

Measuring the Antioxidant Power of Foods

Lots of marketing materials about food and nutritional products cross my desk, as you'd probably guess. When I recently looked over some information from the Cranberry Institute I noticed that they (like the blueberry folks, the goji berry gang and the acai berry crowd) claim to have one of the highest ORAC values of foods tested. ORAC is a measurement relating to antioxidant power, and since it's becoming one of the latest buzz words, I figure an explanation is in order.

WHAT'S MAGICAL ABOUT ANTIOXIDANTS?

The letters ORAC stand for "Oxygen Radical Absorbance Capacity," a reflection of the *antioxidant* ability of just about anything, including foods, to subdue *peroxyl radical* (one of the harmful free radicals) in the test tube. When not being pressed into service by the immune system, these "free radicals" might be considered the body's bad boys, having been shown to trigger much of the aging process and also to be involved in degenerative diseases. At the risk of stating the obvious, antioxidants defend against this "oxidation" process (for example, the way lemon juice prevents apple slices from browning when exposed to the air). That's why foods high in antioxidants are such an important component of healthy eating and in turn, foods with high ORAC ratings are extremely beneficial.

Studies at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University in Boston suggest that consuming fruits and vegetables with a high ORAC value may help slow the aging process in both body and brain. Other research has shown that in middle-aged rats, foods with a high ORAC value can reduce loss of long-term memory and learning ability, maintain the ability of brain cells to respond to stimuli (thought to decrease with age) and protect blood vessels against oxygen damage. The assumption is that these high ORAC foods benefit people in much the same way. Most recently, Ronald Prior, PhD, and colleagues at the USDA reported on several small human clinical studies on high ORAC foods consumption with positive results.

WHICH FOOD IS BEST?

The thing about ORAC ratings is that there isn't a simple way to measure antioxidant capacity or activity because different antioxidants respond to different pro-oxidants or radicals, much like different antibiotics kill different strains of bacteria. In fact, there are at least six kinds of potentially destructive free radicals... and when the original ORAC test was developed, it simply measured the ability of a food to fight *one* of these species specifically, the *peroxyl* radical, the one most abundant in the human body, said Boxin Ou, PhD, chief scientist at Brunswick Laboratories, a leader in ORAC testing. Though the ORAC measure only relates to that, he explained that our bodies also have to defend against the other five. So Dr. Ou's team developed several other tests (with different designations, such as HORAC, NORAC, SORAC and SOAC) to describe how a food defends against the *other* types of potentially dangerous free radicals.

Carotenoids, primarily found in yellow and orange foods such as carrots, for example, score poorly on the standard ORAC test, Dr. Ou told me. Carotenoids do not defend well against the peroxy radicals that are the basis of the ORAC test. But carotenoids defend brilliantly against a *different type* of free radical called singlet oxygen, measured by the SOAC assay. The antioxidant power rank assigned to them would depend on which test was used -- but the only score you'd hear about would be the brilliant one.

Why not just get a list of the antioxidants found in each food and call it a day? It would be meaningless, Dr. Ou said. "The amount of an antioxidant in food doesn't tell you much about its *activity*. For example, a food might have 100 mg of vitamin C and only 10 mg of *quercetin*, an antioxidant plant compound. But quercetin potentially has 10 times the antioxidant *activity* of vitamin C. The ORAC value reflects the total antioxidant fire power of the food against the peroxy radical taken as a whole."

MEANINGFUL OR NOT?

So should you pay attention to those claims about a product's ORAC value? The answer is, yes... but while it is true that a higher ORAC rating is better than a lower one, and any high rating is potentially good, just be sure that you realize the rating reported may be for an isolated and less prominent antioxidant action than the combined environmental assault you may be facing.

What are some high ORAC foods? See below. The list probably won't surprise you too much...

ORAC values of common fruits and vegetables (per 100 grams -- approximately 3½ ounces)

Kale	1,770
Spinach	1,260
Prunes	5,770
Raisins	2,830
Blueberries	2,400
Blackberries	2,036
Brussels sprouts	980
Alfalfa sprouts	930
Broccoli flowers	890
Beets	840
Red bell pepper	710
Strawberries	1,540
Onion	450
Raspberries	1,220

Source(s):

Boxin Ou, PhD, is president of Brunswick Laboratories, LLC. Dr. Ou is one of the

leading scientists in the US on phytochemicals in plant foods, and his research has been widely published in peer-reviewed journals. He regularly collaborates with leading food companies and university research programs.