeal. Enjoy oatmeal's great LDL-lowering fiber without the sugar and sodium load of most flavored instant versions. Raspberries may more than double the fiber while adding nutrients, color and flavor.
- **Think Swiss with easy homemade muesli** for a change of pace. Mix uncooked oats (quick or old-fashioned) with plain lowfat or nonfat yogurt, frozen red raspberries, perhaps a handful of almonds or walnuts and a drizzle of honey. Let it sit overnight in the refrigerator, and in the morning, your refreshing, healthful breakfast awaits.
- **Make raspberry yogurt the healthy, low-cost way** by stirring frozen raspberries into plain yogurt. Adding one cup of frozen raspberries will add nine grams of fiber and possibly much less sugar. (Even if you end up adding a drizzle of honey, there'll be less sugar than you get in commercial sweetened yogurts.) Just let the berries stand a few minutes at room temperature and stir them in.
- **Glam up a salad with raspberry vinaigrette.** Combine some thawed frozen raspberries in a jar with oil, white balsamic or other light vinegar, some water and herbs of your choice. It's delicious and may contain far less sodium than most bottled dressings. For even more nutrition wow, add some raspberries to the salad.
- **Add some razzmatazz to fish and chicken.** Raspberries blend with citrus, ginger or herb-oriented ingredients for an easy topping to make entrées special.
- **Perk up whole grains with raspberries.** Adding raspberries boosts color and flavor in side dishes from brown rice or couscous to farro or quinoa. Thaw frozen raspberries while the grain cooks and then stir in. Add raspberries to cold grain salads, too.
- **Make berry pancakes or waffles with a raspberry-focused topping** made by simply heating frozen raspberries gently with a little maple syrup. Or top them with a dollop of vanilla yogurt for more protein, and then layer on some raspberries.
- **Fuel up with a raspberry smoothie.** Whirl raspberries alone or with other fruits into a smoothie combined with milk, soymilk or plain yogurt for a delicious way to enjoy that DASH diet dairy. Including a banana ups the potassium and provides thicker texture.
- **Raspberry salsa!** Stir frozen raspberries thawed for about an hour with chopped onion, cilantro, jalapeño pepper and lime juice; season with some crushed or minced garlic, cumin, and black pepper. Add just enough sugar and salt to taste. By controlling your own salt, you can make this fresh-spicy-sweet-tart salsa lower in sodium than most bottled salsas.
- **Let raspberries make water more exciting.** Adding some frozen raspberries to a glass of sparkling water can potentially make it easier to reach a goal of less sweetened drinks and more water. Amp up unsweetened ice tea by adding some muddled raspberries. If you have an infusion pitcher that flavors plain tap water, frozen raspberries are a delicious and beautiful choice for the inner tube.

Frozen Red Raspberries: Making Healthy Variety Affordable Year-Round

- Keep a bag or two in the freezer to pour out just what you need, when you need it. No waste.
- No worries about spoilage or needing to use quickly as with delicate fresh raspberries.
- Frozen raspberries deliver berry nutrition at lower cost when fresh berries are out of season.

ABOUT THE NATIONAL PROCESSED RASPBERRY COUNCIL

Created in 2013, the National Processed Raspberry Council (NPRC) represents the processed raspberry industry and is supported by assessments from both domestic and imported sources. The NPRC is responsible for marketing processed raspberries in the U.S. and is committed to promoting the growth of the entire industry. Processed raspberries are frozen at the peak of ripeness to lock in flavor and nutrition. NPRC's mission is to invest in research on the health and wellness benefits of raspberry consumption and communicate the advantages of raspberries to consumers, food manufacturers and foodservice decision makers in order to build demand and secure the long-term viability of the industry.

Visit www.redrazz.org for raspberry recipes covering sweet to savory, to soups and smoothies!

SOURCES

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