

# The Exceptional Cranberry

## A Nutritional Approach to Fighting Infection

NUTRITION CONNECTION



THIS CE ARTICLE IS SPONSORED BY:



Cranberries are an exceptional fruit for a myriad of reasons. In this article we will explore current scientific evidence on the cranberry's role as a nutritional approach to help reduce certain infections and antibiotic use, and how cranberries can promote heart, gastrointestinal, and oral health. We'll also identify populations and at-risk groups that may benefit from the prevention of urinary tract infection (UTI) by utilizing cranberry products; and how this nutritional approach fits into the Centers for Medicare & Medicaid Services (CMS) regulations regarding facility Antibiotic Stewardship Programs. Lastly, we'll look at ways to use cranberries to help meet fruit intake recommendations as part of a healthy, balanced diet.

### CRANBERRY NUTRITION

Two major properties make cranberries exceptional: 1) Cranberries contain some of the highest levels of antioxidants such as polyphenols when compared to other commonly-consumed berries and fruit; and 2) Cranberries are also high in proanthocyanidins or PACs, which are a type of flavonoid polyphenol that is a potent antioxidant.<sup>i,ii</sup> Remember that antioxidants protect cells from damage which may help reduce the risk of developing certain chronic diseases.

*Continued on page 2*



lori@lasutherlandgroup.com

*Continued from page 1*

**Lori A. Kaley, MS, RDN, LD, MSB** is Managing Director with LA Sutherland Consulting, LLC. Kaley just achieved 30 years of membership in the Academy of Nutrition and Dietetics. She earned a Master's degree in Human Development with a concentration in nutrition from the University of Maine.

Proanthocyanidins (PACs) are common in fruit and have the beta or B-type linkage between the phenolic rings on the PAC molecule. On the other hand, cranberry has the alpha or A-type linkage between the phenolic rings on the PAC molecule. It is this unique and exceptional property—the A-type linkage on the PAC molecule—that contributes towards cranberries being able to prevent certain bacteria from adhering or sticking to human cell walls and causing infection. In addition to PACs, the bioactive compounds in

cranberries that act together and are associated with their health benefits include anthocyanins, flavonols, and oligosaccharides.<sup>iii</sup>

Scientists are currently researching the benefits of cranberries for whole body health including the mouth, heart, gastrointestinal tract, and urinary tract. The anti-adhesion or anti-stick effect acts on the urinary tract and there is emerging research showing cranberry compounds have a beneficial effect by decreasing action of bacteria in the mouth and in the stomach. The rich

content of polyphenols may contribute to heart health through anti-inflammatory properties and reduction of oxidative stress.<sup>iv, v, vi, vii</sup>

To understand how the cranberry's unique combination of compounds works, let's review the four phases of infection:

- **Attachment**—For bacteria to cause infection, they must first attach to the cell. The compounds in cranberry prevent bacteria from adhering to the cell.

- **Invasion**—Once bacteria attach to the cell, they can invade the cell. The bacteria will multiply in the cell or remain dormant to emerge later (this is the cause of recurrent UTIs). This phase elicits the body's immune response and causes inflammation. The compounds in cranberry can help to reduce inflammation.

- **Multiplication**—Bacteria inside the cell multiply, then leave the cell and attach to surrounding cells, spreading the infection. The compounds in cranberry prevent bacteria from attaching to the cells and prevent the infection from worsening.

SCIENTISTS ARE CURRENTLY RESEARCHING the benefits of cranberries for whole body health including the mouth, heart, gastrointestinal tract, and urinary tract.



*Continued on page 3*

- **Exfoliation**—The immune system works to exfoliate bacteria-infected cells to be flushed out through urine. Bacteria from these cells and bacteria that are dormant in bladder cells both create risk of reinfection. Once again, the compounds in cranberry can help prevent attachment and these phases of infection point out why consuming cranberries daily can help prevent UTI.

## CRANBERRY RESEARCH AND URINARY TRACT INFECTION

Significant findings from the largest UTI clinical study confirm the benefits of cranberry for urinary tract health. The study results showed that women who drank eight ounces of the experimental cranberry juice drink each day reduced the recurrence of clinically diagnosed symptomatic UTIs by 39 percent, compared to women who drank the placebo beverage. Three hundred and seventy three women with a recent history of UTI and ranging in age from 20 to 70 years participated in this double-blind, randomized, placebo-controlled clinical trial. Eight ounces of the experimental cranberry



juice drink used in the study had the following nutrient profile:<sup>viii</sup>

- 27 percent cranberry juice made from whole cranberry mash
- 35 calories
- 6 grams of sugar and 9 grams of carbohydrate
- 120 milligrams of proanthocyanidins (PACs)

Urinary tract infection is one of the most common bacterial infections in women worldwide and the second highest infection after respiratory in the

U.S. and after intestinal globally.<sup>ix</sup> Up to 60 percent of all women suffer a UTI in their lifetime and one out of four will experience a recurrence within six months.<sup>x, xi</sup>

In healthcare, the implications of urinary tract infections are significant. Catheter-associated urinary tract infections (CAUTIs) are the number one hospital-acquired infection, causing an estimated 13,000 deaths each year and over \$450 million in healthcare costs.<sup>xii, xiii, xiv</sup>

## Dried cranberries add flavor, texture, and color to:

- Oatmeal
- Cereal
- Salads
- Wraps
- Yogurt parfaits
- Granola
- Snacks

## Use fresh cranberries to prepare and cook:

- Salsas
- Barbecue-style sauces
- Cranberry sauces

## Use cranberry juice to prepare:

- Juice for hydration
- Smoothies
- Mocktails

The government is cracking down on hospital-acquired UTIs, fining hospitals millions of dollars for patient safety concerns. According to the most recent CDC Healthcare-associated Infections (HAI) Progress Report, published in 2016, there has been no improvement in overall CAUTIs between 2009 and 2014, signaling a strong need for additional prevention efforts.

*Continued on page 4*

Each year in the U.S., at least 2 million people become infected with bacteria that are resistant to antibiotics and at least 23,000 people die as a result of these infections.<sup>xv</sup> Urinary tract infections are a large contributor to antibiotic resistance with 15 percent of all community-prescribed antibiotics used for UTIs and with suspected UTIs accounting for 30 to 60 percent of antibiotic prescriptions in nursing homes.<sup>xvi, xvii</sup> Cranberries may provide a more nutritional approach to antibiotic use for prevention of urinary tract infections.

### ANTIBIOTIC STEWARDSHIP

The proven benefits of Antibiotic Stewardship Programs (ASP) led the Centers for Medicare & Medicaid Services (CMS) to require the implementation of ASP in long-term care facilities as part of Infection Prevention and Control Programs (IPCP) effective November 28, 2017.<sup>xviii</sup> Additionally, the Joint Commission approved Medication Management (MM) standard MM.09.01.01 for hospitals, critical access hospitals, and nursing care centers that addresses antimicrobial stewardship and became effective January 1, 2017. One intention of these programs is to reduce the incidence of healthcare-associated infections (HAIs) that have emerged as an important public health and patient safety issue.

According to the CDC, antibiotic stewardship refers to a set of commitments and activities designed to “optimize the treatment of infections while reducing the adverse events associated with antibiotic use.”

Since clinical outcomes are better when ASPs are in place, organizations such as the CDC have provided recommendations for their implementation. The CDC Core Elements of Antibiotic Stewardship for Nursing Homes and/or Hospitals include resources on practical ways to initiate or expand antibiotic stewardship activities.<sup>xix, xx</sup>

Out of the six core elements that have been strongly associated with success of ASP, two are of particular interest to certified dietary managers: accountability and taking action. Under accountability, physician, nursing, and pharmacy leads are responsible for promoting and overseeing antibiotic stewardship activities in your facility. As a CDM, CFPP you can play a role together with your dietitian in recommending the daily consumption of cranberry juice as a more nutritional approach to antibiotic use for UTI prevention in your facility, which

**CRANBERRIES** can be beneficial to critical areas of health care and have the potential to:

- Reduce the occurrence of UTIs, one of the most common infections in health care
- Minimize antibiotics use for urinary tract health
- Decrease fines associated with high infection rates and additional health care costs
- Reduce hospital readmissions for UTIs
- Improve quality of life for those frequently suffering from UTIs

addresses antibiotic stewardship. Taking action references infection-specific interventions to improve antibiotic use such as those for UTI including reducing antibiotic use in asymptomatic bacteriuria and reducing antibiotic prophylaxis for prevention of UTI. According to the CDC, “Any action taken to improve antibiotic use is expected to reduce adverse events, prevent emergence of resistance, and lead to better outcomes for residents in this setting.”

### MEETING FRUIT RECOMMENDATIONS

Cranberries are one of three commercially-grown fruits native to North America (blueberries and Concord grapes are the other two) and are grown on farms in Massachusetts, New Jersey, Oregon, Wisconsin, and Washington in the U.S., and in Canada and Chile. As noted earlier, fruits provide polyphenol antioxidants which promote health and help to reduce risk of chronic diseases. Intake of cranberry products can increase intake of polyphenols including PACs since eight ounces of cranberry juice cocktail provides 125 mg total polyphenols including PACs, and 40 grams of sweetened dried cranberries provides 145 mg total polyphenols including PACs.<sup>xxi</sup>

MyPlate, which is based on the Dietary Guidelines for Americans, recommends from one to two cups of fruit a day (1-cup whole fruit is 8 oz., 8 oz. 100% juice, or about ½ cup dried fruit) depending on age and gender.<sup>xxii</sup> It only takes a half cup of dried fruit such as dried cranberries to equal one cup of fruit and this goes a long way towards helping to meet the daily fruit serving recommendations of the Dietary Guidelines for Americans 2015-2020.

Continued on page 5

So, how are Americans doing with regards to meeting fruit serving recommendations? Many children one to eight years old do meet recommended intakes for fruit, but older children often do not. Teen girls 14-18 years old, adult men and women have fruit intakes below recommendations. Most Americans would benefit from consuming more fruits in nutrient-dense forms. Fruits are easy to grab for a snack, add to salads, have as a side to a meal, or enjoy as a dessert.<sup>xxiii</sup>

You can easily incorporate cranberries into healthcare food service and in recommendations to residents and patients to help them meet fruit serving recommendations. If clients can't tolerate dried cranberries or cooked whole berries due to swallowing or dentition issues, consider using cranberry sauce and juice. Thickener can be added to the juice if needed to achieve desired consistency for dysphagia diets. Yogurt, oils, protein powders, and other supplements can be blended into cranberry beverages to add needed calories and protein. **E**

## SOURCES

- i Gu L, et al. Concentrations of proanthocyanidins in common foods and estimations of normal consumption. *Journal of Nutrition*. 2004; 134(3):613-7.
- ii Vinson JA, Su X, Zubik L, et al. Phenol antioxidant quantity and quality in foods: fruits. *Journal of Agricultural and Food Chemistry*. 2001; 49(11):5315-21.
- iii Bioactives in fruit: health benefits and functional foods. Eds. Skinner, M & Hunter, D, 2013.
- iv Blumberg JB, Basu A, Krueger CG, et al. Impact of cranberries on gut microbiota and cardiometabolic health: Proceedings of the Cranberry Health Research Conference 2015. *Adv Nutr*. 2016; 7(Suppl):759S-70S.
- v Gupta K, Chou MY, Howell A, et al. Cranberry products inhibit adherence of p-fimbriated Escherichia coli to primary cultured bladder and vaginal epithelial cells. *J Urol*. 2007 Jun; 177(6):2357-2360.
- vi Zhang L, Ma J, Pan K, et al. Efficacy of cranberry juice on Helicobacter pylori infection: a double-blind, randomized placebo-controlled trial. *Helicobacter*. 2005 Apr; 10(2):139-45.
- vii Delehaney JB, Johnson BJ, Hickey TE, et al. Binding and neutralization of lipopolysaccharides by plant proanthocyanidins. *J Nat Prod*. 2007; 70(11):1718-1724.
- viii Maki KC, Kaspar KL, Khoo C, Derrig LH, Schild AL, Gupta K. Consumption of a cranberry juice beverage lowered the number of clinical urinary tract infection episodes in women with a recent history of urinary tract infection. *Am J Clin Nutr*. 2016; 103(6):1434-1442.
- ix Schappert SM, Rechtsteiner EA. Ambulatory medical care utilization estimates for 2006. National Health Statistics Reports; No 8. Hyattsville, MD: National Center for Health Statistics; 2008.
- x Foxman B, Barlow R, D'Arcy H, et al. Urinary tract infection: self-reported incidence and associated costs. *Ann Epidemiol*. 2000 Nov; 10(8):509-15.
- xi Foxman B. Urinary tract infection syndromes: occurrence, recurrence, bacteriology, risk factors, and disease burden. *Infect Dis Clin North Am*. 2014; 28:1-13.
- xii Klevans RM, Edwards JR, Richards CL, et al. Estimating health care-associated infections and deaths in US hospitals, 2002. *Pub Health Rep*. 2007; 122:160-166.
- xiii Scott RD II. The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention. Centers for Disease Control, March 2009.
- xiv Stone, P. Economic burden of healthcare-associated infections: an American perspective. *Expert Rev Pharmacoecon Outcomes Res*. 2009 Oct; 9(5):417-422.
- xv Centers for Disease Control and Prevention, Antibiotic Resistance Threats in the United States, 2013.
- xvi Mazzulli T. Resistance trends in urinary tract pathogens and impact on management. *J Urol*. 2002; 168:1720-1722.
- xvii Benoit SR, Nsa W, Richards CL, et al. Factors associated with antimicrobial use in nursing homes: A multilevel model. *J Am Geriatr Soc*. 2008; 56:2039-2044.
- xviii [www.federalregister.gov/d/2016-23503](http://www.federalregister.gov/d/2016-23503)
- xix [www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html](http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html)
- xx <https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html>
- xxi Data generated by Ocean Spray
- xxii [www.choosemyplate.gov/fruit](http://www.choosemyplate.gov/fruit)
- xxiii <https://health.gov/dietaryguidelines/2015/guidelines/>

## ONE FREE CE HOUR THROUGH NOVEMBER 16, 2018

Ocean Spray is generously sponsoring 1 free continuing education (CE) hour for CDM, CFPPs who read **The Exceptional Cranberry: A Nutritional Approach to Fighting Infection** and answer the following CE questions through November 16, 2018. You must log into the **ANFP Marketplace** and access the online CE quiz there for this members-only offer. Follow the directions on the quiz below to access your free CE.

Sponsored by:



## CE Questions: Nutrition Connection



*This Level III article assumes that the reader has thorough knowledge of the topic. The desired outcome is to integrate analysis and application of knowledge, incorporating continuous quality improvement into best practice.*



**CBDM** continuing competence  
where education advances performance

Reading *The Exceptional Cranberry: A Nutritional Approach to Fighting Infection* and successfully completing these questions online has been approved for 1 hour of continuing education for CDM, CFPPs. CE credit is available ONLINE ONLY. To earn 1 CE hour, access the online CE quiz in the ANFP Marketplace. Visit [www.ANFPonline.org/market](http://www.ANFPonline.org/market), select "Publication," then select "CE article" at left, then search the title "*The Exceptional Cranberry: A Nutritional Approach to Fighting Infection*," and purchase the article and complete the CE quiz.

*No payment information is required for ANFP members through November 16, 2018.*

1. Antioxidants are beneficial because they:
  - A. Prevent vitamin deficiencies in the senior population
  - B. Protect cells from damage, which may reduce the risk of certain chronic diseases
  - C. Work in tangent with antibiotics to fight staph infections
2. A-type linkage on the PAC molecule
  - A. Gives cranberries their unique, tart flavor
  - B. Allows cranberries to prevent certain bacteria from adhering to cell walls and causing infection
  - C. Contributes to the chemical reaction that gives cranberries their distinctive red color
3. The four phases of infection are:
  - A. Attachment, invasion, multiplication, and exfoliation
  - B. Attachment, invasion, division, and heat activation
  - C. Invasion, multiplication, redness, and itch
4. Findings from the largest UTI clinical study showed that women who drank eight ounces of cranberry juice daily reduced the occurrence of clinically diagnosed UTIs by what percent?
  - A. 11 percent
  - B. 26 percent
  - C. 39 percent
5. Catheter-associated urinary tract infections cause an estimated \_\_\_\_ deaths each year and over \$\_\_\_\_ in healthcare costs.
  - A. 8,000; \$182 million
  - B. 10,500; \$290 million
  - C. 13,000; \$450 million
6. Out of the six core elements that have been associated with the success of the Antibiotic Stewardship Programs (ASP) required by CMS, these two are of particular interest to CDMs:
  - A. Drug Expertise and Reporting
  - B. Accountability and Action
  - C. Tracking and Education
7. Cranberries have the potential to:
  - A. Reduce the occurrence of UTIs
  - B. Minimize antibiotic use for urinary tract health
  - C. Both A and B

EARN 1 FREE CE HOUR FOR  
THIS ARTICLE. DETAILS  
ABOVE!

