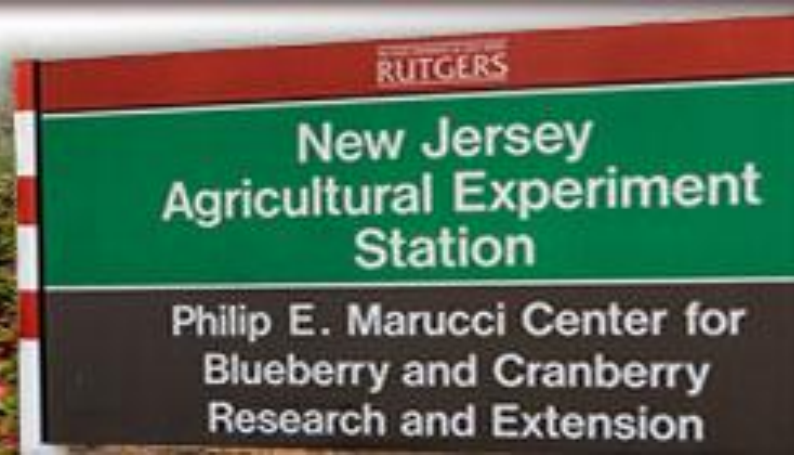


# Cranberry: The Spectrum of Health Benefits Supported by Science



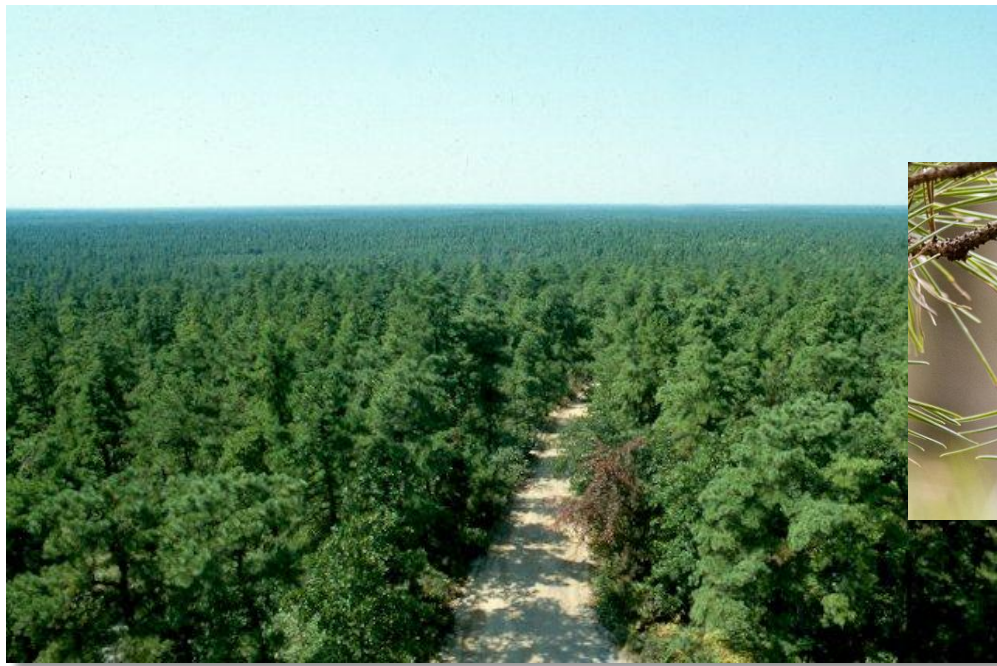
**Amy B. Howell, Ph.D.**  
Rutgers University (retired)  
Marucci Center  
for Blueberry Cranberry Research  
Chatsworth, New Jersey, USA  
[ahowell@scarletmail.Rutgers.edu](mailto:ahowell@scarletmail.Rutgers.edu)

# Blueberry and Cranberry Research



**Breeding ~ Diseases/Insects ~ Crop Management**





# **Cranberry** *Considered one of the healthiest fruits*

**Urinary tract health**

**Stomach ulcers**

**Oral cavity health**



**Microbiome/Gut health**

**Reduces risk factors  
for heart disease**

- Contains over 1000 different active constituents
- Supported by numerous scientific studies and clinical trials

To the bladder  
and beyond!



# Health Research

## Health Research Library

[Home](#) / [Health Research](#) / Health Research Library

Scientists are consistently exploring new ways that cranberries may impact and influence human health. With a database of over 900 studies and growing, The Cranberry Institute's Health Research Library collects and collates research abstracts. The database of abstracts may be searched by category or by any keyword you choose. In addition, you may also browse through abstracts by year. Here is a snapshot and links to the complete database for each key area of investigation.

### SEARCH

- Any -

### BROWSE BY YEAR

2025	2024	2023	2022
2021	2020	2019	2018
2017	2016	2015	2014
2013	2012	2011	2010
2009	2008		

- Used to develop the Berry Best Guidebook
- Over 900 Cranberry Health Studies
- Powerful tool for researchers, health care professionals, key opinion leaders

# Comprehensive guide for media and consumers on health benefits

<https://www.cranberryinstitute.org>



The   
CRANBERRY  
INSTITUTE™

 @cranberryinstitute  @cranberryinstitute

Stomach – Suppression  
of *H. pylori*

Gut Microbiome

Urinary Tract Health

Support of Nerve Cells & Cognition

Oral Health

Cardiometabolic Health

Cardiovascular Health

Diabetes & Blood Sugar Management

Non-Alcoholic Fatty Liver  
Disease Management

Anticancer - Reproductive

Anticancer - Bladder  
Barrett's Esophagus & Esophageal

Immunity & Virus Management

# What forms are best for research?



Juice



Dried Fruit



## Issues with Bioactive Compounds:

- Standardizing
- Stability
- Efficacious serving sizes

**Difficulty comparing health study results using different product forms**



Fruit Powder for Dietary Supplements

- ✓ Can be whole cranberry or enriched extracts
- ✓ Can be highly-standardized, stabilized, dosed
- ✓ Longer shelf-life
- ✓ No sugar
- ✓ Higher compliance rates
- ✓ Portable and convenient

## ***Anthocyanins***

- Color the fruit red – UV protection
- Anti-inflammatory, antioxidant

## ***Flavonols***

- Yellow pigments – attract insects
- Anti-inflammatory

## ***Proanthocyanidins (PACs)*** ★

- Contribute to astringency of cranberry
- Natural defense compounds against attack by predators, and insects
- Anti-bacterial, anti-inflammatory, antioxidant

## ***Fibers***

- cellulose, pectin, soluble, prebiotic oligosaccharides
- Gut health

# **Key Cranberry Bioactive Compounds**

## **Polyphenols**

# Health Functionality of Fruits and Vegetables



Antioxidant/  
Anti-inflammatory

- Heart healthy
- Immunity-Boosting

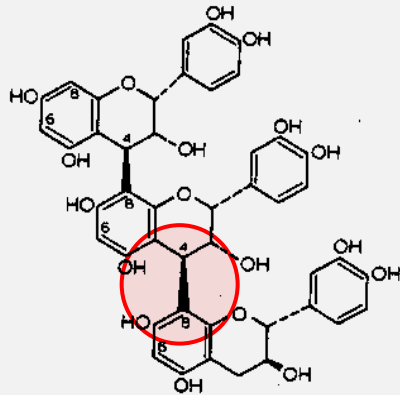
*What makes cranberries unique?*



# Cranberry Proanthocyanidins (PACs)

Condensed tannin polyphenol

## B-linked Proanthocyanidin



Grapes

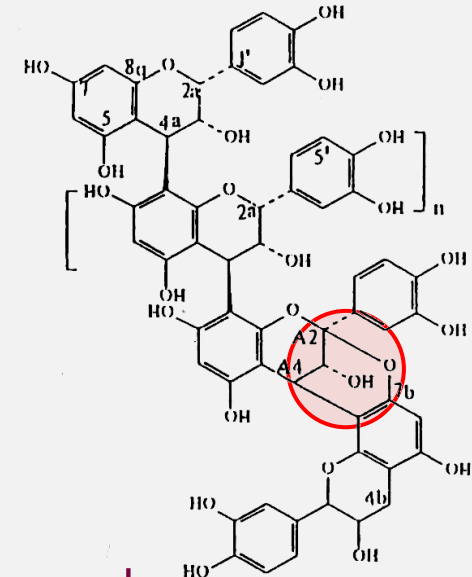


Chocolate

## A-linked Proanthocyanidin

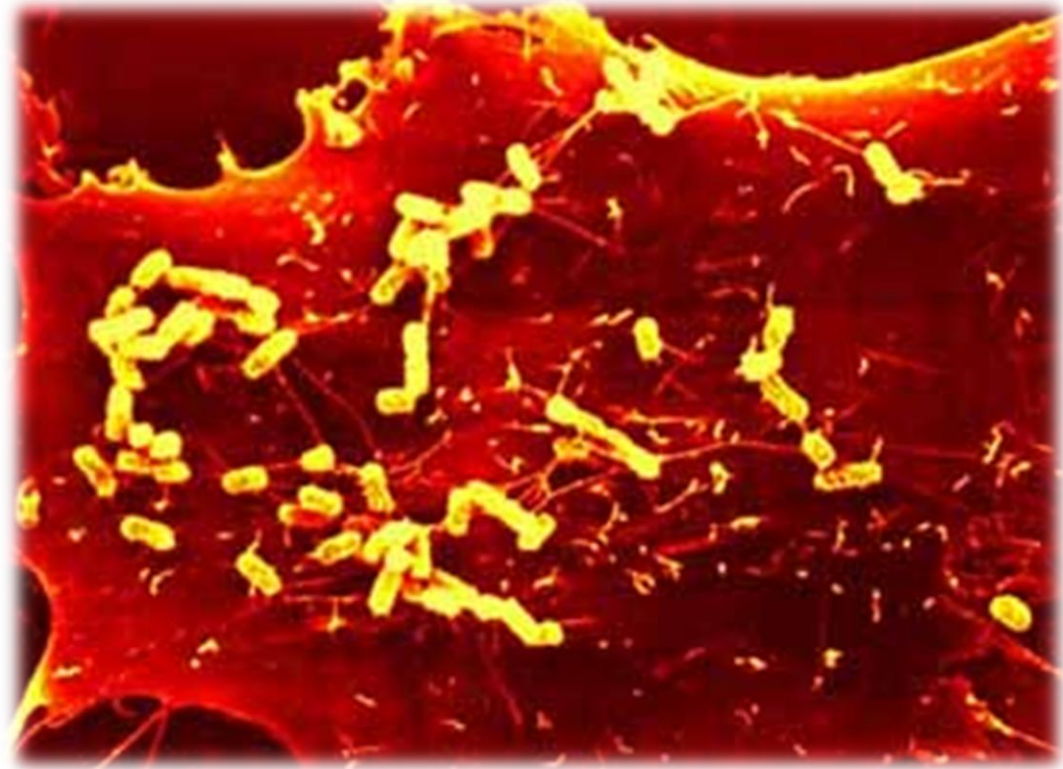
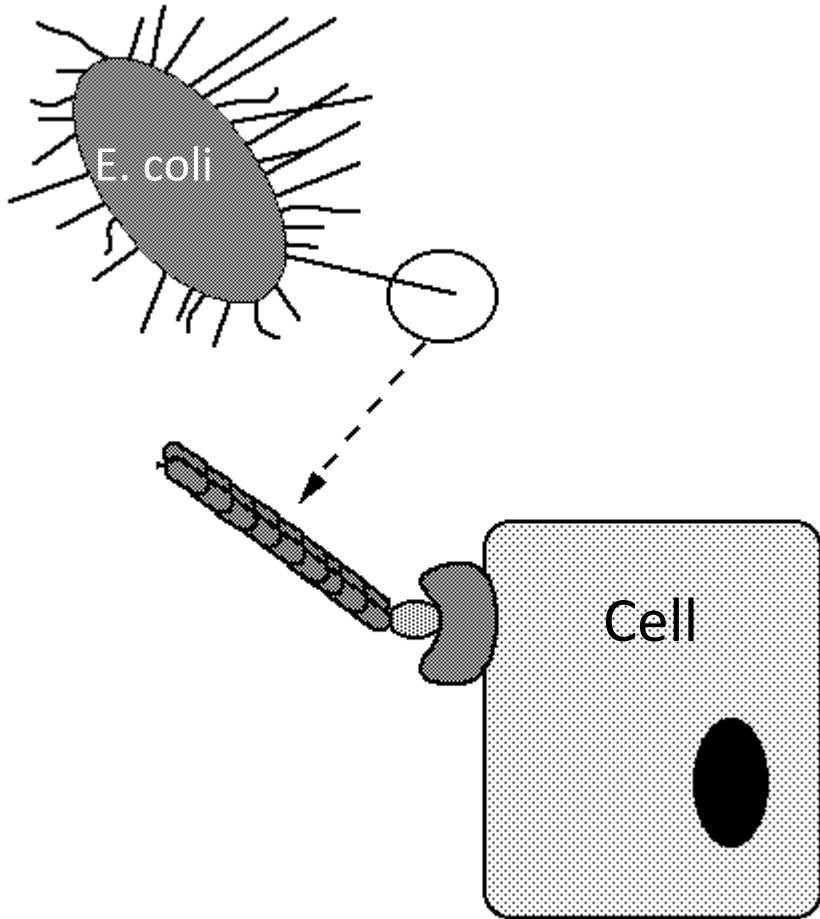


Cranberry

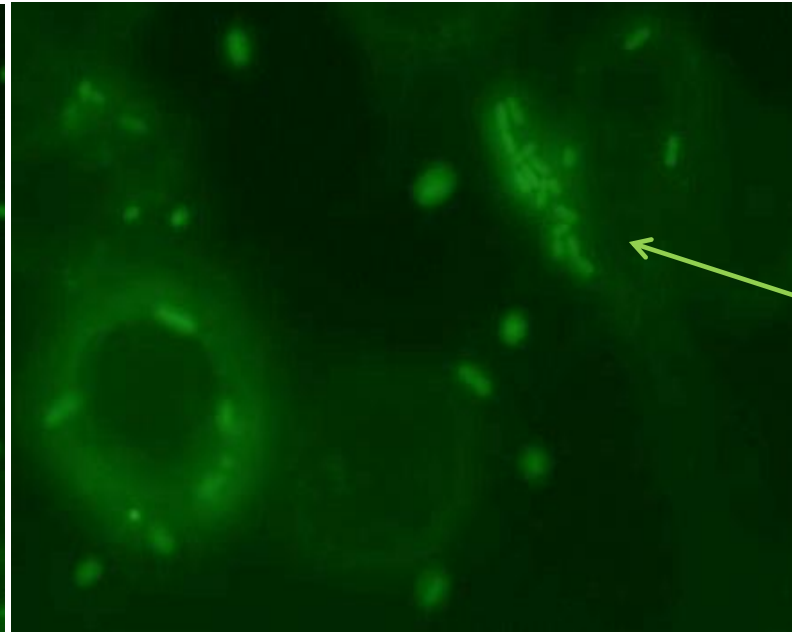
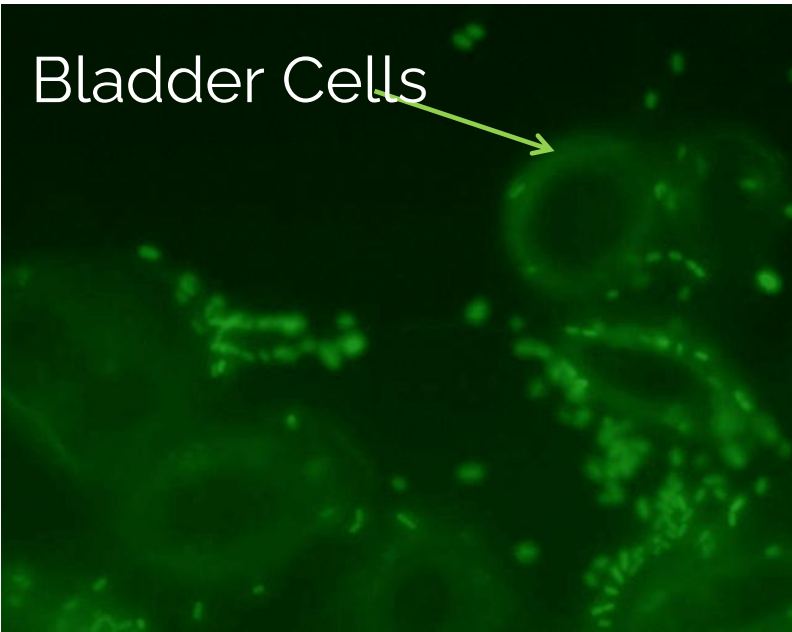


- Very stable bond
- Unique bioactivities

# Bacteria attach to cells to induce infection



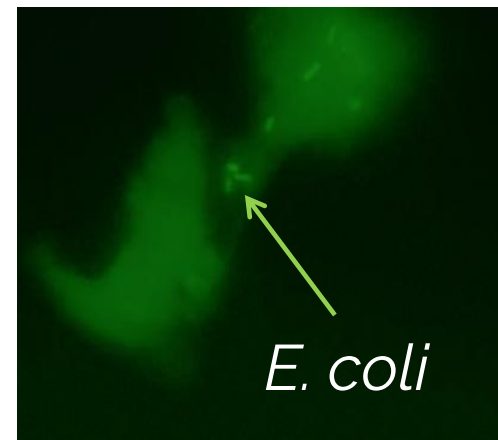
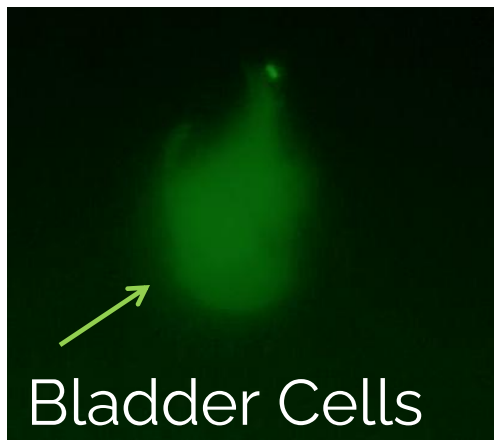
*Cranberry interrupts this first infection step*



No cranberry intake

*E. coli* bacteria

Urine with Bladder Cells and Adhered *E. coli* gfp+

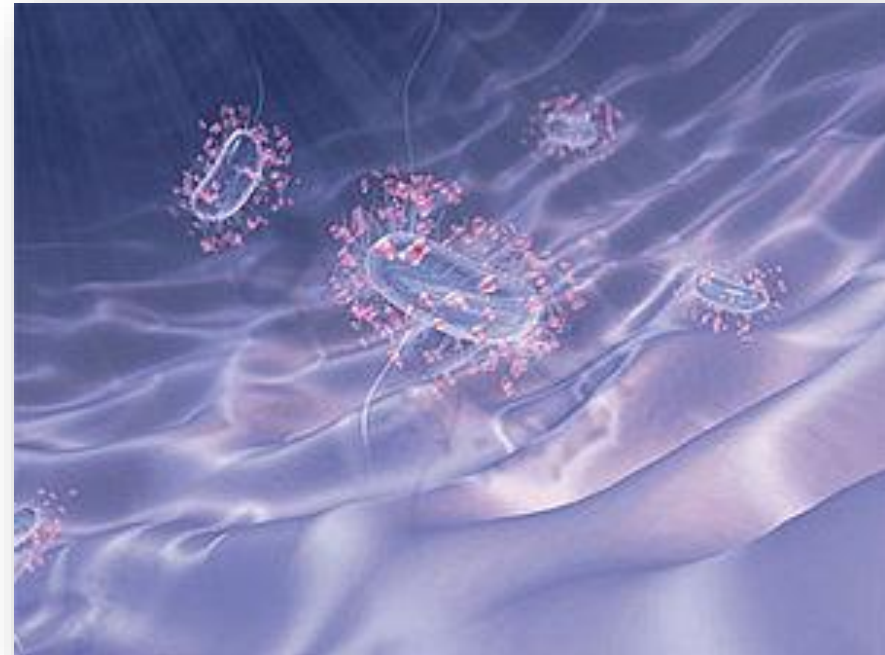


Cranberry intake prevents bacterial adhesion in urine

# Cranberry intake does not kill bacteria - they wash out of bladder in the urine



*E. coli* bacteria in bladder,  
trying to stick to cells



Cranberry compounds induce  
blocking of bacterial tips

# Positive Clinical Data on Different Groups

Elderly nursing home patients – Cranberry juice (~50% red. bacteriuria) Avorn et al., 1994 *JAMA*

University women – Cranberry juice (20% red. In UTI risk) Kontiokari et al., 2000 *British Med. J.*

Pregnant women – Cranberry juice (41-57% red. UTI) Wing et al., 2008 *J. Urol.*

Young girls (~50% red. recurrent UTI) Ferrara et al., 2009 *Scand. J. Urol. Nephrol.*

Children (43% red. UTI occurrences) Salo et al., 2011 *Clinical Infectious Diseases*

Women – Cranberry powder (52% red. UTI risk vs placebo) Stonehouse et al., 2025 *Am J Clin Nutr.*

Women – Cranberry juice (significant red. UTI occurrence) Maki, 2016 *Am J Clin Nutr.*

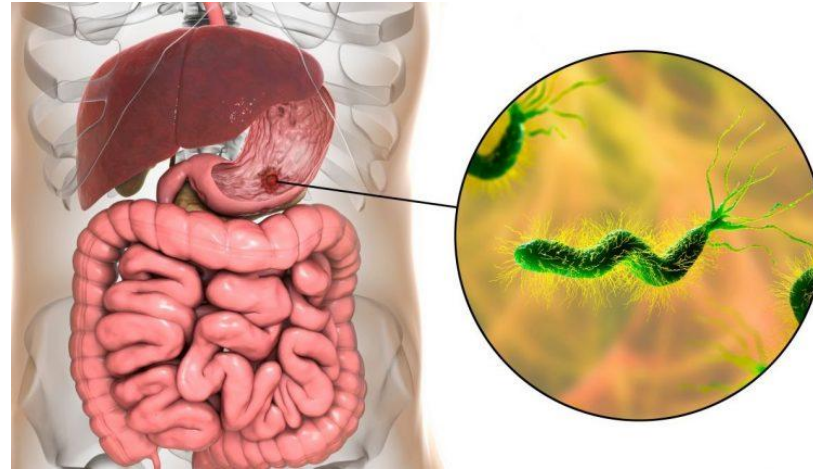
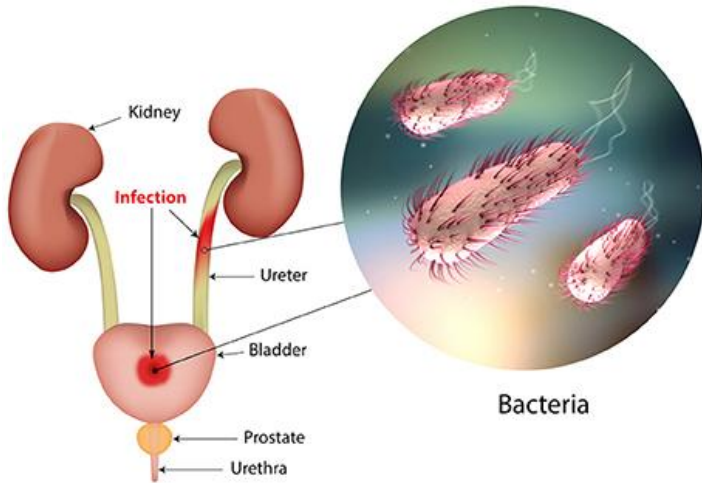
# Daily Intake for UTI Prevention Benefits



- 100% Pure cranberry juice 2 ounces (60 mL) (1/4 cup)
- Fresh or frozen cranberries 1/3 cup
- Cranberry powders (capsules) 240–2000 mg
  
- Cranberry juice cocktail drink 8-10 ounces (240-300 mL)  
(27% cranberry - Regular or “Light”)
- Dried cranberries 1/3 cup
- Cranberry sauces 1/4 cup



# Cranberry PACs – Manage bad bacteria - multiple sites



- Urinary Tract Infections

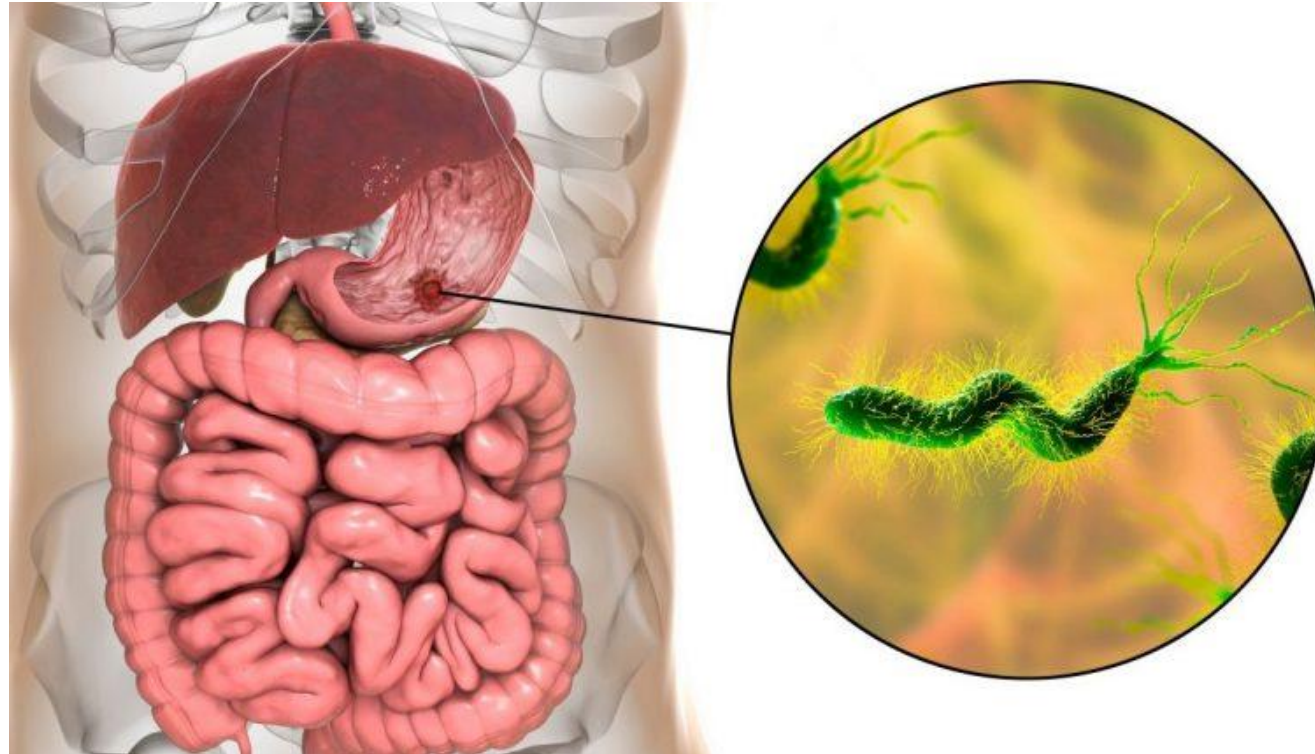
- Stomach Ulcers

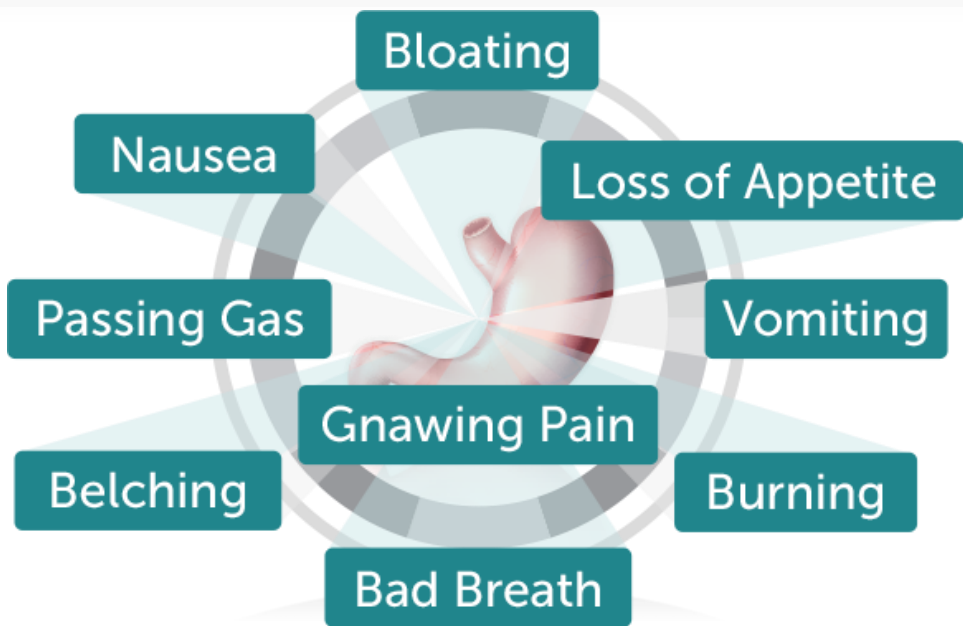
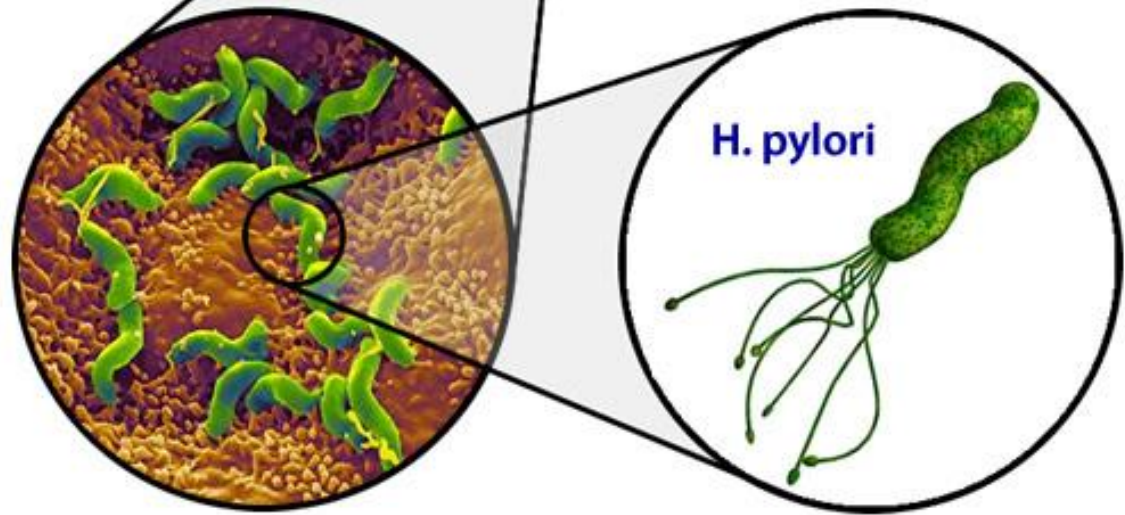
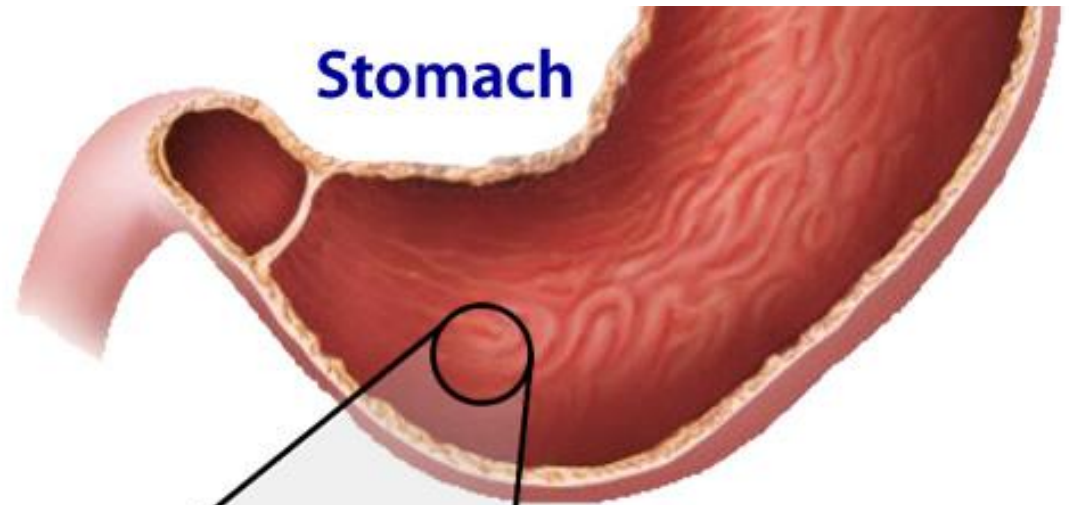
- Oral Cavity

**Prevent initial step in the infection process**

# Effect of Cranberry PACs

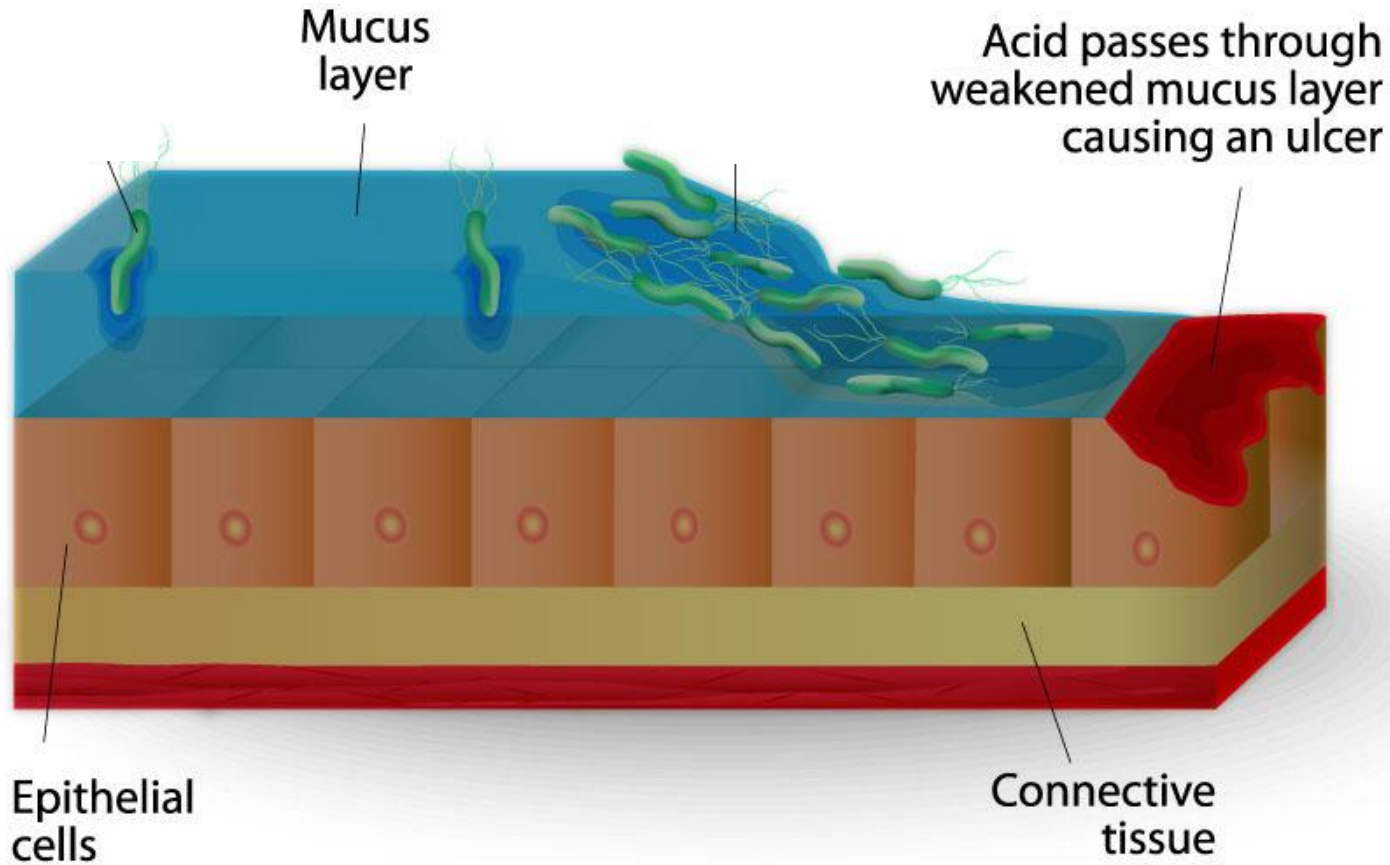
*H. pylori* - Bacteria that cause Stomach Ulcers



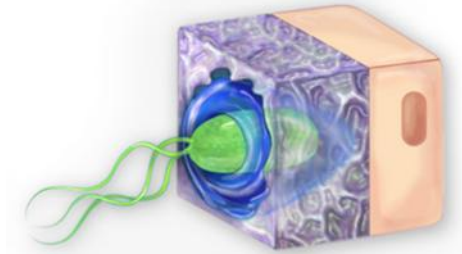
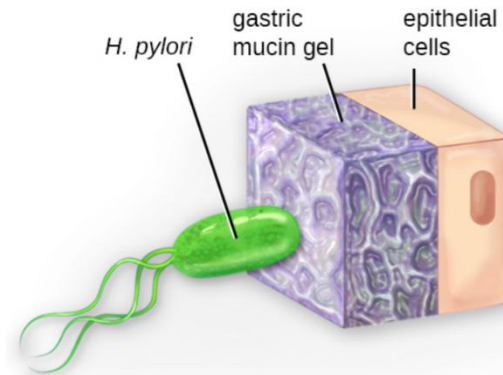


# How *H. pylori* Induces Ulcers

Bacteria are protected in stomach and multiply freely

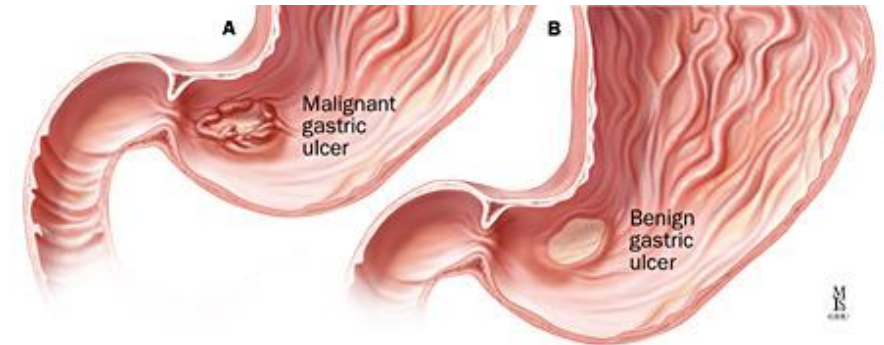
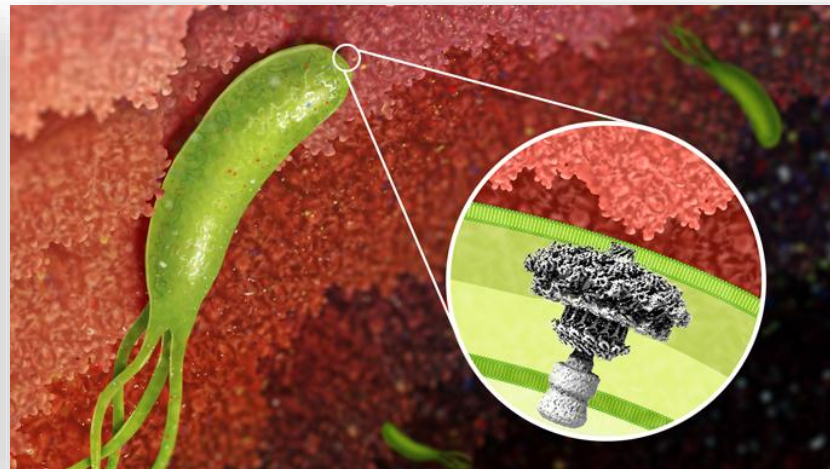


Stomach lining



# *H. pylori* classified by WHO as a **Class 1 Carcinogen**

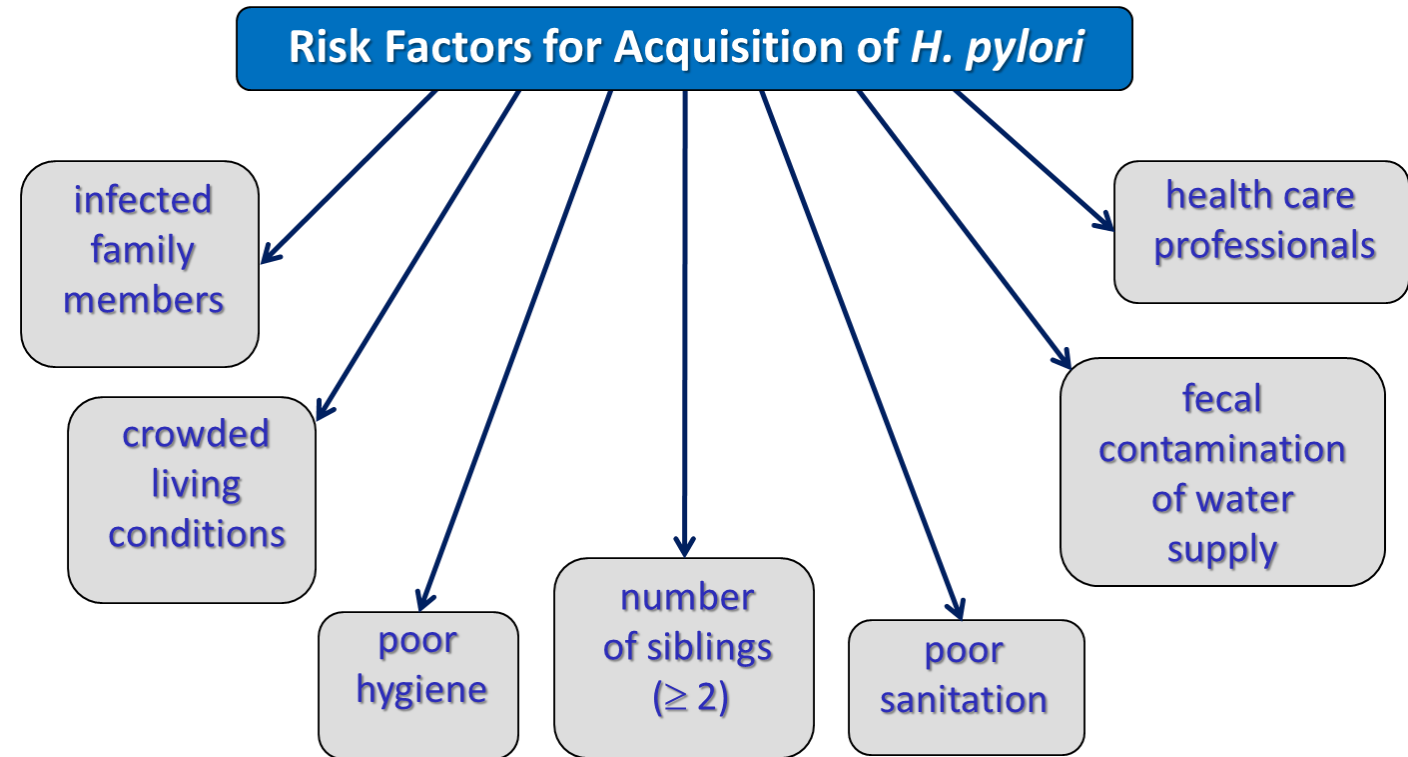
- If untreated, stomach cancer risk increases (3- to 6-fold)
- Potentially Dangerous Outcomes!



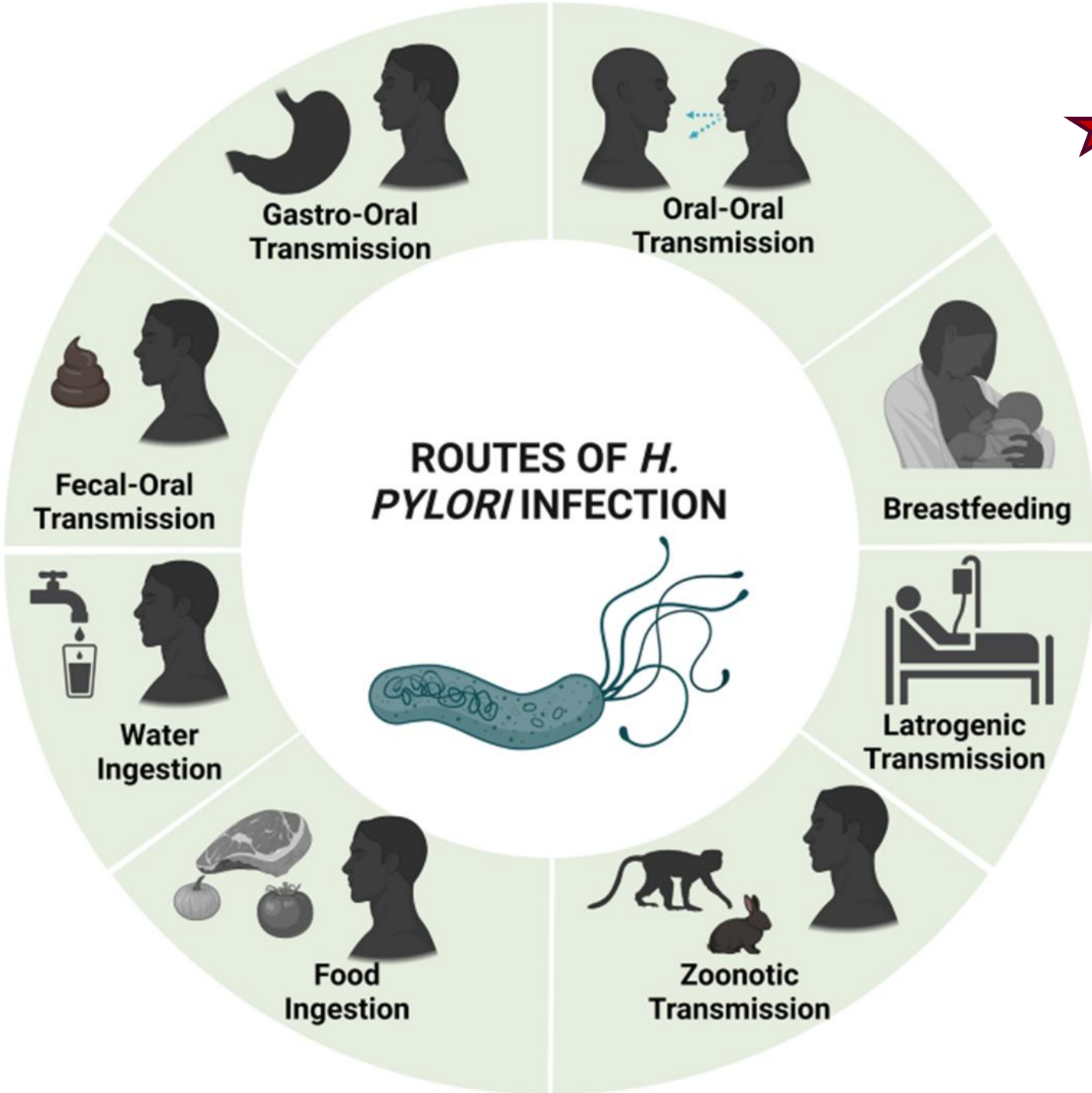
## Highly Contagious! Dangerous Bacteria



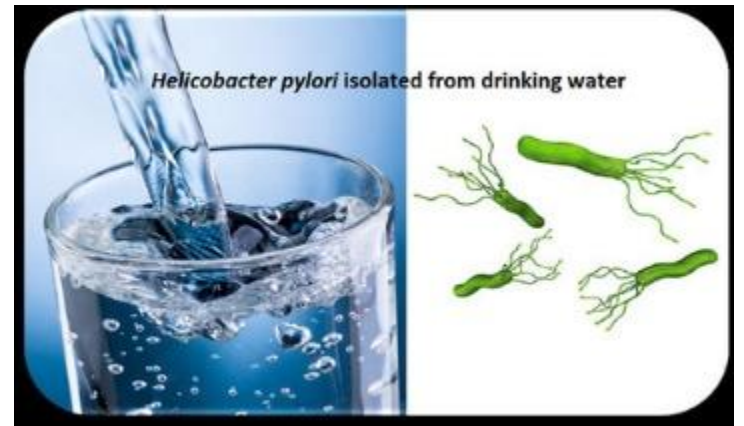
Crowded living conditions



**Important Risk Factors in India**

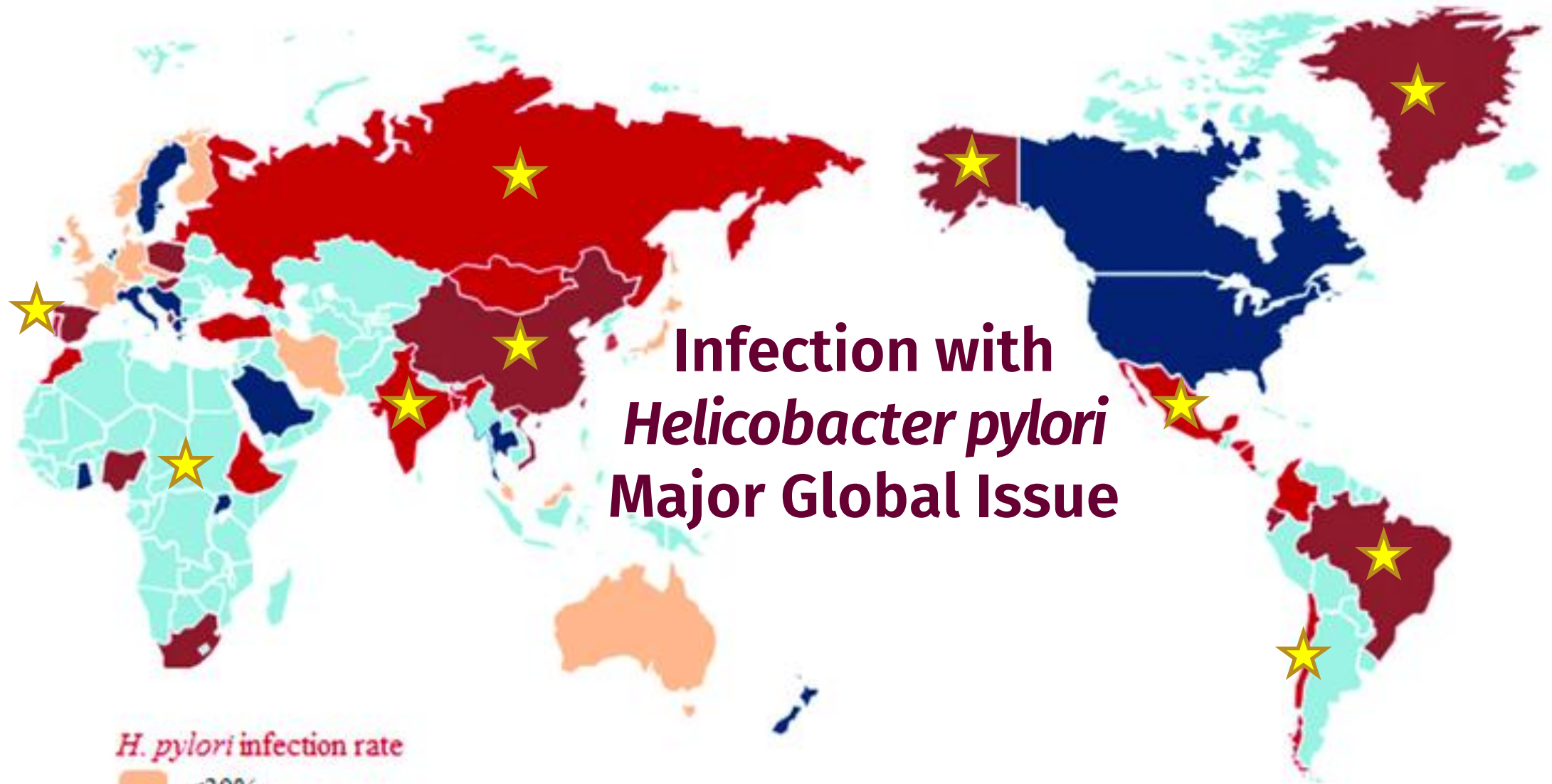


★ **High Reinfection Potential**



~2% of bottled mineral water in India contaminated with antibiotic resistant *H. pylori*

Ranjbar et al., *BMC micro.* 2016



**Infection with  
*Helicobacter pylori*  
Major Global Issue**

*H. pylori* infection rate

- <30%
- 30-50%
- 50-70%
- >70%
- Unclear

**Over 4 billion people infected with *H. pylori***

Eradicating *H. pylori*

Antibiotic Triple Therapy

6-8 Weeks

## High failure/reinfection rate

- Antibiotic resistance – efflux pumps
- Difficult side effects

## Microbiome damaged

- Negative overall health effects
- Worsening of gastric issues

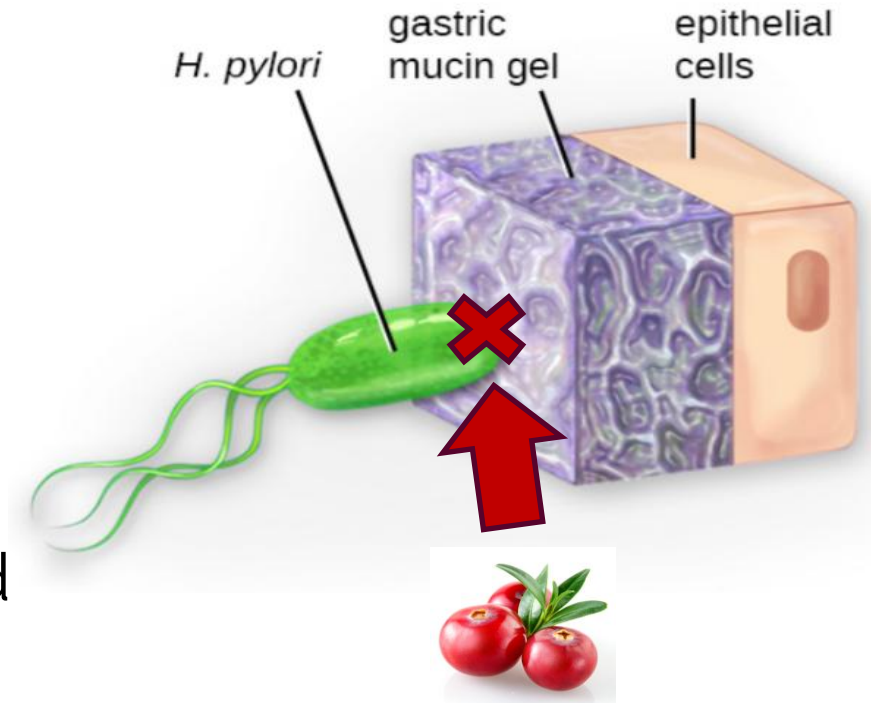
**Unsuccessful treatments significantly increase antibiotic resistance**

# Effects of Cranberry PACs on *H. pylori*


- Eradicates and suppresses *H. pylori* infection
- No resistance development
- **Maintains/improves healthy gut bacteria**

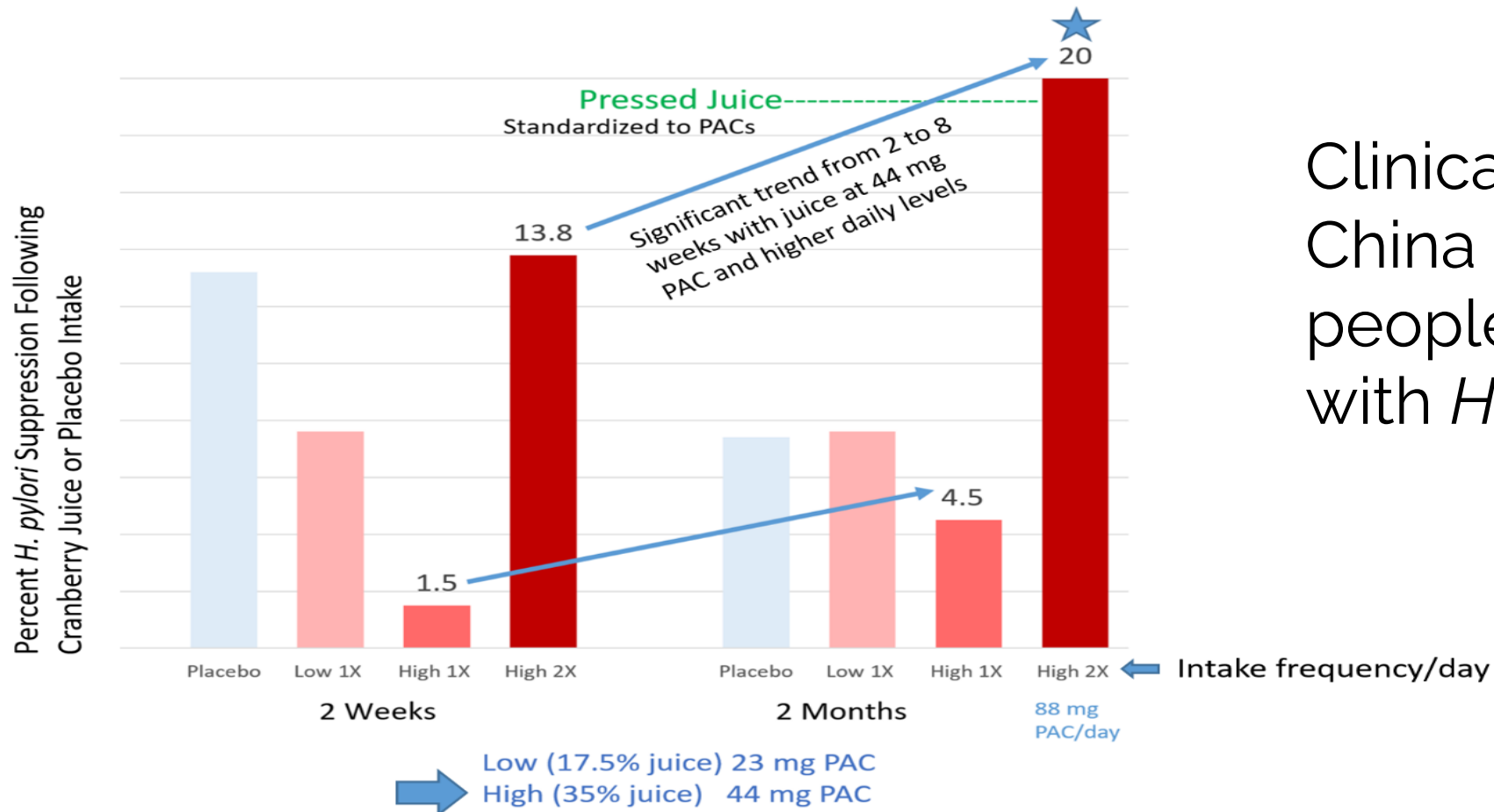
## HOW?

- Prevent adhesion of *H. pylori* to stomach
- Reduce survival ability of *H. pylori* in stomach acid
- Increase mucus layer
- Reduce inflammation



# Suppression of *Helicobacter pylori* infection by daily cranberry intake: A double-blind, randomized, placebo-controlled trial

Zhe-Xuan Li,\*  Jun-Ling Ma,\* Yang Guo,\* Wei-Dong Liu,<sup>†</sup> Ming Li,<sup>†</sup> Lan-Fu Zhang,<sup>†</sup> Yang Zhang,\* Tong Zhou,\* Jing-Ying Zhang,\* Ha-Er Gao,\* Xiao-Ying Guo,\* Dong-Man Ye,<sup>‡</sup> Wen-Qing Li,\* Wei-Cheng You\* and Kai-Feng Pan\*



Clinical trial in China with over 500 people infected with *H. pylori*

# Daily intake of cranberry for *H. pylori* suppression



**100% Pure Cranberry Juice: ½ cup taken twice daily**

- Can dilute in other juices or carbonated water
- No side effects or health risks

*Not a substitute for antibiotic treatments to kill bacteria, but a complementary approach to managing infections and retaining good gut bacteria*

# Strategies for Cranberry Use in *H. pylori* Management

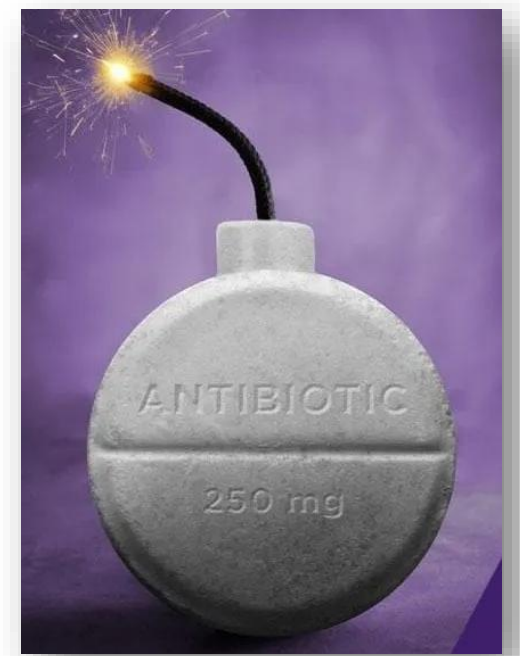
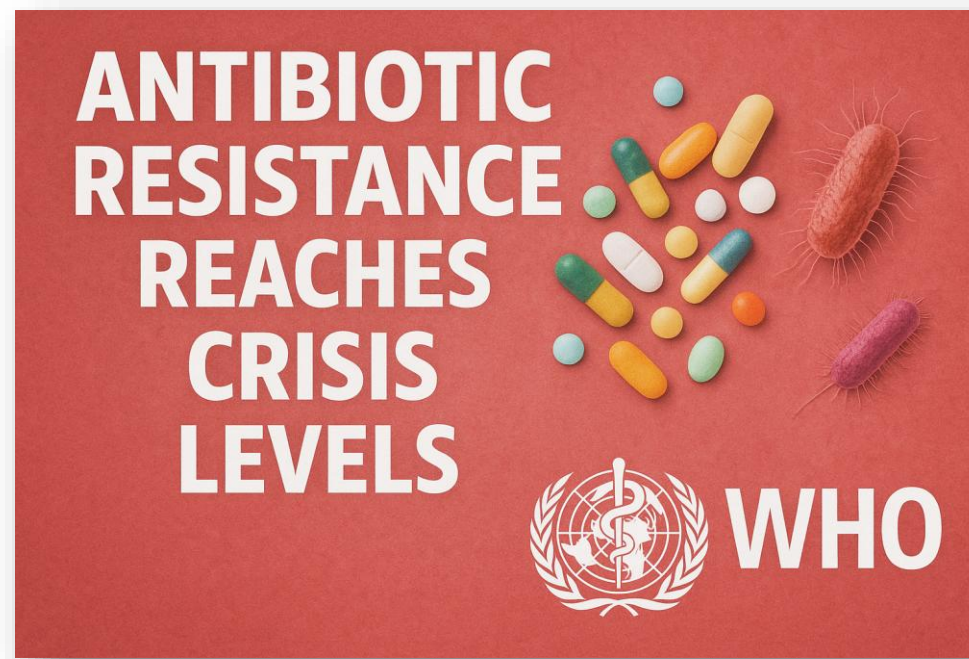
- *H. pylori* suppression
- Co-administration of the cranberry along with antibiotic therapies
- Antibiotic co-administration followed by suppression

**Reducing inoculum levels to manage infections**

# 50,000 new cases/day in India!

➤ Hospitals spread antibiotic resistant infections





- Directly causes over 1.2 million deaths/year (contributes to 5 million)
- Without changes, global deaths reach 39 million from 2026-2050
- **3 deaths/minute**

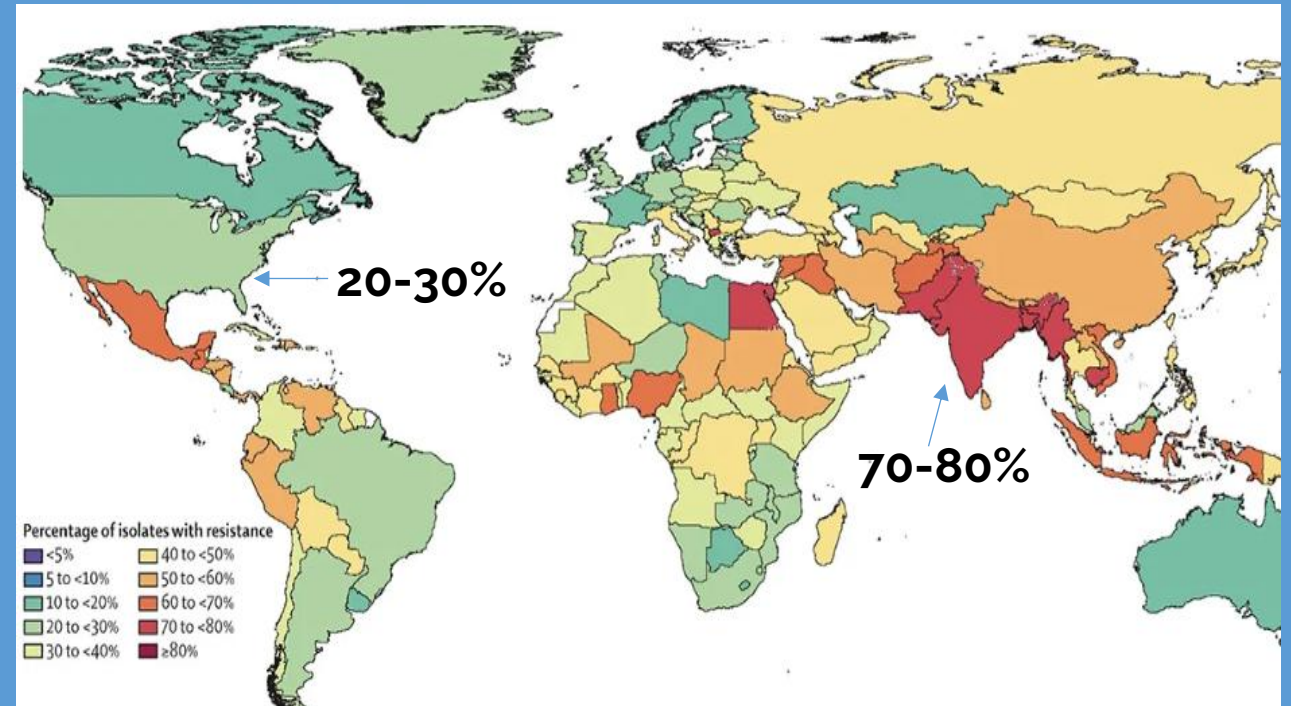
**TIME TO TAKE ANTIBIOTIC RESISTANCE SERIOUSLY**

*E. coli*



Urinary Tract Infections

*E. coli* resistance to Cipro

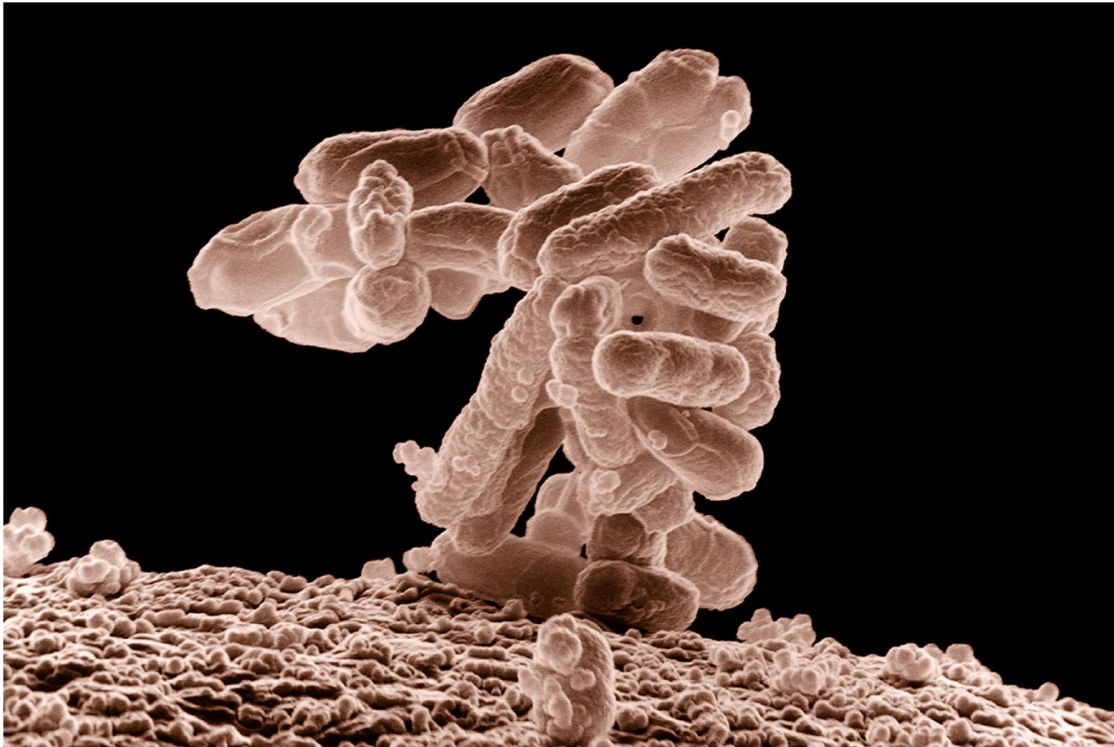


People are dying from resistant UTI infections in SE Asia/India



SHORT SHARP SCIENCE 27 February 2017

## UTIs could soon be life-threatening without new antibiotics



Resistant *E. coli* can make a UTI deadly  
Erbe/Pooley/REX/Shutterstock

THE TIMES OF INDIA INDIA

JERSEY SHORE BOAT SALE & EXPO SEPTEMBER 21-23  
FirstEnergy Park Home of the Lakewood BlueClaws! JerseyBoatExpo.com

CLICK HERE FOR MORE INFO

JERSEY SHORE BOAT SALE & EXPO

Jersey Shore Boat Expo

TOP SEARCHES: Arvind Kejriwal Elections 2018 Kerala floods Narendra Modi Yogi Adityanath YS Jagan

CIBT Visas India | CIBT Visas: The Fastest & Easiest Way To Get Your Travel Visa for India! cibtvisas.com/India  
Apply Now Online

## UTIs turn fatal with reckless antibiotic use

Durgesh Nandan Jha | Updated: Jun 27, 2017, 05:04 IST



Ad

Jersey Shore Boat Sale & Expo - Sept. 21-23, FirstEnergy Park, Lakewood  
This show has something for everyone - hundreds of boats from the state's top dealers.



### HIGHLIGHTS

- UTI is one of the most common bacterial infections that affect one or more parts of the urinary system
- It is more common in women than men
- Four to five patients suffer kidney failure due to UTI infection each year

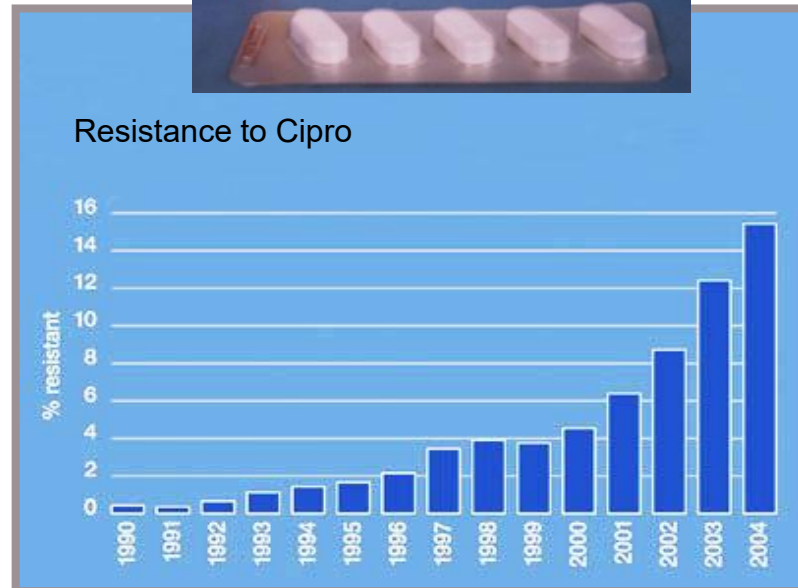
Representative image

NEW DELHI: Indiscriminate use of antibiotics in India is making common infections like urinary tract infection (UTI) deadly. Urologists say five out of every 10 UTI patients are now requiring injectable drugs and, in some cases, even that fails to help.

"We are forced to use old injectable antibiotics with known toxicity to kidneys, for example Colistin, to save patients with multi-drug resistant UTI," Dr Anup Kumar, professor and head of the urology department at Safdarjung hospital, said.

# Current Management of UTIs

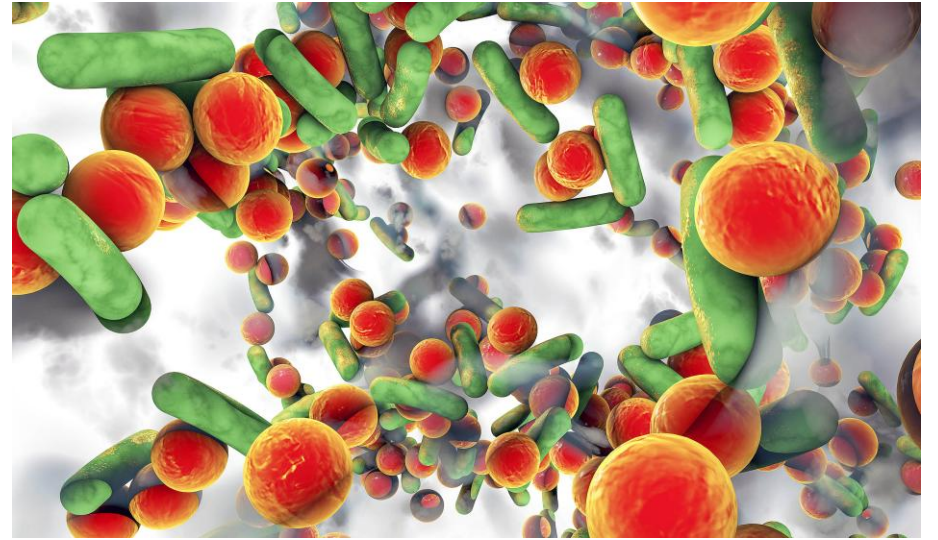
- Antibiotics used to treat active infection
- Low-dose antibiotics used **DAILY** for preventing recurrent infections



**In 1980's,  
resistance was  
virtually zero**



# Why is this happening?



# Overuse & misuse



*Patient demands*



**Over-the counter  
availability in other  
countries**



**Use in livestock feed**



# Effects of Cranberry PACs

## Oral Cavity Health





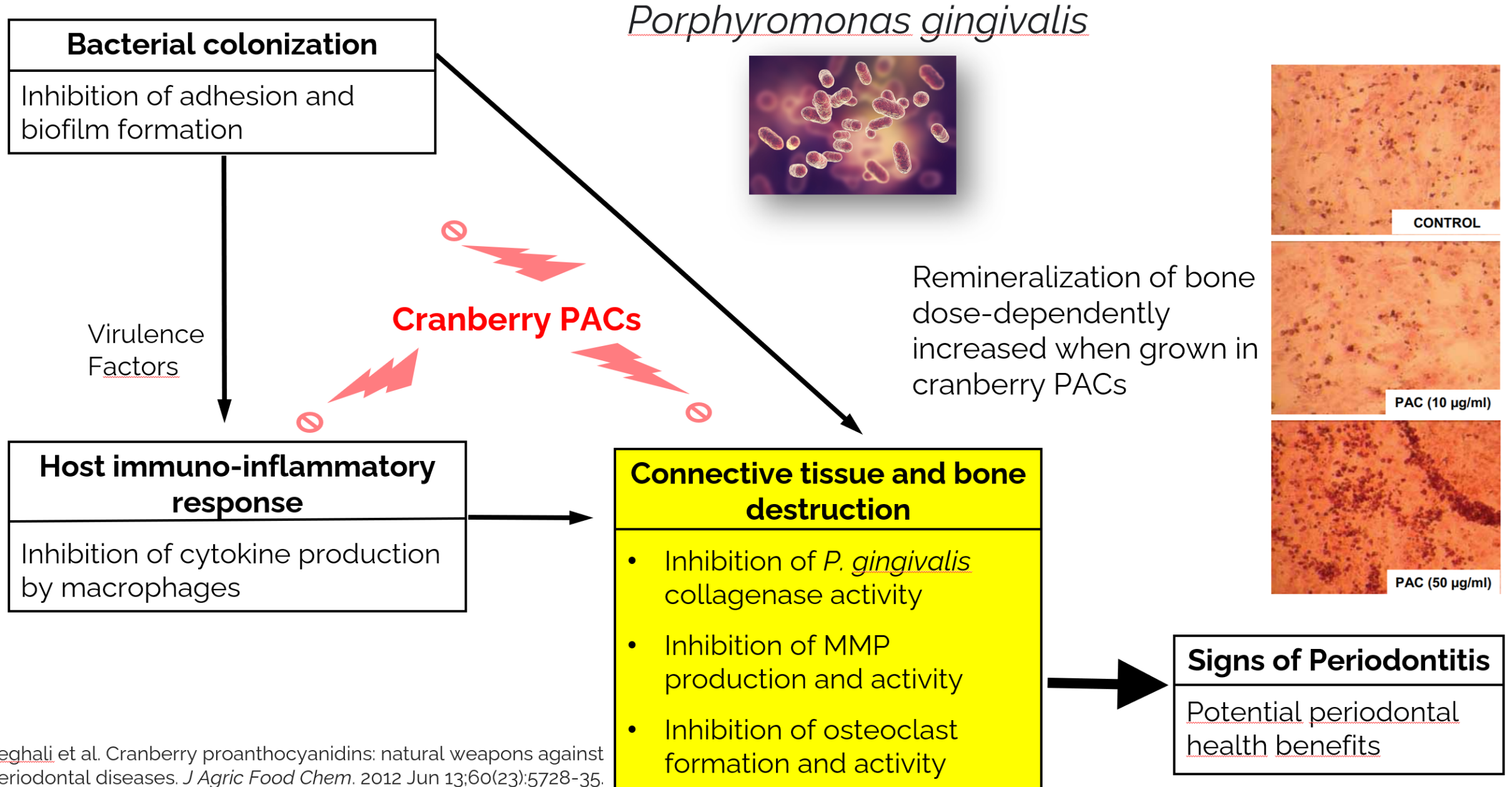
# Cranberry PACs - Oral Cavity Health

- **PACs reduced incidence and severity of cavities**
- **PAC-based mouthwash**
  - Reduced salivary bacterial counts after 6 weeks
  - Prevented adhesion of *Streptococcus mutans*/*S. sobrinus*
  - Reduced plaque by promoting desorption of bacteria from biofilms on teeth
  - Inhibited *S. mutans* enzyme activity/bacterial acid production

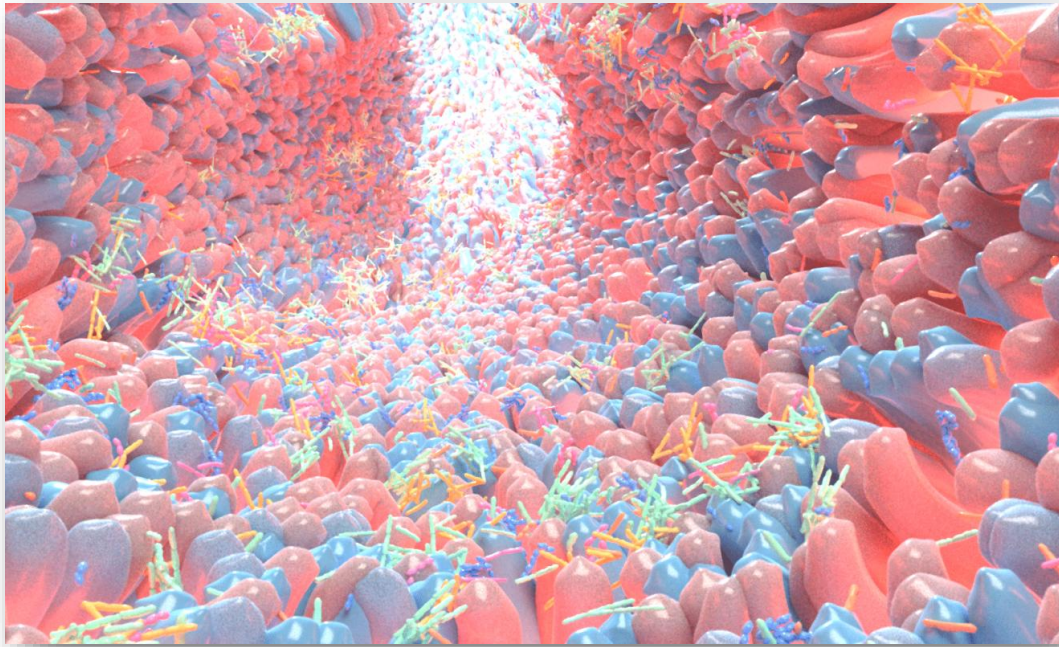
Mechanism related to PAC A-type linkage rigidity
- **PACs not killing bacteria**, retained oral microbiome, no resistance developed



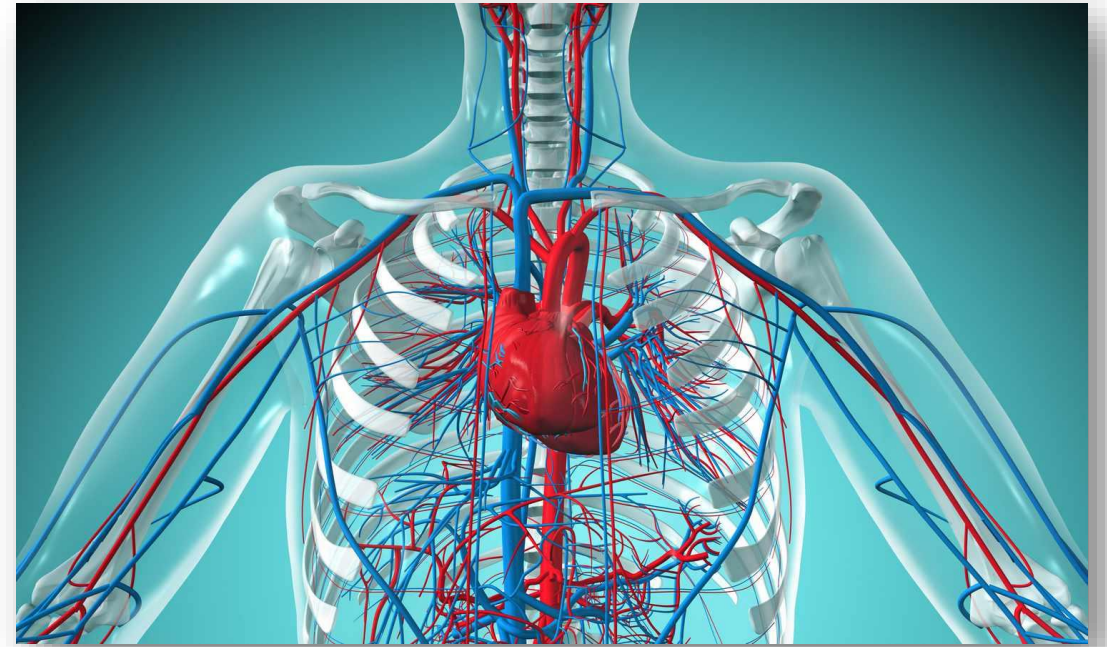
# Cranberry PACs and Periodontal Disease



# Other Research Areas



**Gut Health**



**Cardiometabolic Health**

# Metabolic Syndrome

If you have any 3 of these conditions:

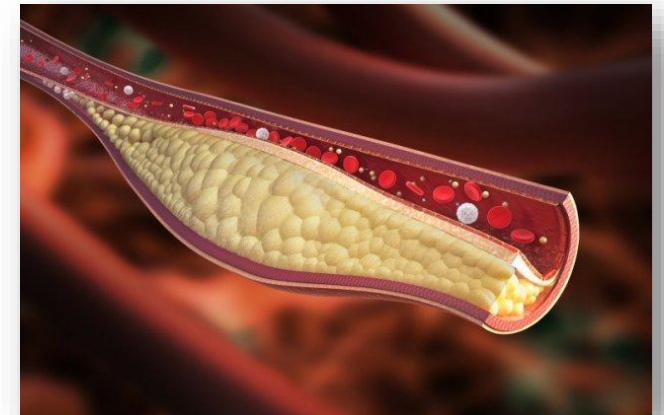
- ✓ Abdominal obesity (pot belly)
- ✓ High cholesterol/Triglycerides
- ✓ High blood pressure
- ✓ High blood sugar/Insulin resistance
- ✓ Inflammation (High CRP)

You are at increased risk for:

**Diabetes, Heart Disease, Reduced Cognitive Functioning**



Link between air pollution  
and heart disease

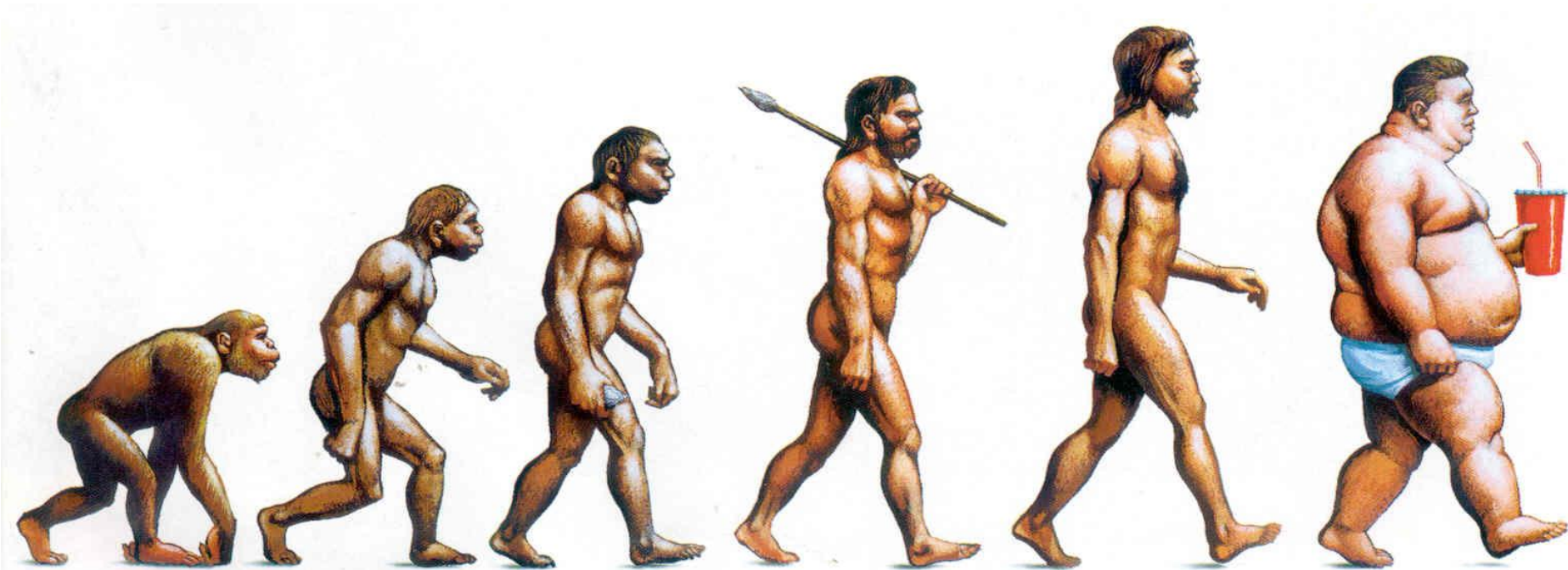


# Adults in US/Canada with Metabolic Syndrome

*Prevalence Increases with Age*

Ages 18-39: ~19-36% have it

Ages 60-79: ~40-50% have it



# Cranberry and Metabolic/Obesity/Blood Sugar

## High fat/high sugar diet



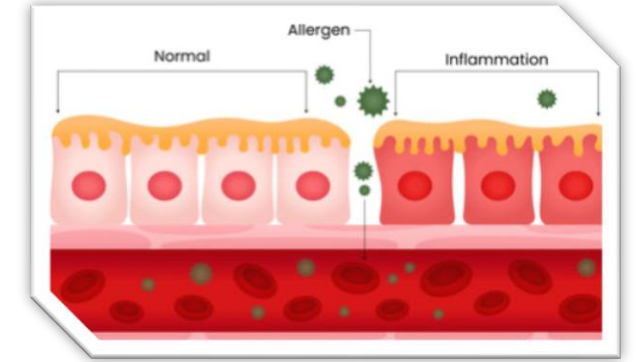
- Cranberry **protected against diet-induced obesity and insulin resistance**
  - Reduced oxidative stress and inflammation
- Acute dose of high-PAC cranberry beverage **improved glucoregulation, reduced inflammatory biomarkers**
- Cranberry juice (light) consumption **lowered glucose concentrations**

Hsia et al. 2020. Effect of daily consumption of cranberry beverage on insulin sensitivity and modification of cardiovascular risk factors in adults with obesity: a pilot, randomised, placebo-controlled study. *Br J Nutr.*

Anhê et al. 2015. A polyphenol-rich cranberry extract protects from diet-induced obesity, insulin resistance and intestinal inflammation in association with increased *Akkermansia* spp. population in the gut microbiota of mice. *Gut*

# Cranberry and Gut Lining Integrity

**Leaking in the gut lining allows** toxins into the blood stream causing immune system to trigger inflammation →



## High-fat, high-sugar diet in mice

Caused weight gain, increased intestinal permeability, *E. coli* invasion, inflammation

## Cranberry:

- **Reversed negative effects**
- **Reduced chronic inflammation** associated with gut barrier dysfunction
- **Strengthened intestinal barrier** by maintaining intestinal immunity, increasing mucus secretion– *Akkermansia* feeds on mucin

# Cranberry and Positive Gut Health Effects



- Improves gut lining integrity – increases mucin production
- Reduces aspects of “Leaky Gut Syndrome”
- Microbiome remodeling – increases *Bacteroidetes*, reduces *Firmicutes*
- Reduces inflammation, oxidative stress/improves immunity
- Improves glucose control



**Cranberry  
polyphenols**

# Cardiovascular Benefits

**Heart Disease...**

**It's all about**



## Improving Blood Flow



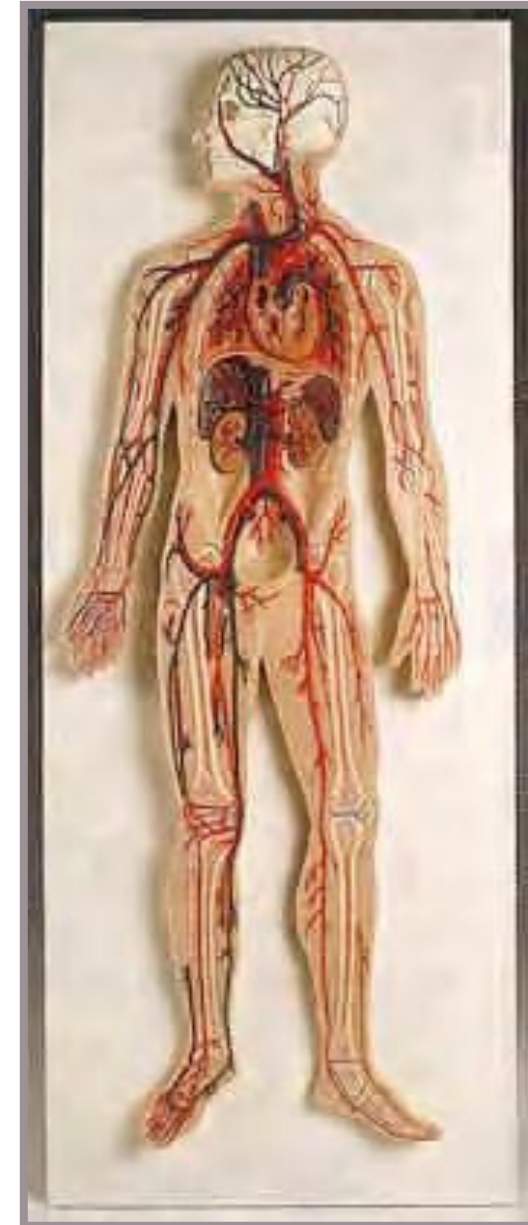
Inflexibility of arteries

LDL cholesterol oxidation

Inflammation (similar to aspirin – inhibit COX-2 expression, decreases proinflammatory prostaglandin synthesis)



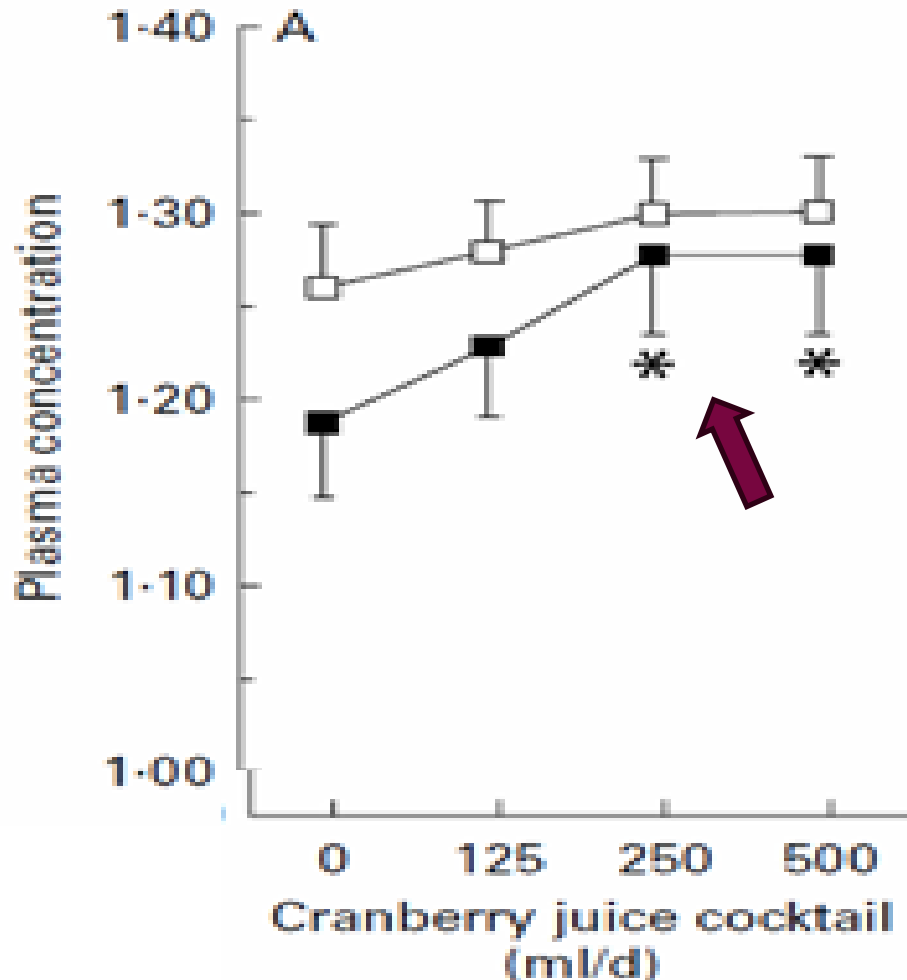
Flow-mediated dilation (FMD) after 2 hours



# Cranberry increases HDL-cholesterol concentrations in men

Couillard - Laval University

Changes in plasma HDL-cholesterol (mmol/l)



- Abdominally obese men
- Increasing doses, 4 wks each
- 250mL Light CJC/day
- 8.6% increase in HDL
- Drugs ~ 10% increase

# Reasons to include cranberries in the daily diet



- Make big impact on **slowing antibiotic resistance**
- Inexpensive, convenient functional food
- Effective at **reasonable serving sizes**
- **Additional health benefits** possible
  - Anti-adhesion in multiple sites in the body
  - Antioxidant/anti-inflammatory/heart health

# Review Article on Cranberry Health Benefits

## Cranberries and Their Bioactive Constituents in Human Health

Information about the bioactive compounds in cranberry and how they may protect against UTIs, cardiovascular health, etc.

Blumberg et al. 2013. Cranberries and their bioactive constituents in human health. *Advances in Nutrition* 4(6):618-32

<http://advances.nutrition.org/content/4/6/618.full>

FREE OPEN ACCESS

A scenic landscape photograph featuring a large field of vibrant red flowers in the foreground, a calm blue lake to the right, and a dense green forest on a hillside in the background under a bright blue sky with scattered white clouds.

Any  
Questions??

**Amy B. Howell, Ph.D.**

[ahowell@scarletmail.Rutgers.edu](mailto:ahowell@scarletmail.Rutgers.edu)