

THE NUTRITION STORY  
— *of this* —  
HOMEGROWN SUPERFRUIT





# Cherry pie is a classic American favorite, but there's so much more to know about those tart cherries nestled inside the crust.



Thanks to years of scientific research, these ruby red orbs have broken out of the pie shell and onto the superfruit stage. This traditional pie ingredient has gained a new reputation – praised for its versatility, nutrient density and health benefits.

Tart or sour cherries (*Prunus cerasus*) are also an American fruit – grown primarily in seven U.S. states: Michigan, Utah, Wisconsin, Washington, Oregon, Pennsylvania and New York. The U.S. variety is called Montmorency. While the name may come from a valley in France, Montmorency tart cherries are strictly homegrown. So when you buy U.S. Montmorency tart cherries, you're supporting American family farms.

The distinctive taste and deep red color of Montmorency tart cherries are due to the concentration of anthocyanins, a type of polyphenol in the flavonoids family. Nearly all of the health research on cherries has been conducted on the Montmorency variety vs. any other type of cherry.

Montmorency tart cherries are harvested in the summer, yet they're available year-round in multiple forms: **dried, frozen, canned, 100% juice and juice concentrate.**

## DELICIOUS GEMS OF GOODNESS

### NUTRIENT DENSITY

Tart cherries are a good source of vitamin C, vitamin A and copper, and contain 56 mg of flavonoids, including anthocyanins.

### VERSATILITY

Tart cherries are the perfect pie-making cherries, but this delicious fruit can easily transition from sweet to savory, adding complex flavors to a range of recipes – from oatmeal and smoothie bowls to salads, snacks, sides and entrees.

### EXERCISE RECOVERY

Research suggests Montmorency tart cherry juice may help aid exercise recovery.



### ARTHRITIS AND GOUT

Studies have explored the impact of Montmorency tart cherry juice consumption on gout attacks and arthritis symptoms.

### SLEEP

Melatonin-containing Montmorency tart cherries have been the focus of multiple sleep studies.

### HEART HEALTH

Montmorency tart cherry research has examined blood pressure and blood lipids.

140 grams tart cherries, raw, without pits <sup>1,2</sup>

# ARTHRITIS AND GOUT

For decades, arthritis and gout sufferers turned to tart cherry juice to soothe their symptoms – although the evidence to support a benefit was only anecdotal. The first observational study to examine the potential reality of this folklore remedy was conducted in 1950.<sup>3</sup> This preliminary investigation of 12 patients with arthritis and gout found that daily consumption of a half-pound of various water-packed canned cherries helped to relieve self-reported gout attacks and the symptoms associated with arthritis. After eating about a can of tart or yellow cherries a day, the participants had lower blood levels of uric acid. Excess uric acid is the culprit behind the onset and progression of gout.

Since then, additional studies have supported this finding, including a study from USDA's Human Nutrition Research Center at the University of California, Davis, where researchers found that healthy women ages 20 to 40 who consumed 2 servings (280 grams) of cherries after an overnight fast showed a 15% reduction in uric acid levels, as well as decreased inflammatory markers nitric oxide and C-reactive protein.<sup>4</sup>

Bell and colleagues in the UK used 2 different amounts of Montmorency tart cherry juice concentrate, 30 and 60 mL (about 1 and 2 ounces), mixed with water to investigate the bioavailability of anthocyanins and the impact on uric acid levels and inflammation.<sup>5</sup>

In this single-blind, two-phased, randomized, crossover designed study, 12 healthy participants without gout (male and female) were given the 2 different doses of the juice with a washout period of at least 10 days between the phases. The tart cherries were found to significantly reduce uric acid levels up to 8 hours. The levels

began to increase back to the starting levels after 24-48 hours. The 30 mL dose (equal to about 90 whole Montmorency tart cherries) was just as effective as the 60 mL dose. More research is needed to determine what the effect would be on individuals with gout or those at risk of developing gout.

In a study conducted at Oregon Health and Science University, 20 females with osteoarthritis (ages 40-70 years) drank 10.5-ounce bottles of either Montmorency tart cherry juice or a placebo beverage twice daily for 21 days.<sup>6</sup> Participants assessed level of pain at baseline and after the intervention, and blood was drawn to evaluate several different biomarkers of inflammation. The tart cherry group experienced a significant reduction in one of the inflammation biomarkers, C-reactive protein. An ongoing, internet-based, case-crossover study of 633 individuals revealed that 42% of gout patients used tart cherries in some form.<sup>7</sup>



## HOMEGROWN SUPERFRUITS — with — SCIENCE-BASED BENEFITS



***Studies have explored the impact of Montmorency tart cherry juice consumption on gout attacks and arthritis symptoms.***

The analysis of the group found that tart cherry intake over a 2-day period was associated with a 35% lower risk of gout attacks compared to no intake. The effect persisted even when controlling for other factors, such as obesity, alcohol consumption and the use of diuretics or anti-gout medications. When tart cherries were combined with medication (the uric acid-reducing drug allopurinol), the risk of gout attacks was 75% lower.





An internet study coordinated through the Gout and Uric Acid Education Society's website ([gouteducation.org](http://gouteducation.org)) used a cross-sectional survey of 220 gout patients to assess the use of tart cherry juice and other supplements.<sup>8</sup>

Gout attacks or flares were common:

87% reported one or more attacks in the last month. Among the survey participants, 54% had been prescribed medication (allopurinol or febuxostat), 43% were taking cherry extract or cherry juice and 25% were taking other natural supplements. Compared to gout patients not taking supplements, those that took tart cherry or other supplements reported significantly lower number of gout flares in the last month. While this suggests an association and not causation, it does indicate that patients have a high degree of interest in non-pharmacological therapies for gout.

## EXERCISE RECOVERY

Montmorency tart cherry juice is rapidly gaining a following among elite athletes and recreational exercisers as a recovery drink. Positive results have been found with long-distance running, cycling, sprinting, field sports and strength training. In one of the first tart cherry studies on exercise, Connolly and colleagues found that Montmorency tart cherry juice decreased some of the symptoms of exercise-induced muscle damage.<sup>9</sup> The researchers gave 14 male college students either 12 ounces of Montmorency tart cherry juice or a placebo drink twice a day for 8 days. On day four, the participants performed strenuous weight lifting. Isometric elbow flexion strength, pain, muscle tenderness and relaxed elbow angle were recorded before and for 4 days after the exercise. Self-reported pain and strength loss were significantly less in the tart cherry group; strength loss averaged over the 4 days after the eccentric exercise was 22% with the placebo but only 4% with the tart cherry juice.

Similarly, Bowtell and colleagues found that Montmorency tart cherry juice improved muscle

## How much do you need?



The exercise recovery studies used 8-12 ounces of 100% tart cherry juice or juice blend, or 1 ounce of juice concentrate twice a day mixed with water, adding up to 90-120 whole Montmorency tart cherries a day. Other studies gave participants one capsule (480 mg) of powdered tart cherries once a day.

recovery after intensive strength exercise.<sup>10</sup> The UK researchers gave 10 well-trained male athletes either 30 mL (about 1 ounce) of tart cherry juice concentrate or a placebo twice a day for 7 days before, day of and 2 days after single-leg knee extension exercises. Montmorency tart cherry juice consumption was found to reduce strength loss and reduce a biomarker for oxidative damage.

Oregon Health and Science University researchers gave 54 healthy male and female runners participating in the annual 199-mile Hood to Coast relay race either Montmorency tart cherry juice (10.5 ounces twice a day) for 7 days before and on the day of the race or a placebo drink.<sup>11</sup> Participants assessed level of pain using a visual scale at baseline, before the race and after the race. The tart cherry group reported a significantly smaller increase in muscle pain following the race compared to the placebo group.

Howatson and colleagues in the UK were the first to measure blood levels of inflammation, oxidative stress and muscle damage in athletes.<sup>12</sup> In this study, 20 recreational male and female runners competing in the London marathon were divided into 2 groups: one group consumed 8 ounces of Montmorency





tart cherry juice twice a day for 5 days before, day of and 2 days after the marathon, while the other group was given a placebo drink. The participants drinking the tart cherry juice experienced a faster recovery of strength and reduced markers of inflammation compared to those who drank a different beverage.

A second study in the UK measured blood markers of inflammation in 16 trained male cyclists who were divided into equal groups that consumed either 30 mL (about 1 ounce) of Montmorency tart cherry juice concentrate mixed with water or another placebo beverage, twice a day for 7 days.<sup>13</sup> On days five, six and seven, the participants performed high-intensity cycling intervals – exercise that was designed to replicate the demands of a 3-day race. The markers of inflammation and oxidative stress (c-reactive protein and uric acid) were significantly lower in the cyclists who drank the tart cherry juice compared to those who did not.

The same UK researchers conducted a similar study with 16 semi-professional male soccer players.<sup>14</sup> Montmorency tart cherries were found to aid recovery following a test that simulated the physical and metabolic demands of a soccer, field hockey or rugby game. The soccer players, ages 21 to 29, were divided into 2 equal groups and drank either 30 mL (about 1 ounce) Montmorency tart cherry juice concentrate mixed with water or a placebo drink twice a day for 8 days. On day five, the soccer players completed the exercise test. Compared to the placebo group, the tart cherry group experienced greater functional performance (including agility), recovered faster, reported less muscle soreness and had lower markers of inflammation (Interleukin-6).



### **Research suggests Montmorency tart cherry juice may help aid exercise recovery.**

There were no differences in muscle damage and oxidative stress.

Researchers at Texas A&M tested the beneficial effects of powdered Montmorency tart cherries in athletes participating in both strength and endurance events. In the first study with 23 healthy, resistance-trained men, the participants who consumed one capsule a day (480 mg) of the powdered tart cherries for 10 days reported less quadriceps soreness and strength loss after performing back squat exercises.<sup>15</sup> The second study used the same methodology but in 27 aerobically trained male and female runners or triathletes.<sup>16</sup> Compared to the placebo group, the group that was supplemented with tart cherries experienced lower markers of muscle damage and inflammation after a half-marathon run.

## **Fresh Tart Cherries**



### **Nutrition Facts**

**1 cup without pits**

**Serving size (155 grams)**

**Amount per serving**

**Calories 80**

**% Daily Value\***

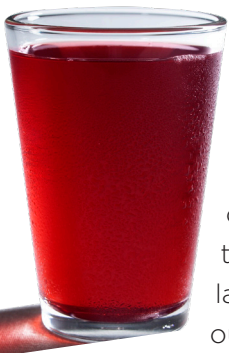
<b>Total Fat</b> 0g	<b>0%</b>
Saturated Fat 0g	<b>0%</b>
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 0mg	<b>0%</b>
<b>Total Carbohydrate</b> 19g	<b>7%</b>
Dietary Fiber 3g	<b>11%</b>
Total Sugars 13g	
Includes 0g Added Sugars	<b>0%</b>
<b>Protein</b> 2g	<b>4%</b>
Vitamin D 0mcg	0%
Calcium 25mg	2%
Iron 0.5mg	2%
Potassium 268mg	6%
Vitamin A 99mcg RAE	10%
Vitamin C 15.5mg	15%
Vitamin K 3.3 mcg	2%
Copper 0.161mg	20%

\*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Raw, without pits

A study with cyclists found that Montmorency tart cherry juice helped lower their systolic blood pressure and improved end-sprint performance.<sup>17</sup> In this randomized, double-blind, placebo-controlled, crossover study, 10 trained male cyclists consumed either 60 mL of Montmorency tart cherry juice concentrate mixed with water or a placebo beverage. Tart cherry juice supplementation increased test peak power by 9.5% and the total work completed during the 60 seconds sprint by 10%; there was no impact on the time to exhaustion. Among the study participants

drinking the tart cherry juice, systolic blood pressure was significantly reduced 1.5 hours after consumption.



A comprehensive review article on tart cherry juice in athletes summarized the full body of evidence over the last 10 years and analyzed the various outcomes: pain, inflammatory/oxidative stress blood markers, muscle damage markers, strength loss, recovery time, upper respiratory tract symptoms and performance.<sup>18</sup>

## SLEEP

Preliminary studies on Montmorency tart cherries, one of the few food sources of melatonin,<sup>19</sup> have explored the duration and quality of sleep, insomnia and sleep efficiency. The research is still emerging and more studies are needed to confirm the role of tart cherries on achieving a better night's sleep.

Howatson and colleagues were the first to show direct evidence that dietary supplementation with Montmorency tart cherry juice increases circulating melatonin and provides modest improvements in sleep time and quality of sleep in healthy adults.<sup>20</sup> In this randomized, double-blind, placebo-controlled, crossover designed study, 20 male and female participants (ages 18-40) with no reported sleep disturbances drank either 2 servings of Montmorency tart cherry juice concentrate (total of 60 mL concentrate mixed with water) or a placebo beverage for 7 days. The tart cherry consumption resulted in a statistically significant increase of time in bed

(25 minutes), total sleep time (34 minutes) and sleep efficiency (5-6%). Circulating blood melatonin levels were also increased.

In a pilot study of 15 men and women (ages 65 and older) with chronic insomnia, tart cherry consumption resulted in significant improvements in the Insomnia Severity Index and a 62-minute improvement in waking after sleep onset.<sup>21</sup>

The participants drank two 8-ounce servings of Montmorency tart cherry juice a day for 2 weeks. Compared to the placebo drink, the tart cherry juice was associated with significant improvements on all self-reported sleep variables.



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***Melatonin-containing Montmorency tart cherries have been the focus of multiple sleep studies.***

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Research conducted at Louisiana State University found that Montmorency tart cherry juice extended sleep time by 84 minutes.<sup>22</sup> In this placebo-controlled, crossover study, 8 healthy men and women (ages 50 and older) with chronic insomnia were randomized to a tart cherry group (2 weeks) or a placebo control group (2 weeks), separated by a 2-week washout period. Those in the tart cherry group drank about 8 ounces (240 mL) of Montmorency tart cherry juice in the morning and at night, 1-2 hours before bedtime, for 14 days. When compared to the placebo, Montmorency tart cherry juice was found to extend sleep time by 84 minutes and increase sleep efficiency on the Pittsburgh Sleep Quality Index.



# HEART HEALTH

Studies on cardiovascular health are still emerging, with preliminary studies exploring tart cherries and the effect on blood pressure and blood lipids. A randomized, placebo-controlled, double-blind, crossover study of 15 men with early hypertension found that the participants who consumed tart cherry juice concentrate (60 mL, or the equivalent of 180 tart cherries) experienced a reduction in systolic blood pressure, but not microvascular reactivity or arterial stiffness.<sup>23</sup>

Similarly, 27 men and women (ages 45-60 years) with moderately elevated blood pressure were randomly assigned to receive 60 mL of Montmorency tart cherry juice concentrate or a placebo beverage.<sup>24</sup> Those consuming tart cherry juice experienced a significant reduction in systolic blood pressure over a 3-hour period after consumption. Cognitive function and mood were not affected.

In a study of 19 women with diabetes, 6-week supplementation with 40 grams a day of tart cherry juice concentrate (720 mg/day anthocyanins) significantly decreased both systolic blood pressure and diastolic blood pressure when compared with the pre-supplementation values.<sup>25</sup> Total cholesterol and LDL cholesterol decreased significantly in 12 of the participants with elevated LDL levels.



## ***Montmorency tart cherry research has examined blood pressure and blood lipids.***

A randomized, placebo-controlled clinical trial conducted at the University of Delaware studied 17 men and women ages 65-80 years.<sup>26</sup>

The participants were randomly assigned to drink either 480 mL of Montmorency tart cherry juice or a placebo beverage for 12 weeks. At the end of the trial, the tart cherry juice group experienced significantly lower systolic blood pressure and LDL or “bad” cholesterol compared to the placebo group.

The researchers suggest further investigation in a larger sample size and longer-term trials with better compliance.





# TART CHERRIES ARE ALWAYS IN SEASON

Look for Montmorency tart cherries outside of the fresh produce aisle – you'll find them frozen, canned or dried. Tart cherry juice and juice concentrate are also available in grocery stores and online. Don't just make a pie with these homegrown superfruits. Use Montmorency tart cherries to add a pop of color, a nutrient punch and a hint of sweet-tart flavor to overnight oats, grain bowls, salads, side dishes, trail mixes and more.



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