

AHG WEBINARS FOR HERBALISTS PRESENTS:
“MEDICINAL BERRIES AND ANTHOCYANINS”
MIMI HERNANDEZ, RH (AHG), AHG EXECUTIVE DIRECTOR

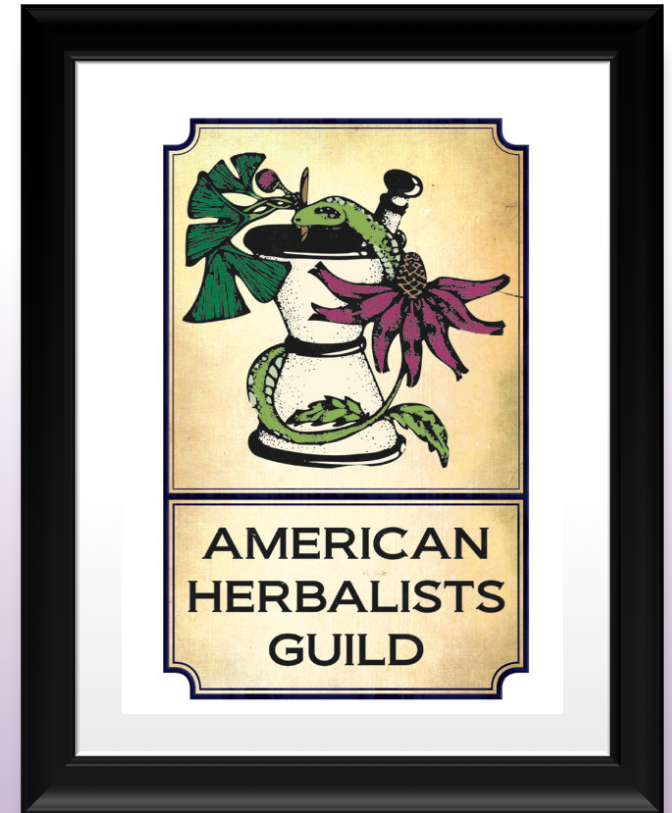
HOSTED BY MICHELE MARLOW
WEBINAR ASSISTANT FOR THE AHG



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15/01/2019

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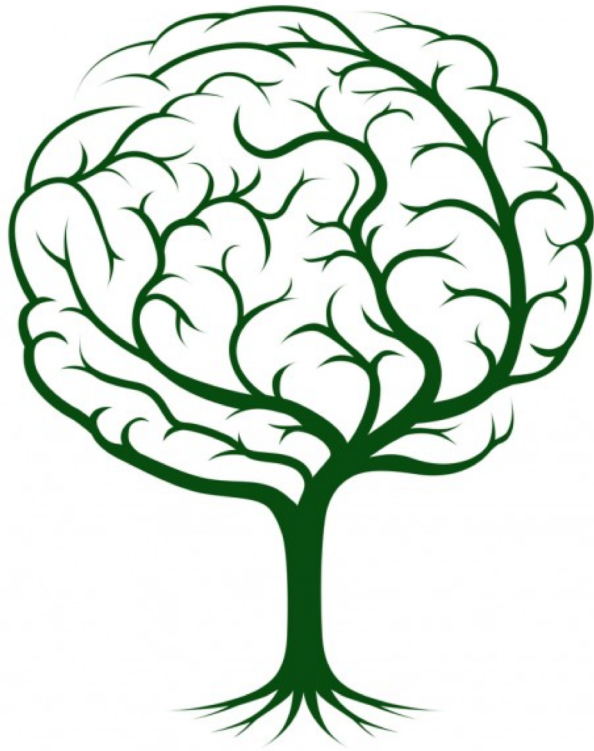
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15/01/2019



Medicinal Berries and Anthocyanins

Mimi Hernandez, MS, RH(AHG)



+ What is a berry?



- Botanically speaking...
- A fleshy fruit produced from a single ovary
- The seeds are usually embedded in the flesh of the ovary.
- Bacciferous: A plant that bears berries



+ Not a berry...

■ Technically



Aggregate fruits-
contain seeds from
different ovaries of
a single flower as in
raspberries and
blackberries

+ For this class...What is a berry?

- Colloquially, "berry" is a term for any small edible colorful fruit.
- These "berries" are usually juicy, round or semi-oblong, brightly colored, sweet or sour, and do not have a stone or pit, although many seeds may be present.



+Berries!

Common Characteristics

- COLOR!! Attracts seed distributors
- Between 4 and 9 grams of fiber per cup.
- High Vitamin C content
- Low Calorie
- Low Glycemic



+Berry Queen



- Raspberries are the high-fiber berry leader with 8 grams of fiber in every cup.
- Only 64 calories
- 15 grams of carbohydrate per single cup serving
- Calorie per calorie one of the highest fiber foods you will find.

+ Berry Queen

- Of all berries, strawberries have the least amount of calories and the lowest carbohydrate density with a slim 45 calories, 11 grams of carbohydrate, and 3 grams of fiber per cup.
- In fact, according to the diabetic exchange list you may enjoy an entire 1 1/4 cups of sliced strawberries per single fruit serving.
- This serving delivers over 200% of your daily dose of vitamin C.



+Low Glycemic

- GI for blueberries is somewhere in the range of 40-53
- Blackberries, raspberries, and strawberries repeatedly score closer to 30 than to 40.

Classification	GI range	Examples
Low GI	55 or less	Some fruits and vegetables, legumes/pulses, nuts, and products low in carbohydrates
Medium GI	56-69	whole wheat products, basmati rice, sweet potato, sucrose, baked potatoes
High GI	70 and above	white bread, most white rices, corn flakes, cereals, glucose, maltose

+ Berries and Diabetes

- A recent study found that blueberries, along with other berries, clearly have a favorable impact on blood sugar regulation in persons already diagnosed with type 2 diabetes.
- Participants in the study who consumed daily servings of low-GI fruits per day (including blueberries) saw significant improvement in their regulation of blood sugar over a three-month period of time.
- Anthocyanins have a significant potency of antiobesity and have important implications for preventing metabolic syndrome.

J Agric Food Chem. 2008 Feb 13;56(3):642-6. doi: 10.1021/jf073113b. Epub 2008 Jan 23.

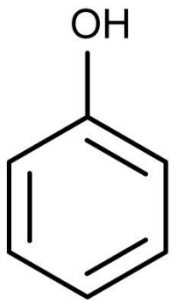
Tsuda T1. Regulation of adipocyte function by anthocyanins; possibility of preventing the metabolic syndrome.

+ Berry Polyphenols

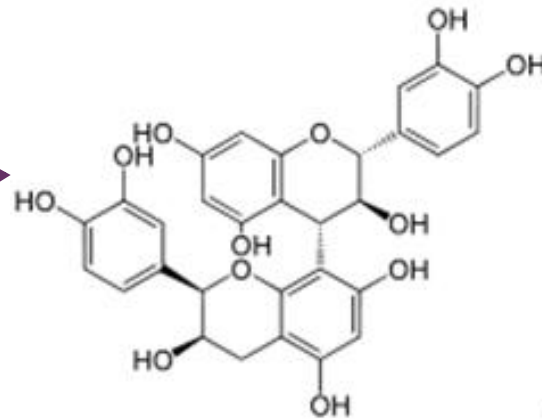
- These bioflavonoids include anthocyanins and their precursor, proanthocyanidins, both of which are voracious scavengers of free radicals.



+ Packed with Polyphenols

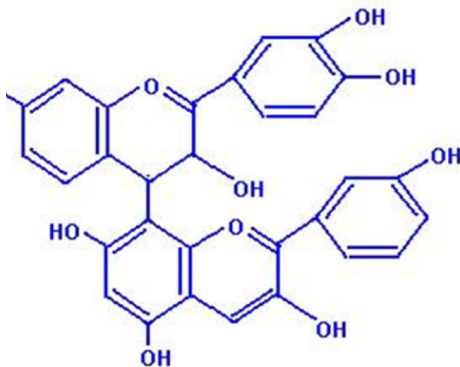


One phenol

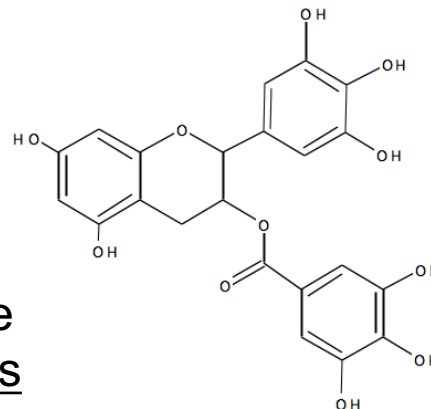


Polyphenol OPCs
Proanthocyanidin B4
is found in the lychee
pericarp, in grape
seeds, and skins

**COLORFUL
BERRIES**



Tannins are
polyphenols



EGCG a
polyphenol



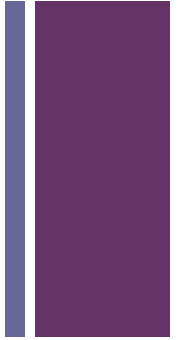
+ Oligomeric Proanthocyanidins (OPCs) =Condensed Tannins

- Tannins are astringent
- Astringents “tighten the weave” of a membrane or wounded area.
- Tannins are too large to cross into the bloodstream
- Condensed tannins are small enough to go into the bloodstream.
- OPCs are astringents for the inside of our blood vessels.

Tannins are extremely polar and able to attract other negatively charged molecules. This property of electronegativity explains tannin’ s capacity to bind to pretty much any organic molecule in its path.



Proanthocyanidins



- Colorless polyphenols, when leaves naturally change from green to red in the fall, they transform colorless proanthocyanidins into colorful anthocyanidins.

The main functions of proanthocyanidins are:

- antioxidant activity
- stabilization of collagen
- maintenance of elastin in connective tissue, blood vessels and muscle.
- Reduction of edema
- visual performance
- Found to cross blood brain barrier: ADD. Alzheimer's.

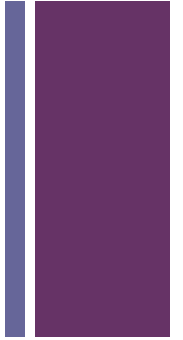
+ Anthocyanins=Color

- Polyphenol
- A type of flavonoid
- Glycosides of Anthocyanidins
- Water Soluble
- Red, Purple, Blue Pigments
- Flavorless
- Astringent

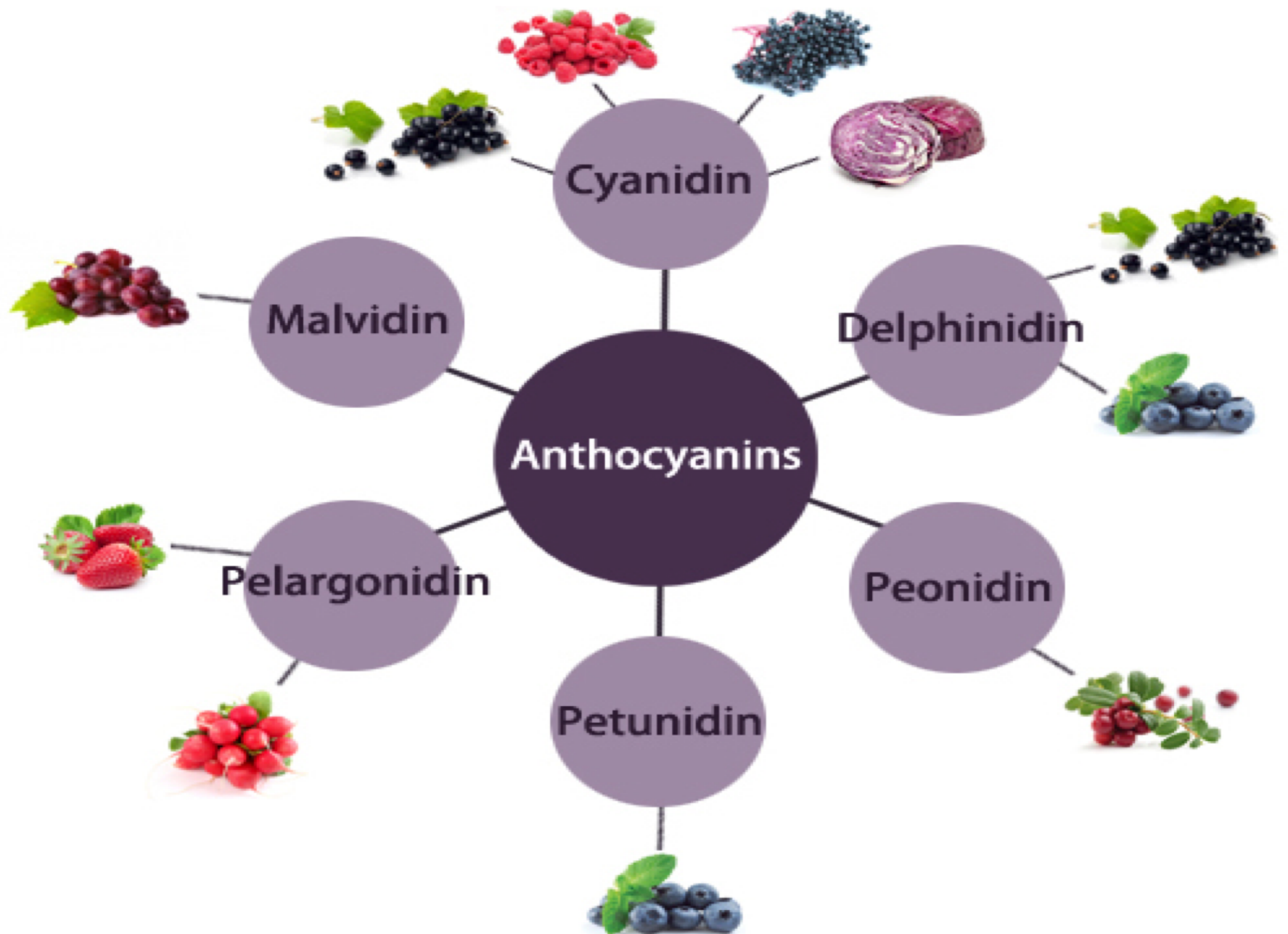


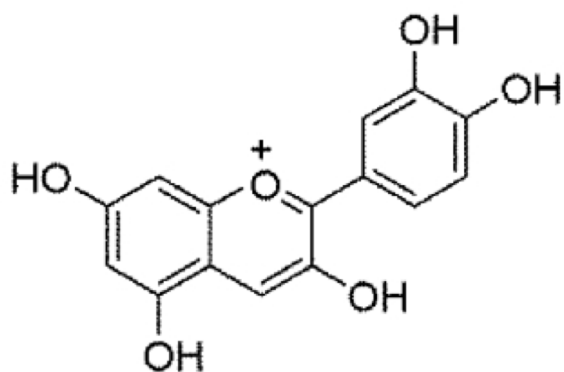
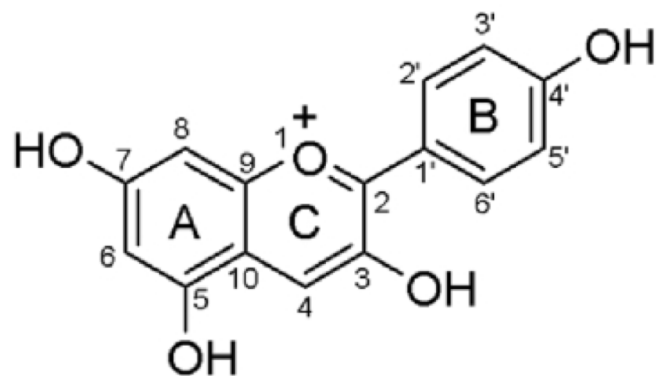


Anthocyanins

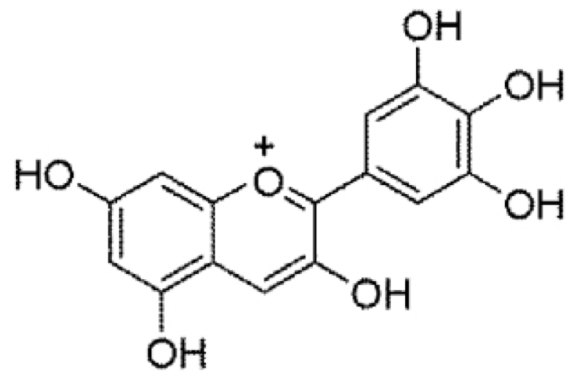


- Enhance glucose metabolism and reduced glucose absorption.
- Reduce the formation and enhance immune system clearance of amyloid protein, the hallmark protein seen in the brain of individuals with Alzheimer's disease
- Inhibit LDL oxidation and improved lipid profiles
- Inhibit DNA damage
- Inhibit inflammatory gene expression and reduce inflammation
- Reduce capillary permeability and fragility
- Boost nitric oxide, an important cell signaling molecule
- Improve neuronal cellular communication

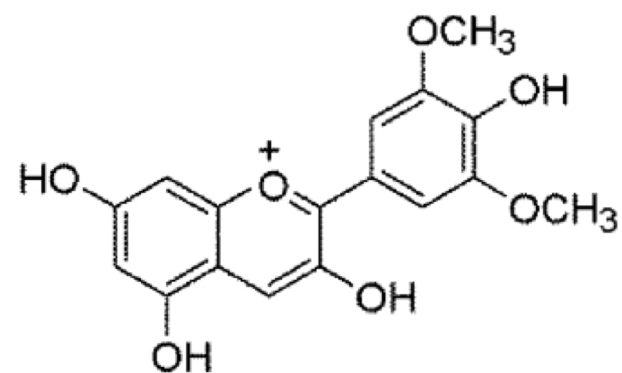




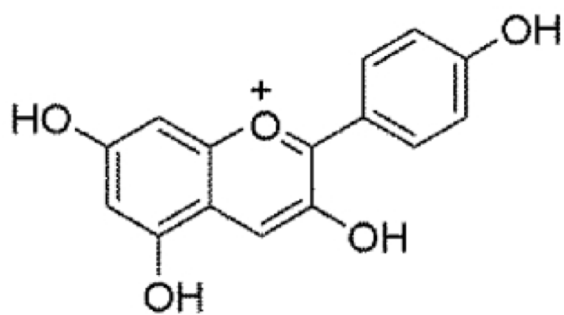
Cyanidin



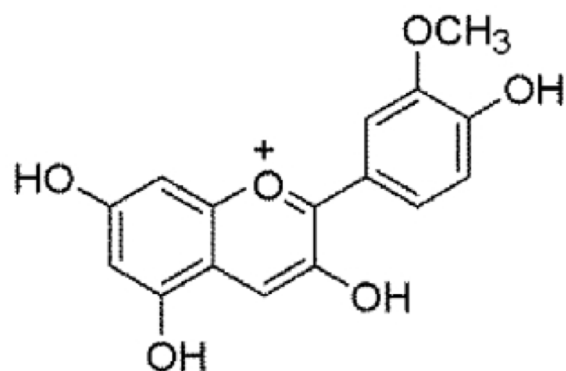
Delphinidin



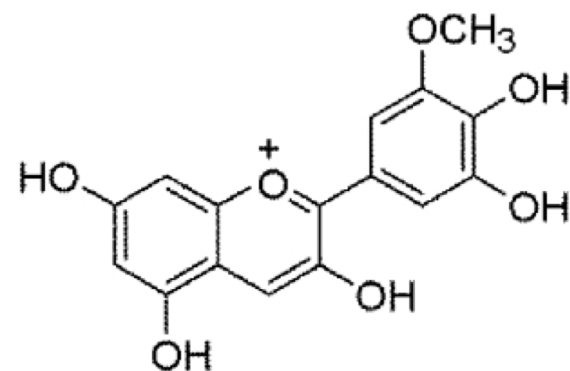
Malvidin



Pelargonidin

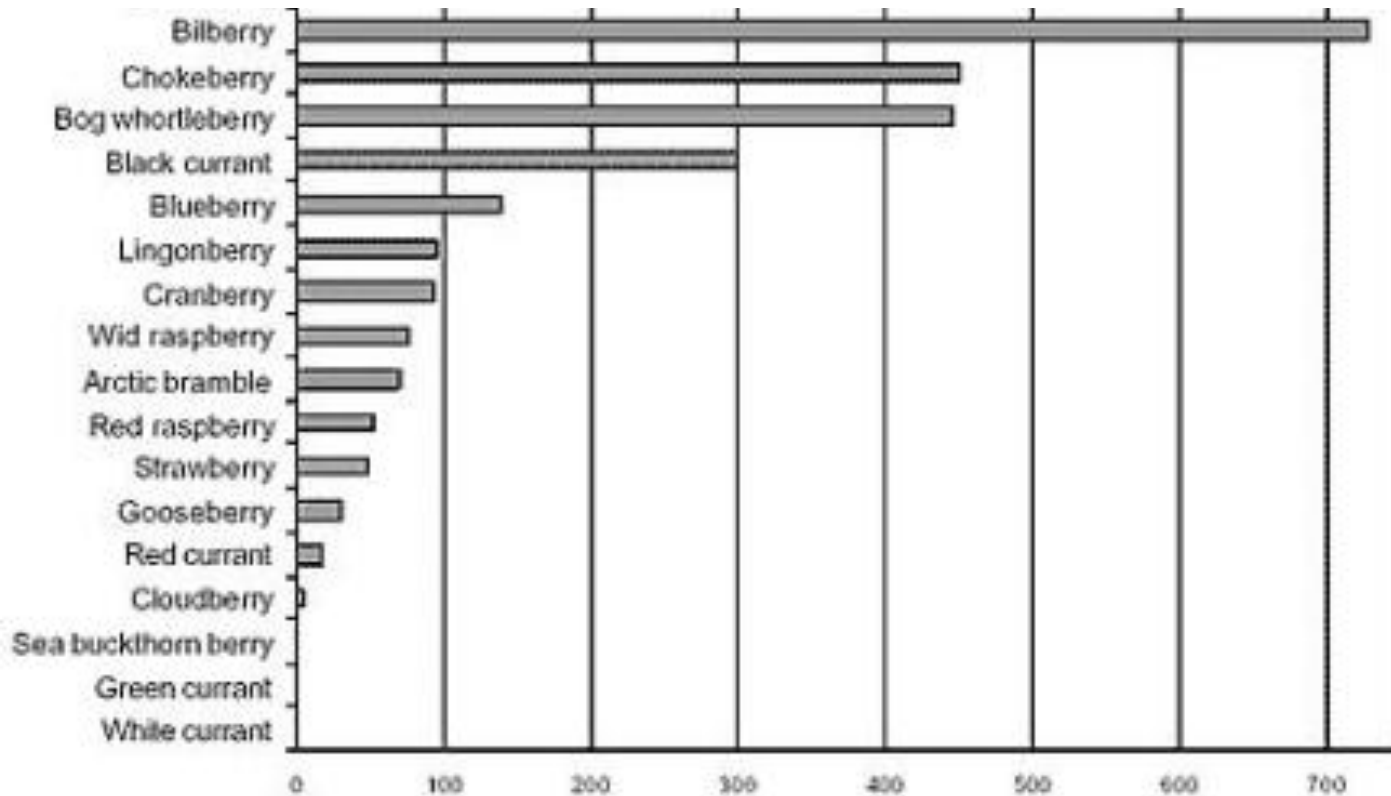


Peonidin



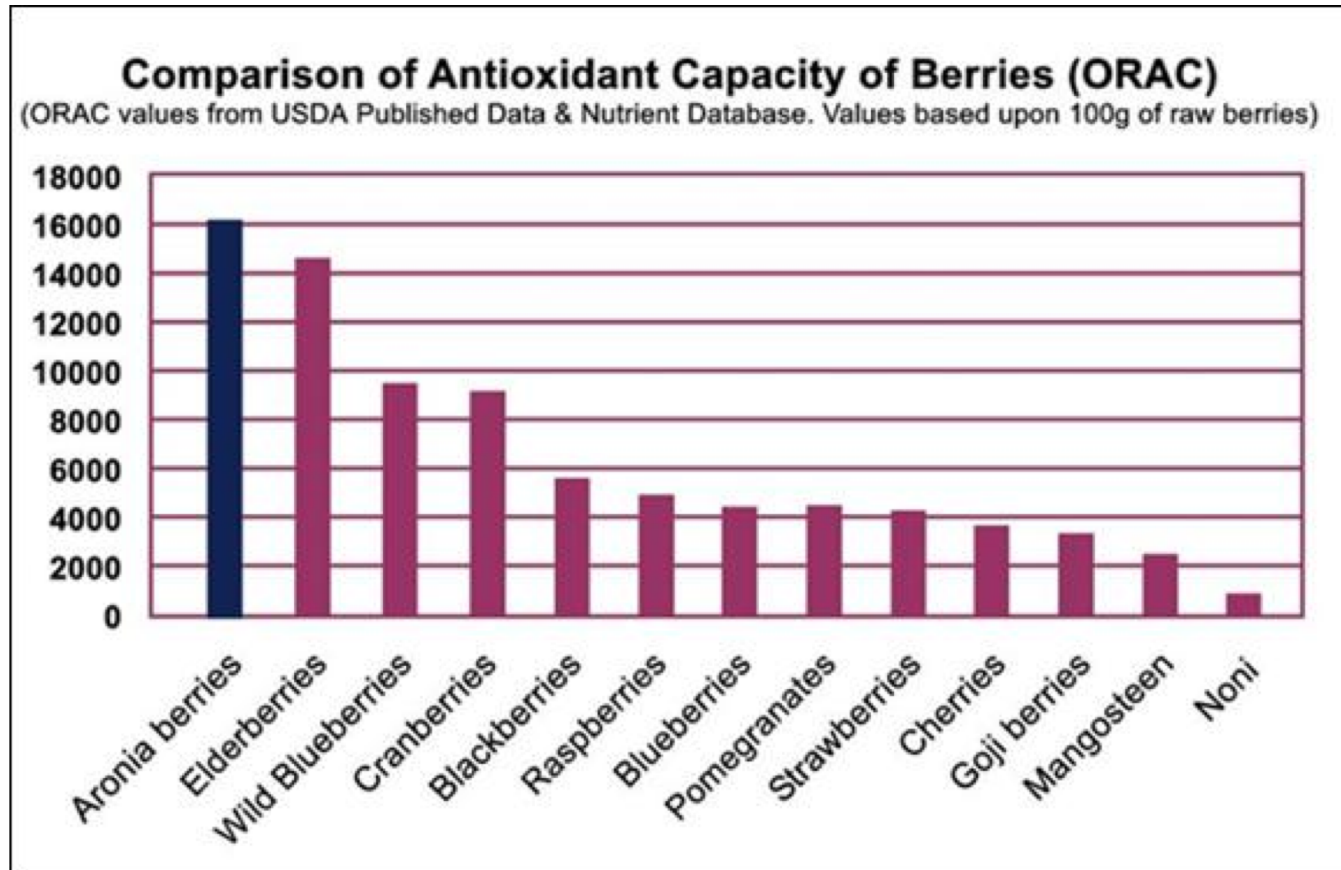
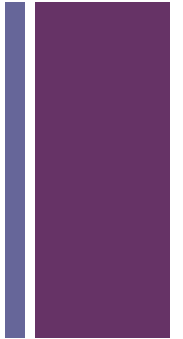
Petunidin

+ Berry Anthocyanidins





Berry Antioxidants

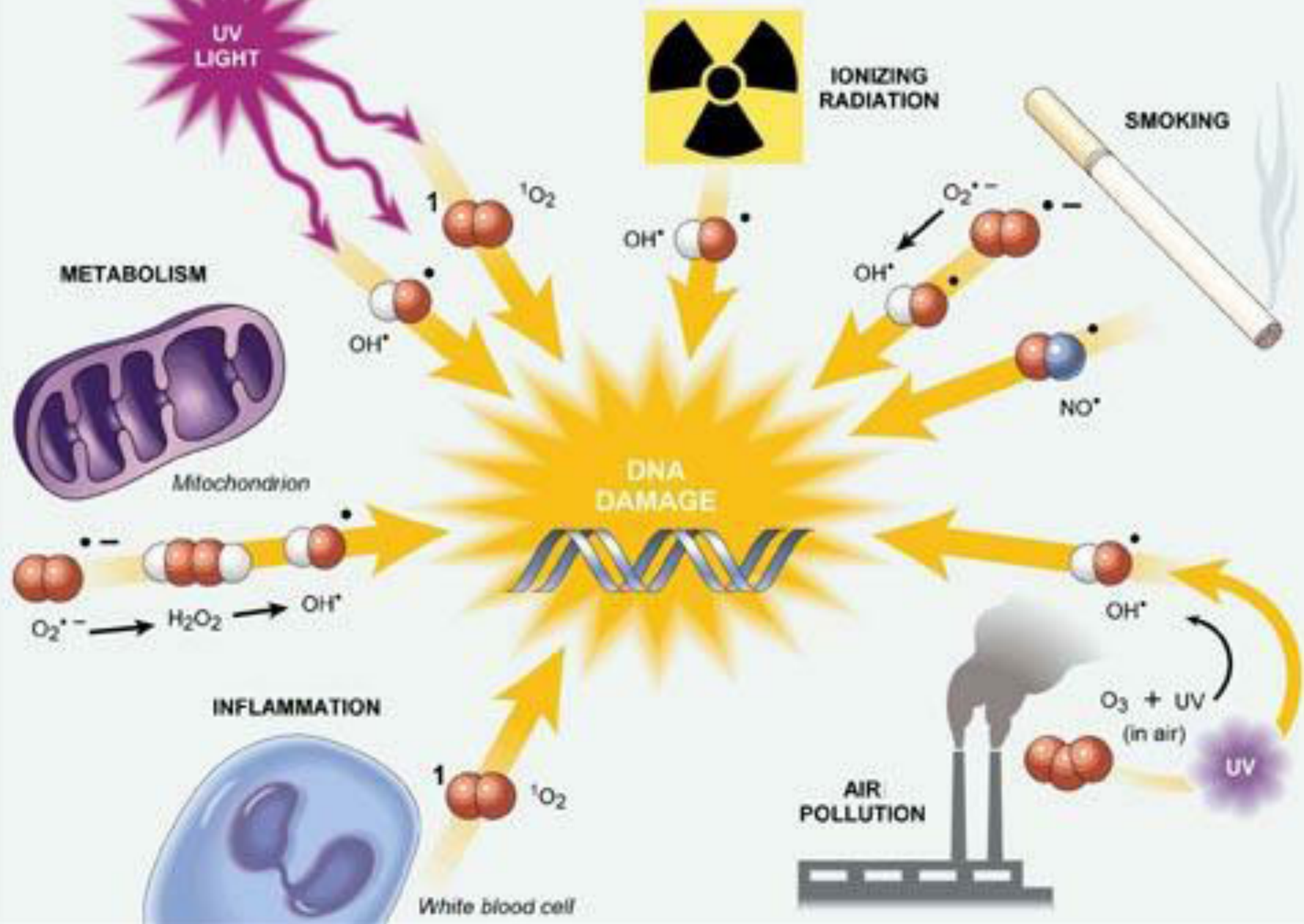


↑Polyphenols=↑Antioxidants =↓Free Radicals

"The human life span simply reflects the level of free radical oxidative damage that accumulates in cells. When enough damage accumulates, cells can't survive properly anymore and they just give up."

*- E.R. Stadtman
NIH researcher on aging*

FORMATION OF FREE RADICALS



+ What is your inflammatory status?

- Allergies
- Asthma
- Cardiovascular disease
- Diabetes
- Arthritis and pain
- Obesity
- Depression
- ADD
- Sunburn
- Dental issues
- Acne, eczema, psoriasis
- Ulcers, IBS
- Infections

EAT ¼ CUP OF BERRIES
EVERY DAY AS PART OF AN
ANTIINFLAMMATORY
LIFESTYLE
FLARE CARE!!!



+ Anthocyanins and the Brain

Dietary anthocyanins can cross the blood-brain barrier, allowing the compounds to have a direct beneficial effect on brain vasculature

- Studies have indicated that the accumulation of flavonoids in the brain is not dependent on the brain region, with increased levels of anthocyanins seen in the hippocampus and the cortex following intervention with blueberry diet for 12 weeks



Youdim KA, Shukitt-Hale B, Joseph JA. *Free Radic Biol Med*. 2004;37(11):1683-1693.

Williams CM, El Mohsen MA, Vauzour D, Rendeiro C, Butler LT, Ellis JA, Whiteman M, Spencer JP *Free Radic Biol Med*. 2008 Aug 1; 45(3):295-305.

+ Berries and Cognition



UK study finds blueberries enhance brain performance across all ages

- An hour after consuming a blueberry smoothie participants received 45 minutes of computer-based mental tests of concentration and short term working memory.
- The tests were then repeated five hours after the smoothies were consumed.



“While no differences were seen during the tests taken right after downing the smoothie, the people in both age sets who drank a blueberry smoothie in the morning were better at concentrating later in the day.”

-Jeremy Spencer, Reading University, 2009



+ Berries and Cognition



- Wild blueberry juice supplementation for 12 weeks improved memory function in older adults with early memory decline.
- Also observed were trends suggesting diminished depressive symptoms and reduced fasting glucose levels

While much of the preclinical research has focused on antioxidant, anti-inflammatory, and neuronal signaling properties, there also are recent data supporting the notion that anthocyanins can enhance glucose disposal through a number of mechanisms, a factor that may contribute to improved neurocognitive function.

-Robert Krikorian, University of Cincinnati, 2010

+ Berries and Cognition



- A high intake of flavonoid-rich berries, such as strawberries and blueberries, over time, can delay memory decline in older women by two and a half years.

Annals of Neurology, a journal of the American Neurological Association and Child Neurology Society.



“Among women who consumed two or more servings of strawberries and blueberries each week we saw a modest reduction in memory decline. This effect appears to be attainable with relatively simple dietary modifications.”

- Elizabeth Devore, Harvard University, 2012

+ Berries and Cognition

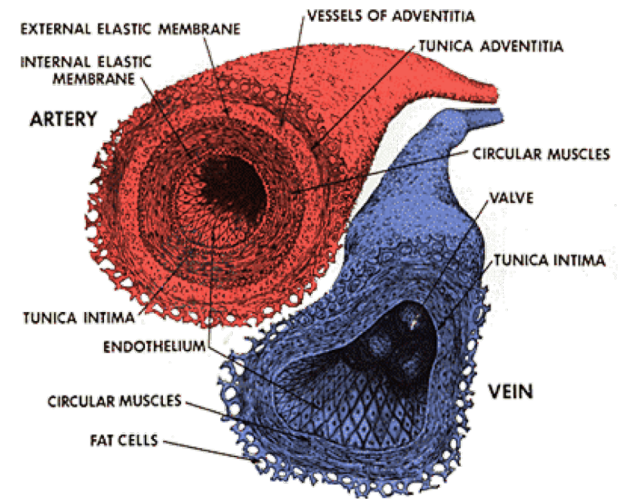
- The cognitive effects of acute blueberry anthocyanin interventions on 7–9 year old children - A.R. Whyte , C.M. Williams
- Children ages 8 to 10 y consumed either a flavonoid-rich blueberry drink or placebo. Two hours after consumption, the children completed a battery of cognitive tests
- **RESULTS:** In comparison to the vehicle, the blueberry drink produced significant improvements in the delayed recall of a previously learned list of words, showing for the first time a cognitive benefit for acute flavonoid intervention in children.





Anthocyanins and Blood Flow

- *Anthocyanins protect the integrity of the endothelial cells that line blood-vessel walls. Supplementation improves endothelial function via NO-cGMP activation.*
- *They neutralize enzymes that destroy connective tissue and prevent oxidants from damaging connective tissue.*
- *Anthocyanins repair damaged proteins in the blood-vessel walls.*
- *improved the vessel integrity by increasing the endothelium barrier, stabilizing the membrane phospholipids, and increasing the GAG content of the connective ground substance.*



Zhu, Y., M. Xia, Y. Yang, F. Liu, Z. Li, Y. Hao, . . . W. Ling, Clin Chem, 2011. 57(11): p. 1524-33.

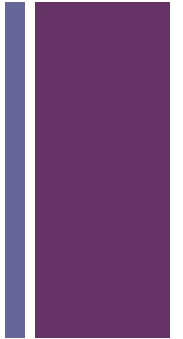
+ Anthocyanins and blood flow



A study by the USDA at Tufts University in Boston found elderberry anthocyanins are quickly taken up into endothelial cell membranes where they prevent oxidation from hydrogen peroxide and other oxidants.



Anthocyanins and blood flow



- The Reading researchers believe that—among other effects, such as enhanced cell connections and signaling—the flavanols in berries activate an enzyme in the body called Enos, which increases the flow of blood and oxygen to the brain.



+ Brain Communication

- Anthocyanin distribution in the hippocampus has been related to increased neuronal signaling in that structure.
- Enhanced signaling and neuroprotection have been observed in association with blueberry supplementation
- Anthocyanins and other phenolics from bilberry upregulate the oxidative stress defense enzymes, suggesting that they stimulate signal transduction pathways.



Youdim KA, Shukitt-Hale B, Martin A, Wang H, Denisova N, Bickford PC, Joseph JA. *Nutri Neurosci*. 2000;3:383–397.

Galli RL, Bielinski DF, Szprengiel A, Shukitt-Hale B, Joseph JA. *Neurobiol Aging*. 2006 Feb; 27(2):344-50.

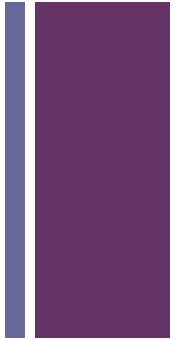
Paul Milbury, B Graf, J Curran-Celentan. Jeffrey B. Blumberg. *Retinal Cell Biology*. May 2007

+ Boosting Berries

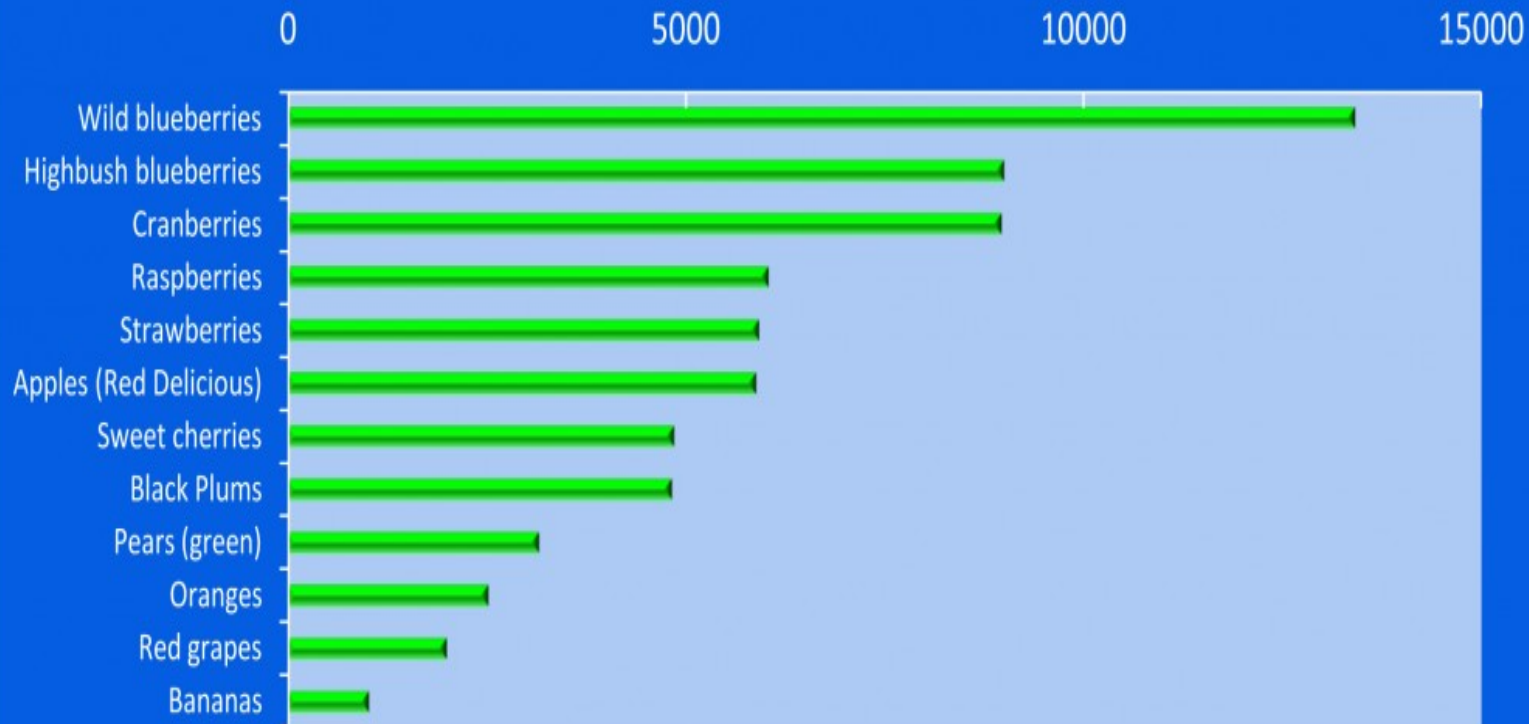
- Fresh
- Juiced
- Dried
- Frozen
- Extracts
- Supplements



+ ORAC Values

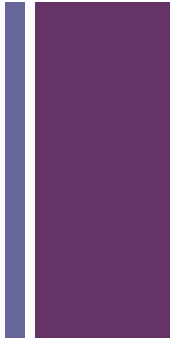


ORAC Values per Serving of Several Fruit and Berries

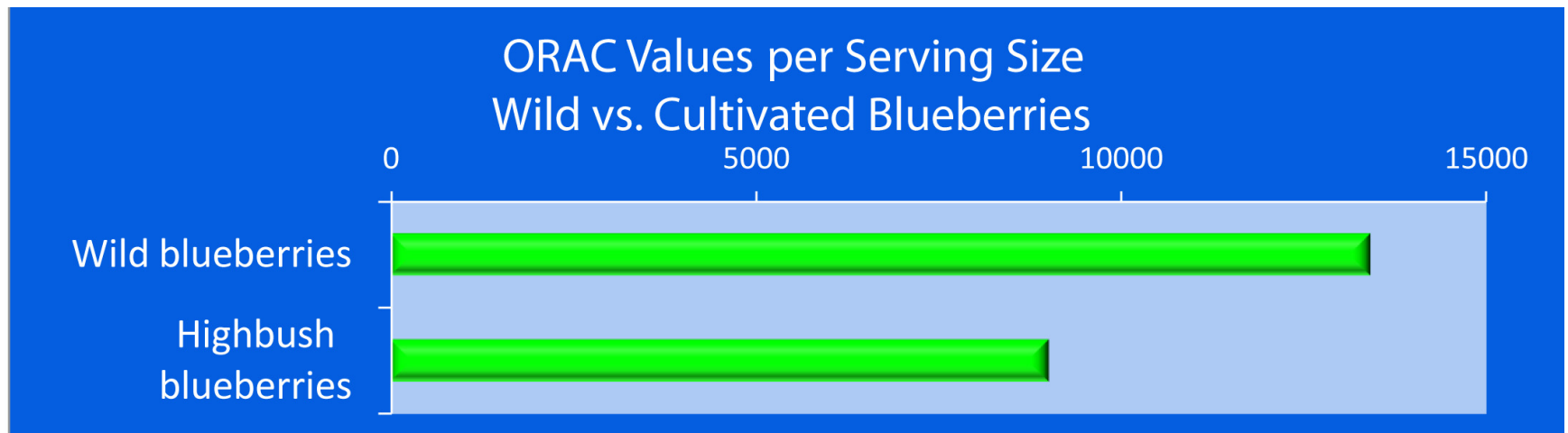


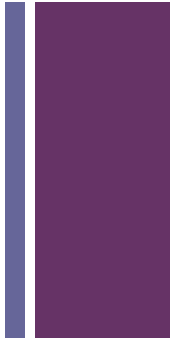
Xianli Wu, Gary R. Beecher, Joanne M. Holden, David B. Haytowitz. 2004

+ ORAC Values

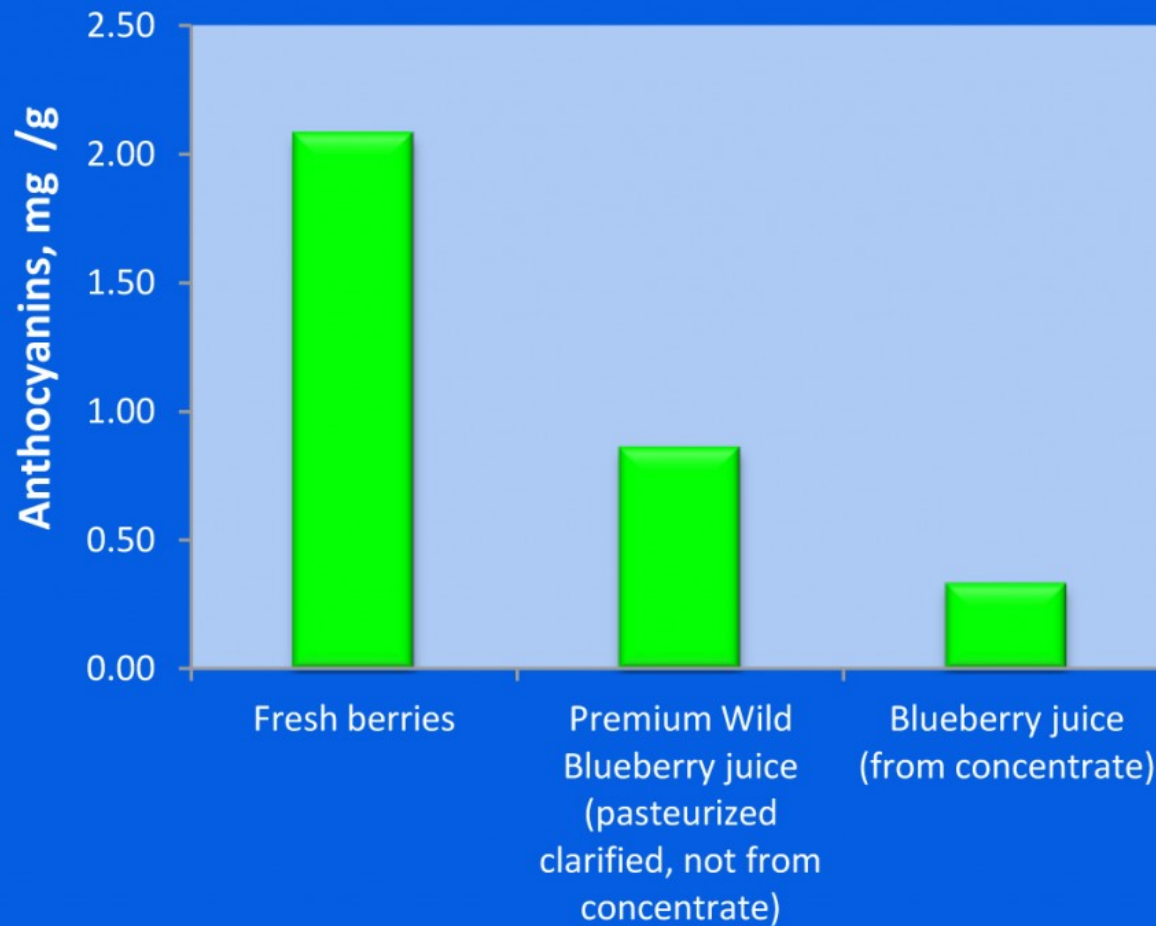


- There is up to a 320-fold difference in the anthocyanin concentration in blueberry skins compared to blueberry pulp .
- Given the higher skin to pulp ratio, wild blueberries score higher than high bush or cultivated blueberries on an ORAC scale.





Anthocyanin Concentration Whole Blueberries vs. Blueberry Juice



Berry Juices

■ Anthocyanin Decline

Losses in anthocyanins and other phenolics in blueberry juice can occur during storage. During the approximately three month storage of the juice samples, losses in the total phenolics and anthocyanins were determined to be 23% and 20%, respectively, for juice that was stored under refrigeration in amber bottles.



Frozen Berries

- Recent research has shown that fresh blueberries can be frozen without damaging their delicate anthocyanin antioxidants.
- After freezing blueberries for periods of time between 3-6 months, researchers have discovered no significant lowering of overall antioxidant capacity or anthocyanin concentrations.



+ Dried Berries

- Measurement of the antioxidant activity of anthocyanin extracts from blueberries showed there was no significant difference between fresh and dried blueberries



Over Ripe Berries

- Research conducted at the University of Innsbruck in Austria suggests that as fruits fully ripen, almost to the point of spoilage, their antioxidant levels actually increase.



Taking Berries

Tannin & OPC containing herbs may interfere with bioavailability as they precipitate alkaloids, proteins (ie. albumin), salicylates, iodine, metals, and minerals in drugs.

- Tannin and OPC herbs may best be taken at least 2 hours away from medication.



Berry Tea

- Elderberry
- Hawthorne Berry
- Schisandra Berry



+ Blueberries

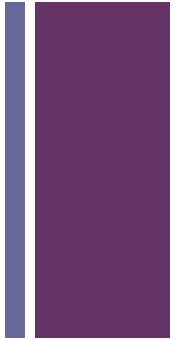
vaccinium corymbosum

Ericaceae

- The blue color in blueberries:
- Enhance the effects of vit C
- Improve capillary integrity
- Inhibit enzymes from cleaving the collagen matrix
- Cross-link with collagen fibers to form a more stable collagen matrix.



+ Berries for the Brain



- Blueberries help protect the brain from oxidative stress and may reduce the effects of age-related conditions such as Alzheimer's disease or dementia.
- Researchers found that diets rich in blueberries significantly improved both the learning capacity and motor skills of aging animals, making them mentally equivalent to much younger ones.

Blueberries and Cranberries

- Blueberries can help relieve both diarrhea and constipation.
- Blueberries contain the same anti-adhesive compounds found in cranberries that help prevent or eliminate urinary tract infections.



Cranberry

vaccinium Occycoccus Ericaceae

- For many years, researchers believed that the ability of cranberries to help prevent urinary tract infections (UTIs) was related to the strong acidity of the cranberries.
- Recent research has shown that it's not the acidity of the cranberries, but the unusual nature of their proanthocyanidins (PACs).



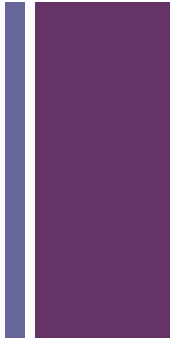




+CranBerries for bladder health

- In 1994, a placebo-controlled study of 153 elderly women was published in the Journal of the American Medical Association that gave scientific credibility to claims of cranberries effectiveness in preventing urinary tract infection.
- The women given cranberry juice had less than half the number of urinary infections as the control group who received a placebo drink.
- The daily dose of cranberry juice in this initial study was just 300 milliliters (about one and one-quarter cups).

+CranBerries for bladder health



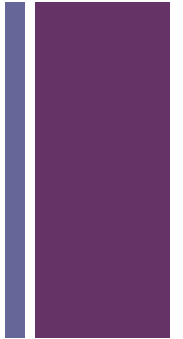
Cranberry proanthocyanidins:

- Alter *E. coli*'s cell membranes
- Prevent the bacteria from making contact with cells or attaching to them even if they somehow manage to get close enough
- Change the shape of *E.coli* from rods to spheres
- Disrupt bacterial communication

+Antiviral cranberry

- Cranberry juice shows potent anti viral effects. More so than orange or grapefruit juice.
- the October 2004 issue of the *Journal of Science, Food and Agriculture* have shown that a phytonutrient isolated from cranberries is effective against the herpes simplex virus
- proanthocyanidin A-1, inhibits the attachment and penetration of the herpes virus.

+Cranberry for digestion



- Reports from the 2002 American Chemical Society meeting and Experimental Biology Conference indicate cranberries' ability to act as a natural probiotic, supporting the health-promoting bacteria that grow in the human gastro-intestinal tract while killing off the bacteria that promote infections and foodborne illnesses.
- Critical Reviews in Food Science and Nutrition indicated that a constituent in cranberry juice prevents the bacterium responsible for most gastric ulcers, *Helicobacter pylori*, from adhering to gastric epithelial cells

Cranberry and Dental Health

- Compounds isolated from cranberry juice actually dissolved the aggregates formed by many oral bacteria and was effective in decreasing the salivary level of *Streptococcus mutans*, the major cause of tooth decay.



HAWTHORN

CRETAEGUS SPP.

FAMILY: ROSACEAE

- Vitamin C content helps to strengthen tiny capillaries
- Anthocyanidins and proanthocyanidins in the herb help to stabilize collagen
- Good source of rutin and OPC's



Hawthorn

Crataegus spp.

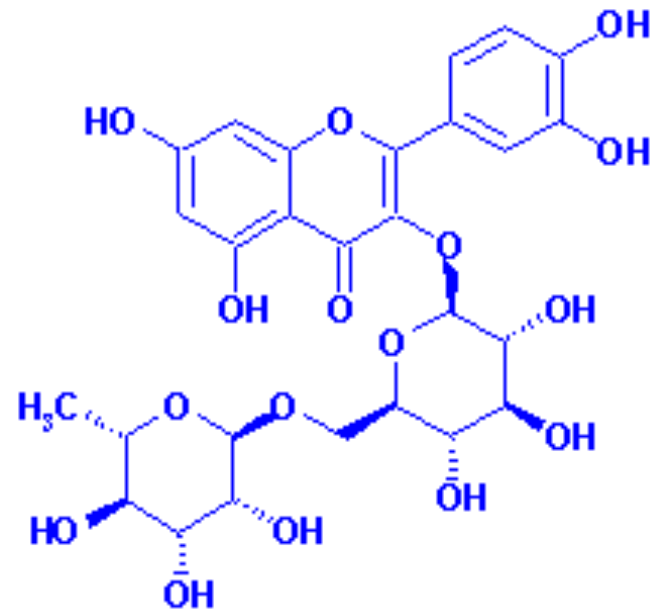
Family: Rosaceae

- Increases the pumping force of the heart muscle to boost cardiac output
- Causes direct dilation of smooth muscle in coronary vessels thereby lowering their resistance and increasing blood flow
- Increases the heart's tolerance to oxygen deficiency.



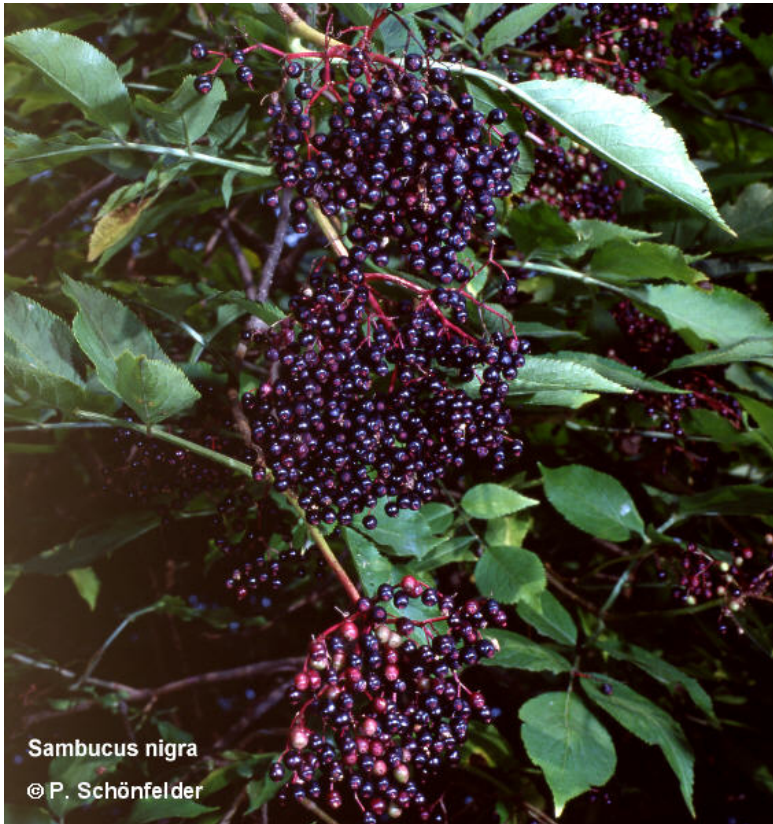
Rutin in berries

- Rutin is effective in treating venous edema and hypertension and in preventing deterioration of the distal venous system.
- Rutin inhibits platelet aggregation, as well as decreasing capillary permeability.
- Rutin has proved to be especially helpful in preventing recurrent bleeding caused by weakened blood vessels, preventing and treating bruises.



ELDERBERRY

(*SAMBUCUS NIGRA*)



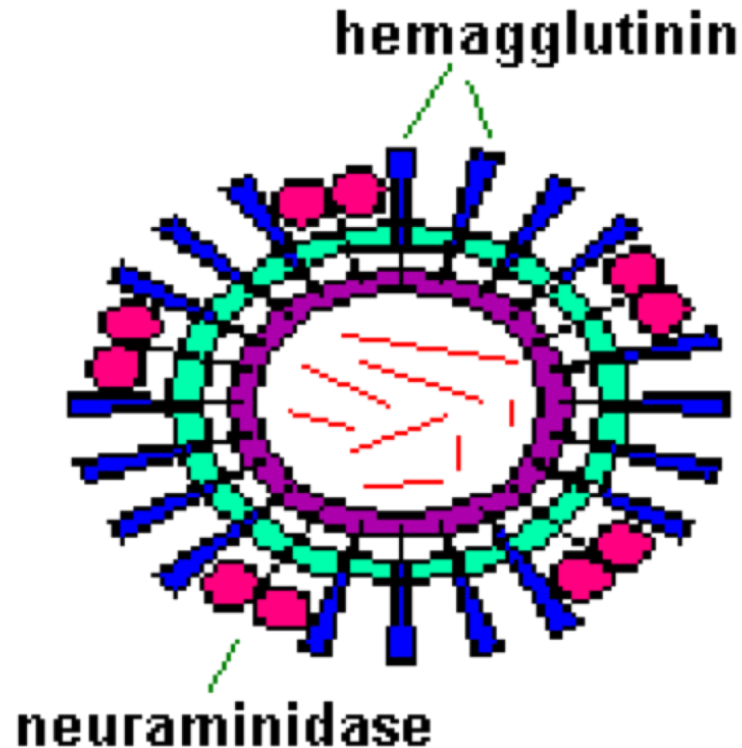
- Reduced length of flu from more than 6 days to 2-3 days in clinical trials
- In Europe elderberry has been used since antiquity as a wine, a syrup and a warming winter cordial.

Uncooked berries can result in diarrhea or vomiting, leaves may be poisonous

Elderberry

(Sambucus nigra)

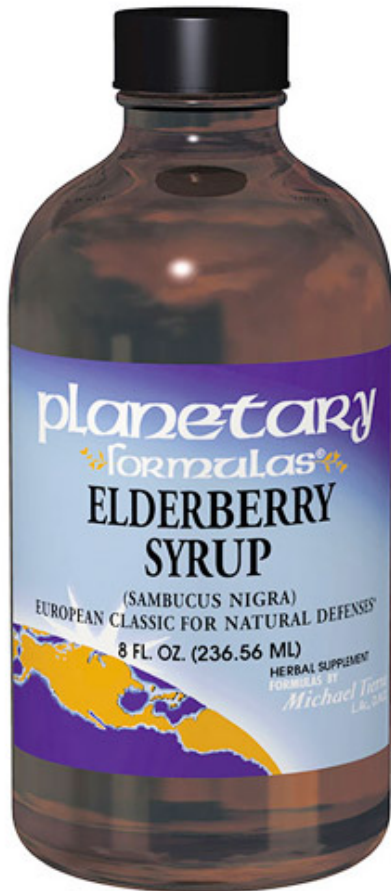
- Deactivates hemagglutinin spikes on viral surfaces so they can't pierce cells & replicate.
- Prevents common cold & Flu.
- Yummy!



Elderberry

(Sambucus nigra)

Take Elderberry



- Can take syrup, tincture, or tea.
- 4 Tablespoons of syrup/day
- or, 1 dropper full tincture per hour
- Neutralizes Viruses



Sumac berry

Rhus glabra- Smooth Sumac

Rhus Typhina- Staghorn Sumac

Rhus Copallina- Winged Sumac

■ Tommie bass used sumac berry for its high vitamin C content for sore throats and colds.

family: *anacardiaceae*

- The berries are very astringent and sour
- Used as a delicious lemonade or honey syrup!



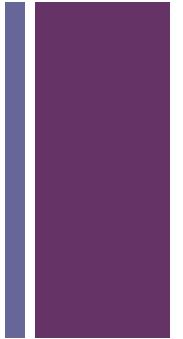
+ Smooth Sumac berry

Rhus glabra



+ Staghorn Sumac berry

Rhus typhina



+ Winged sumac
rhus copallina



Acai palm

euterpe oleracea *arecaceae*

- ◉ Acai berries are indigenous to the South American rainforest.
- ◉ The berries spoil too quickly to be widely transported and sold in their natural state
- ◉ Acai berries are beneficial simply because they do contain a high concentration of antioxidants



- In 2005, an article published by Greenpeace International stated that “the tasty dark violet wine of açaí is the most important non-wood forest product in terms of money from the river delta of the Amazon
- Sustainable wild harvesting of açaí may contribute to forest preservation and support of harvesting families, thereby making the forest more economical intact rather than cut down.
- While conventionally grown, monoculture açaí farming is a threat to the rainforest



Wolf berry gogi berry

lycium barbarum *solanaceae*

- As a food, dried wolfberries are traditionally cooked before consumption and are often added to rice as well as used in Chinese tonic soups, in combination with chicken or pork, vegetables.



Goji research

- ◉ Some research suggests that goji berry extracts may boost brain health and may protect against age-related diseases such as Alzheimer's.
- ◉ Other studies using goji berry juice finds benefits in mental well-being, and calmness, athletic performance, happiness, quality of sleep, and feelings of good health. These are preliminary studies that need to be repeated before definitive conclusions can be drawn.

Goji contraindications

- There may be some possible herb-drug interactions with goji berries. If you take warfarin (a blood thinner), you may want to avoid goji berries. Goji berries may also interact with diabetes and blood pressure drugs.



Schisandra

(Schizandra chinensis)

- Liver Protection
- Brain Support
- Immune enhancement
- Adaptogenic
- Lectins in the seed
- Quick Lift



Partridgeberry *mitchella repens*

- A tea made from the fresh or dried leaves was used by American Indian women in the weeks preceding childbirth as it was thought to promote easy delivery.



Partridgeberry

Mitchella repens

- Common throughout Appalachia.
- The flowers grow in pairs, have white-hairy petals, and will produce a single bright red berry.



Poke Root

Phytolacca americana

Family: Phytolaccaceae

- Toxic!
- Traditional in very small dosages.
- Young greens boiled with 3 changes of water to minimize toxicity.
- Lymphatic reputation
- Puccoon



Ginseng berry

- Scientists hypothesize that ginsenoside Re may speed up sugar transport from the blood to the muscle, thereby lowering blood sugar and reducing the risk of diabetes.



Ginseng berry

The key ingredient appears to be a substance known as ginsenoside Re



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