



# *Antioxidant Anti-theories*

## *Part 3 of 3*

### Oxygen Paradox



Blackberries (*Rubus ursinus* L.) -- do the dark pigments really help us?  
Read the antioxidant anti-theories, Parts 1-3

[follow the [Wikipedia](#) links]

We are interested in berry [phytochemicals](#) because they represent dietary options for obtaining antioxidant value from our food choices.

For background from the Berry Doctor's Journal, see this [8-part series on berry anthocyanins and their potential for antioxidant and anti-disease effects](#), *click!*

But in science, we want to hear all points of view, especially those that challenge a doctrine -- even the theory that health benefits can be provided by berry antioxidants.

This is the objective of the current 3-part series of essays -- present counterpoints to what we believe -- let's call them anti-theories.

[Read part 1 here](#) (*click!*)

Our bodies see berry anthocyanins and other flavonoids as unwanted chemicals, so actively get rid of them

[Part 2 here](#) (click!)

Antioxidant phytochemicals from dark berries, such as resveratrol, can cause oxidation under some conditions, i.e., they are pro-oxidants



## *Oxygen Paradox*

From Davies KJ. Oxidative stress: the paradox of aerobic life. *Biochem Soc Symp.* 1995;61:1-31  
[follow the [Wikipedia](#) links]

We cannot exist without oxygen, yet oxygen is inherently dangerous to us.

This 'dark side' of oxygen comes from the fact that each oxygen atom has one unpaired electron that makes it highly reactive and unstable -- that is, an oxygen radical, also called a [reactive oxygen species](#), ROS.

### Facts concerning oxygen, ROS and how we live in an environment of oxygen

- Superoxide anion radical, hydrogen peroxide and the extremely reactive hydroxyl radical are common ROS products of life in an aerobic environment
- they appear to be responsible for oxygen toxicity and perhaps the origin of many diseases and maybe even aging itself
- to survive in such an unfriendly oxygen environment, living organisms generate -- or obtain from their surroundings and foods eaten -- a variety of [water- and lipid-soluble antioxidant compounds](#)
- antioxidant enzymes, whose role is to intercept and inactivate ROS, are synthesized by all known aerobic organisms
- although extremely important, such antioxidant enzymes and compounds are not completely effective in preventing damage by ROS
- oxidative damage ("[oxygen stress](#)") by ROS remains an inescapable part of a life in oxygen

A Confusing Fact:

• *Paradoxically, ROS also serve short-lasting*

(milliseconds to seconds in duration) normal roles essential  
to cell regulation and communication

*The 1998 Nobel Prize in physiology or medicine  
was given for work on the normal  
physiological roles of nitric oxide, a ROS! click!*

Antioxidant Anti-theory #3, posed as questions:

Why do our bodies produce ROS moment-by-moment, use them for essential functions, then eliminate them so quickly after they are formed?

Why would our cells' health be so susceptible to damage by ROS formed sometimes *within* the same cells?

Science has not yet revealed the answers.

## *The anti-theory?*

The main role of dietary antioxidants may not be to neutralize the damaging effects of ROS, but rather to terminate normal, short-duration actions of ROS as cell-to-cell transmitters.



Spoon yourself a diet of berries to lower risk against diseases

Diseases possibly initiated by oxygen radicals

- **mutagenesis** (genetic mutations)
- cancer
- **atherosclerosis** (accumulation of fatty plaques on blood vessel walls, weakening blood vessels such as in aneurysms)
- platelet adhesion to blood vessel walls leading to **blood clots**
- arteriosclerosis (loss of elasticity in arterial blood vessels, leading to high blood pressure)

- heart attacks, strokes and ischemia/reperfusion injuries
- chronic inflammatory diseases, such as rheumatoid arthritis, lupus erythematosus and **osteoarthritis**
- acute inflammatory problems, such as wound healing
- photo-oxidative stresses to the eye, such as cataract and age-related macular degeneration
- central nervous system disorders, such as amyotrophic lateral sclerosis, seizures, Parkinson's disease and Alzheimer's dementia
- age-related disorders, perhaps even including factors underlying the aging process itself

Some of these oxidation-linked disorders can be worsened, perhaps even initiated, by numerous environmental pro-oxidants and/or **pro-oxidant drugs and foods, including supplementation or over-consumption of antioxidant foods or phytochemicals (part 2 of this series, click!)**

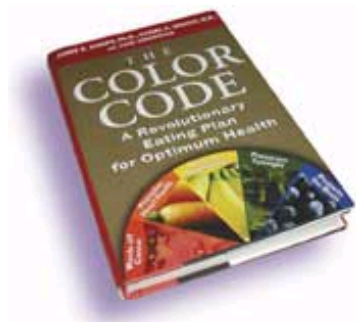
### *So what do we do about having antioxidant foods in our diets?*

The safest advice is to consume a balanced variety of whole color-rich plant foods or their products to obtain moderate amounts of antioxidant compounds.

Particularly use those from berries, other fruits and vegetables containing different deep colors of red, blue, purple, black, yellow, orange or green.



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