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Understanding the Health Benefits of Moderate Red Wine Consumption

By [Daniel Pambianchi](#) | Submitted On June 19, 2010

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Earlier epidemiological studies suggested that alcohol-and therefore, wine, beer and spirits, was the compound responsible for claimed health benefits though its negative effects such as alcoholism and social impacts, cognitive developmental deficiencies, fetal alcohol syndrome (FAS), and increased risk of breast cancer in women are undisputed.

In moderate consumption, alcohol has been shown to increase the amount of tPA, or tissue Plasminogen Activator, a substance that catalyzes the conversion of plasminogen to plasmin, the major enzyme responsible for clot breakdown. And in the May 31, 2009 issue, *Wine Spectator* cites a Stanford University research which claims that aldehyde dehydrogenase-2 (ALDH2)enzymes process the alcohol and "eliminate toxic byproducts created by the breakdown of fats in cells during a heart attack. Eliminating the byproducts prevents additional damage to the heart cells."

Although alcohol does play a favorable role, more recent studies have demonstrated that red wine provides further protection against illnesses and diseases and, therefore, that there are other important healthy compounds in red wine not found in white wine, beer or spirits. These healthy compounds belong to a class of compounds known as *polyphenols* of which there are two types in red wine: nonflavonoids and flavonoids. The word "flavonoid" is derived from the Latin *flavone*, meaning "yellow"-and not "flavor"-which tends to confuse people.

Nonflavonoids include stilbene polyphenols (also known as *stilbenoids*) such as resveratrol from grape pulp, and hydroxycinnamic and hydroxybenzoic acid derivatives such as gallotannins and ellagitannins found in oak-aged wines. Gallotannins and ellagitannins are better known as *hydrolyzable tannins* and are copolymers of gallic and ellagic acids and glucose, respectively.

Until recently, resveratrol (3,5,4'-trihydroxystilbene) was believed to be the main compound responsible for the health attributes in red wine. However, modern quantification methods reveal that the amount of resveratrol in wine is too low, particularly in wines processed with fining agents such as PVPP, to be of any important health consequence on its own. But a diet rich in resveratrol from fruit, vegetables, nuts, and wine has been linked, along with a healthy lifestyle, to longevity in humans according to Dr. Joseph Maroon, a world-renowned neurosurgeon and author of *The Longevity Factor*. He has studied extensively Dr. David Sinclair's research on the subject. Sinclair is Director of the Paul F. Glenn Laboratories for the Biological Mechanisms of Aging at Harvard Medical School and a prominent researcher on the biology of longevity. His team recently demonstrated in laboratory experiments that resveratrol has life-extending activity in not only normal mice but obese ones too by activating "survival" genes. It has also been demonstrated that resveratrol increases the production of nitric oxide (NO) by the endothelium (the thin layer of cells that line the interior surface of blood vessels). Endothelial nitric oxide is a vasodilator meaning it dilates arteries in our bodies to protect organs from ischemic damage.

It is interesting to note that resveratrol molecules are manufactured under stress in plants as a mean to fight off fungal infections. Then too, resveratrol is also classified as a phytoalexin (antibiotics produced by plants that are under attack) and, therefore, concentrations of resveratrol are highest in grapes grown in cool and wet climates. This is the basis of the *Xenohormesis Hypothesis* which states that "animals have evolved to sense stress signaling molecules in other species, in order to gain advance warning of a deteriorating environment." This was postulated by Sinclair and colleague Konrad Howitz and helps explain the French Paradox. Maroon also states that V.

rotundifolia Muscadine grapes are uniquely beneficial because these possess an extra chromosome (compared to *V. vinifera* cultivars) that produces the phytochemical ellagic acid, and is then transformed into ellagitannins which are believed to provide anticancer and other health benefits.

Flavonoids are a group of compounds mainly found in grape skins, stems and seeds. Flavanols (also known as *flavan-3-ols*) such as catechin and epicatechin are flavonoids found abundantly in grape seeds (as well as other "health foods" such as green tea and dark chocolate) and are responsible for imparting that familiar astringency sensation from tannic wines. There are also anthocyanins such as delphinidin and malvidin which are responsible for the red color found in grape skins and subsequently imparted to red wine during maceration and fermentation. And there are flavonols such as quercetin which were found to be strong biological antioxidants providing a number of health benefits that are maximized in the presence of resveratrol which quercetin more readily absorbs.

Recent research, particularly that of Roger Corder, a professor of experimental therapeutics at the William Harvey Research Institute in London, England and author of *The Red Wine Diet*, now demonstrates that procyanidins are the active components.

Procyanidins, a subclass of flavanols is also known as *proanthocyanidins* or as *procyanidin oligomeric proanthocyanidins (OPC)* or as *condensed tannins* because they are formed from condensation of flavanols. They are found in great concentrations in grape seeds (which explains the recent grape seed oil rage) and consist of long chains of repeated units of other flavanols such as catechin and epicatechin. Young red wines are most rich in procyanidins and as wine ages, procyanidin molecules polymerize into longer, heavier and less soluble chains which then precipitate to the bottom of barrels, tanks or bottles. Logically it follows then, as Corder asserts, that the health benefits of red wine are maximized when drunk young. Moreover, different grapes contain different amounts of procyanidins and Corder's research singles out Tannat as the most procyanidin-rich red *vinifera* variety.

Tannat grapes are used to craft the wonderful wines of Madiran, an important appellation at the foothills of the Pyrénées Mountains in southwestern France and of Uruguay in southeastern South America. Tannat-based wines are remarkably deep-colored, concentrated, and highly tannic as its name would suggest when vinified using traditional winemaking techniques that emphasize phenolic extraction and little or no fining and filtration. Red wines made using carbonic maceration or vinified as rosés or using a short maceration period will only contain low levels of procyanidins. As we have seen earlier, polyphenols are not as soluble in grape juice and become more soluble in wine as the alcohol content increases during fermentation.

Procyanidin concentration in grapes also depends on the age of the vines as well as viticultural practices. Stressing vines, for example, by limiting water intake and harvesting at low yields can be beneficial in this respect and the older the vines, the better owing to the additional stress of age which tends to favor phenolic concentration. A long, slow growing season is always preferred, however, we cannot control Mother Nature.

So how do procyanidins work in our bodies to reduce risks of atherosclerosis, cancer, dementia, diabetes and other malaises and diseases? There are various biological mechanisms two of which we examine here: antioxidant by reducing oxidative stress, and hypolipemic (as the name suggests-hypolipemic refers to a substance or compound that lowers the concentration of fats in the blood).

Procyanidins are potent biological antioxidants (so is resveratrol) much like vitamins C and E. They are capable of fighting free radicals responsible for aging and diseases. Free radicals are atoms, molecules or ions with unpaired electrons which makes them highly reactive and which can attack and damage key components in living cells, proteins within cells as well as DNA and can disrupt their proper functioning to initiate a disease such as CHD or malignant cancer. In her booklet *Resveratrol*, Matilde Parente, MD aptly likened the oxidative damage caused by free radicals to rust.

Procyanidins also inhibit LDL (low-density lipoprotein) cholesterol better known as *bad cholesterol*, and raising the level of HDL (high-density lipoprotein) cholesterol or the *good cholesterol*. LDL cholesterol is responsible for coronary thrombosis, i.e., platelet formation in blood clotting leading to LDL cholesterol oxidation and then to atherosclerosis-the most common form of arteriosclerosis in which fatty deposits build up in arterial walls thereby restricting blood flow-and increasing the risk of myocardial infarction (heart attack). Saturated fats from red or processed meats and trans-fats are the major culprits of LDL cholesterol. Triglycerides, the main constituent of vegetable oil and animal fats are also implicated in atherosclerosis. HDL cholesterol contains more proteins and less fat and actually removes LDL cholesterol from blood and the lining of arteries and transports it to the liver for breakdown and excretion.

On the lighter side of things, NYDailyNews.com reports that women who drink two glasses of wine a day experience greater sexual satisfaction than non-drinkers or one-glass-a-day drinkers according to researchers from the University of Florence, Italy. We can safely extrapolate these results to men, without the need for any scientific studies. But gentlemen (and post-menopausal women), be forewarned-alcohol exacerbates snoring which your partner may find unromantic and be less inclined to invite you again for another sexual escapade. So go easy on the wine (and other alcohols particularly distilled spirits) and stick to moderate consumption.

Need any more good news to make wine a part of your daily diet?

Daniel Pambianchi is the author of "Wine Myths, Facts & Snobberies: 81 Questions and Answers on the Science and Enjoyment of Wine" published by Vehicule Press (2010).

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