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The clinical consequences of alcohol use and abuse

HCC Webinar, December 6th, 2019

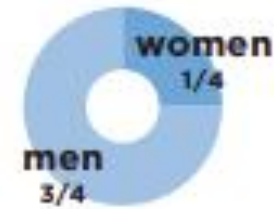
Professor Simon Anderson
The George Alleyne Chronic Disease Research Centre
THE UNIVERSITY OF THE WEST INDIES | CAIHR

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Alcohol and health

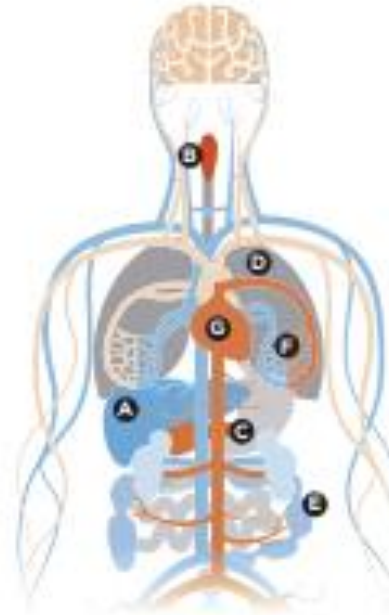


3 million **deaths**
6 deaths every minute
from harmful use of alcohol
every year



Harmful use of alcohol causes

-  **100%** of alcohol use disorders
-  **18%** of suicides
-  **18%** of interpersonal violence
-  **27%** of traffic injuries
-  **13%** of epilepsy

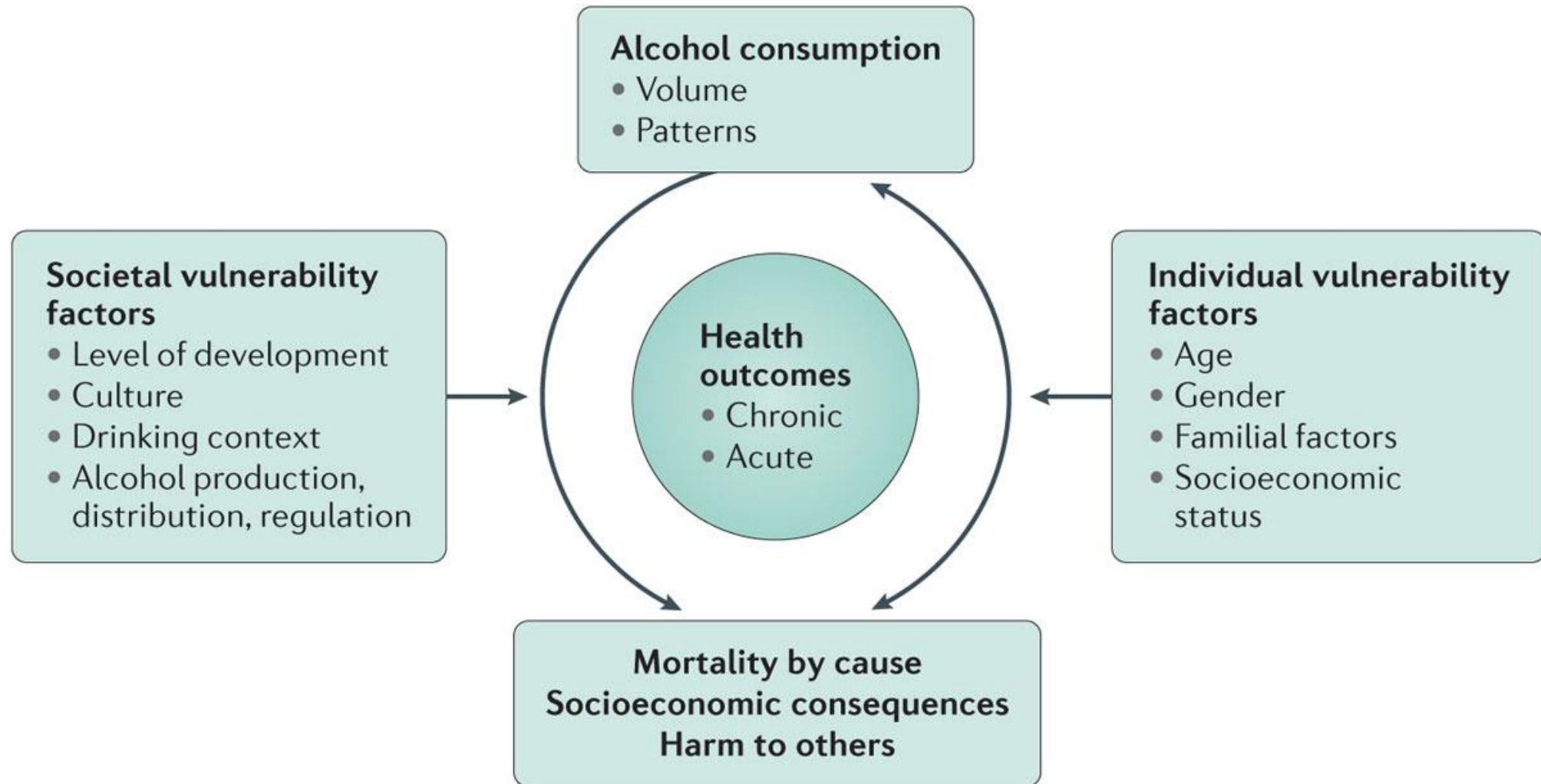


- A** **48%** of liver cirrhosis
- B** **26%** of mouth cancers
- C** **26%** of pancreatitis
- D** **20%** of tuberculosis
- E** **11%** of colorectal cancer
- F** **5%** of breast cancer
- G** **7%** of hypertensive heart disease

Harmful use of alcohol

- Harmful use of alcohol is accountable for 7.1% and 2.2% of the global burden for males and females respectively.
- Alcohol is the leading risk factor for premature mortality and disability among those aged 15 to 49 years, accounting for 10 percent of all deaths in this age group.
- Disadvantaged and especially vulnerable populations have higher rates of alcohol-related death and hospitalization.

Conceptual causal model of alcohol consumption and health outcomes



Nature Reviews | Gastroenterology & Hepatology

Gilmore, W. *et al.* (2016) Alcohol: taking a population perspective
Nat. Rev. Gastroenterol. Hepatol. doi:10.1038/nrgastro.2016.70



Global status report on alcohol and health 2018



Estimates from 2016

- Alcohol caused an estimated 0.4 million of the 11 million deaths globally in 2016 from communicable, maternal, perinatal and nutritional conditions.
- Harmful use of alcohol caused some 1.7 million deaths from noncommunicable diseases in 2016, including deaths from digestive, cardiovascular diseases and from cancers.
- Globally an estimated 0.9 million injury deaths were attributable to alcohol, including deaths due to road injuries due to self-harm and interpersonal violence.
- Of the road traffic injuries, 187 000 alcohol-attributable deaths were among people other than drivers.

Causes of death and disability causally related to alcohol consumption

Diseases and injuries included in the analysis

Detrimental

- Communicable, maternal, perinatal and nutritional conditions

 - Tuberculosis, HIV/AIDS, lower respiratory infections

Noncommunicable diseases

 - Lip and oral cavity, pharyngeal cancers (excluding nasopharyngeal), oesophagus cancer, colon and rectum cancers, liver cancer, breast cancer, larynx cancer, alcohol use disorders, epilepsy, hypertensive heart disease, haemorrhagic stroke, alcoholic cardiomyopathy, cirrhosis of the liver, pancreatitis

Injuries

Unintentional injuries

 - Road injury, poisonings, falls, fire, heat and hot substances, drowning, exposure to mechanical forces, other unintentional injuries

Intentional injuries

 - Self-harm, interpersonal violence

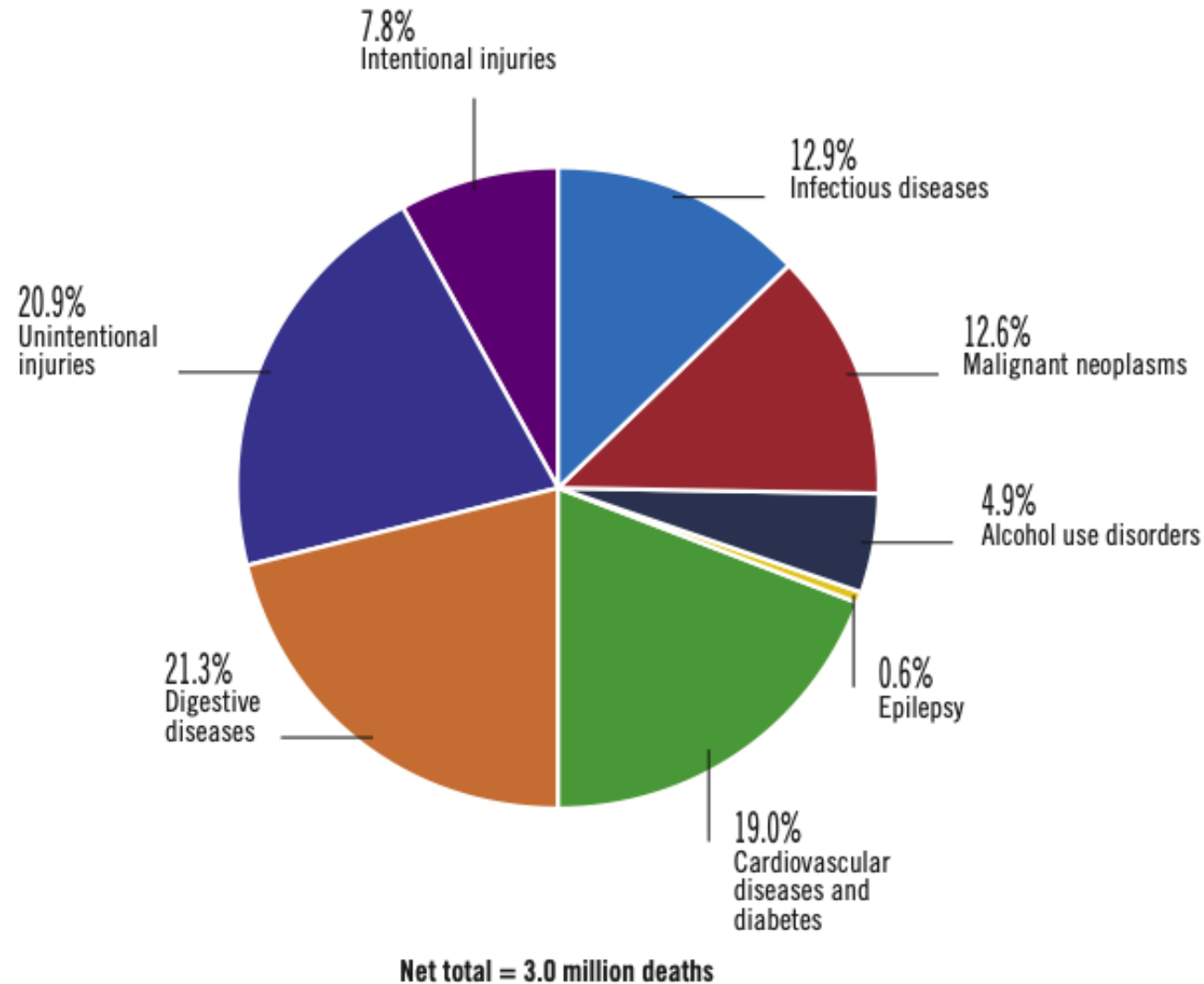
Beneficial (at low levels of alcohol consumption*)

Noncommunicable diseases

 - Diabetes mellitus, ischaemic heart disease, ischaemic stroke

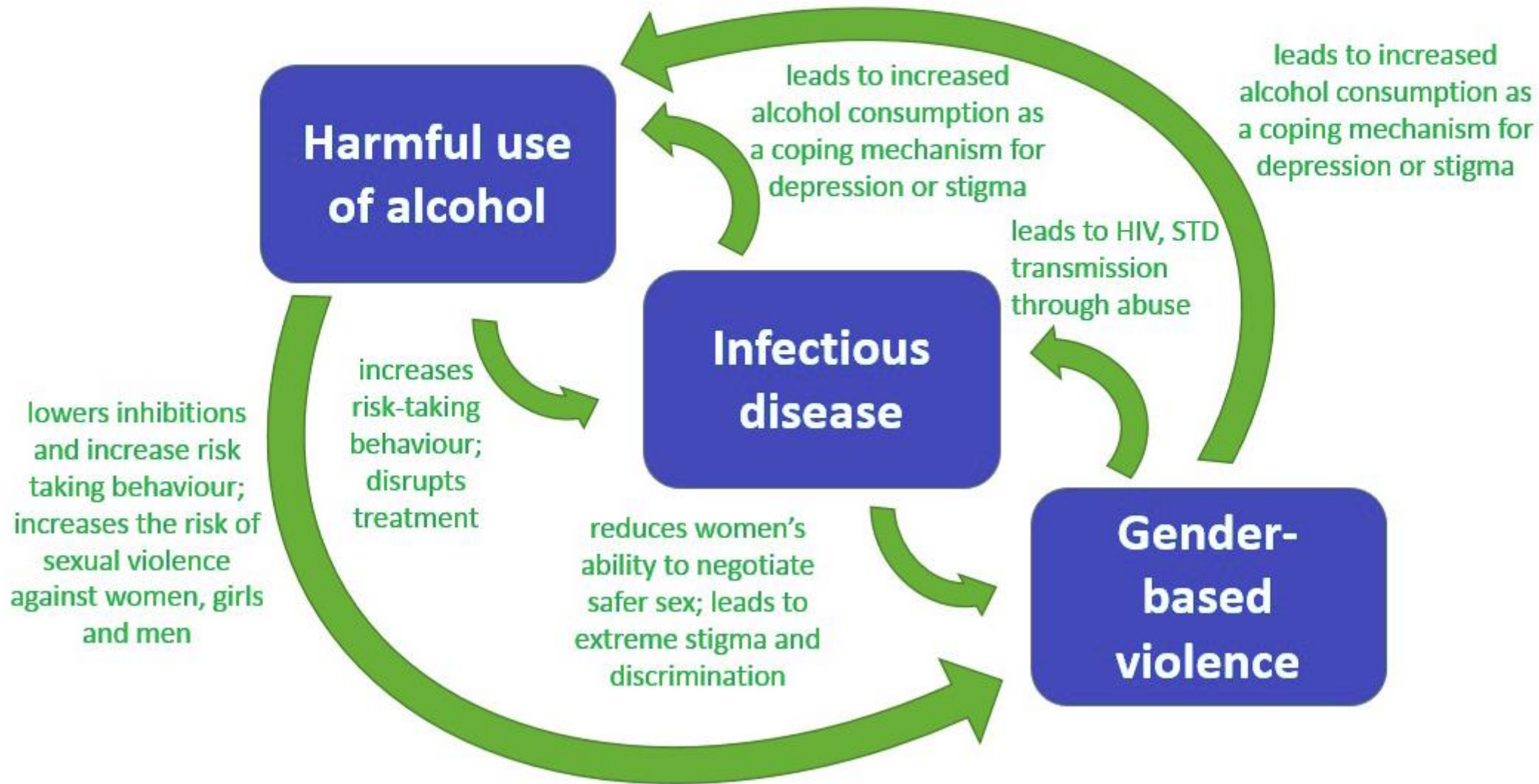
WHO. Global status report on alcohol and health 2018

Percentage of alcohol-attributable deaths, by broad disease category, 2016



WHO. Global status report on alcohol and health 2018

Alcohol, GBV, and infectious disease are closely correlated



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Resilient nations.

Harmful alcohol use and the Immune System

- Chronic alcohol abuse results in immunodeficiency and liver damage that may also be partly triggered by alcohol-induced autoimmunity
- Higher rates of infectious illnesses, such as pneumonia


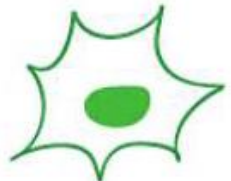


Alcohol & Infectious Disease

Individuals who excessively consume alcohol have higher rates of infectious illnesses, such as pneumonia, as well as the development of liver damage



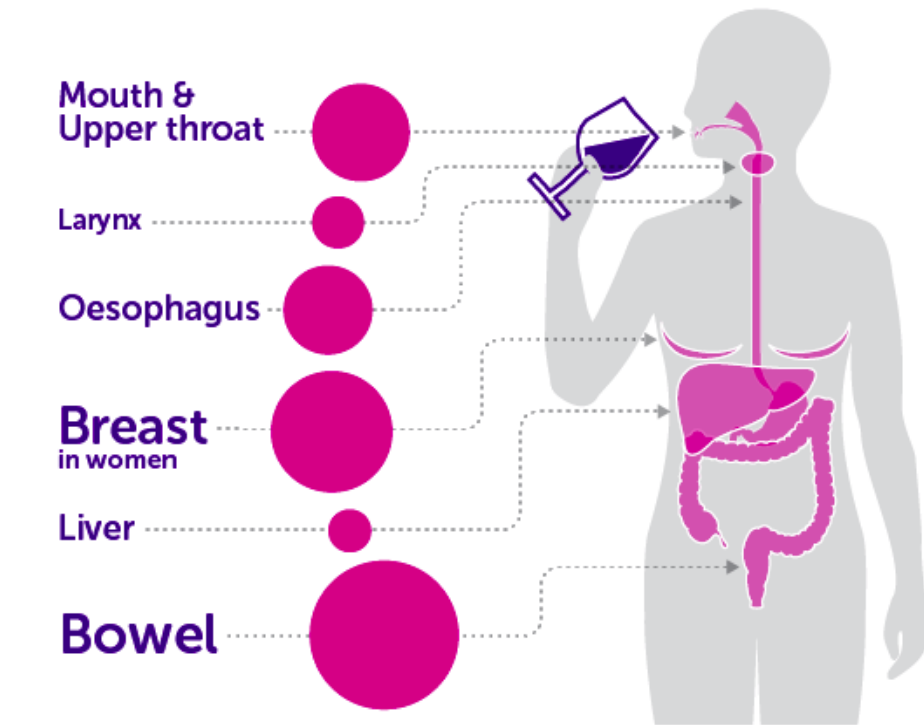
Image from: <https://sunrisehouse.com/addiction-demographics/infectious-diseases/#1>

Opposing Effects of Alcohol Consumption on Immune Cells

CELL	Moderate	Heavy	
	Chronic	Acute	Chronic
Monocyte 	↑ Phagocytic activity ↑ IL-6, TNF- α	↓ Frequency ↓ IL-6, IL-12, TNF- α ↓ Effercytosis ↑ IL-10	↑↑↑ TNF- α
Dendritic cell 			↓ IL-12 ↑ IL-10 ↓ CD80/CD86
T lymphocyte 	↑ Frequency ↑ IL-2, IL-4, IL-10, IFN- γ ↓ IFN- γ /IL-10 ratio ↑ Vaccine responses	↑ Apoptosis	↓ Frequency ↓ Naive T cells ↑ Memory T cells ↑ Activation ↓ Antigen-specific responses
B lymphocyte 	↑ Frequency ↓ IgA, IgM, IgG	↑ Apoptosis ↑ IgA	↓ Frequency ↑↑↑ IgA, IgM

Alcohol and cancer: This is how booze damages DNA inside cells

ALCOHOL CAN CAUSE 7 TYPES OF CANCER

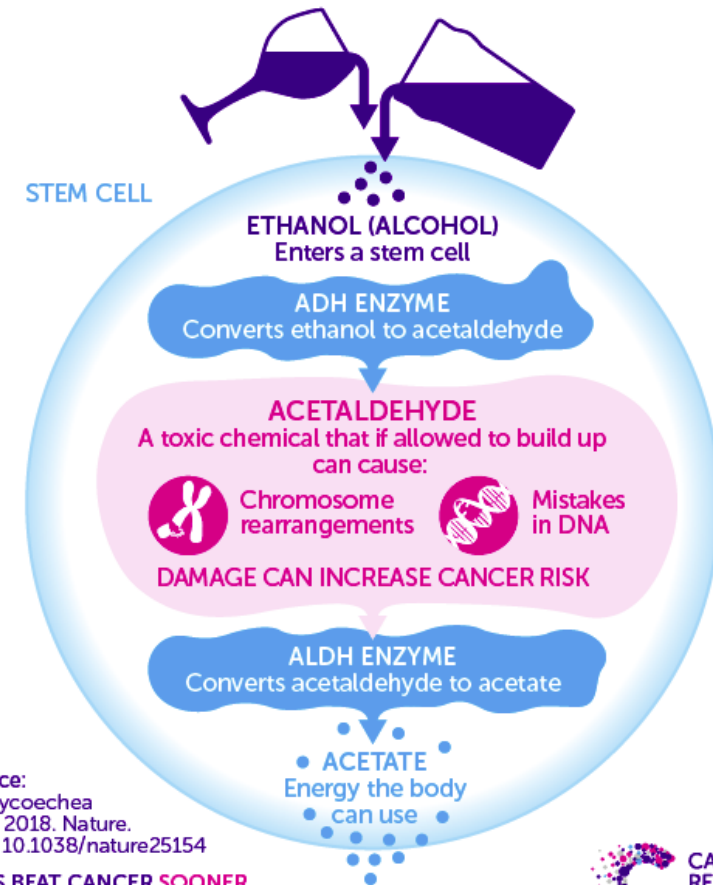


Larger circles indicate cancers with more UK cancer cases linked to drinking alcohol

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ONE WAY ALCOHOL INCREASES CANCER RISK



Source:
Garaycoechea
et al. 2018. Nature.
DOI: 10.1038/nature25154

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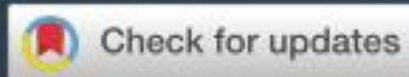
https://scienceblog.cancerresearchuk.org/2018/01/03/alcohol-and-cancer-this-is-how-booze-damages-dna-inside-cells/?_ga=2.192117098.1139034860.1575567678-756342923.1575567678

ARTICLES | [VOLUME 4, ISSUE 1, PE41-E48, JANUARY 01, 2019](#)

Alcohol drinking patterns and liver cirrhosis risk: analysis of the prospective UK Million Women Study

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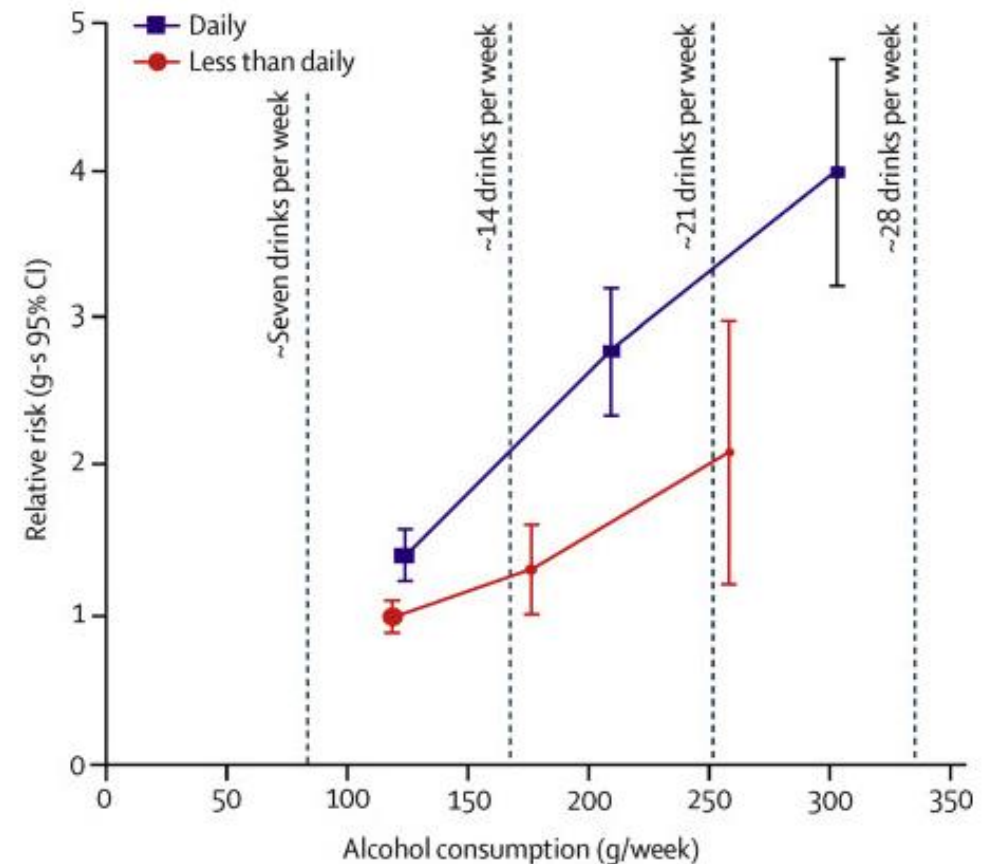
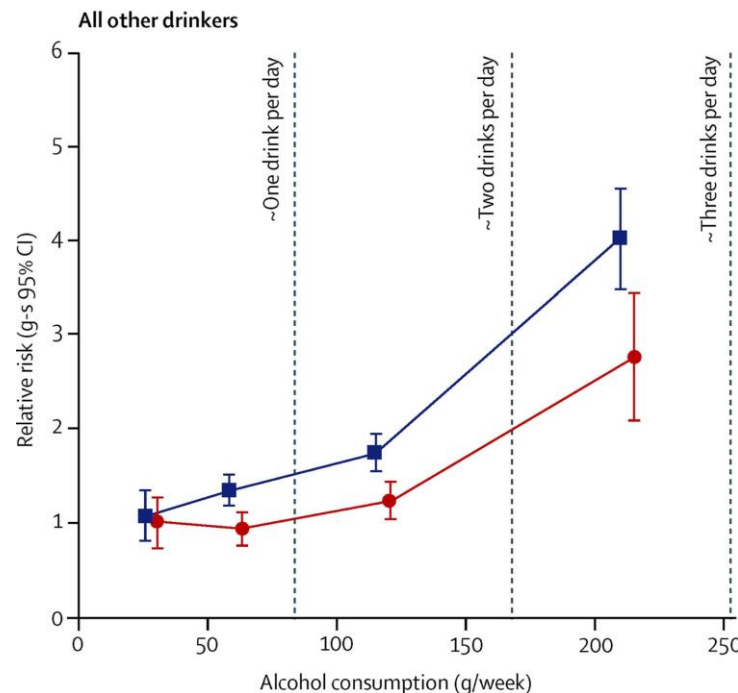
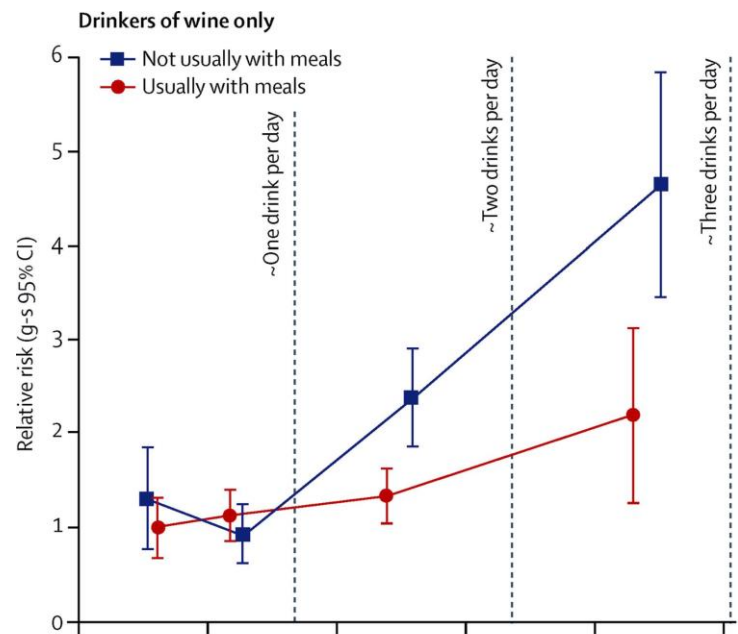
Open Access • Published: November 21, 2018 • DOI: [https://doi.org/10.1016/S2468-2667\(18\)30230-5](https://doi.org/10.1016/S2468-2667(18)30230-5) •



Alcohol drinking patterns and liver cirrhosis risk: analysis of the prospective UK Million Women Study

- The Million Women Study is a prospective study that includes one in every four UK women born between 1935 and 1950
- The women were recruited between 1996 and 2001.
- In 2001 the participants reported their alcohol intake, whether consumption was usually with meals, and number of days per week it was consumed.

Relative risk (RR) of liver cirrhosis by amount of alcohol consumed



Simpson et al.; [https://doi.org/10.1016/S2468-2667\(18\)30230-5](https://doi.org/10.1016/S2468-2667(18)30230-5)

So how does alcohol cause cancer?

- There are three main ways alcohol can cause damage:
- Acetaldehyde - when we drink alcohol, it is turned in to a chemical called acetaldehyde which can cause cancer by damaging DNA and stopping our cells from repairing this damage.
- Hormone changes – alcohol can increase the levels of some hormones such as oestrogen and insulin.
- Increased absorption – alcohol can affect the cells between the mouth and throat, which may make it easier for other carcinogens to be absorbed.

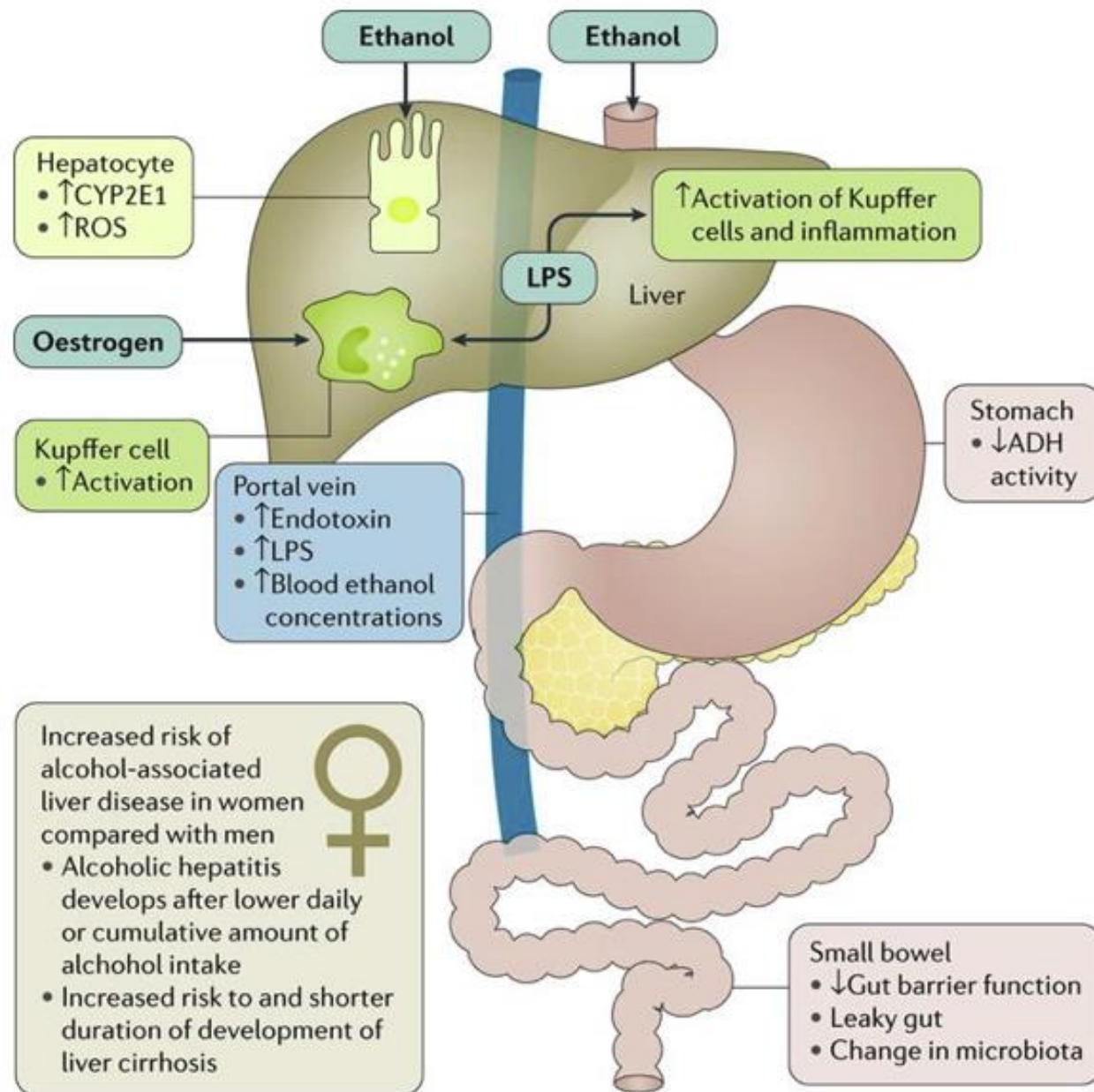
Women and alcoholic liver disease — warning of a silent danger

- Alcoholic liver disease (ALD) is a spectrum of liver abnormalities caused by excessive and chronic alcohol use that includes steatosis progressing to steatohepatitis and, over time, to cirrhosis.
- Although ALD can silently lead to cirrhosis, some individuals present with alcoholic hepatitis — a clinically severe form of ALD that carries high mortality.
- In most clinical textbooks ALD is described as a disease of middle-aged and elderly men.
- However, this aspect is rapidly changing due to increased alcohol use by women worldwide.

[Nature Reviews Gastroenterology & Hepatology](#) volume 15, pages253–254(2018)

Factors contributing to increased risk of alcohol-associated liver disease in women.

- substantial gap remains in understanding why women are more susceptible to these diseases
- sex-related differences in the expression and activity of key alcohol-metabolizing enzymes
- an equivalent dose of alcohol results in higher blood ethanol levels in women than in men





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Alcohol and cardiovascular disease

Alcohol and cardiovascular disease

- The association between excessive drinking and various forms of cardiovascular disease is well established.
- Significant alcohol consumption is associated with a higher risk of atrial fibrillation and other forms of cardiac arrhythmias, hypertension, left ventricular hypertrophy (LVH), obstructive sleep apnea (OSA) and cardiomyopathy.

Alcohol and cardiovascular disease

- Heavy drinking and binge drinking increase the risks of haemorrhagic types of stroke, such as cerebral haemorrhage and subarachnoid haemorrhage
- Alcohol may be responsible for 16% of hypertensive disease, with the incidence of hypertension increased by 40% if consuming >14 standard drinks/week.

ARTICLES | [VOLUME 391, ISSUE 10129, P1513-1523, APRIL 14, 2018](#)

Risk thresholds for alcohol consumption: combined analysis of individual-participant data for 599 912 current drinkers in 83 prospective studies

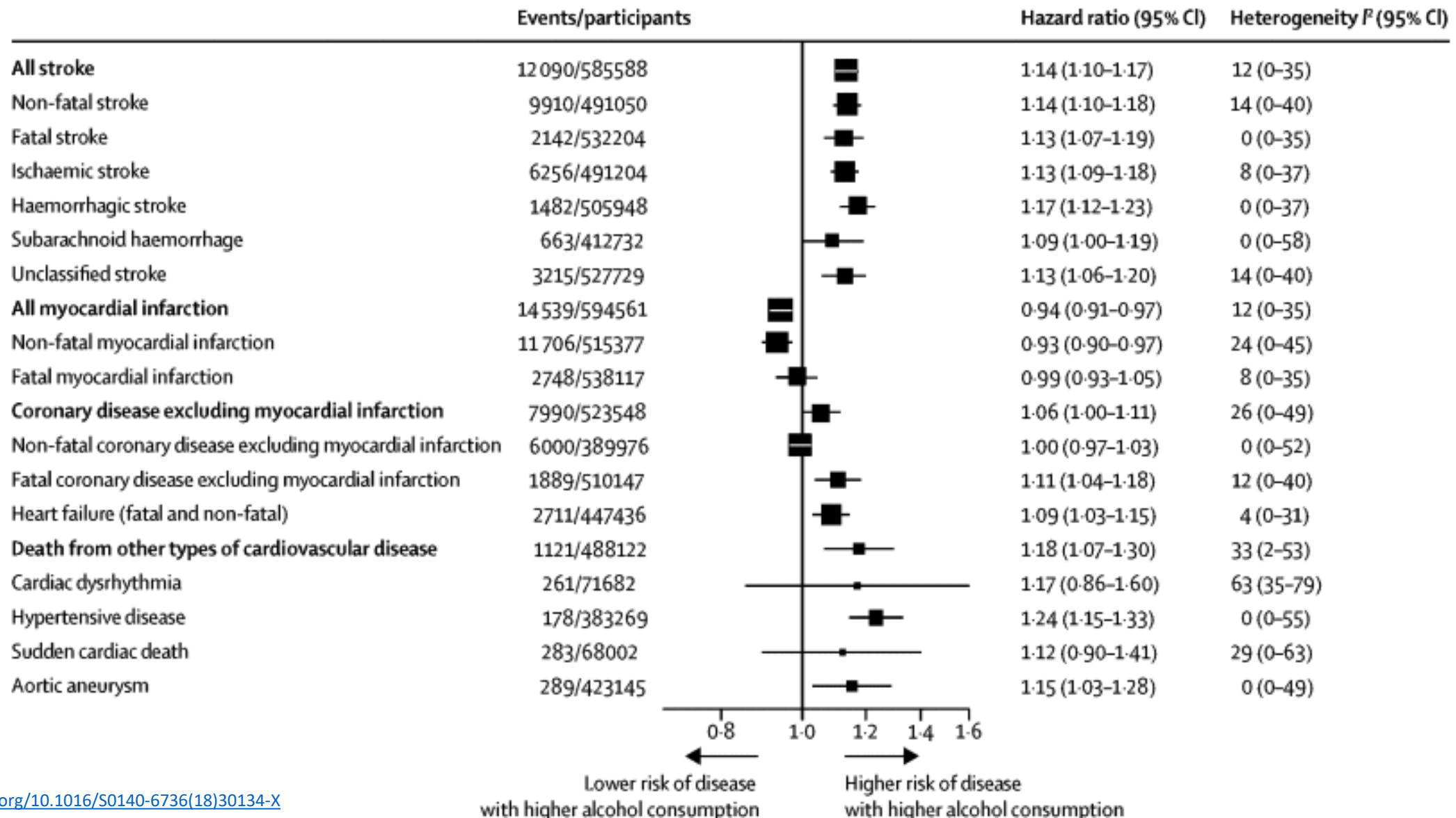
[Angela M Wood, PhD](#)   • [Stephen Kaptoge, PhD](#) • [Adam S Butterworth, PhD](#) • [Peter Willeit, MD](#) •

[Samantha Warnakula, PhD](#) • [Thomas Bolton, MMath](#) • et al. [Show all authors](#) • [Show footnotes](#)

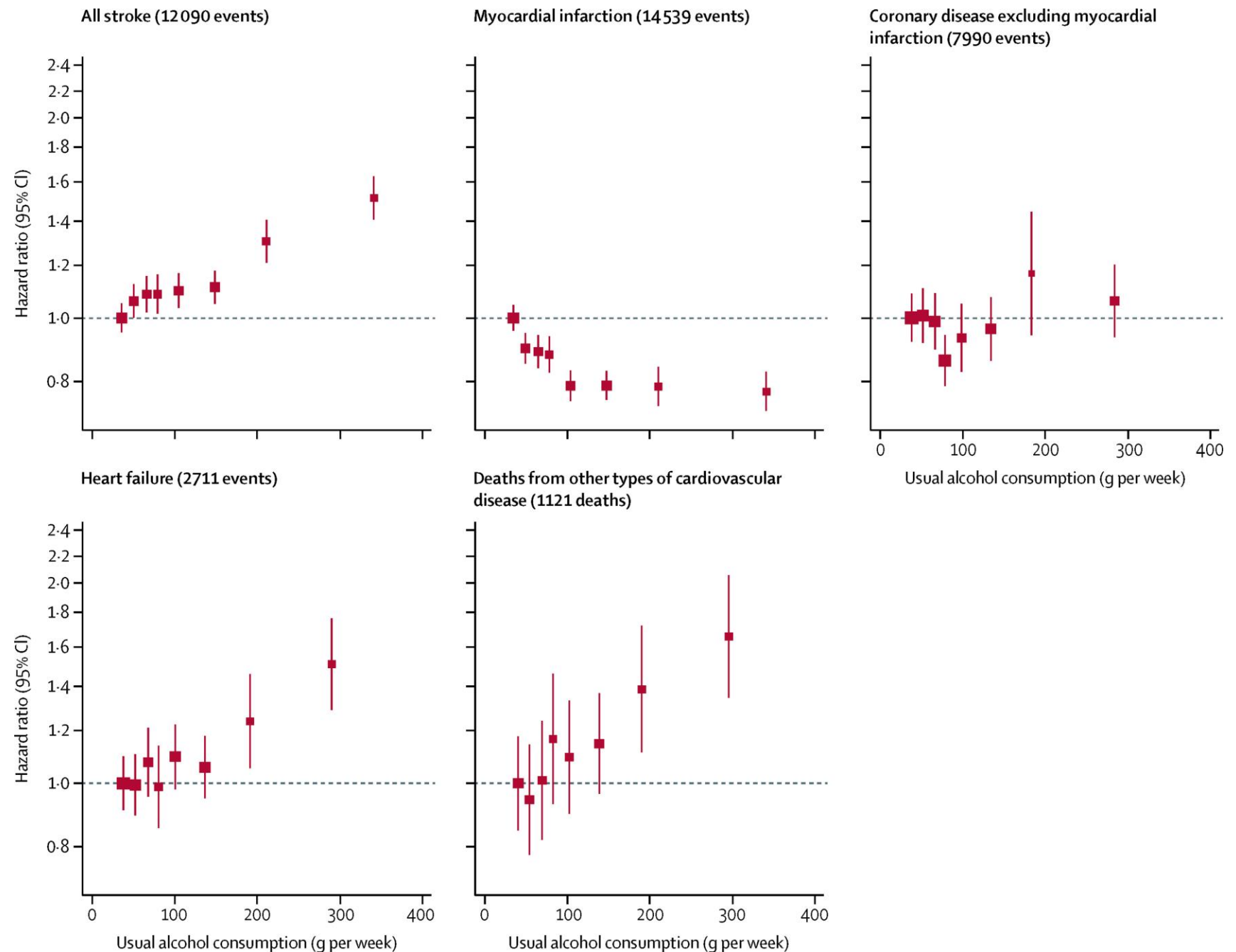
[Open Access](#) • Published: April 14, 2018 • DOI: [https://doi.org/10.1016/S0140-6736\(18\)30134-X](https://doi.org/10.1016/S0140-6736(18)30134-X) •



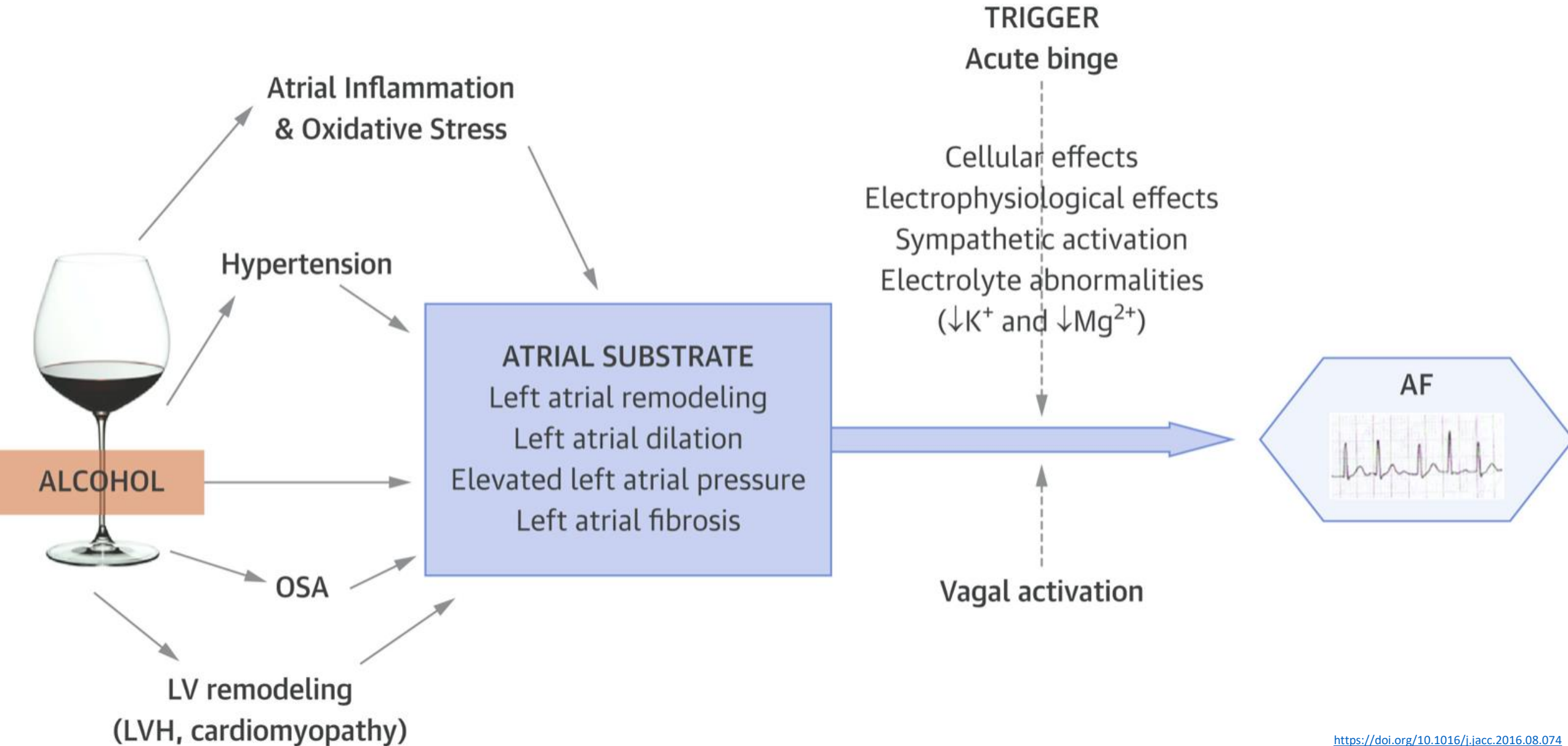
Risks for subtypes of cardiovascular outcomes in current drinkers, per 100 g per week higher usual alcohol consumption



Associations of usual alcohol consumption with all-cause mortality and the aggregate of cardiovascular disease in current drinkers



Habitual Alcohol consumption and arrhythmias



<https://doi.org/10.1016/j.jacc.2016.08.074>



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Summary

Clinical consequences of the harmful use of alcohol

Excessive alcohol use – short term health risks

- Injuries, such as motor vehicle crashes, falls, drownings, and burns
- Violence, including homicide, suicide, sexual assault, and intimate partner violence
- Alcohol poisoning, a medical emergency that results from high blood alcohol levels
- Risky sexual behaviours, including unprotected sex or sex with multiple partners. These behaviours can result in unintended pregnancy or sexually transmitted diseases, including HIV
- Miscarriage and stillbirth or fetal alcohol spectrum disorders among pregnant women

<https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm>

Excessive alcohol use – long term health risks

- High blood pressure, heart disease, stroke, liver disease, and digestive problems.
- Cancer of the breast, mouth, throat, oesophagus, liver, and colon.
- Learning and memory problems, including dementia and poor school performance.
- Mental health problems, including depression and anxiety.
- Social problems, including lost productivity, family problems, and unemployment.
- Alcohol dependence, or alcoholism.

<https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm>

Excessive Alcohol Use and Risks to Women's Health

- Excessive drinking may disrupt the menstrual cycle and increase the risk of infertility.
- Women who binge drink are more likely to have unprotected sex and multiple sex partners. These activities increase the risks of unintended pregnancy and sexually transmitted diseases
- **Liver Disease:** The risk of cirrhosis and other alcohol-related liver diseases is higher for women than for men

Excessive Alcohol Use and Risks to Women's Health

- **Impact on the Brain:** women are more vulnerable to the brain damaging effects of excessive alcohol use, and the damage tends to appear with shorter periods of excessive drinking for women than for men.
- **Impact on the Heart:** Studies have shown that women who drink excessively are at increased risk for damage to the heart muscle than men even for women drinking at lower levels.
- **Cancer:** Alcohol consumption increases the risk of cancer of the mouth, throat, oesophagus, liver, colon, and breast among women. The risk of breast cancer increases as alcohol use increases.



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Thank you