Oxyphyte® antioxidants: beyond ORAC

There is a reason why physicians and dieticians are recommending a diet rich in fruits and vegetables. They contain phytonutrients that act as antioxidants to ward off free radical damage in our bodies. Oxidative damage is thought to be a causative factor in many diseases and aging. Therefore, antioxidant phytonutrients must be supplied in the diet. Fruits, vegetables and whole grains are better sources of antioxidants than pill forms, but, in general, supplementation is needed since most people do not eat the recommended 5-9 servings of fruits/vegetables per day.

OxyPhyte® is a line of proprietary powerful antioxidant products made from consumer-friendly, GRAS fruits, vegetables, teas and herbs selected for their antioxidant activity. We have concentrated the antioxidant power of our raw materials by selectively extracting the phytonutrients responsible to provide maximum antioxidant activity. These products, which are available for use in dietary supplements and functional foods and beverages, are high in ORAC value and offer the benefits of the "5-a-day fruit and vegetable" story.

OxyPhyte® Natural Antioxidants range

OxyPhyte® Apple 70% polyphenols

OxyPhyte® Black Currant 25% anthocyanins

OxyPhyte® Grape Concentrate 12% anthocyanins

OxyPhyte® Grape Seed 90% polyphenols

OxyPhyte® Grape Skin 40% polyphenols, 10% resveratrol

OxyPhyte® Green Tea* 90% polyphenols, 80% catechins

OxyPhyte® Heart Blend

OxyPhyte® Ultra Blend

OxyPhyte® White Tea* 90% polyphenols, 70% catechins

What is ORAC?

The ORAC (Oxygen Radical Absorbance Capacity) assay measures the ability of a substance to disarm oxygen free radicals. The assay compares a sample to Trolox (a non-commercial water-soluble derivative of tocopherol). Results are reported as µmoles Trolox Equivalents (TE)/g. ORAC has become a standard method for measuring antioxidant capacity in dietary supplements.

Single servings of fresh or freshly cooked fruits supply an average ORAC value of 3400, while vegetables supply an average of 900 ORAC units. The estimated ORAC intake following the USDA-

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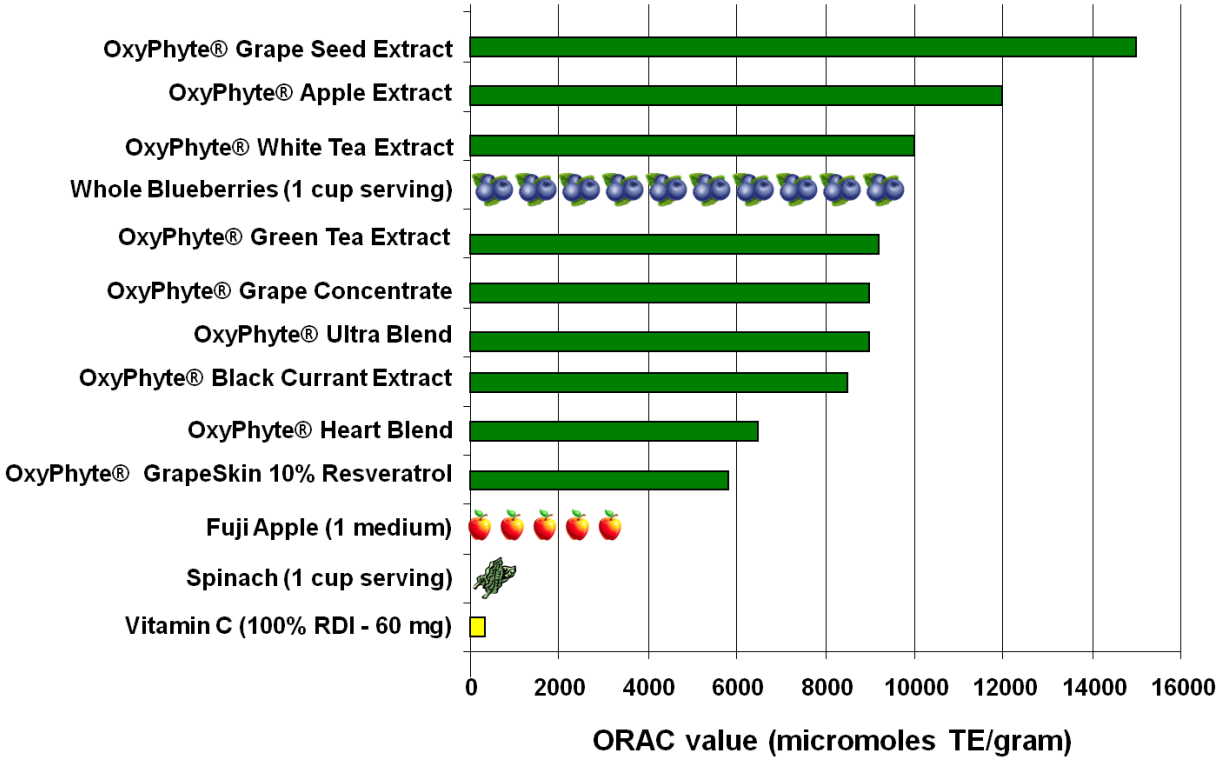
recommended 5-9 servings of fruits and vegetables is 11,000 to 20,000 ORAC units per day. Since most consumers do not eat 5-9 servings of fruits and vegetables a day, OxyPhyte® antioxidant products can provide additional ORAC units in a very concentrated form. Our blends and single ingredients can provide ORAC units equivalent to a single serving of vegetables using as little as 65 mg.



Bioavailability Assay Confirms Potency

One of our OxyPhyte® products, OxyPhyte® Ultra Blend, was the subject of a recent assay to measure bioavailability in human subjects.

A preliminary study was conducted at the Health Research Studies Center in Stanford, CA. A baseline ORAC level of blood serum of subjects was measured prior to ingesting 400 mg of OxyPhyte® Ultra (approximately 5000 ORAC units) and then again after 30 minutes and 1 hour. Increases of blood ORAC levels averaged 12% and were as high as 32%, providing evidence that the OxyPhyte® product is absorbed into the blood and increases the antioxidant capacity of the blood plasma.

In previous research, similar increases in serum antioxidant capacities have been also seen with diets rich in fruits and vegetables (*Cao, G, Booth SL, Sadowski, JA, Prior RL. Increases in human plasma antioxidant capacity following consumption of controlled diets rich in fruits and vegetables. American Journal Clinical Nutrition 1998a; 68:1081-1087).*

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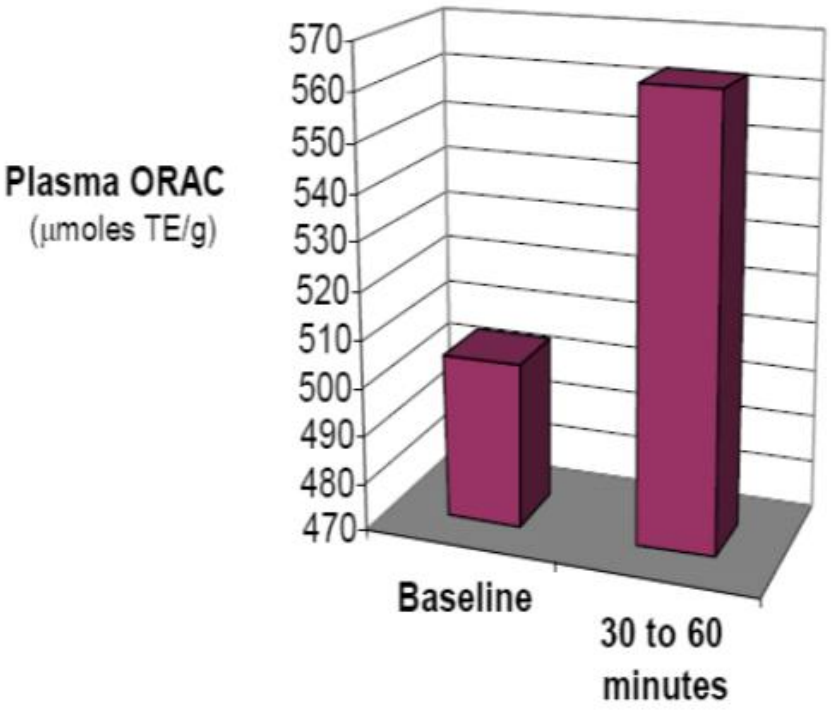

OxyPhyte® Use Rate Recommendations based on ORAC

OxyPhyte® Apple Extract

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables = 67 mg
- 1 serving of fruit = 283 mg

Equivalent polyphenol content as 1 small apple: 170 mg (127mg polyphenols)[1]

OxyPhyte® Grape Seed Extract

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables = 60 mg
- 1 serving of fruit = 225 mg

[1] Journal of Fruit and Ornamental Plant Research, 2006, 14:133-142)

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Equivalent polyphenol content as 1 serving of red grapes = 34 mg (30 mg polyphenols)[2]

OxyPhyte® Grape Skin Extract

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables =158 mg
- 1 serving of fruit = 596 mg

Equivalent polyphenol content as 1 serving of red grapes (30 mg polyphenols)[2] = 75 mg
Equivalent resveratrol content as 10 glasses of red wine (6.3 mg resveratrol)[3] = 63 mg

OxyPhyte® Green Tea Extract

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables = 100 mg
- 1 serving of fruit = 378 mg

Equivalent catechin content as 1 cup of green tea (291 mg catechins)[4] = 364 mg

OxyPhyte® White Tea Extract

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables = 90 mg
- 1 serving of fruit = 340 mg

Equivalent catechin content as 1 cup of green tea (291 mg catechins)[3] = 364 mg

OxyPhyte® Black Currant Extract

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables = 89 mg
- 1 serving of fruit = 378 mg

Equivalent anthocyanin content as ½ cup of black currants (140 mg anthocyanins)[5] = 388 mg

OxyPhyte Ultra Blend

Recommended Use rates
Equivalent to antioxidant activity (based on ORAC) of:

- 1 serving of vegetables = 100 mg

[2] J Agric Food Chem. 2002. 50(20):5691-6.
[3] J. Agric. Food Chem. 1999. 47 (8):3223–7.
[4] USDA database of flavonoids in foods: http://www.nal.usda.gov/fnic/foodcomp/Data/Flav/Flav02-1.pdf
[5] J. Agric. Food Chem., 2002, 50 (11): 3228–3231.

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- 1 serving of fruit = 378 mg

OxyPhyte® Heart Blend
Blend of heart-specific antioxidants (apple, green tea, pomegranate and grape skin extract)
Recommended Use rates
500 mg serving =

- Catechin content of 1/2 cup of green tea[4]
- Resveratrol content of 30 glasses of red wine[3]
- Ellagic acid content of 5 glasses of pomegranted juice[6]

CAP-e assay: beyond ORAC

Each of the OxyPhyte® single products and blends are guaranteed to an ORAC value and confirmed cellular-uptake and activity via CAP-e Assay (Cell-based Antioxidant Protection in Erythrocytes).

The CAP-e assay (Cell-based Antioxidant Protection in Erythrocytes) is a new method for evaluating the antioxidant potential of natural products based on the concept that many such antioxidant products are only of biological relevance if they are able to protect living cells. In other words, it is a cell-based assay for the evaluation of whether antioxidants in natural products are capable of protecting live cells from oxidative damage - it is designed to measure the antioxidant bioavailability of a product at a cellular level.

The erythrocyte, red blood cell (RBC), model was chosen for the CAP-e test because RBCs are simple and stable cells, and biologically relevant for antioxidant protection in the body. The RBC does not perform cellular signalling, undergo apoptosis, or produce reactive oxygen species, whereas all other cell types used in cell-based assays can.

Many test types used for measuring antioxidants have limited relevance for understanding the biological effects of antioxidants. Therefore, the relevance of antioxidants and antioxidant testing, especially as it relates to the Natural Products Industry, has come into question. However, with the introduction of the CAP-e that has changed.

The CAP-e assay is performed by allowing red blood cells to absorb antioxidants from a physiological liquid containing soluble product. All compounds not absorbed into the cell are then removed. The cell is exposed to oxidative stress. An indicator dye shows the degree of intracellular damage to the cell, in the presence versus absence of serial dilutions of the test product (www.nistesting.com)

The following graphic shows the CAP-e assay values for each Oxyphyte ingredient, including the blends:

[6] J. Agric. Food Chem. 2001. 48(10) 4581-4589

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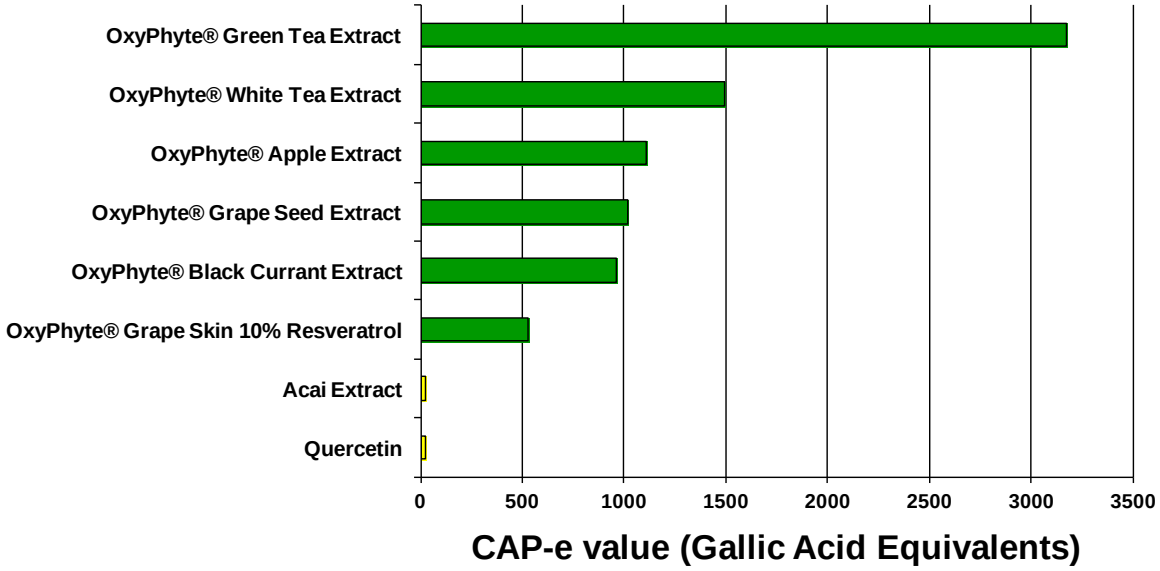

Oxyphyte Antioxidants can be used in different applications apart from food supplements.

OxyPhyte® Antioxidants are Generally Recognized as Safe (GRAS) and water soluble, hence suitable for most functional food applications, such as:

- Ready-to-drink beverages
- Nutrition bars, shots, gels and chews
- Dairy
- Powdered beverage mixes
- Confectionery
- Cereals, snack foods

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