well-being
by nature

dianafood

URINARY HEALTH

urophenol®

A rich source of ProAnthoCyanidins (PACs) Type A from cranberry.

Urophenol® extract: promoter of your health

What is Urophenol® extract?

Urophenol® is an ingredient which is obtained by extracting with water and ethanol, the organic molecules contained in cranberry. These molecules are concentrated in a process developed by **Diana Food** to obtain highly purified extracts of Proanthocyanidins (PACs). In cranberry, it is the A-type PACs content that is of interest. **Diana Food's** process allows to reach concentration of PACs as high as 15 to 18 % according the BL-DMAC method.

We keep the essence!

The extraction process developed by **Diana Food** not only allows us to achieve high concentration of A-type PACs in **Urophenol®**, it keeps the nature of them during the extraction process, thus maintaining intact the activities inherent to this group of molecules.

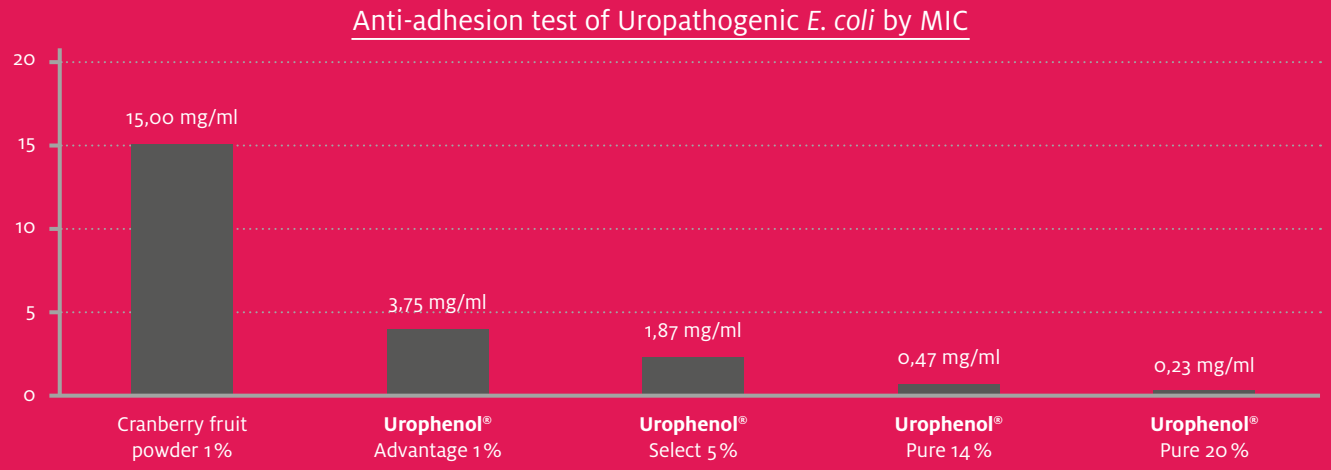
What is making PACs from Urophenol® extract so attractive?

PACs are chains of polymeric flavonoids, which interact strongly with proteins and glycoproteins. We find 2 sorts of PACs in the cranberry: A-type PAC and B-type PAC. Since cranberry is one of the only fruit having a high amount of A-type PACs, **Urophenol®** thus offers a highly purified source of A-type PACs.

The A-type oligomers are characterized by a specific double interflavan bound, which confers the anti-adhesion activity against uropathogenic *Escherichia coli* strains with the P-fimbriated phenotype (*Howell et al., 2005*) and bacteria involved in dental carries and periodontal infections (*Duarte et al., 2010*)

Urophenol® extract helps inhibit adhesion of uropathogenic E. coli.

Urophenol® Pure has the highest anti-adhesion effects of all cranberry products with the lowest quantity used as defined by the minimum inhibitory concentration (MIC).



Mode of action of PACs

MOLECULES INVOLVED IN THE PREVENTION OF UTI

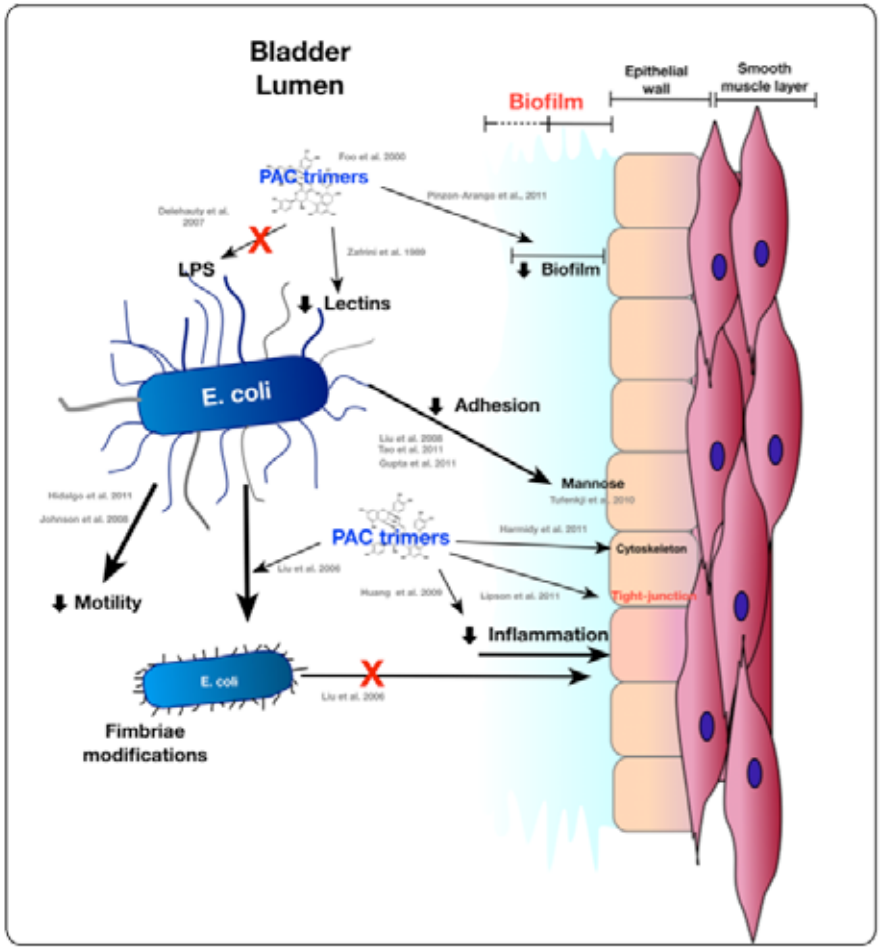
It has been shown by many that cranberry polyphenols and in particular PAC are bioactive against UTI *(Reed and Howell, 2009)*. Research has shown that cranberry PAC possesses a specific double interflavan bound, also known as A-type PAC, conferring anti-adhesion activity against uropathogenic *Echerichia coli* strains *(Howell et al., 2005)*. PAC from other plant species have instead B-type single interflavan bounds and do not have this antiadhesion property *(Howell et al., 2005)*. Foo et al. *(Foo et al., 2000)* have demonstrated that cranberry PAC trimers have more antiadhesion capacity than dimers or other oligomers. PAC with more than 3 flavan units are much less bioavailable than smaller ones *(Deprez et al., 2001)*.

MODE OF ACTION OF PAC AGAINST UTI

PAC are polyphenol tannins that interact strongly with proteins and glycoproteins *(Dangles and Dufour, 2006)*. They will prevent the adhesion of P-fimbriae, a proteinous extension at the surface of many gram-negative bacteria, by interacting with mannose receptors at the surface of the bladder epithelial cells *(Ofek and Beachey, 1978)*. PAC have also been shown to prevent the formation of a biofilm, a protective community of multiplying bacteria enclosed in extrapolysaccharide substances at that surface of epithelial cells, which act as a defense barrier against antibiotic treatments *(Pinzón-Arango et al., 2011)*.

ANTI-ADHESION PROPERTIES

PAC provide protection against uropathogenic bacteria by interacting with P-fimbriae in a dose dependant manner *(Gupta et al., 2011; Tao et al., 2011)*. Liu et al. *(Liu et al., 2006)* showed that PAC caused an alteration of the conformation of fimbriae which make them less adhesive to surfaces. Extensive work by the group of Tufenkji also revealed that PAC reduced bacterial adhesion to surfaces *(Eydelnan and Tufenkji, 2008; Tufenkji et al., 2010; O'May et al., 2012)*, while reducing bacterial motility *(Johnson et al., 2008; Hidalgo et al., 2011)*. They also block lectin-specific sites of the uropathogens thus preventing their adhesion to eukaryotic cells *(Zafriri et al., 1989)*. The action of PAC is not only directed to the bacterial cells but also to the host cells. They are altering the cytoskeleton of the host epithelium cells, preventing the formation of pedestal structure beneath the adherent bacteria a process thought to be of critical importance for the establishment of a productive infection. PAC reduce E-coli induced inflammation of blood mononuclear cells and macrophage *(Huang et al., 2009)*, a response most probably taking place also in the epithelial cells of the bladder {WANG:2000ga}. It has been suggested that PAC may tighten the junctions between cells *(Lipson et al., 2011)*.



Source: Desjardins et al, 2013 Laval University

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