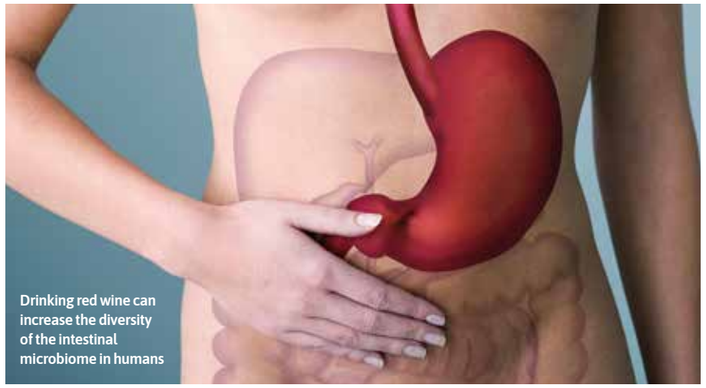

Drinking red wine can increase the diversity of the intestinal microbiome in humans

EXPLAINED Wine and digestion

STORY MICHAEL APSTEIN, MD, ASSISTANT PROFESSOR OF MEDICINE, HARVARD MEDICAL SCHOOL & MEMBER OF THE DIVISION OF GASTROENTEROLOGY, BETH ISRAEL, BOSTON

In *Timothy 5:23*, Paul advises: 'Drink no longer water, but use a little wine for thy stomach's sake.' Red wine, and even red wine that has had its alcohol removed, can inhibit the growth of bacteria in the test tube. Maybe Paul felt that a little wine would counteract the bacterial impurities found in water in Biblical times. But, is there something else at work here? As is usual with science, the answer is not clear and, worse, there's good evidence that wine for many people worsens gastrointestinal problems.

INSIDE THE BODY

Let's start with the intestinal microbiome, the billions of bacteria, viruses, fungi and other organisms that inhabit our intestinal tract. No doubt, the intestinal microbiome is important. It may be a marker of how healthy we are. Or changes to it may contribute to disease. Healthy people have a more diverse intestinal microbiome – more species of organism – than obese individuals or those with chronic inflammatory diseases.

It's a fascinating observation, but the question remains, which is the cart and which is the horse? Does obesity or chronic disease, for example, cause the lack of diversity of the microbiome? Or is the lack of diversity the cause of obesity or chronic disease? If it's the latter, changing the intestinal microbiome could be a crucial way to helping people lose weight or modify the disease process. If the former is true, altering the intestinal microbiome will make no difference.

WINE & THE BIOME

A recent study from King's College, London suggested that drinking red wine – but not white wine, spirits, beer or cider – increases the diversity of the intestinal microbiome in humans, presumably because of its polyphenol content. The popular press embraced the findings as more evidence of the beneficial effect of red wine. It's a tantalising prospect – altering our gut bacteria by drinking red wine could make us healthier. But, and this is key, until we can distinguish the cart from the horse, we won't know whether that's true.

Wine, both red and white, is a potent stimulus of gastric acid secretion. In contrast, a 12% solution of ethanol has no effect on gastric acid secretion. So, something other than alcohol – we don't know what – is responsible for the bump in acid output. Unsurprisingly, many individuals report worse heartburn or gastroesophageal reflux after drinking wine. Excess acid washing back into the esophagus likely explains their discomfort. But distilled beverages, even those with a higher alcoholic content, such as whisky and Cognac, have no effect on acid secretion. Yet they still induce heartburn. As with the intestinal microbiome, the relationship between alcohol and heartburn is not straightforward.

Everyone 'knows' that drinking causes ulcers. Wine's ability to induce hyperacidity would seem to fit that paradigm. But multiple studies show that wine drinking is associated with a lower, not higher, risk of peptic ulcer disease. Sometimes the conventional wisdom is incorrect.

Though the liver is the primary site of the metabolism of alcohol, the stomach plays a key role. The stomach lining contains an enzyme that also breaks down alcohol. That explains why eating while drinking results in lower blood alcohol levels. Food slows the rate at which contents leave the stomach. As a result, the alcohol spends more time in the stomach where it is broken down before it could be absorbed.

Conversely, drinking on an empty stomach allows more alcohol to escape breakdown there, be absorbed and result in a higher blood alcohol level. Women have less of this enzyme in their stomachs compared to men, which helps explain why they are more susceptible to alcohol's effects.

So, if you take Paul's advice, have a bite to eat with the wine.

World of difference: the importance of enzymes

The breakdown (metabolism) of alcohol differs between Asians and Westerners. Ethanol is broken down in two steps by different enzymes. The first enzyme, alcohol dehydrogenase (also the one that's in the stomach) converts ethanol to acetaldehyde, a toxic substance.

Westerners have an enzyme that eliminates this toxicity instantly. Many Asians, however, lack the gene that produces the enzyme, so acetaldehyde accumulates in the blood, leading to, among other things, flushing and general discomfort in individuals who drink even minimal amounts of wine. The syndrome affects roughly 50% of Japanese, 40% of Chinese and 30% of Koreans. In contrast, only 10% of the Thai and 4% of the Indian population is affected. Not only is the syndrome socially embarrassing, but the build-up of acetaldehyde may contribute to the increased risk of cancer of the esophagus and stomach.

While the intestinal microbiome may be important to health, so is our genetic make-up. And that's not easy to alter.

Ask Decanter

Each month our experts answer your burning wine questions. Email your questions to *editor@decanter.com*

CONCRETE & WINE

How does the use of concrete in winemaking affect the taste of the wine? Does its contact with the wine give aromas and flavours of stone dust or wet gravel? [As the use of oak can bestow a toasty oak character.]
Mats Wedel, Gamleby, Sweden

***Decanter* contributing editor Andy Howard MW replies:** Today, there are so many materials available for the storage and maturation that it can be confusing to see what each brings. Wine can be matured in stainless steel, clay amphorae, oak barrels or foudres, or even larger wooden vessels, glass and concrete.

The latter is very interesting as it was widely used as a material for storage and maturation of wine before becoming unfashionable in the 1980s and '90s. Today, concrete is back in a big way, so your question is a very valid one.

Concrete, unlike steel and glass, allows for micro-oxidation of the wine – a process similar to that which takes place with wooden or clay vessels. Unlike wood, however, concrete is essentially a neutral material which doesn't contribute extra tannins to a wine, although some winemakers feel it adds a specific, mineral flavour.

Complex reactions certainly take place in wine matured in concrete tanks – the pH of concrete is about 13 when new, whereas wine will be between 2.9 and 3.6. Maturation in concrete seems to add a sensation of wet stone/pebble, although to me this is more of a textural change than a modification of flavour.

This may be due to a different balance of acidity in a wine which has been matured in concrete. The absence of oak/wood characters also helps to emphasise the fruit character and structural elements of the wine, adding to a sensation of purity, mid-palate concentration and freshness.

AGEING VINTAGE FIZZ

Do certain vintage Champagne styles age better than others? For example, will a blanc de blancs age better than a blanc de noirs? What about rosé?
Deep Mitra, London

Simon Field MW, DWWA Regional Chair for Champagne, replies: Vintage Champagne, on release, has already enjoyed extensive ageing in bottle and on its lees (dead yeasts), gaining richness, in many cases for far longer than the minimum of three years set out in the appellation rules.

Complexity is guaranteed; that's part of the deal and underwrites stylistic and qualitative features rarely found in other sparkling wines.

The debate gets more intriguing when one assesses the categories of vintage Champagne. There are no rules of thumb, but generally the Chardonnay blanc de blancs are slowest to show their true colours; the best are cerebral, linear and unremittingly complex. Blanc de noirs tend to be more expressive earlier on, with red fruits ceding to more savoury notes. Rosés can be enigmatic, as often released earliest, yet a happy few can last for decades. Finally the blends, which account for the lion's share are, in a sense, the most unpredictable, excitingly so as long as one knows the producer and reputation of the vintage in question.

BOOZE RUN PLANNING

Is the personal duty free allowance per person or per car when travelling into to the UK from abroad?
Stepan Pasicznyk, by email

Amy Wislocki, *Decanter* magazine editor, replies: Travellers are allowed to bring into the UK: 42 litres of beer, plus 18 litres (24x75cl bottles) of still wine. You can also bring in 4 litres of spirits **OR** 9 litres (12x75cl bottles) of sparkling wine, fortified wine or any alcoholic drink less than 22% abv. These allowances apply per passenger aged 18 or over. D

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