

Alcohol: a connection that goes back millions of years

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Alcohol is the drug most commonly consumed by the population, with more than 8 in 10 Quebecers regularly consuming alcoholic drinks. It seems that this attraction to alcohol is the result of a genetic mutation which occurred several million years ago, even before the appearance of the first Homo sapiens.

The **fermentation of alcohol** appeared on earth about 80 million years ago, thanks to a mutation which enabled yeast to use fruit sugars as a source of energy, which happened as fruits were becoming abundant at that particular period of evolution. All evidence suggests that many animals became adapted quite rapidly to this presence of alcohol in fruits because insects such as *Drosophila* or even mammals such as the shrew or the bat can easily tolerate alcohol and, in some cases, are even attracted by this substance.

A similar situation has occurred in the human species. Recent studies indicate that about 10 million years ago, the common ancestor of gorillas, chimpanzees and humans acquired the ability to tolerate alcohol thanks to a mutation in an enzyme (alcohol dehydrogenase) which allowed it to degrade ethanol 40 times faster and thus reduce its toxicity¹.

At that time, our distant ancestors had adapted themselves to a lifetime spent close to the soil due to the drying of the climate and were thus in contact with rotting and fermented fruit which had fallen from trees. The ability to tolerate the presence of alcohol in these fruits thus presented an evolutionary advantage because it permitted these primates to have access to additional calories which improved their chances of survival.

Alcohol is thus not just another drug like the others, in the sense that our attraction to it is not solely due to its psychoactive effects, but also because it has been a part of human eating habits for a very long time and has even contributed to the evolution of our species.

DOUBLE-EDGED SWORD

Despite the important place that alcohol occupies in our daily life, we must not forget that the use of this substance is a double-edged sword. At weak doses (2 glasses for a man, 1 for a woman), the consumption of alcohol is good for the health, as several studies have shown that it is associated with a significant reduction (20%) in the risk of mortality compared to people who do not drink.

At elevated quantities, on the other hand, alcohol is quite toxic and considerably increases the risk of premature death, particularly due to very large increases in the risks for at least six types of cancers (mouth, larynx, esophagus, colon, liver and breast).



The link between the consumption of alcohol and breast cancer merits particular attention because statistics indicate that young women drink much more than in previous decades and that they are even in the process of catching up to men in this respect².

Unfortunately the studies show that regular consumption of alcohol, even when it is moderate, increases by about 10% the risk of developing breast cancer³ and the risk is certainly much more significant in cases of excessive consumption. The recommendation of health agencies is for women to not surpass the suggested limit of one glass per day, in order to minimize the risks of cancer.

RED WINE

In low doses, all types of alcoholic drinks reduce the risk of mortality due to the positive effects of alcohol on the cardiovascular system. However, some population studies involving hundreds of thousands of participants have suggested that regular, moderate consumption of red wine could provide benefits superior to those observed for other forms of alcohol due to the unique content in red wine of phytochemical compounds such as polyphenols which are uniquely found in the skin of grapes. These molecules, most notably resveratrol, interfere with numerous processes involved in the development of cancer and could explain why studies have found that excess red wine causes a smaller increase in the risk of cancer than has been observed with other types of alcoholic drinks: 15 times less for hepatic cancer and 6 times less for oral cancer.

If you drink alcohol, red wine thus seems to be superior for taking advantage of the benefits of alcohol on the reduction of risk for heart diseases, all while minimizing the negative effects on the risk of cancer.

- (1) Carrigan MA et al. Hominids adapted to metabolize ethanol long before human-directed fermentation. *Proc. Natl. Acad. Sci. USA* 2015;112:458-463.
- (2) Slade T et al. Birth cohort trends in the global epidemiology of alcohol use and alcohol-related harms in men and women: systematic review and metaregression. *BMJ Open* 2016;6:e011827.
- (3) Allen NE et al. Moderate alcohol intake and cancer incidence in women. *J. Natl. Cancer Inst.* 2009;101:296-305.