

Wine and Health

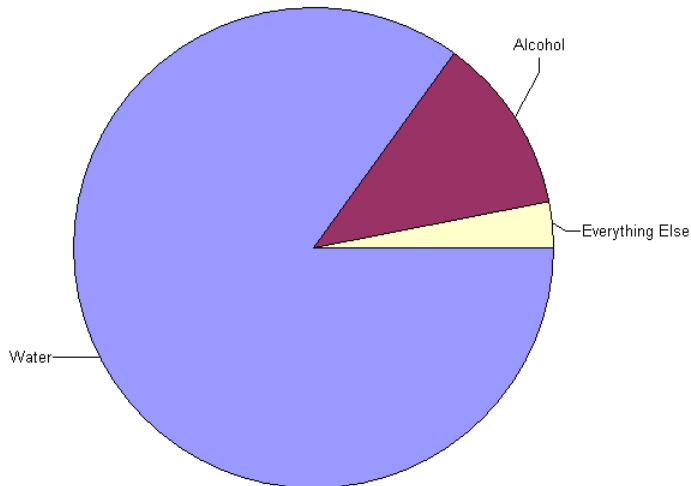


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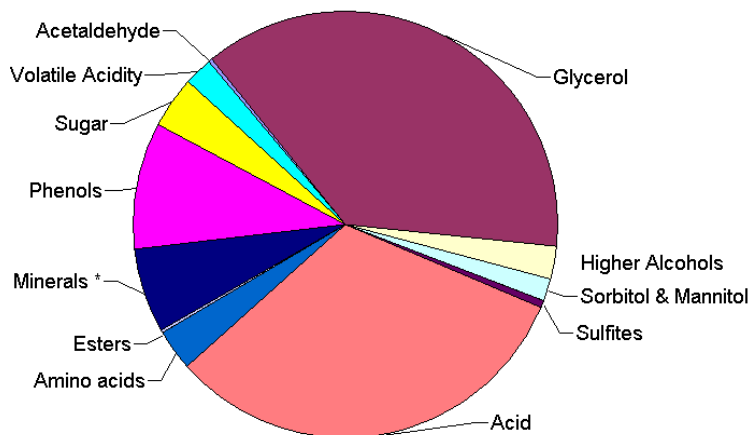
Insight Cruises
December 1, 2013
Somewhere on the Rhone

Wine Composition



Waterhouse, 2002

Wine Composition-Everything Else



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Waterhouse, 2002

Wine Composition-Phenolics

TABLE 3. Typical levels of phenolics in red and white table wine^a

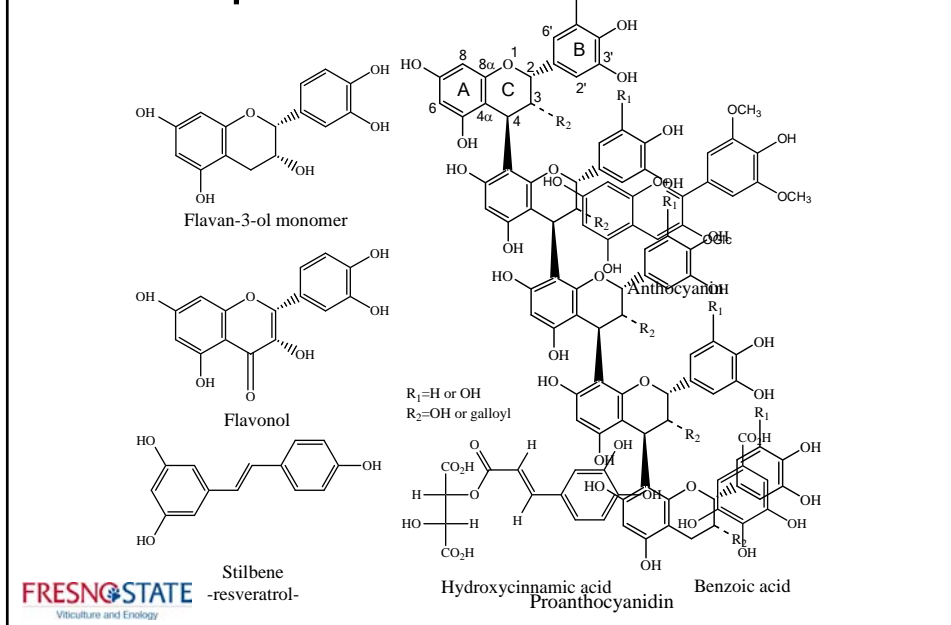
Phenol Class	White Wine		Red Wine	
	Young	Aged	Young	Aged
Non-flavonoids				
Hydroxycinnamates	154	130	165	60
Benzoic Acids	10	15	60	60
Hydrolyzable tannins (from oak)	0	100	0	250
Stilbenes (Resveratrol)	0.5	0.5	7	7
Total mg/L	164.5	245.5	232	377
Flavonoids				
Flavanol monomers	25	15	200	100
Proanthocyanidins and condensed tannins	20	25	750	1,000
Flavonols	—	—	100	100
Anthocyanins	—	—	400	90
Others	—	—	50	75
Total mg/L	45	40	1,500	1,365
Total all phenols	209.5	285.5	1,732	1,742

^aYoung means new wine, less than six months of age, not having been aged or fermented in oak barrels. Aged implies about one year for white, about two years for red and some oak barrel aging (or other oak contact).

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Waterhouse, A., Ann. N.Y. Acad. Sci. 2002, 957:21-36

Grape and Wine Phenolics



Wine and Health History

- Wine or other alcohol consumed in dilute form as the primary beverage until ~1650
- Moderate wine consumption recommended for health
- Heavy use discouraged
- Wine used as a medicine and medium for other medicines

Wine and Health

- Wine consumption has been associated with a reduction in disease incidence.
 - Cancer
 - Neurodegenerative disorders
 - Cardiovascular disease



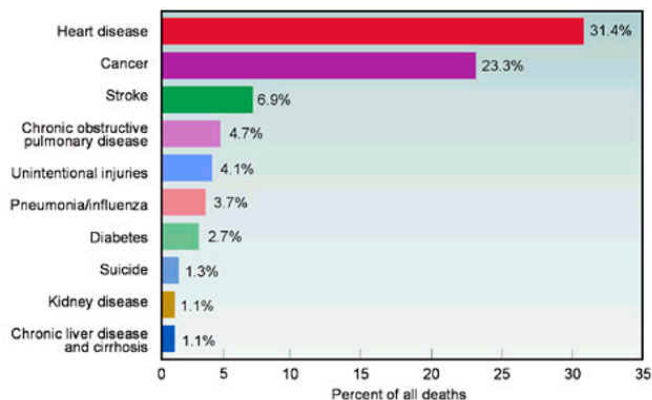
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Wine and Cardiovascular Disease



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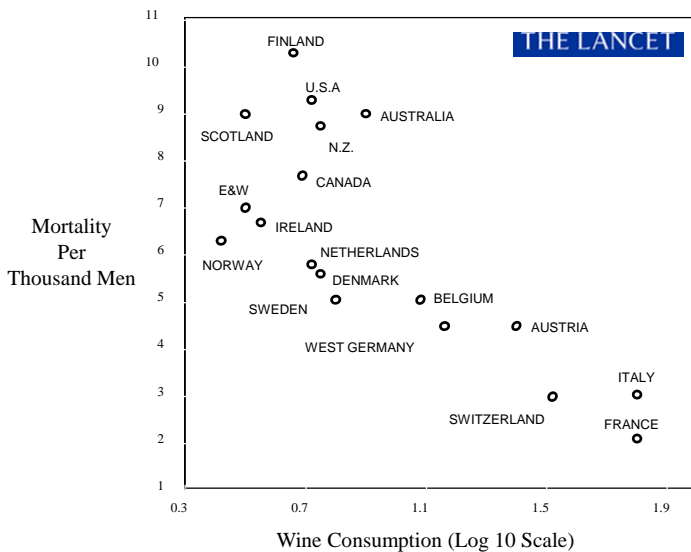
Leading Causes of Death in U.S.



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Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System and unpublished data. 1997.

Early Wine Epidemiology



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St. Leger et al., The Lancet, May 12, 1979, 1017-1020.

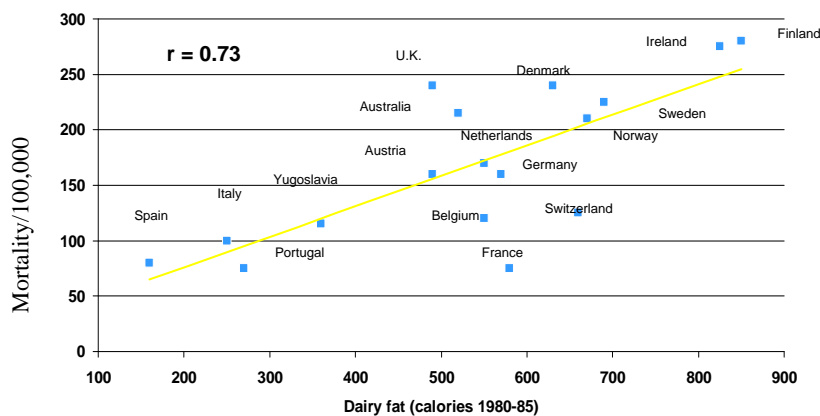
The French Paradox



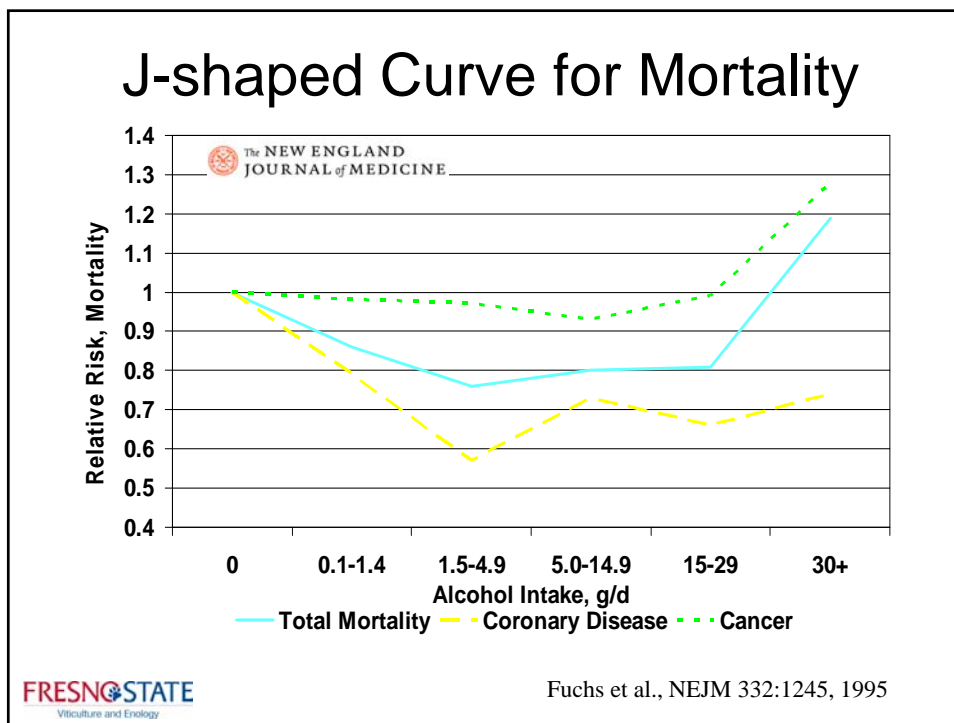
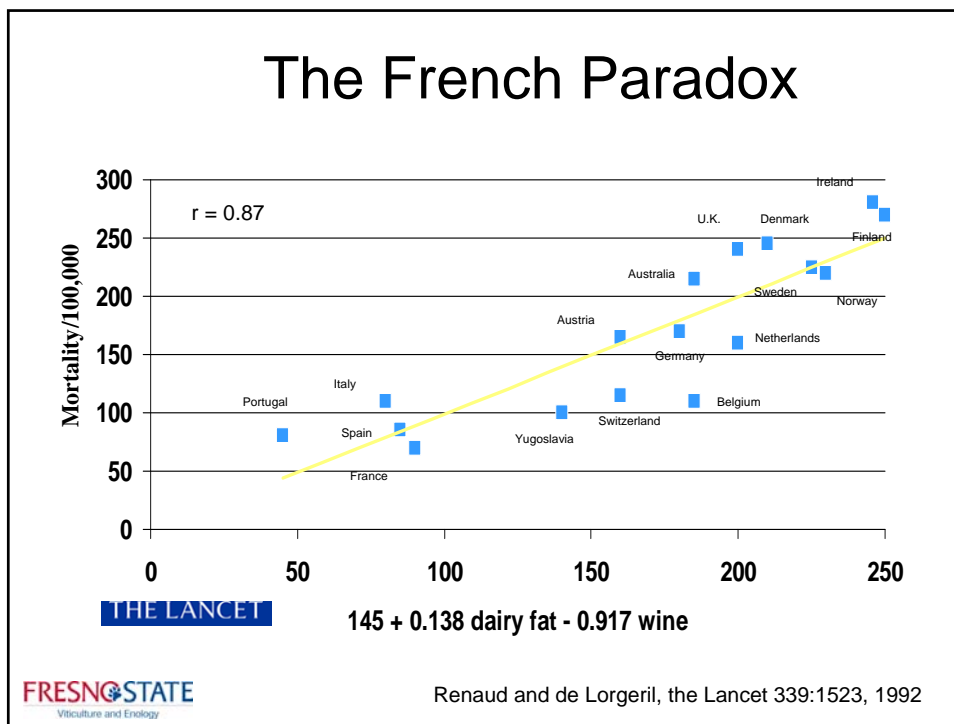
- November, 1991: *60 Minutes* segment on the unusually low incidence of CHD among the French population despite a large dietary intake of saturated fat and cholesterol.
- These results were attributed to wine consumption.

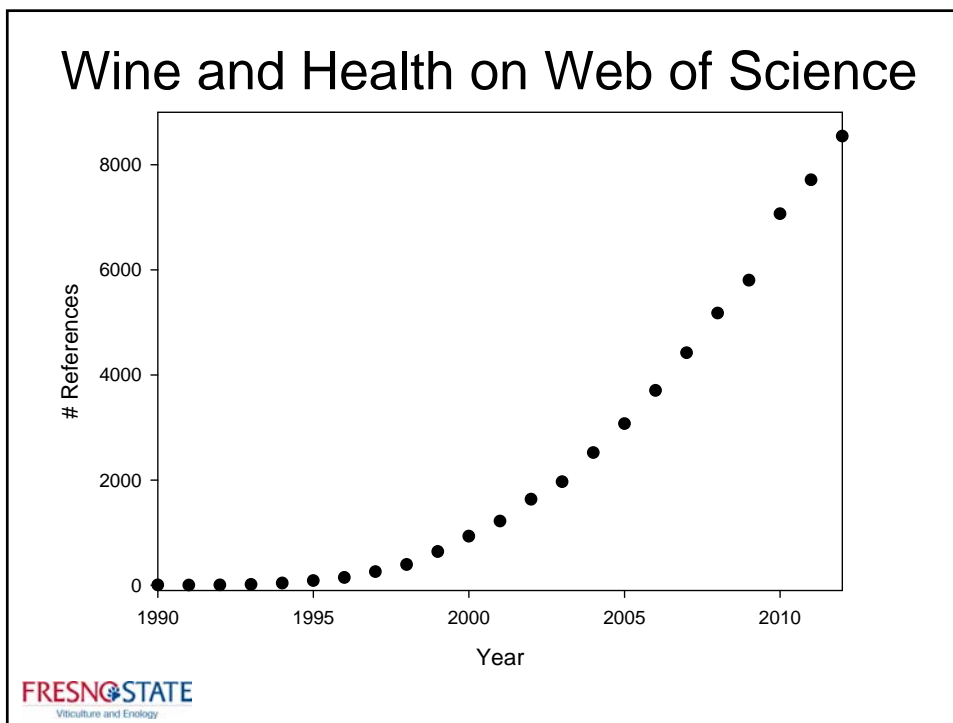
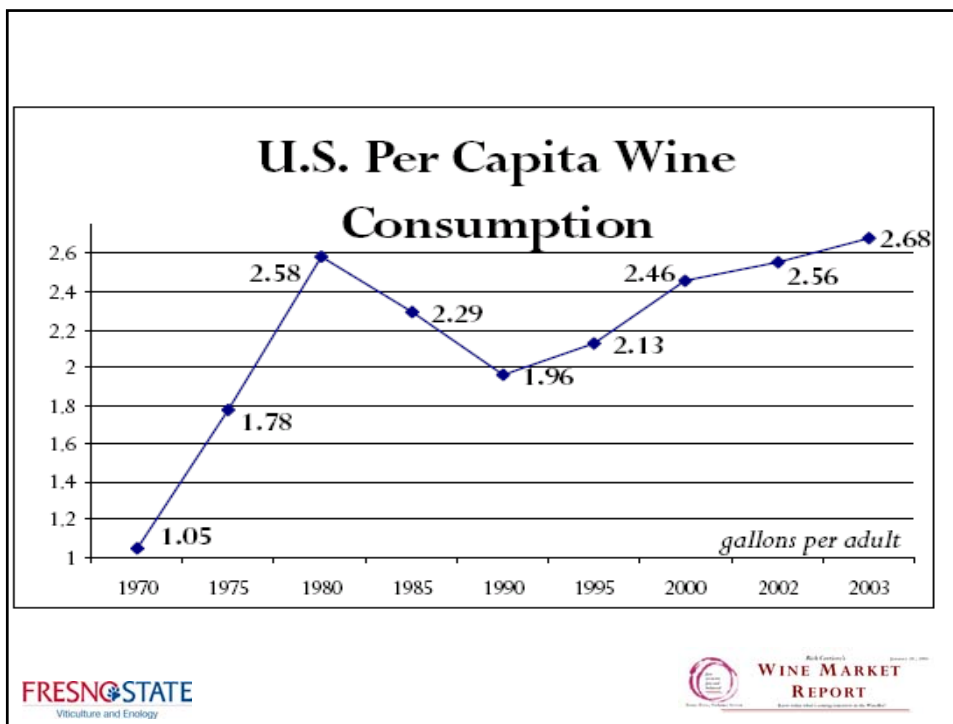


The French Paradox



Renaud and de Lorgeril, The Lancet 339:1523, 1992

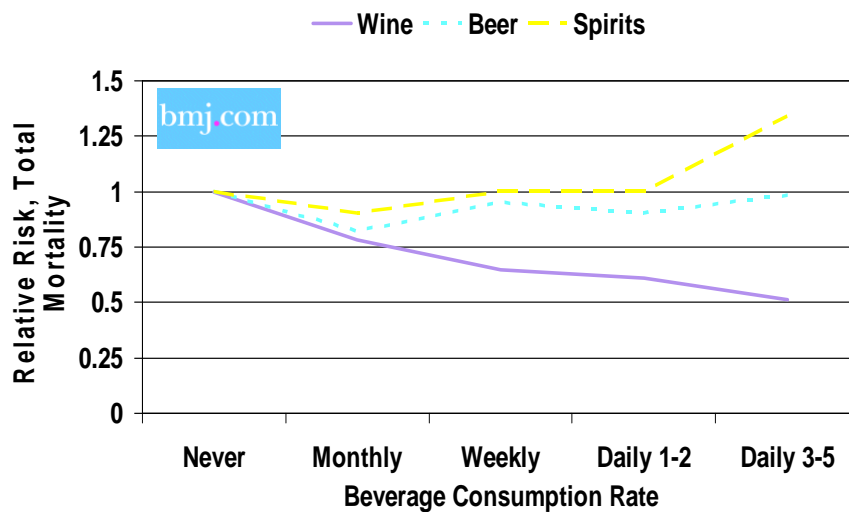




Wine and Health

- Increased longevity from regular, moderate alcohol consumption
- Drinkers, especially wine-drinkers have a lower incidence of many diseases
 - Cancer
 - Neurodegenerative disorders
 - Cardiovascular disease
- Explanation??

Effect of Alcoholic Beverage



In vitro and in vivo experimental research support the biological plausibility of red wine, both its ethanol and phenolic compounds, as an inhibitor of atherosclerosis

Endothelium Maintenance	Impairment of Plaque Formation	Impairment of Plaque Progression	Reduction of Thrombosis
<ul style="list-style-type: none"> ↑ HDL ↑ NO ↓ ET-1 ↓ CRP 	<ul style="list-style-type: none"> ↓ LDL oxidation ↓ VCAM-1 ↓ MCP-1 ↓ Macrophage transmigration ↓ NF-κB 	<ul style="list-style-type: none"> ↓ LDL oxidation ↓ SMC migration ↓ SMC proliferation 	<ul style="list-style-type: none"> ↓ TF, vWF, Factor VII ↓ Fibrinogen, PAI ↓ Platelet function & aggregation ↑ tPA

Szmitko, P. E. et al. Am J Physiol Heart Circ Physiol 288: H2023-H2030 2005; doi:10.1152/ajpheart.00868.2004

AJP - Heart and Circulatory Physiology

Both the alcohol and phenolic components found in red wine are believed to decrease the risk of atherosclerotic disease via several different mechanisms

RED WINE

- PHENOLIC COMPONENTS**
- ALCOHOL COMPONENTS**

- ↑ endothelial function
- ↑ NO
- ↓ ET-1
- ↓ LDL oxidation
- ↓ VCAM-1
- ↓ MCP-1
- ↓ SMC migration
- ↓ SMC proliferation
- ↓ coagulation
- ↓ platelet aggregation
- ↓ thrombosis
- ↓ inflammation
- ↓ CRP
- ↑ HDL

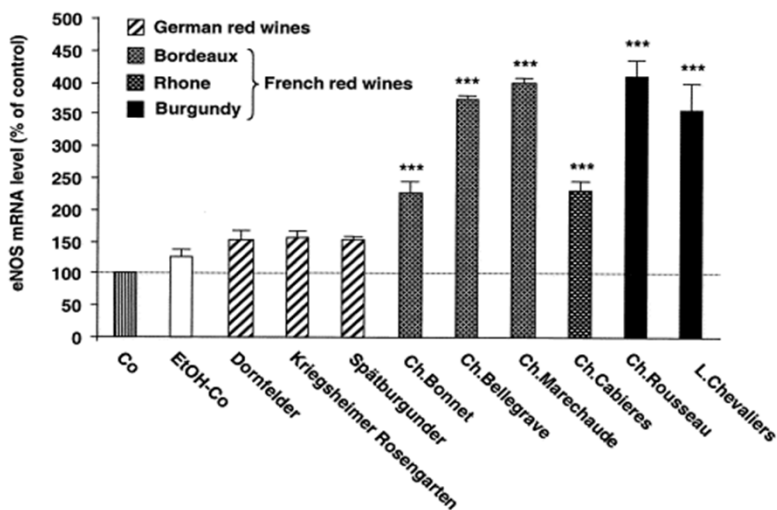
↓ RISK OF ATHEROSCLEROSIS

Szmitko, P. E. et al. Am J Physiol Heart Circ Physiol 288: H2023-H2030 2005; doi:10.1152/ajpheart.00868.2004

AJP - Heart and Circulatory Physiology

Expression of eNOS mRNA

- Nitric oxide is a potent vasodilator

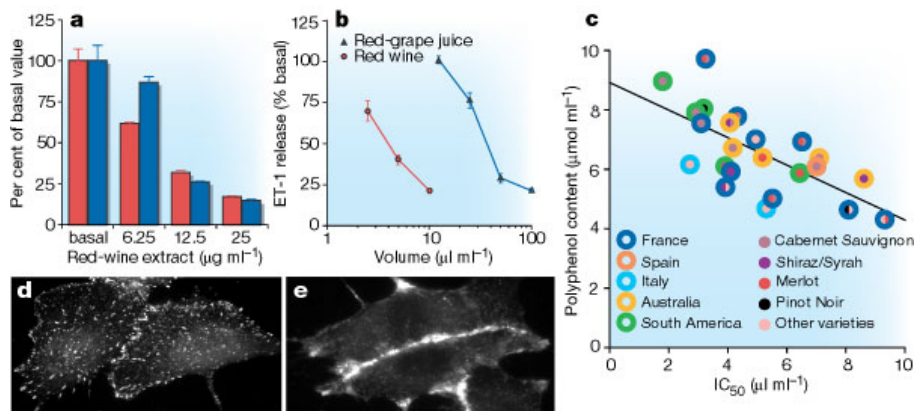


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Wallerath et al., J. Am. Coll. Card., 41: 471, 2003

Endothelin-1 Synthesis

- Endothelin-1 is a potent vasoconstrictor peptide
- Overproduction is a key component of cardiovascular disease



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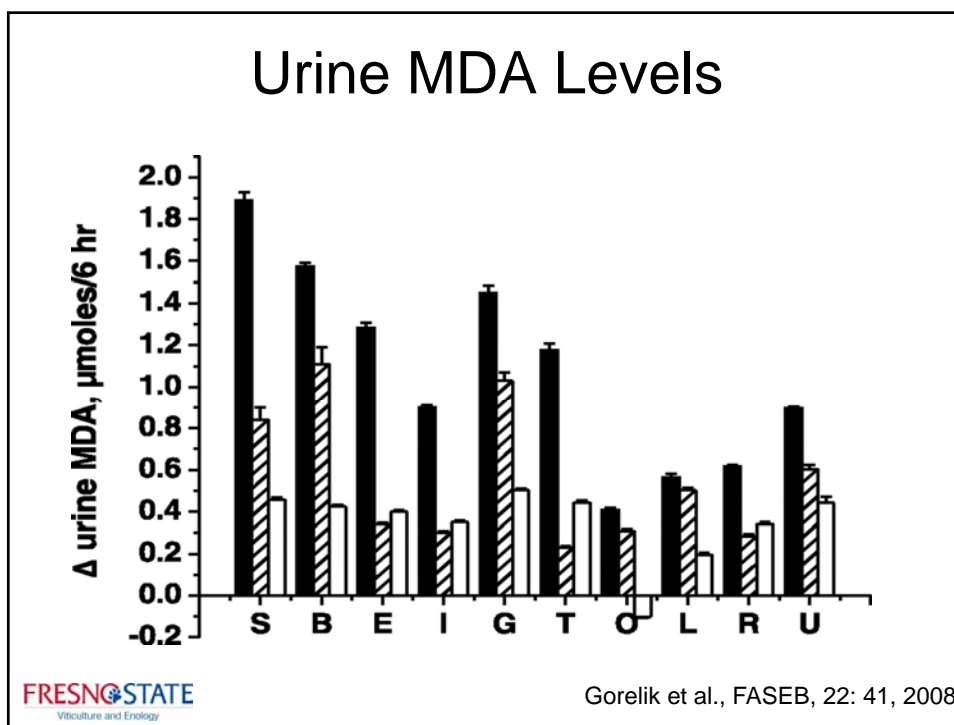
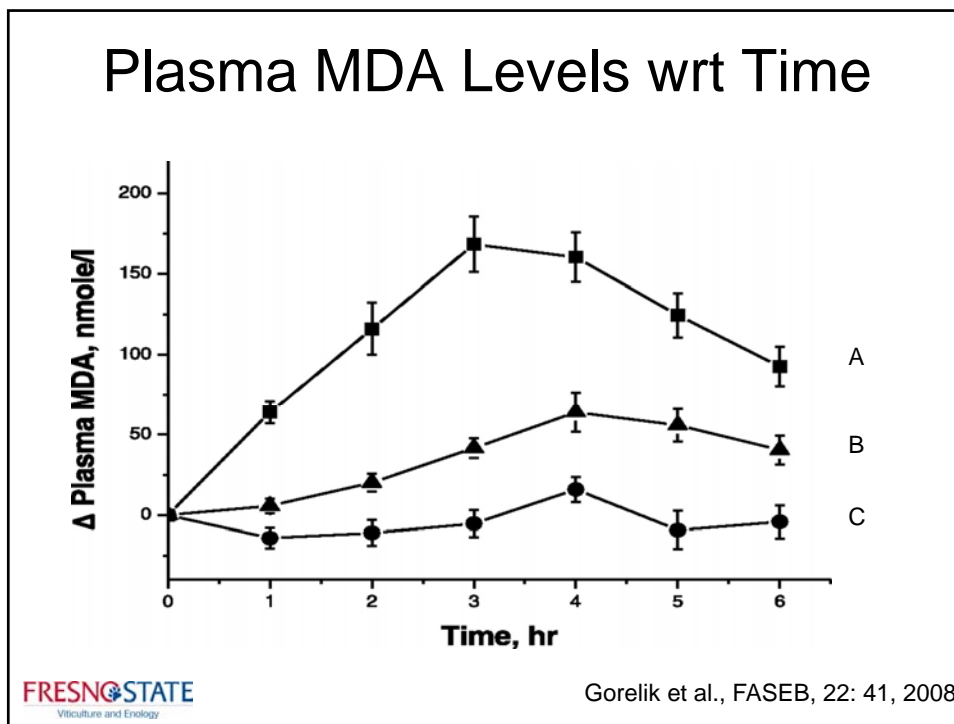
Corder et al., Nature, 414:863, 2001

Red Wine Polyphenols and Health

- Atherosclerosis may be partly due to processes that occur after ingestion of high-fat foods that contain lipid oxidation end products (ALEs).
- Some products are cytotoxic and genotoxic such as:
 - Oxysterol
 - 4-hydroxy-nonenal
 - malondialdehyde (MDA)

Red Wine Polyphenols and Health

- 10 subjects were recruited
 - Given the following diets
 - A: cooked meat with water
 - B: cooked meat, red wine polyphenols (RWP) after cooking, red wine
 - C: RWP mixed with meat then cooked, red wine
 - MDA monitored in plasma and urine



Wine and Health Summary

- Most studies associate moderate red wine consumption with a low incidence of cardiovascular disease
- Most studies implicate ethanol and phenolics as being the active components in wine



Resveratrol and Labeling

2002 OREGON PINOT NOIR

Pinot noir grows in the Willamette Valley in among the highest quality of this variety in the world. This wine is an excellent companion with salmon, pork, lamb, poultry and dark chocolate.

These vines were trellised by hand and cluster thinned to increase flavor intensity. We use sustainable farming practices earning LVI (Low Input Viticulture and Enology) and Salmon Safe certification for our vineyards. The Pinot noir berries were separated from the stems and "cold soaked" for 3 days in small fermenters and then allowed to naturally ferment with our Estate Vineyard's yeast.

Pinot noir, a thin skinned winegrape, develops a natural defense against botrytis (mold) in our moist, cool climate - the antioxidant resveratrol.

J. Beatty Founder/Vinogrower
Pauline Klafke Winemaker

P.S. Please return this bottle to the winery for a 10 cent refund. Thank you for keeping Oregon Green.

GOVERNMENT WARNING: IT ACCORDING TO THE SURGEON GENERAL, WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS. (2) CONSUMPTION OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS.

TECHNICAL DATA
Pinot Noir Clones: Dijon 113, 114, 115, 667, 777, Pomard, Wadenswil
Soil Type: Jory (iron rich volcanic)
Harvest: September 28, 2002
Brix at Harvest: 24.5°
Resveratrol: 10.96 Micromolar
Barrel Regimen: 11 months in French Oak
New Oak: 20% Allier Forest
Peak Drinkability: 2006-2008

TECHNICAL DATA
Produced & Bottled by WILLAMETTE VALLEY VINEYARDS
8000 WASHINGTON WAY SE TURNER, OR 97130 • 1-800-344-8463
www.willamettevalleyvineyards.com
300 GR 145-40X 14.5L BY VOL.
CONTAINS SULFITES
17071 91171



University Suspects Fraud by a Researcher Who Studied Red Wine

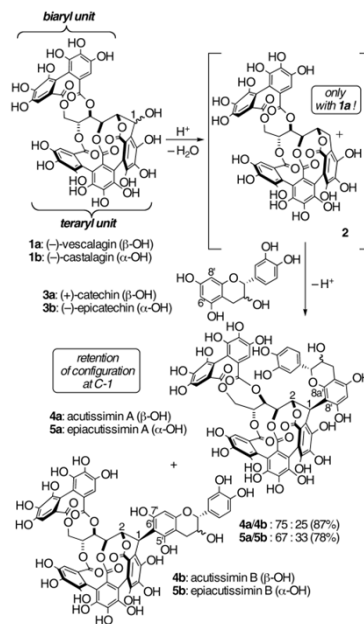
A charge of widespread scientific fraud, involving 26 articles published in 11 journals, was leveled by the [University of Connecticut](#) today against Dipak K. Das, one of its researchers, whose work reported health benefits in red wine.

NY Times, January 11, 2012



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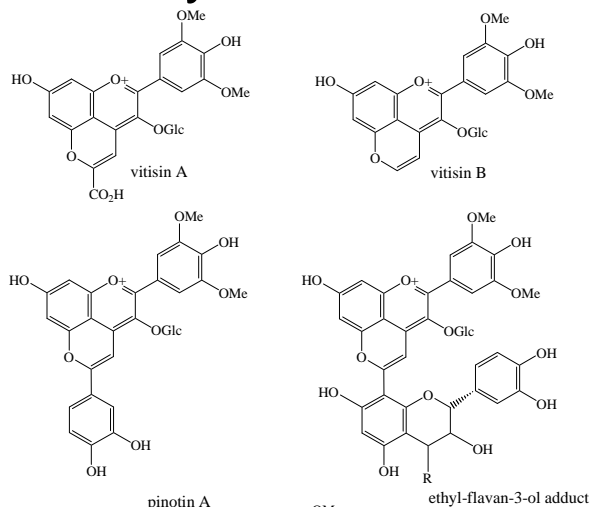
Many plant-based foods have high phenolics so why is wine special???



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Quideau et al., Ang. Chem.-Int. ed.. 42 (48): 6012-6014 2003

Anthocyanin Products



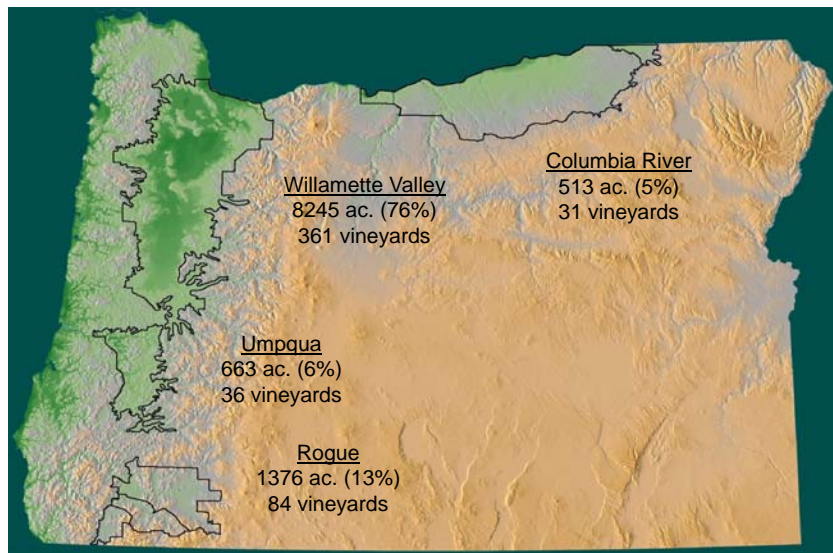
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Optimizing Phenolics through Research

- Goal of Research program
 - Improve quality of red wine phenolics
 - Concentration
 - Balance
- Considerations
 - Oregon's climate
 - Short growing season
 - Predominant variety Pinot noir

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Influence of Place



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Courtesy of Gregory Jones

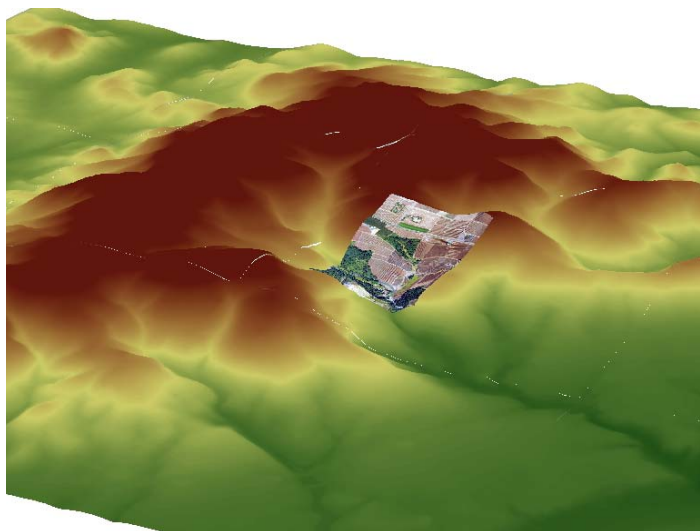
Arcus Estate: Dundee, Oregon



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Halbleib and Cortell, 2003

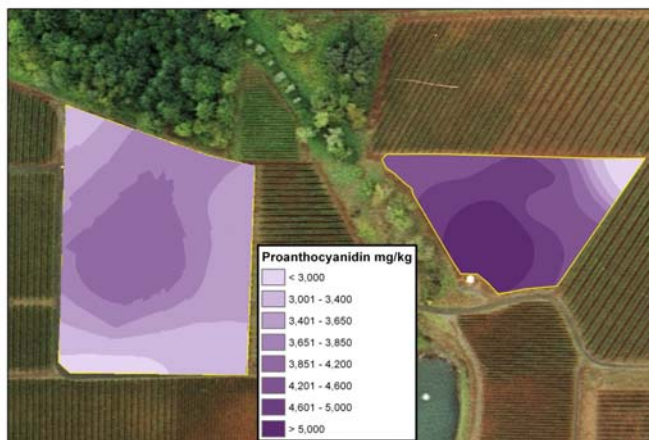
Terrain Map w/ Image Overlay



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Courtesy of Mike Halbeib

Spatial Map of Tannins



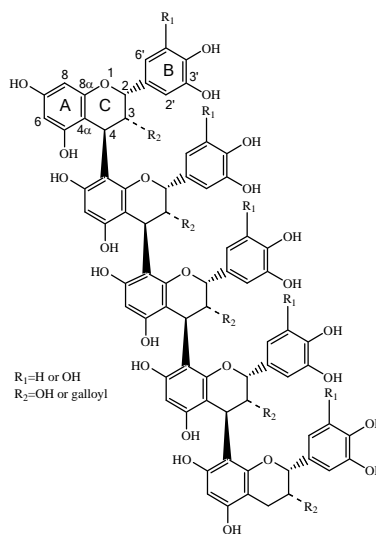
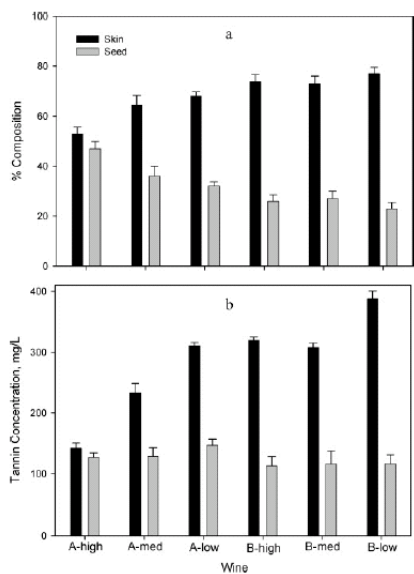
0 756 1522 3030
Meters



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Cortell et al., J. Agric. Food. Chem., 53: 5798, 2005

Wine Tannin and Vigor



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Cortell et al., J. Agric. Food. Chem., 53: 5798, 2005

So Which Wines are Healthier?

- In most studies, red wines are more effective than white wines
 - Due to phenolics
- For red wines, higher phenolic concentrations considered more effective
 - Specific phenolics?
 - Studies have focused on grape-based phenolics and red wine phenolic mixtures
 - Labelling?
 - Consumer information

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In Summary

- Epidemiology is clear but . . .
- Has wine's causality been confirmed?
 - Japan
 - Socioeconomics
- Issues with phenolics
 - Absorption
 - Metabolism
- If confirmed, issues remain with alcohol

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"By the way, the health benefits of a glass of wine a day are not retroactive."

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The New Yorker, June 5, 2006