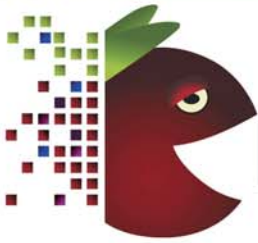




DECAS BOTANICAL SYNERGIES



PACRAN®

Clinically Supported PAC Standardized Whole Cranberry Powder

(Vaccinium macrocarpon)



Natural Support for Urinary Tract Health

Cranberries are widely known as a potent source of antioxidants and for their unique anti-adhesion activity which helps protect the body from harmful bacteria that cause

urinary tract infections. This unique anti-adhesion activity is primarily due to a natural compound in the fruit called proanthocyanidins (PACs).

PACran® is the world's first clinically supported and PAC standardized cranberry powder. It is made from a proprietary formula of whole PAC-rich cranberries and has been clinically shown to support urinary tract health at a 500 mg daily dose. The unique formula of PACran provides superior potency per PAC at a substantially lower cost per dose. PACran is also the first cranberry product in the world with a government sanctioned health claim. The Korean Food and Drug Administration (KFDA) in 2009 reviewed the complete clinical dossier and awarded PACran with a permissible urinary health claim.

First Cranberry Ingredient in the World with a Government Sanctioned Health Claim

Clinically Shown to Support Urinary Tract Health at 500 mg Daily Dose

Most Cost Effective Efficacious Dose of Cranberry for Urinary Tract Health

Patent Protected* Standardized Formula

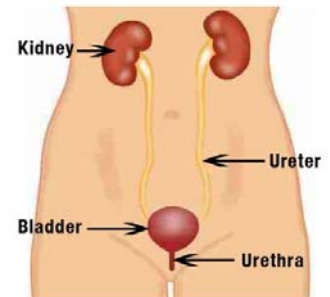
* U.S. Patents (5,474,774, 5,525,341, 5,646,178, 5,650,432), U.K. Patent (0752871), Australian Patents (703158, 708657)



Urinary Tract Health

Urinary Tract Infections (UTIs) are among the most common of all bacterial infections. UTIs affect over 11 million women in the United States every year and cost the U.S. health care system over \$2 billion annually. Anyone of any age can have a UTI. However, young to middle-aged women who are sexually active are most often affected by UTIs.

An infection occurs when microorganisms, usually bacteria from the digestive tract, cling to the opening of the urethra and begin to multiply. Most infections arise from one type of bacteria, *Escherichia coli* (*E. coli*), which normally live in the colon and cause about 80% of UTIs in adults. Symptoms of UTIs, both uncomfortable and debilitating, may include pain or burning with urination, the urge to urinate frequently while passing only small quantities of urine, tenderness or a feeling of heaviness in the lower abdomen, cloudy or foul-smelling urine, pain on one side of the back under the rib cage (flank pain), fever, chills, nausea and vomiting.



Clinical Studies

Trial 1: “A randomized double blind placebo controlled trial to evaluate the efficacy of cranberry powder as a prophylactic against recurrent urinary tract infection in women” (Vidlar, et. al.)

A 180 day clinical study was conducted to evaluate the effect of 500 mg of PACran on the recurrence of symptomatic Urinary Tract Infections (UTI) in women compared to placebo treatment. The daily dose of 500 mg PACran reduced UTI recurrences by one half compared to the placebo group. Results of this study were presented at the 15th annual *PhytoPharm* congress in Nuremberg, Germany July 25-27, 2011.

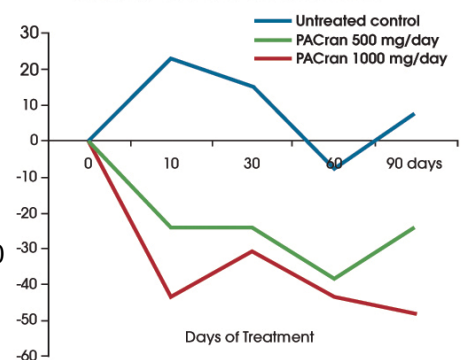
Clinical Discussion: During the 180 day study 22 women in the placebo group and 11 women in the PACran group had at least one UTI recurrence. All recurrences of UTI were confirmed microbiologically. The recurrence rate for the PACran group was 14.2% (95% confidence interval, 6.0% - 21.7%). This corresponds to an absolute reduction in UTI recurrence of 15%. The recurrence rate for the placebo group was 25.7% (95% confidence interval, 15.9% - 34.5%) This corresponds to an assumed 30% recurrence rate in the placebo group.

Trial 2: “A randomized, double blind, controlled, dose dependent clinical trial to evaluate the efficacy of a proanthocyanidin standardized whole cranberry (*Vaccinium macrocarpon*) powder on infections of the urinary tract” (Sengupta, et. al.)

A 90 day clinical study was conducted to determine the effect of PACran on bacteriuria and pyuria in women. The data show that a daily dose of 500 mg of PACran helps to support a healthy urinary tract system. Results of this study were published in the journal *Current Bioactive Compounds* (Volume 7, Number 1, March 2011).

Clinical Discussion: After the 90-day follow up period, there was a 36% and 65% reduction of urinary *E. coli* infection reported in the 500 and 1,000 mg/day groups, respectively. This study demonstrates a highly significant reduction ($P < 0.0001$) in urinary *E. coli* occurrence in the 1,000 mg/day group when compared to the baseline. Whereas, change in the presence of *E. coli* at 90 days in the untreated control group was not significant when compared to baseline ($p=0.7234$). Both PACran doses showed significant reduction in urinary *E. coli* as well as symptoms compared to the control group.

***E. coli* Percent Reduction**





Ex Vivo Studies

Two separate cross-over human pilot clinical studies were conducted at Rutgers University to compare the proanthocyanidin (PAC) content and *ex vivo* bacterial anti-adhesion of human urine after consumption of commercially available cranberry products. The results show that 500 mg of PACran[®] containing just 2 mg of PACs per dose is just as effective at providing the anti-adhesion activity as 300 ml of Cranberry Juice Cocktail (CJC) containing 38 mg of PACs or an extract containing 33 mg of PACs.

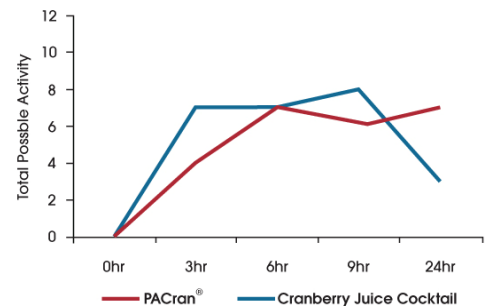
Study 1: PACran vs. 10 oz. glass of Cranberry Juice Cocktail¹

Discussion: Summing all observed anti-adhesion activity recorded for all participants over every time period yielded nearly identical results for each product (25 out of a possible 80 for CJC, and 24/80 for PACran). This means that the potential efficacy for both products is very similar. By time period, the post-CJC urinary activity increased steadily from 3 to 9 hrs and dropped off significantly at 24 hrs. The post-PACran urinary activity increased to a high at 6 hrs, dropped off at 9 hrs and then increased again at 24 hrs.

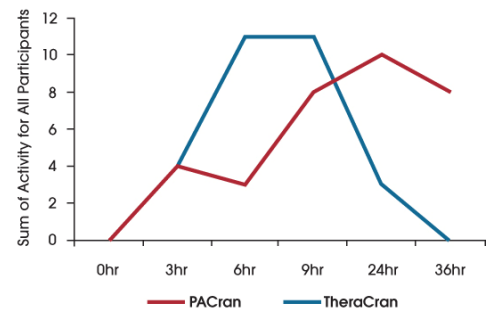
Study 2: PACran vs. TheraCran^{®2} Cranberry Extract (two 650 mg capsules)³

Discussion: Summing all observed anti-adhesion activity recorded for all participants over every time period yielded 29 out of a possible 120 for TheraCran, and 33/120 for PACran. The differences between the products were not statistically significant. By time period, the post-TheraCran urinary activity was significantly greater ($p < 0.05$) at the 6-hr time period than the activity for PACran, whereas at 36 hours PACran was significantly greater than TheraCran. This suggests that TheraCran has a more rapid and substantial effect in the first 6 hours, which it maintains at 9 hours, but diminishes thereafter. The PACran activity appears to slowly increase over time and reaches peak activity at about 24 hours.

Total Anti-adhesion Activity per Time Period



Total Bacterial Anti-adhesion Activity per Time Period



¹ACS 2009 Annual Meeting - Bacterial Anti-adhesion Activity of Human Urine Following 27% Cranberry Juice Cocktail vs. PACran Capsule Consumption

²TheraCran[®] is a registered trademark of TheraLogic, LLC

³Rutgers University - Bacterial Anti-adhesion Activity of Human Urine: PACran Capsule vs. TheraCran Capsule Consumption





Proanthocyanidins

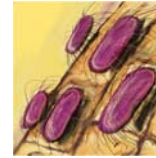
Proanthocyanidins (PACs) are a class of biologically active flavonoids found throughout the plant kingdom and are one of the most potent antioxidants in nature. Typically concentrated in the bark of trees and in the outer shells of fruits and seeds, proanthocyanidins serve to protect plants against oxidative elements such as oxygen and sunshine.

PACs are the phytochemicals responsible for many of the health benefits associated with cranberries. Science has shown that cranberries contain unique A-type PACs, seldom found elsewhere in nature, that provide bacterial anti-adhesive properties and help promote urinary tract, gastrointestinal, and oral health. PACs are the "power of the cranberry" but not all PACs are the same. Though many plant sources contain PACs, a recent study entitled "A-type Cranberry Proanthocyanidins and Uropathogenic Bacterial Anti-Adhesion Activity" Neto, et. al., and published in *Phytochemistry* (2005) has shown that North American cranberry A-link PACs are the only PACs that provide bacterial anti-adhesion activity.

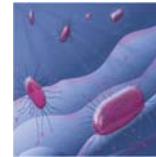
Only the cranberry's unique A-linked PACs exhibit *ex vivo* bacterial anti-adhesion capabilities. B-link PAC found in many plants including; dark chocolate, apples, grapes, etc. do not display bacterial anti-adhesion.

Cranberry PACs are Unique!
Source: Howell, et al., *Phytochemistry*, 2005

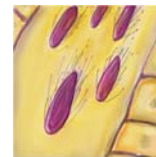
Cranberry PACs Anti-Adhesion



1. Bacteria adhere to cells with their hair-like fimbriae (pili)

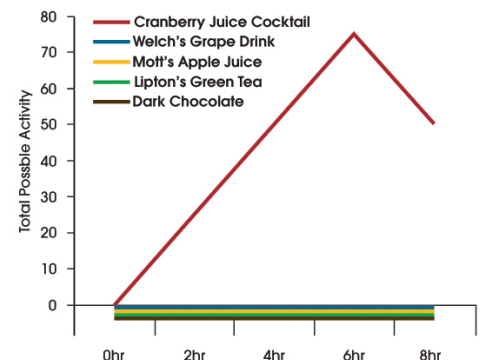


2. Cranberry PACs inhibit fimbriae's adhesion capabilities



3. Inhibited bacteria "passing through"

Anti-adhesion Activity of Human Urine After Cranberry Juice and Other Drinks



Health Claims

AFFSA Health Claim 2004 – Generic Cranberry Health Claim

Cranberry is the only fruit in the world with a government sanctioned health claim. On December 3, 2004 the French Food Authority (AFSSA) approved a health claim for the North American Cranberry (*Vaccinium macrocarpon*). The claim states that a product containing at least 36 mg of North American Cranberry PACs can carry the claim "help reduce the adhesion of certain *E. coli* bacteria to the urinary tract walls."

KFDA Health Claim 2009 – PACran Specific Health Claim

Decas Botanical Synergies has obtained Korean Food and Drug Administration (KFDA) approval for a Urinary Tract Health health claim for PACran. PACran is the first health food ingredient approved by the KFDA for urinary tract health. The claim is unique to PACran.

The PACran specific claim is based on the consumption of 500-1,000 mg daily of PACran Whole Cranberry Powder and states, "By reducing bacteria adhesion on urinary tract wall, it may help to support urinary health."





Cranberry Botany

The North American cranberry, *Vaccinium macrocarpon*, Aiton, is a member of the family Ericaceae that is composed of about 1350 species including Scotch Heather (*Calluna vulgaris*), Rhododendrons (*Rhododendron spp.*) and Blueberries (*Vaccinium angustifolium*, *V. corymbosum*). Cranberries are a low-growing, vining, woody perennial plant with small, alternate, ovate leaves. The plant produces stolons (horizontal stems) up to 6 feet (2 m) long. Short vertical branches, or uprights, 2 to 8 inches (5 to 20 cm) in height, grow from buds on the stolons and these can be either vegetative or fruiting. Each fruiting upright may contain as many as seven flowers. Pollination is primarily via domestic honey bees.
(Source: Cranberry Institute)



Applications

PACran is ideal for nutraceutical and functional food applications such as:

- Softgels
- Softchews
- Toothpastes
- Capsules
- Cereals
- Nutrition Bars
- Tablets
- Smoothies
- Personal Care Products

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References

- Avorn, J., et al., Reduction of bacteriuria and pyuria after ingestion of cranberry juice. *JAMA*, 1994; 271(10):751-754.
- Howell AB, et al., Inhibition of adherence of P-fimbriated *Escherichia coli* to uroepithelial-cell surfaces by proanthocyanidin extracts from cranberries. *N Engl J Med*. 1998; 339:1085-1086.
- Howell AB, et al., Cranberry juice and adhesion of antibiotic-resistant uropathogens, *JAMA*, 2002; 287(23):3082-3083.
- Lee, YL, Does cranberry juice have antibacterial activity? *JAMA*, 2000; 283(4):1691.
- National Institutes of Health, *Urinary Tract Infections in Adults*, 1999.
- Reed, J., Cranberry flavonoids, atherosclerosis and cardiovascular health, *Critical Reviews in Food Science & Nutrition*, 2002; 42(Suppl.):301-316.
- Stothers, L., A randomized trail to evaluate effectiveness and cost effectiveness of naturopathic cranberry products as prophylaxis against urinary tract infection in women, *The Canadian Journal of Urology*, 2002, June; 9(3): 1558 – 1562.
- Sun, J., Liu, R., et al., Antioxidant and antiproliferative activities of common fruits, *J of Agricultural and Food Chem*, Sept. 24, 2002.
- Swartz, J., et al., Properties of Cranberry Juice, *Applied Microbiology*, 1968, Oct.; 16(10):1524-1527.
- Wang, H., et al., Oxygen radical absorbing capacity of anthocyanins, *J Agricultural & Food Chem*, 1997; 45:304-309.
- Weiss, E., et al., Inhibiting interspecies coaggregation of plaque bacteria with a cranberry juice constituent. *J Am Dent Assoc.*, 1998, Dec; 129(12):1719-1723.
- Wilson, T., et al., Cranberry extract inhibits low density lipoprotein oxidation. *Life Sciences*, 1998; 62(24):381-386.
- Youdim, K., et al., Potential role of dietary flavonoids in reducing microvascular endothelium vulnerability to oxidative and inflammatory insults, *J Nutr Biochem*, 2002, May;13(5):282-288.
- Neto, et al, A-type Cranberry Proanthocyanidins and Uropathogenic Bacterial Anti-Adhesion Activity. *Phytochemistry*, 2005

