



ALCOHOL AND HEALTH

# ALCOHOL AND HEART HEALTH



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# INTRODUCTION

The impact of regular, moderate drinking on cardiovascular health has been a hot topic around the world for more than a quarter-century. It all began in 1981, with the work of French researchers Jacques Lucien Richard, François Cambien and Pierre Ducimetière, whose epidemiological studies on the relationship between heart disease and fat consumption in France revealed what they called the “French Paradox.”<sup>1</sup>

Ten years later, physician and researcher Serge Renaud presented the results of his studies confirming that, “despite diets similar in saturated fats (which cause an increase in “bad cholesterol,” or LDL), the statistical risk of heart disease in France is 3.5 times lower than in the U.S., mainly because of French people’s regular, moderate consumption of one to three glasses of antioxidant-rich red wine with meals.”<sup>2</sup>

One year earlier, Renaud and his colleagues, cardiologist Michel de Lorgeril and dietitian-nutritionist Patricia Salen, had hailed the diets of Crete and southwestern France—rich in “good cholesterol,” antioxidants and omega-3 fatty acids—and moderate consumption of red wine as a good way to prevent and treat heart disease.

The lowest incidence of heart attack was seen among those who ate a Mediterranean diet: 38 cases per 100,000 residents, or eight times lower than the 315 per 100,000 in the United States and United Kingdom, with a life expectancy 10 years longer than in northeastern France. The incidence of heart attack among those eating the diet of southwestern France was 80 cases per 100,000 residents, or four times lower than in the U.S. and U.K.<sup>3</sup>

The news spread like wildfire, and the subject continues to make headlines and spark passionate debate. Still, studies contradict each other and cast doubt on the conclusions of both sides, creating a controversy that remains unresolved.

In any case, Éduc’alcool believes it is important to provide the people of Quebec with all the data information currently available.

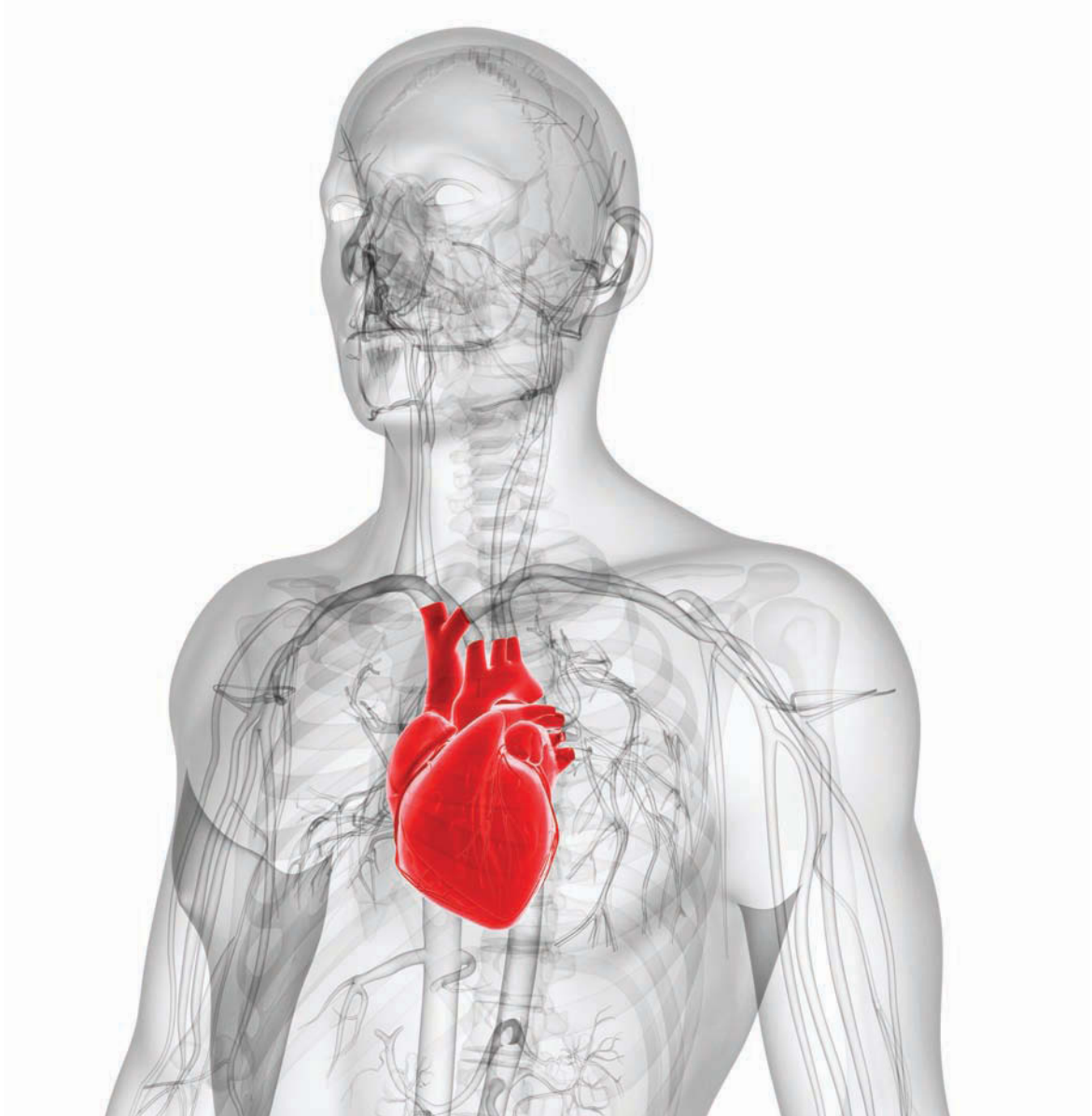
Furthermore, we want to do so in a manner both calm and credible, remembering at all times that, even in science, absolute certainty is exceedingly rare, and there is no such thing as incontestable opinion. Nuance is everything, and, as always, moderation is always in good taste.

<sup>1</sup> Richard et al., 1981.

<sup>2</sup> *60 Minutes*, CBS Television, 1991

<sup>3</sup> <https://www.westonaprice.org/le-french-paradox/>





## HEART DISEASE COMES IN MANY FORMS

There are a number of different types of cardiovascular disease. These include the coronary heart disease that causes myocardial infarction (commonly known as heart attack), hypertensive heart disease, atrial fibrillation, congestive heart failure, and sudden cardiac death.

While all scientists agree that excessive drinking significantly increases the risk of developing one or more of these diseases, it remains true that, for some drinkers, regular and moderate alcohol consumption is associated with a number of improvements in cardiovascular health.<sup>4</sup>

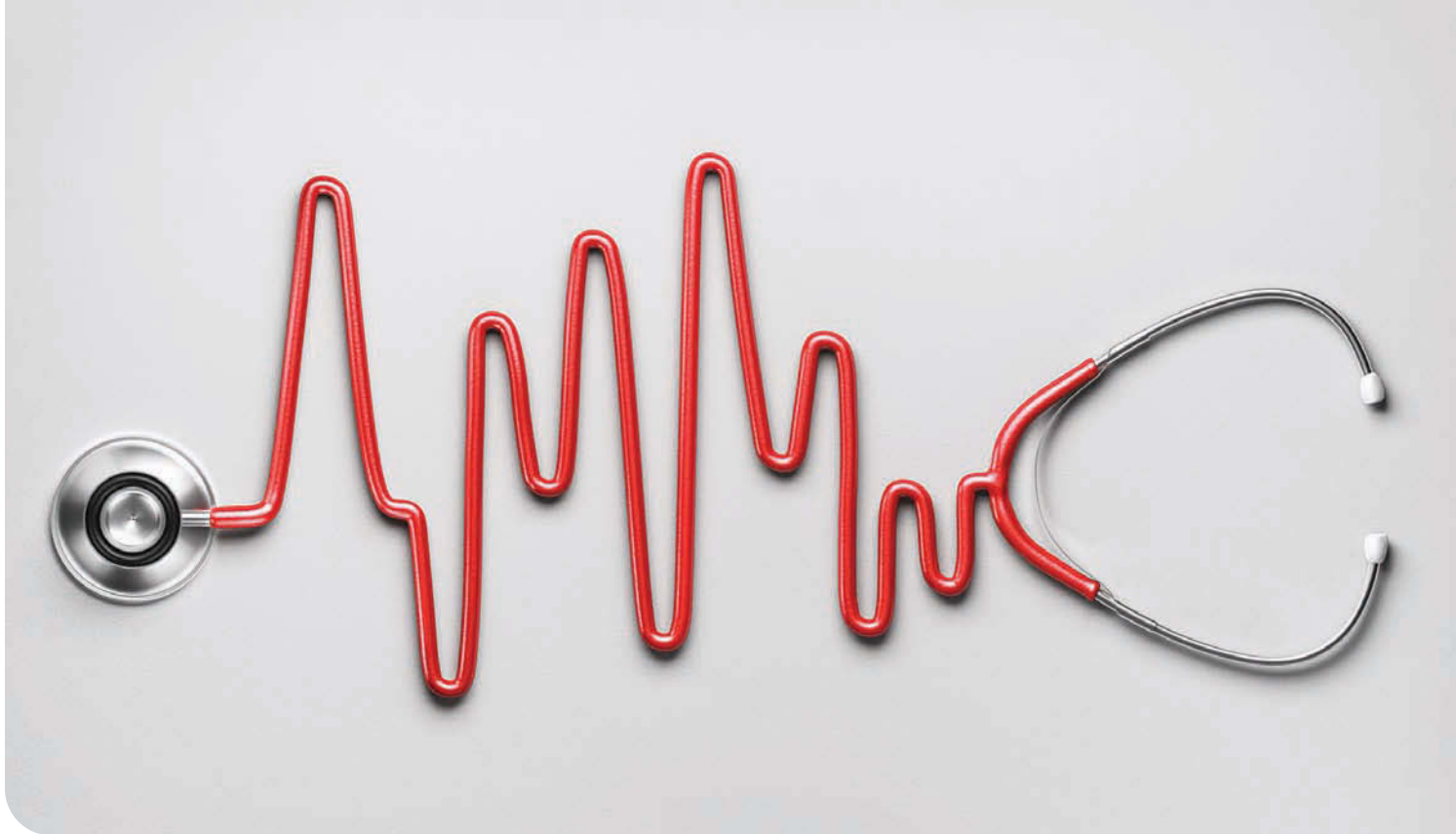
As noted above, it's a controversial subject. Some researchers are cautious about making conclusions based on studies showing beneficial effects, noting that these are nothing more than co-occurrences observed between drinking and health, while others go so far as to state confidently that moderate amounts of alcohol have a causal effect on improved cardiovascular health.<sup>5</sup> Still others believe that the risks of moderate drinking outweigh any possible benefits, and recommend complete abstinence.<sup>6</sup>

But it's even more complicated than that.

<sup>4</sup> Ronsley et al., 2011 ; Xi et al., 2017.

<sup>5</sup> Richard et al., 1981.

<sup>6</sup> Grisword et al., 2018a.



## Nuances even within individual studies

Two large-scale studies were published in 2018. The first, led by Angela Wood, concluded that, among drinkers in countries with a high standard of living, there was an almost proportional increase between the amount of alcohol consumed and the risk of stroke (technically known as cerebrovascular accident, or CVA), cardiac arrest, and death due to a cardiac disease. The more people drank, the greater the risk of developing certain cardiac problems. However, this effect was not observed for incident coronary heart disease, including heart attack.

Furthermore, when mortality was examined in relation to the type of alcohol consumed, there was a difference in risk between wine and other types of alcohol: drinking wine was associated with a smaller increase in mortality. But in this study, wine drinkers also smoked less, and ranked higher in terms of various socioeconomic status indicators. Since such factors are also associated with better cardiovascular health, the differences observed might shrink, if not disappear altogether, if those factors were included in the equation.

What's more, the study unfortunately did not include non-drinkers, i.e. former drinkers or lifetime non-drinkers. It is therefore impossible to draw conclusions about the level of drinking at which the symptoms of cardiovascular disease exceed those of non-drinkers, or about the level at which drinking becomes a significant factor in the development of the disease.

The second study, by the *Global Burden of Disease 2016 Alcohol Collaborators*,<sup>7</sup> which includes data from 195

countries—almost every country on the planet— does include non-drinkers. Although the authors recommend aiming for abstinence in order to avoid any risk of disease, their data<sup>8</sup> suggest that, when it comes to cardiovascular disease, the risk increases at the following levels:

- less than one drink<sup>9</sup> a day for atrial fibrillation
- 1.5 drinks for hypertensive cardiac disease
- 2.2 drinks for hemorrhagic stroke
- 3.7 drinks for ischemic stroke
- 5.2 drinks for ischemic heart disease.

For the last two, the study results even suggest that moderate alcohol consumption could have beneficial health effects.

At the same time, the increase in risk observed between zero and two drinks per day is small, if not negligible. When you go from abstinence to a single drink per day, the risk of developing one of the diseases studied over a given year increases by 0.5%. In real numbers, 914 out of 100,000 people developed one of the diseases studied while they were abstinent. Having one drink a day increased the number to 918, an increase of four people in a population of 100,000. When you go from zero to two drinks a day, the increase is 7%, up to 977 people, or 63 more with a cardiovascular disease.

That said, it is important to note that the authors said their study had not established any cause-and-effect link between drinking alcohol and the cardiovascular diseases studied.

<sup>7</sup> Grisword et al., 2018a.

<sup>8</sup> Grisword et al., 2018b.

<sup>9</sup> The amounts considered standard drinks in the study have been converted to Canadian norms, based on data reported by the researchers: a standard drink is considered to contain 13.45 grams of alcohol.



# BENEFITS OF ALCOHOL

The *Global Burden of Disease 2016 Alcohol Collaborators*<sup>10</sup> study showed that women who have up to 1.5 drinks per day benefit from a reduced risk of ischemic heart disease and ischemic stroke. In men, the benefit was only with regard to the risk of ischemic heart disease, and that was associated with daily consumption of up to 2.2 drinks.

A meta-analysis published in 2011 by Ronksley and colleagues in the *British Medical Journal* examined 4,235 studies on the subject and listed 84 of good quality<sup>11</sup> that evaluated the impact of alcohol on various cardiovascular diseases. Compared to those who never drank, people who had no more than 4.5 drinks a day showed a marked reduction in death from cardiovascular disease, as well as a reduced risk for incident coronary heart disease. Better yet, there was an additional benefit of reduced risk of stroke and resulting death for those who had only 1.1 drinks a day, compared to people who did not drink at all. In fact, the risk of cardiovascular disease in participants who consumed up to 1.1 drinks per day was reduced by 14% to 25%.

## Regular drinking

When it comes to drinking, frequency is as important as quantity. One study of just over 35,000 people from five cohorts in the United Kingdom and one cohort in France surveyed drinking habits in order to explore their connection with the incidence of cardiovascular diseases. Regularity was determined by checking drinking habits three times over the years: regular drinkers were considered those who reported similar consumption levels each time.

The researchers found that moderate and regular drinking over a period of 10 years, i.e. up to 168 grams of alcohol per week for men, and up to 112 grams of alcohol per week for women, has a beneficial effect on the cardiovascular health of drinkers.<sup>12</sup> That's equivalent to a weekly maximum of 12.5 standard drinks for men, and 8.3 for women. According to this study, the risk for moderate and regular drinkers of developing a cardiac disease is lower than for lifetime abstainers, former drinkers, and moderate irregular drinkers. Note that regular drinking does not mean drinking every day; generally speaking, it means drinking the same moderate amounts of alcohol over time.

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<sup>10</sup> Grisword et al., 2018a.

<sup>11</sup> A good quality study is one in which participants are followed over several years and confounding variables are taken into account.

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<sup>12</sup> O'Neill et al., 2018.



## The sex factor

There are observable differences between men and women, in terms of both the amount of alcohol at which a protective effect is observed<sup>13</sup> and the types of diseases associated with drinking.

For example, a meta-analysis of 20 studies on hypertension found that men generally show an increase in blood pressure from the very first daily drink, while women's blood pressure increases significantly only after the second daily drink.<sup>14</sup>

## The age factor

Young adults are generally at lower risk for cardiovascular disease. The beneficial effects attributed to alcohol are not likely to be observed, since most young people are already in good health. However, risk increases naturally with age, and that's where moderate drinking can have a beneficial impact.

Teenagers who indulge in occasional heavy drinking put themselves at risk for cardiac complications. Researchers have observed, in people as young as 17, a hardening of the arterial walls associated with abusive drinking throughout adolescence.<sup>15</sup>



<sup>13</sup> O'Neill et al., 2018.

<sup>14</sup> Roerecke et al., 2018.

<sup>15</sup> Charakida et al., 2018.

## What about red wine?

Red wine is often hailed in the media and popular culture for its polyphenols, including resveratrol, which has achieved almost celebrity status. These molecules are known for their role in preventing heart disease, specifically due to their effect on high-density lipoproteins (HDL, or “good cholesterol”). But are the claims about the beneficial properties of red wine really true?

Much research around the world has indeed shown that, compared to other types of alcohol, red wine in moderate amounts is associated with a significant reduction in the risk of developing various heart diseases.<sup>16</sup> The additional benefits of red wine appear to be due, at least partly, to its higher resveratrol content.<sup>17</sup>

Other research<sup>18</sup> has analyzed a number of studies that examined the differential role of various types of alcohol, and suggested that certain aspects of the methodology might have produced biased results. For example, in several studies that found a particular type of alcohol had a marked effect, a sizable percentage of participants were regular drinkers of that same type of alcohol. The imbalance in the size of the sub-groups could, at the time of statistical calculations, make it easier to detect a significant effect in the larger sub-groups; and conversely, make it more difficult to detect differences in the smaller sub-groups.

Additional factors, such as participants' lifestyle, might also provide a general explanation for some of the differences observed between the different types of alcohol consumed. In fact, whether in the United States,<sup>19</sup> Denmark<sup>20</sup> or France,<sup>21</sup> red wine is consumed primarily by the more affluent and educated classes, who have healthier eating and other habits, such as exercising more and not smoking. It would be presumptuous to conclude that red wine is responsible for better health without controlling statistically for all these other lifestyle factors.

Fortunately, there are scientific ways to compensate for the problem, in particular, by using experimental or quasi-experimental trials. While these are not common, quite a few studies on the subject have used them. For example, researchers in Spain examined the subject using a crossover study.<sup>22</sup> They compared the impact on blood pressure of alcoholic red wine, non-alcoholic red wine, and gin, using a sample of 73 men, aged 55-75, who were at high risk for cardiovascular problems. Over three successive periods of four weeks, each participant was to have 2.2 servings of each drink daily, with one type of drink in each period. In keeping with experimental trials, the order of the drinks was randomly determined for each participant.

Blood pressure was measured at the beginning and end of each period, and the results showed that the non-alcoholic red wine was the only drink that reduced blood pressure significantly. This suggests that the impact on blood pressure is due primarily to the resveratrol in red wine, and that in alcoholic wine, the beneficial effect is cancelled out by the alcohol. According to this study, alcohol itself has no beneficial effect, at least with regard to blood pressure; but the particular ingredients in red wine do, indeed, produce the effect. Nevertheless, given the very specific category of participant in the study, it would be difficult to generalize for the entire population.



<sup>16</sup> Grønbaek et al., 2000 ; Klatsky et al., 2003 ; Renaud et al., 1999.

<sup>17</sup> Juneau, 2018.

<sup>18</sup> Rimm et al., 1996.

<sup>19</sup> Barefoot et al., 2002.

<sup>20</sup> Tjønneland et al., 1999.

<sup>21</sup> Ruidavets et al., 2004.

<sup>22</sup> Chiva-Blanch et al., 2012.



## How it works

### Protective effects

#### Increase in HDL

Fat deposits accumulate along the inside of arterial walls, which can cause a hardening of the arteries called atherosclerosis. When blood is forced to circulate through increasingly narrow passageways, blood pressure goes up. In some extreme cases, the arteries become completely blocked. If the blocked artery is flowing directly to the brain, it can cause a stroke; if the artery is flowing to the heart, it can cause a heart attack.

Lucky for us, we also produce HDL. These molecules cruise through the body, removing LDL from where it doesn't belong, and dropping it off in the liver, where it is metabolized. This, in effect, cleans the arterial walls.

While polyphenols help raise HDL in the blood, there is enough evidence to suggest that all types of alcohol—beer, wine, cider and spirits—boost HDL.<sup>23</sup> With or without polyphenols, alcohol contributes to increased HDL. The average drinker who has an average of 2.2 drinks a day, would see an HDL increase of about 3.99 mg/dl, compared to an abstainer. Thus, red wine is not the only drink that produces the beneficial effect of increased HDL.

### The importance of healthy habits

Moderate drinking is just one aspect of a healthy lifestyle that could help reduce the risk of heart disease and premature death. One recent study<sup>24</sup> shows just how determining these lifestyle factors can be: 50-year-olds who refrain from smoking, eat a healthy diet, exercise at least 30 minutes every day, maintain a healthy weight and drink moderately are 82% less likely to die of a cardiovascular disease and 65% less likely to die of cancer. In real terms, this means an increase in life expectancy of 14 years for women and 12 years for men.



<sup>23</sup> Brien et al., 2011 ; Rimm et al., 1999.

<sup>24</sup> Y. Li et al., 2018.

# DOES ALCOHOL HELP OR HARM? IT DEPENDS ON THE DOSE.

## HELPFUL EFFECTS

### Changes in acetaldehyde levels

A medical team in Brazil<sup>25</sup> offers some encouraging data about the protective effect of alcohol. Its study on mice suggests that a small amount of acetaldehyde, which is produced when alcohol is metabolized in the liver, strengthens heart function, while too much acetaldehyde can be harmful.

Acetaldehyde is produced when alcohol is metabolized by a family of enzymes known as alcohol dehydrogenases, or ADH. The body then eliminates the acetaldehyde, primarily in the liver, via the action of another enzyme called aldehyde dehydrogenase 2, or ALDH2. Acetaldehyde is thus produced in greater amounts when ADH activity is high, and eliminated more slowly when ALDH2 levels are low.

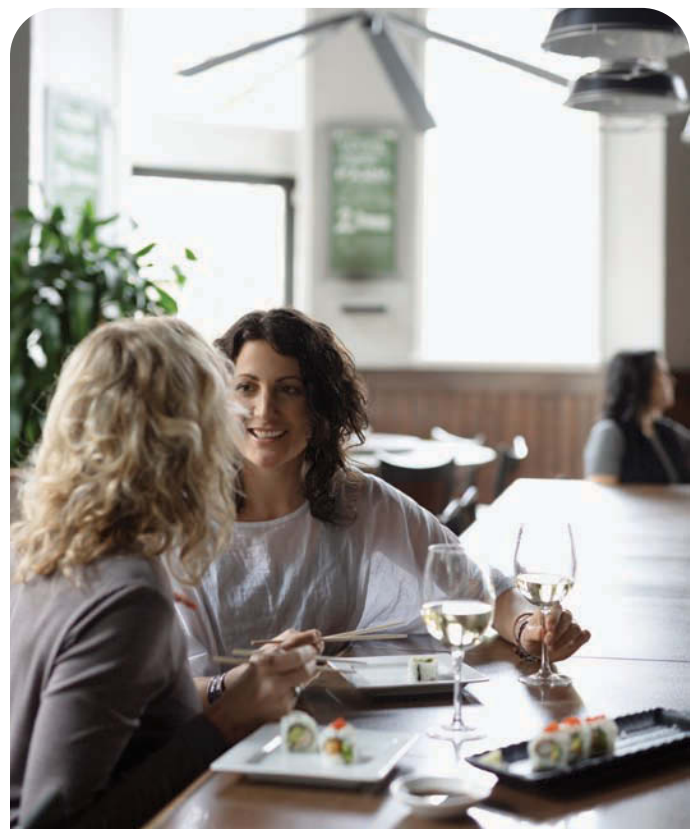
As for the specific role of ALDH2, researchers explain it this way: when the body is exposed to moderate amounts of alcohol, the liver learns to produce ALDH2 on a constant basis, so as always to be ready in case it needs to metabolize acetaldehyde. That way, the acetaldehyde from any alcohol consumed is metabolized regularly, before it reaches toxic levels. When alcohol is not consumed regularly, there is no reserve of ALDH2 to handle the immediate demand.

In a sample group of menopausal women and men over 40, drinkers who had low levels of ADH and therefore metabolized alcohol slowly had a lower risk of heart attack because they produced less acetaldehyde.<sup>26</sup> It is also known that some Asian populations are genetically predisposed to produce more ADH and less ALDH2 than the general average,<sup>27</sup> which would explain why a number of studies find no protective effect among moderate drinkers of Asian origin.<sup>28</sup>

### Fewer blood clots

Lower rates of ischemic heart disease, i.e. caused by obstructed blood flow, observed among light drinkers can be explained partly by a reduction in the formation of blood clots. Alcohol contributes to lowering fibrinogen,<sup>29</sup> a protein that functions as a blood coagulant. Less fibrinogen means fewer blood clots and better blood circulation.

But coagulation is essential to survival: it allows us to survive injury by stopping bleeding quickly. Alcohol can thus become harmful in the event of injury. The same process that reduces blood clots can be dangerous, and even fatal, in the case of a hemorrhagic stroke.



<sup>25</sup> Ueta et al., 2018.

<sup>26</sup> Hines et al., 2001.

<sup>27</sup> Eng et al., 2007.

<sup>28</sup> Z. Li et al., 2016 ; Schooling et al, 2008 ; Taylor et al., 2009.

<sup>29</sup> Pomp et al., 2008 ; Rimm et al., 1999.

# HARMFUL EFFECTS

Alcohol can also have a harmful effect on cardiovascular health.

## Arterial stiffness

Arterial stiffness can result from excessive drinking over a period of at least five years.<sup>30</sup> The arteries lose their ability to expand and contract in response to changes in blood pressure, placing undue pressure on the heart muscle. This can have serious consequences, such as ischemic or hemorrhagic stroke.

## Dilated cardiomyopathy

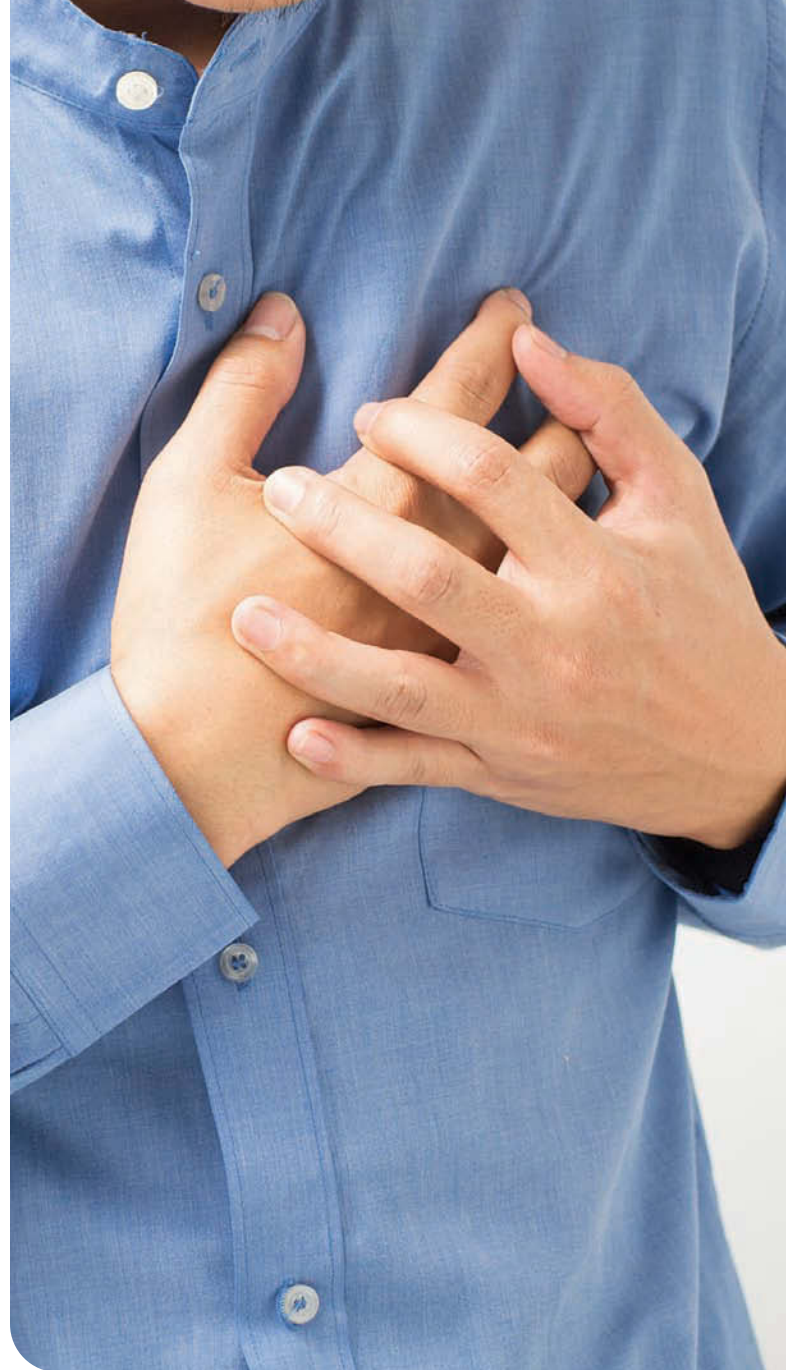
This is a disease in which the heart muscle becomes enlarged and function is impaired. Studies of long-term abusive drinkers generally find an enlargement of the left ventricle,<sup>31</sup> which weakens the ability of the heart to effectively pump blood to the rest of the body.

# WHAT IF YOU ALREADY HAVE A HEART DISEASE?

Once someone has been diagnosed with a heart disease or has a coronary event, should they continue drinking moderately or stop altogether? That depends on the disease.

In the case of atrial fibrillation, no drinking at all seems advisable. Among people with this disease, moderate drinkers, i.e. 8-21 drinks a week, show a significant disturbance in cardiac activity, compared to abstainers. This increases the risk of another coronary event.<sup>32</sup> Abstinence might therefore be the better choice.

In other situations, however, it could be advisable to continue drinking moderately. This, at least, is what has been observed



in people suffering from heart failure. One study<sup>33</sup> of 393 heart failure patients over the age of 65 found that moderate drinking was associated with increased life expectancy. In fact, compared to longtime abstainers, the lives of moderate drinkers were extended by a little more than a year (with maximum benefit to those who had 10 drinks a week). However, this does not mean that someone who has never drunk alcohol should start drinking to increase life expectancy.

Given the lack of certainty with regard to different types of diseases, it is always best to consult your doctor.

<sup>30</sup> P. ex. Zhao et coll. 2012.

<sup>31</sup> Lazarević et al., 2000.

<sup>32</sup> Voskoboinik et al., 2019.

<sup>33</sup> Sahdu et al., 2018.



# SUMMARY CHART

A summary of the alcohol daily levels at which point protective or harmful effects on various cardiovascular health indicators are observed among drinkers, compared to lifetime abstainers.

RISK	PROTECTIVE EFFECT (IN NUMBER OF DRINKS)	HARMFUL EFFECT (IN NUMBER OF DRINKS)
Incident coronary heart disease	< 4.4 <sup>3</sup>	-
Heart failure	Among women: < 1 <sup>5</sup>	No indication, compared to abstainers, but the more you drink, the more dangerous it is <sup>1</sup>
Death due to a heart disease	< 4.4 <sup>3</sup>	No indication, compared to abstainers, but the more you drink, the more dangerous it is <sup>1</sup>
Stroke (CVA)	< 1.1 <sup>3</sup>	> 4.5 <sup>3</sup>
Hemorrhagic stroke	-	> 2.2 <sup>2</sup>
Ischemic stroke	Among women: < 3.7 <sup>2</sup>	> 3.7 <sup>2</sup>
Death following a stroke	< 1.1 <sup>3</sup>	-
Atrial fibrillation	-	> 0 <sup>2</sup>
Hypertensive cardiac disease	-	In general: > 1.5 <sup>2</sup> Among women: > 1.5 <sup>4</sup> Among men: > 0 <sup>4</sup>
Ischemic cardiomyopathy	< 5.2 <sup>2</sup>	> 5.2 <sup>2</sup>

N.B. Some data may appear redundant or contradictory, but this is the result of using a variety of sources. Data are presented for information purposes only and do not constitute absolute truth.

<sup>1</sup> Wood et al. (2018)

<sup>2</sup> Grisword et al. (2018a)

<sup>3</sup> Ronsley et al. (2011)

<sup>4</sup> Roerecke et al. (2018)

<sup>5</sup> Larsson et al. (2017)

# IN CONCLUSION

There is increasing evidence that people who drink moderately are at a lower risk for certain cardiovascular diseases. Caution is advised, however, for even though studies demonstrating this connection try to control for other variables, such as exercise and smoking, some lifestyle habits might well separate moderate drinkers from other categories of drinkers.

Unless an experimental study is able to distribute participants randomly in these various categories, all while ensuring that everyone follows the specific drinking instructions over an extended period—which may be realistic, but is nonetheless difficult—it is sadly impossible to state with any certainty whether alcohol is a causal factor in the benefits observed. But we can still draw some conclusions, provided they are properly qualified.

## Briefly . . .

- Moderate drinking is associated with better cardiovascular health, particularly when it comes to ischemic heart disease.
- The positive effects are generally seen among people who drink regularly and moderately, but not every day.
- Studies suggest that red wine is less toxic than other alcoholic beverages; but this difference might be related to other factors, rather than the wine itself.
- Alcohol appears to have an impact on various molecules and enzymes that strengthen the heart muscle, clear the arteries and prevent blood clots.
- For drinking to be beneficial, it must be part of a healthy lifestyle that includes a diet rich in plant products, regular exercise, maintaining a healthy weight and not smoking.

## . . .with qualifiers

People who do not drink alcohol should not start drinking in the hopes of improving their cardiovascular health. Even though some benefits have been observed among moderate drinkers, alcohol is also associated with a number of diseases, including cancer. There are other ways to improve your health, such as exercising more regularly, eating better and quitting smoking.

People who do drink alcohol—and that means 83% of Quebecers—would do well to drink small amounts more regularly, rather than large amounts occasionally. Éduc'alcool advises sticking to the recommended limits: 2 drinks a day for women and 3 for men, with weekly limits of 10 for women and 15 for men, and no drinking at all at least one day a week, preferably two.

In the end, the one constant that emerges from all these studies on drinking and cardiovascular disease, is that moderation is always in good taste.





# DEFINITIONS

**Atherosclerosis:**

A degenerative arterial disease caused by a buildup of fatty deposits (plaque) on the arterial walls.

**Atrial fibrillation:**

An abnormal heart rhythm characterized by rapid (up to 400 or 600 beats per minute) and irregular beating of the atria.

**Cardiac arrest (cardiocirculatory arrest):**

The abrupt loss of heart function, resulting in the cessation of blood flow to vital organs.

**Dilated cardiomyopathy:**

A condition in which the heart chambers—often starting with the left ventricle—dilate (i.e. stretch and become thinner), thereby affecting the heart's ability to contract normally and pump blood.

**Heart failure:**

This is when the heart is unable to pump sufficiently to maintain adequate blood flow.

**Hemorrhagic stroke:**

About 15% of strokes are caused by bleeding (hemorrhage) in the brain. The most common cause is hypertension (high blood pressure), although some are caused by aneurisms or arteriovenous malformations, clotting problems, or complications resulting from anticoagulant treatment.

**Hypertensive cardiomyopathy:**

A structural cardiac disorder caused by persistent, uncontrolled hypertension.

**Incident coronary heart disease:**

The first appearance of heart disease symptoms.

**Ischemic cardiomyopathy:**

A weakening of the heart muscle due to ischemia—a lack of blood supply to the heart caused by coronary artery disease (the narrowing of the arteries supplying the heart). Characterized primarily by angina and most notably by myocardial infarction (heart attack).

**Ischemic stroke:**

These account for about 85% of all strokes, and are caused by blockages, such as a thrombus (a blood clot that develops within an artery), an embolism (a blood clot that develops elsewhere in the circulatory system and travels to the brain), or a narrowing of an artery due to atherosclerosis.

**Stroke (cerebrovascular accident, or CVA):**

A sudden neurological deficit lasting longer than 24 hours. Strokes are caused when blood flow to the brain is stopped due to a blockage or a ruptured blood vessel.



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A review of the research on how moderate, regular alcohol consumption affects human health.



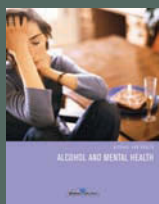
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