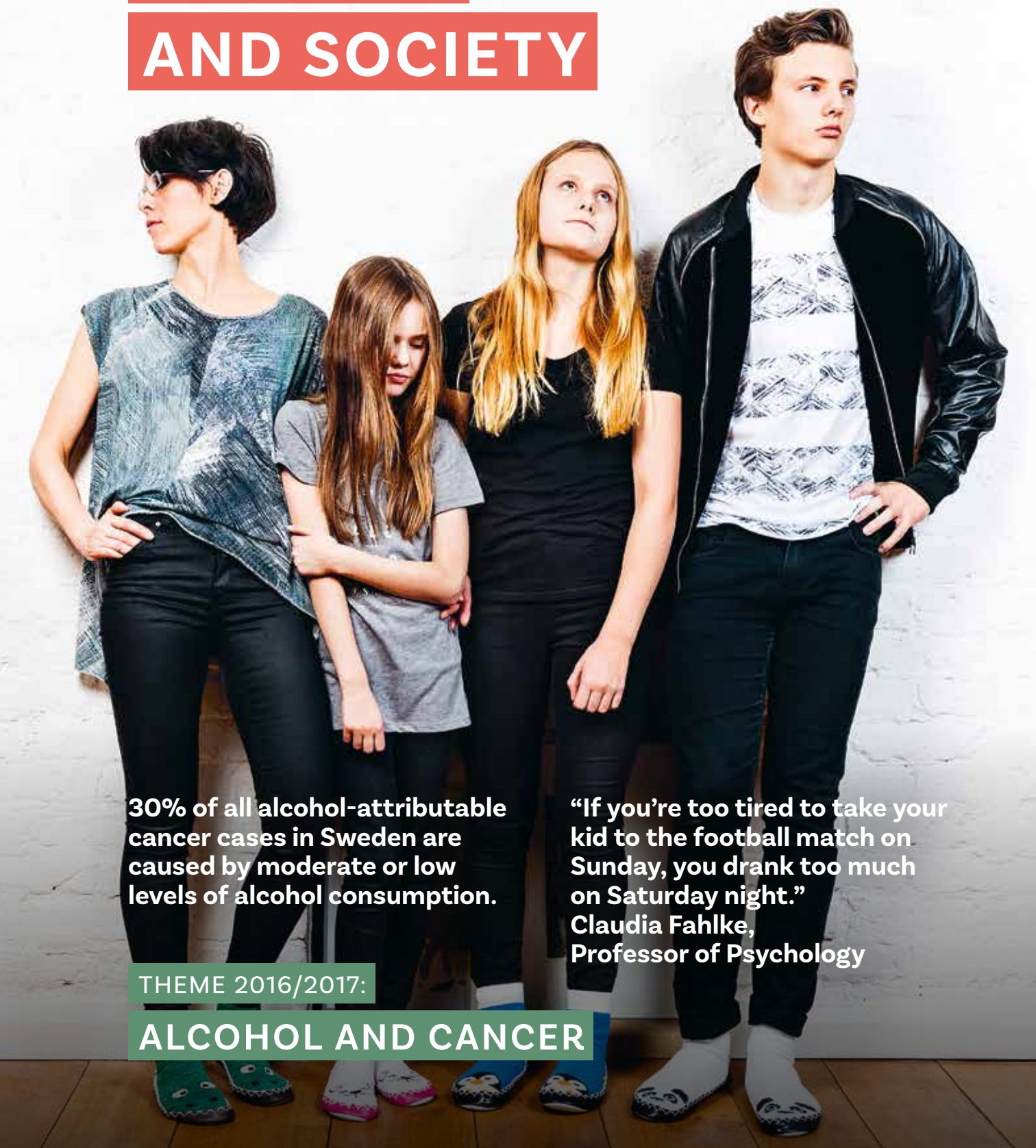
ALCOHOL AND SOCIETY



30% of all alcohol-attributable cancer cases in Sweden are caused by moderate or low levels of alcohol consumption.

"If you're too tired to take your kid to the football match on Sunday, you drank too much on Saturday night."
Claudia Fahlke,
Professor of Psychology

THEME 2016/2017:

ALCOHOL AND CANCER

The Swedish Society of Medicine and IOGT-NTO are voluntary organisations independent of commercial interests. The Swedish Society of Medicine is the scientific organisation of the Swedish medical profession and has a broad range of interests across the entire field of medicine. The importance of lifestyle to people's health at both individual and societal level, is a priority issue. IOGT-NTO focuses on the effects of alcohol and narcotics on individuals and society, but is also engaged in broad social and club activities. CERA is an interdisciplinary and collaborative centre for education and research into hazardous use, abuse and addiction at Gothenburg University – which works to strengthen and develop research and education in the field of addiction, and to disseminate scientific expertise to people working professionally in the field of abuse and addiction, and other interested parties.

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Report

Find out more about the latest research showing clear links between alcohol and cancer.

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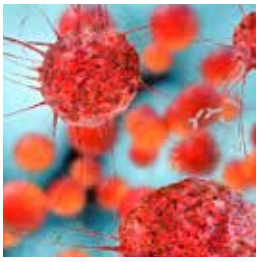

Interview

Jonas Sjögreen: Alcohol – a sensitive issue in health care.

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Interview

Claudia Fahlke, Professor of Health Psychology, on Alcohol Dependence.

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Clear link between alcohol and cancer

Healthy living and lifestyles are a strong trend in Sweden, but no other EU nationality knows less about or is less aware of the link between alcohol and cancer. And given that alcohol is the second most common contributory factor in terms of the global cancer burden, according to the World Health Organisation, this is something we are keen to change. Which is why we hope that this report can help boost knowledge levels and awareness, and increase interest in the issue, both in the health care sector and in society as a whole.

International research has shown that alcohol can cause cancer, even at moderate consumption levels. This report includes estimates that almost 30% of the cases of alcohol-induced cancer in Sweden are due to moderate or low levels of alcohol consumption, and that the more the individual consumes, the greater the risk. It should also be noted that the cost of hospital treatment of alcohol-induced cancer exceeded SEK 320 million in Sweden in 2014. This year's report also includes estimates of the percentage of Swedish deaths from cancer where alcohol was a factor, in order to highlight the importance of the issue and to intensify initiatives aimed at prevention and information provision.

> "It is our hope that readers will find the report thought-provoking and that it will provide you with valuable information on the latest findings in alcohol-related research!

The Swedish Society of Medicine and IOGT-NTO, with the financial support of Forum Ansvar, publishes an annual research report entitled "Alcohol & Society", with the aim of illustrating the harmful effects of alcohol consumption at both an individual and a societal level. This year's report, which is on the theme of alcohol and cancer, was also produced in partnership with CERA, an interdisciplinary centre for education and research into hazardous use, abuse and addiction at Gothenburg University.

The report is produced by a group headed by Harold Holder and comprising some of the foremost researchers in the field of international alcohol research. The group collates and aggregates facts and figures from international studies, and then draws conclusions and proposes measures tailored for use in Sweden and the other Nordic countries. They receive no financial remuneration for this work.

Previous years' reports have addressed such issues as alcohol and young people, the effects of low dose consumption, and the second-hand harm caused by alcohol. The report's articles are aimed at a broad target group and can be read by anyone interested in public health. An English-language version with a full bibliography is also provided for more in-depth study, and is available on our respective websites.

It is our hope that readers will find the report thought-provoking and that it will provide you with valuable information on the latest findings in alcohol-related research!



STEFAN LINDGREN, CHAIRMAN SWEDISH SOCIETY OF MEDICINE



CLAUDIA FAHLKE, DIRECTOR CERA UNIVERSITY OF GOTHENBURG



JOHNNY MOSTACERO, CHAIRMAN IOGT-NTO





EXECUTIVE SUMMARY

- Alcohol causes cancer. Any alcohol consumption increases the risk of certain cancers, and higher levels of consumption further increase those risks.
- Evidence for the relationship between alcohol and cancer comes from chemical toxicology studies, animal studies, and epidemiological studies among humans. Alcohol is considered a Group I carcinogen (highest level) by the International Agency for Research on Cancer of the World Health Organization.
- Human cancers that are considered causally related to alcohol consumption include cancers of the oral cavity (mouth), pharynx (throat), larynx (voice box), esophagus, stomach, liver, colon and rectum, and female breast. Other cancers that are associated with alcohol consumption and are probably causally related to alcohol include cancers of the pancreas and prostate. There are other cancers that are associated with alcohol consumption (e.g., lung cancer, melanoma) but where a causal relationship is more speculative in nature.
- In Sweden in 2014, there were an estimated 996 alcohol-attributable cancer deaths (4.5% of all cancer deaths) among the 10 cancers listed above. This includes 795 alcohol-attributable cancer deaths (3.6% of cancer deaths) from the eight for the cancers where evidence for a causal relationship with alcohol is considered to have the highest level of evidence.
- The leading causes of alcohol-attributable cancer deaths in Sweden are colorectal cancer for the entire population and among men, and breast cancer among women.
- More than 10% of breast cancer deaths in Sweden are attributable to alcohol.
- Critically, the evidence summarised in this report indicates that approximately 30% of all alcohol-attributable cancer cases and deaths in Sweden are caused by moderate or low levels of alcohol consumption.
- The number of alcohol-attributable cancer deaths in Sweden has increased by 7.3 percent since 2001
- Hospitalizations from alcohol-attributable cancers cost at least 324 million SEK in 2014
- The public and members of the medical professions are largely unaware of the role of alcohol as a cause of cancer. Among the general public in European Union nations, Swedes had the lowest recognition of the relationship between alcohol and cancer in a recent study.
- A number of steps should be taken to raise public awareness of the link between alcohol consumption and cancer, including the labeling of alcohol containers with warnings about the risk of specific cancers.
- Population-level reductions in excessive and overall alcohol consumption are the best way to prevent future alcohol-related cancers. The most effective means to achieve this is by adopting and strengthening evidence-based alcohol policies, including maintaining and strengthening the Swedish retail alcohol monopoly, limiting overall access to alcohol, and raising alcohol prices.

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INTRODUCTION

Alcohol causes cancer. Cancer is among the leading causes of death and disease worldwide. Worldwide the incidence of cancer has increased from 12.7 million in 2008 to 14.1 million in 2012 as a result of population growth, ageing, and adoption of industrialized lifestyles with increased use of tobacco, consumption of alcohol and highly processed foods, and a lack of physical activity. **Consumption of alcohol is the second largest contribution to the global burden of disease for cancer, second only to tobacco use according to recent estimates made for the World Health Organization (WHO).**[1] In the last decades, the total number of alcohol-attributable cancer cases has increased to approximately 770,000 worldwide or 5.5% of the total number of cancer cases. Correspondingly estimated cancer deaths attributable to alcohol consumption are estimated to be approximately 480,000 or 5.8% of the total number of cancer deaths. Alcohol-attributable cancer cases are particularly high in the Western Pacific, European and South-East Asia WHO regions.[2]

The predicted global cancer burden is expected to exceed 20 million new cancer cases annually by 2025. Cancer treatment and care of cancer patients has an escalating economic impact as do the wider corresponding losses to economic productivity. All countries including those with the highest-incomes will struggle to cope with the increasing costs associated with cancer. [3]

In the first part of the 20th century causes of cancer were not commonly known and the hopes of physicians and the public were focused initially on improved treatment and early detection. Over time, epidemiological cancer research increasingly found that external factors were associated with differences in observed cancer rates across countries and regions. Such research has supported a conclusion that the great majority of cancers, could be due to external factors.[4, 5] **A recent estimate of the global burden of disease for 2013 found that 42% of all cancers are attributed to a known risk factor.**[1]

Thus while improving the diagnosis and treatment of cancer is essential, there is also a compelling case for a public health approach to the prevention of cancer. Towards this end, the International Agency on Research on Cancer (IARC) was established in 1965 as the WHO expert agency on cancer and charged with identification of the causes of human cancers as a first step in cancer prevention.[4]

Even though awareness on the part of the public is low, in scientific circles alcohol has been known to cause cancer for several decades. In its first evaluation of the substance in 1988, IARC concluded that alcohol was carcinogenic. IARC repeated this evaluation in 2007 and found evidence that the contribution of alcohol to cancer was larger than previously appreciated. In the same year the World Cancer Research Fund (WCRF) published its conclusions about the state of the science on cancer which agreed with IARC. **In recent years the evidence has strengthened that alcohol is causally implicated in an increasing array of cancer types.**

Given the importance of cancer to Swedish society, the purpose of this report is to provide an overview of alcohol's contribution to cancer in general, to provide estimates of alcohol-related cancer mortality and morbidity in Sweden as well as in comparison to other Nordic countries, and to discuss implications for Swedish policies concerning public health and alcohol. In this report we apply methods used by the WHO Global Burden of Disease study to estimate the proportions of cancer deaths and hospitalizations caused by alcohol in 2014. In our discussion of the research literature we have conducted systematic searches of scholarly databases and given priority to systematic reviews published in peer reviewed scientific journals and major reports from international expert bodies such as the International Agency for Research on Cancer.



Consumption of alcohol is the second largest contribution to the global burden of disease for cancer, second only to tobacco use according to recent estimates made for the World Health Organization (WHO).

Alcohol as a cause of cancer



IARC has evaluated 990 agents of which 118 have been classified as Group 1 as carcinogens in humans. Group 1 carcinogens include substances such as benzene, aflatoxin, soot, tobacco and alcohol.

This report builds on international evidence summaries generated by the IARC and the WCRF on the relationships between alcohol and cancer.

In particular, IARC has developed a methodology for examining studies published in the scientific literature to determine the strength of evidence in relation to external, and often preventable, causes of cancer in humans. The most recent IARC monograph on alcohol was published in 2012.

IARC collect and summarize all available human and animal studies on the carcinogenicity of potential agents and closely consider study quality, temporal effects, use of biomarkers, plausible mechanisms and apply an overall causality criteria.

To date, IARC has evaluated 990 agents of which 118 have been classified as Group 1 as carcinogens in humans. Group 1 carcinogens include substances such as benzene, aflatoxin, soot, tobacco and alcohol.[7]

Alcohol was classified as a Group 1 carcinogen in 1988 when it was concluded that there was sufficient evidence that alcohol played a causal role in cancers of the oral cavity, pharynx, larynx, esophagus and liver. Since that time, several hundred more epidemiological studies have reported on the association between the consumption of alcoholic beverages and the risk for cancer at various sites. In 2007, the IARC added cancers of the female breast, colon and rectum to the list of cancers caused by alcohol.[6] In 2016 the World Cancer Research Fund concluded that stomach cancer also was causally related to alcohol consumption.[8]

> "If you drink alcohol of any type, limit your intake. Not drinking alcohol is better for cancer prevention."

In its European Code Against Cancer, the European Commission also recognizes and highlights the causal role of alcohol for a range of cancers. There are 12 recommendations in the most recent Code and alcohol is listed sixth: "If you drink alcohol of any type, limit your intake. Not drinking alcohol is better for cancer prevention."[9] **For alcohol-related cancers, risk increases as alcohol intake increases. However, for most of these cancers increased risk is evident even** at low or "moderate" levels of drinking.

Potential carcinogenic agents are classified according to the following:

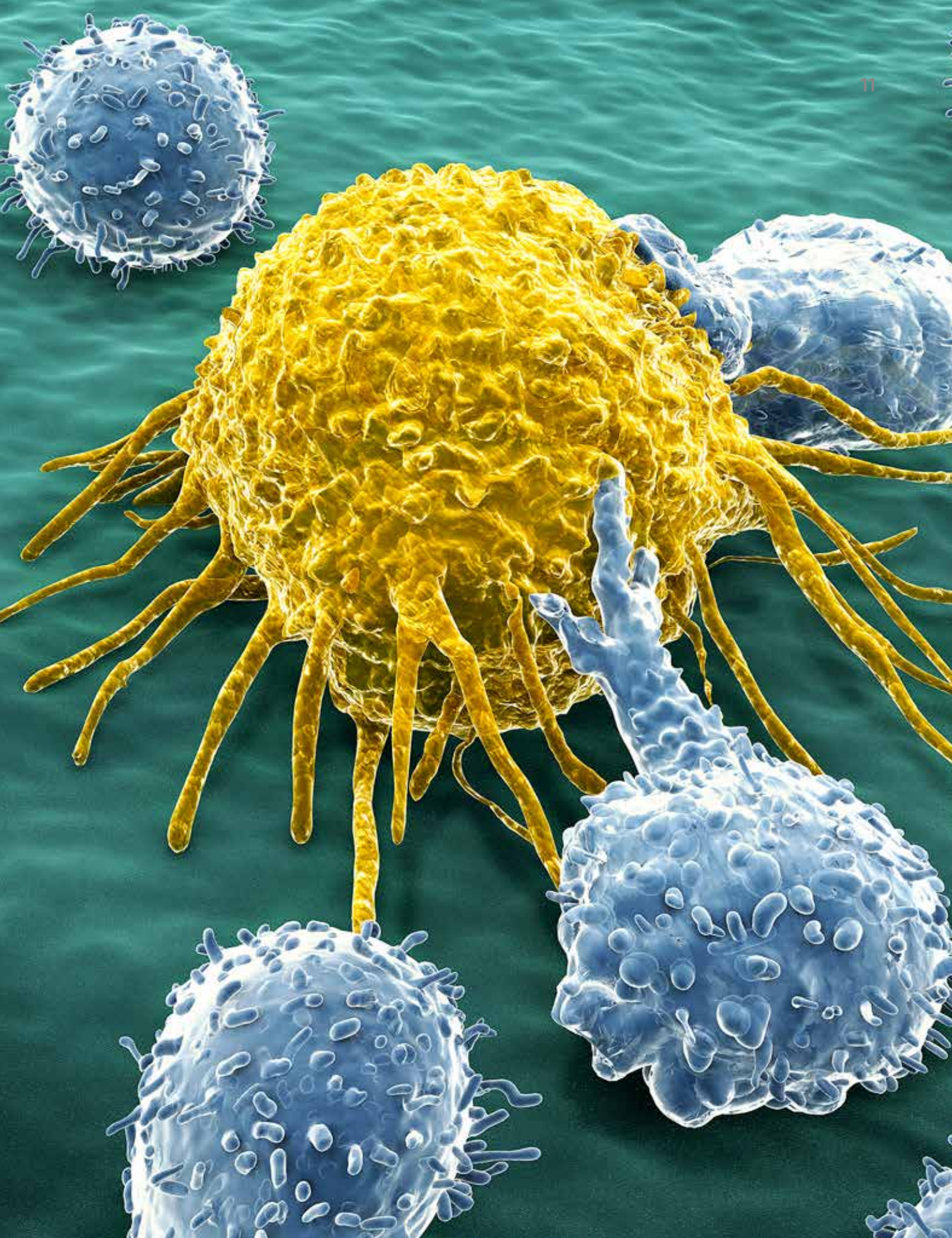
Group 1: The agent is carcinogenic to humans.
Group 2A: The agent is probably carcinogenic to humans.
Group 2B: The agent is possibly carcinogenic to humans.
Group 3: The agent is not classifiable as to its carcinogenicity to humans.
Group 4: The agent is probably not carcinogenic to humans.

Ref: 4, pp 145-6, pp 9-35

European Code Against Cancer

If you drink alcohol of any type, limit your intake. Not drinking alcohol is better for cancer prevention.

Is drinking alcohol a cause of cancer?
Yes. There is no doubt that drinking alcohol can cause at least seven types of cancer: those of the mouth, gullet (oesophagus), throat (pharynx and larynx), liver, large bowel (colon and rectum), and breast.
Consumption of any amount of alcohol increases your cancer risk. The more alcohol you drink, the higher the risk of developing cancer. Reducing your consumption or – even better – avoiding alcohol completely will help reduce your cancer risk.
http://cancer-code-europe.iarc.fr/index.php/en/ecac-12-ways/alcohol-recommendation/19-drinking-alcohol-cause-cancer





How does alcohol cause cancer?

When alcohol is consumed, different enzymes in the body will metabolize it into acetaldehyde. Acetaldehyde is harmful to human cells and will cause breakage and mutations in the DNA.

Biological mechanisms

When alcohol is consumed, different enzymes in the body will metabolize it into acetaldehyde. Acetaldehyde is harmful to human cells and will cause breakage and mutations in the DNA. This means that the body's ability to accurately regenerate itself is compromised. Such damage is considered to be a primary cause for the initiation of tumors and the development of cancer, and acetaldehyde has been shown to cause cancer in experimental animals. **Alcohol also causes oxidative stress, which in turn can damage or change DNA.** Another mechanism is that alcohol modifies the effects of other chemicals in ways that increase their carcinogenicity.[6, 10]

Alcohol can not only initiate cancer, but promote the growth of existing tumors. Alcohol itself may promote the growth and malignant properties of tumors, possibly by its toxic effect on cells which may cause uncontrolled growth of cells and by producing free radicals which can damage DNA. Alcohol can also affect signaling proteins in the cells which influence cell differentiation, inflammation and cell death. **The sex hormones estrogen and androgen are known to increase the risk of cancer, and alcohol increases the level of these hormones in women which may promote the development of breast cancer.** Heavy alcohol use also weakens the body's immune system especially by reducing the number and ability of the immune cells responsible for killing cancer cells, which increases the risk for cancer.[11, 12]

Acetaldehyde is mainly metabolized from alcohol in the liver, but alcohol-converting enzymes are present in almost all tissues in the body including the brain, skin, blood and prostate. Bacteria in the oral cavity, esophagus and the intestines can also convert alcohol to acetaldehyde. A single sip of alcohol has been shown to almost immediately raise the level of acetaldehyde in the mouth to carcinogenic levels. The level decreases with time but remains above the level of carcinogenicity even after 10 minutes.[13] It has been suggested that mouthwash products containing high alcohol contents may increase the risk of mouth and neck cancers among in long-term and frequent mouthwash users.[6, 14]

It has been suggested that alcohol-related cancers are difficult to cure because ethanol consumption influences the metabolism of chemotherapeutic treatment which results in a decreasing response to medication and increase in side effects. Moreover, during cancer development, alcohol consumption may contribute to inflammatory and immunosuppressive environments, thus allowing tumor cells to proliferate and spread.[15, 16]

Animal studies

Rats and mice that are fed with alcohol in drinking water have been shown to develop cancers at several sites, including the head and neck, liver, lymph nodes, and blood. Consumption of acetaldehyde by rats has also been shown to lead to cancers at several sites. Furthermore, alcohol may enhance tumor development in experimental animals if consumed together with other known carcinogenic substances, thus potentiating their effect.[17, 18, pp 454-5]

Occupation and cancer in the Nordic countries

One of the earliest indications that alcohol and cancer were associated was the observation that people living in different geographical areas or engaging in different occupations had different rates of cancer. Variations in cancer risk by occupation and geography still remains relevant to modern society.

A very large study of 15 million Nordic participants followed up to 45 years, from 1960 – 2005 showed that even in countries with good access to relatively high quality health care, the risk of cancer was highly dependent on an individual's status in society.

For instance, Nordic workers engaged in occupations which have traditionally involved high levels of alcohol consumption – either via ease of access or cultural tradition – have high rates of liver cancer. For Nordic males the top five occupations with the highest rates for liver cancer include: waiters, cooks, beverage workers, journalists and seamen. Lowest cancer risk was found among farmers, gardeners, forestry workers and teachers. The group with the highest risk, waiters, had almost ten times higher risk for liver cancer compared to farmers, the lowest risk group.[19]



For Nordic males the top five occupations with the highest rates for liver cancer include: waiters, cooks, beverage workers, journalists and seamen.



Tanya Chikritzhs,

Researcher in alcohol policy, co-author, specialising in prevention.

How did you come to specialise in prevention?

"Because I believe that prevention, despite its low priority in the public health sector, is the key to improving people's health and quality of life. Alcohol plays such a major role in society and in people's everyday lives, that small changes can make a huge difference in terms of well-being, both for the individual and for society as a whole."

What motivates you?

"I want to understand why things are the way they are, and then it also comes down to the Australian love of supporting the underdog – in this case, prevention."

Why did you want to contribute to this report?

"This is a fantastic opportunity to learn more and to spend time with some excellent, sharp-minded colleagues, but it was also a chance for me to contribute to something I regard as important."

Cancers accepted by IARC as caused by alcohol



Most studies on alcohol and cancer show a positive linear relationship such that as alcohol intake increases so risk of cancer also increases.

As of 2016, the IARC has concluded that there is sufficient evidence that alcohol causes cancers of the oral cavity, pharynx, larynx, esophagus, liver, colon and rectum, female breast and stomach.[6, 8] In general, risk of developing these cancers does not vary consistently by type of alcoholic beverage, i.e. risk is similar for beer, wine or spirits intake. Most studies on alcohol and cancer show a positive linear relationship such that as alcohol intake increases so risk of cancer also increases. Cancer risk also tends to be substantially increased when alcohol and tobacco are consumed together, this is particularly true for cancers of the upper aerodigestive tract. Most higher quality alcohol and cancer studies control for concurrent tobacco use.[18]

Oral cavity and pharynx

Alcohol consumption increases the risk of cancers of the mouth and throat in a dose-dependent manner, i.e. as alcohol intake increases so does the degree of risk.[e.g. 18, 20, 21, 22] At 60 grams of alcohol per day or more, there is a threefold increased risk of mouth and throat cancers. Risk does not appear to vary by type of beverage or between males and females.[18, p446]

A meta-analysis of studies of the effect of cessation of alcohol consumption on cancers of the pharynx and larynx indicated that increased risk was reversible but may take more than three decades to reach a level equivalent to that for non-drinkers.[23]

Larynx

In the lower throat, the risk for cancer from alcohol consumption also increases with increased alcohol intake dose-dependently. Increased risk is detectable at levels as low as 10 grams of alcohol per day, and at 100 grams per day, the risk for cancer is fourfold compared to non-drinkers.[24, 25] The effect of drinking more drinks/day for a short period of time seems more deleterious than drinking few drinks/day for a longer period of time.[26] Risk does not appear to vary by type of beverage or between males and females.

The effect on laryngeal cancer seems to decline if you stop drinking, and will be nearly as low as for never-drinkers 2 decades after drinking cessation.[27] There is a strong additive effect of tobacco use on risk for laryngeal cancer, with the highest risk for heavy drinkers who are also heavy smokers.[18, pp 379-80, 28]

Esophagus

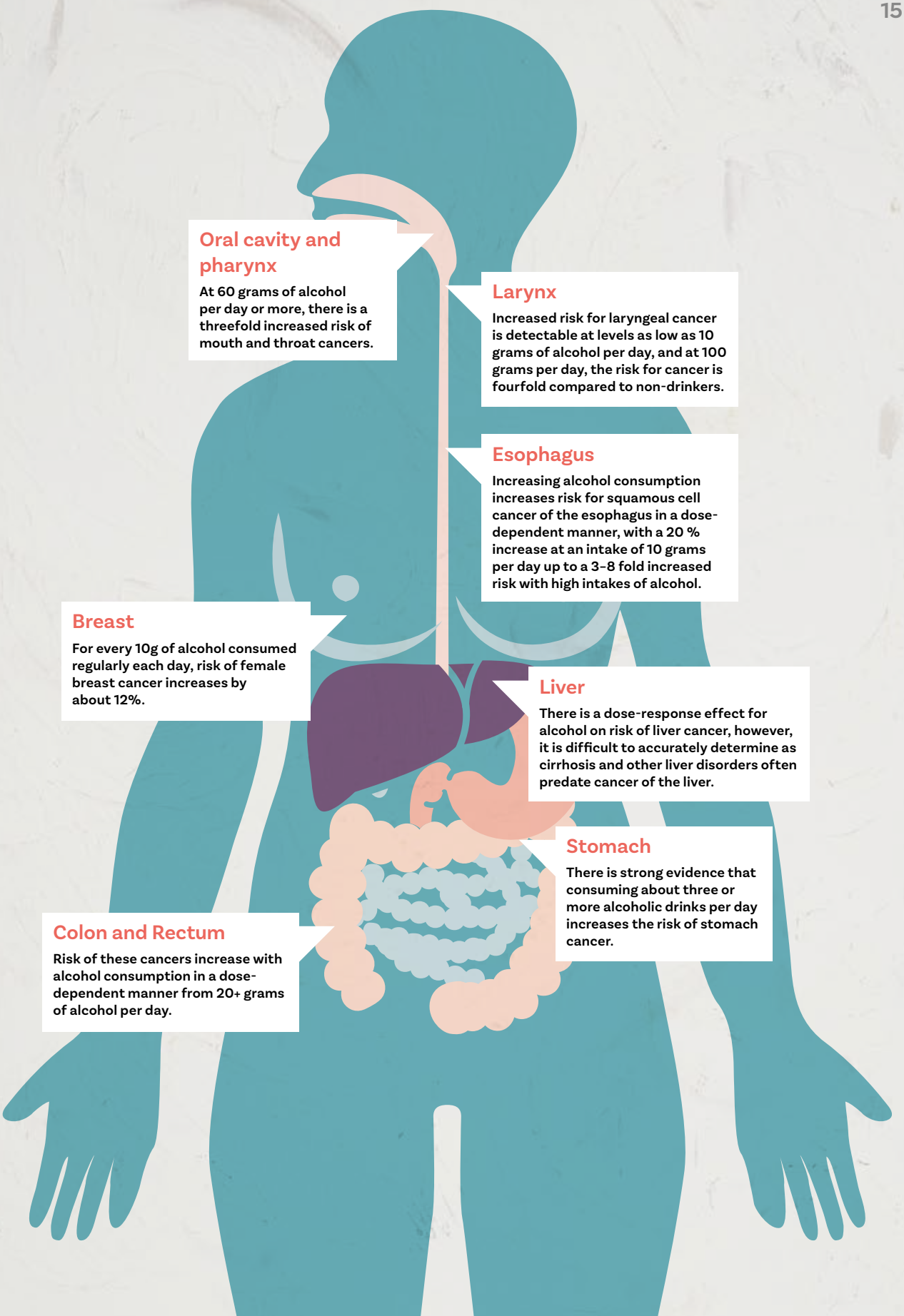
Increasing alcohol consumption increases risk for squamous cell cancer of the esophagus in a dose-dependent manner, with a 20 % increase at an intake of 10 grams per day up to a 3–8 fold increased risk with high

> "Most studies on alcohol and cancer show a positive linear relationship such that as alcohol intake increases so risk of cancer also increases."

intakes of alcohol. The risk also increases with higher drinking frequency, longer drinking duration, lower age at starting drinking and cumulative intake. The risk does not appear to vary by type of beverage or by gender.[18, 20, pp 380-2]

There is a strong additive effect of tobacco use on risk for esophageal cancer, with the highest risk for heavy drinkers who are also heavy smokers.[28] However, studies providing evidence for alcohol's unique causal role have been careful to control for a separate contribution from tobacco use.

The risk for esophageal cancer seems to decline exponentially if you stop drinking, with a risk equal to never-drinkers 15–20 years after drinking cessation.[29]



Oral cavity and pharynx

At 60 grams of alcohol per day or more, there is a threefold increased risk of mouth and throat cancers.

Larynx

Increased risk for laryngeal cancer is detectable at levels as low as 10 grams of alcohol per day, and at 100 grams per day, the risk for cancer is fourfold compared to non-drinkers.

Esophagus

Increasing alcohol consumption increases risk for squamous cell cancer of the esophagus in a dose-dependent manner, with a 20 % increase at an intake of 10 grams per day up to a 3–8 fold increased risk with high intakes of alcohol.

Breast

For every 10g of alcohol consumed regularly each day, risk of female breast cancer increases by about 12%.

Liver

There is a dose-response effect for alcohol on risk of liver cancer, however, it is difficult to accurately determine as cirrhosis and other liver disorders often predate cancer of the liver.

Stomach

There is strong evidence that consuming about three or more alcoholic drinks per day increases the risk of stomach cancer.

Colon and Rectum

Risk of these cancers increase with alcohol consumption in a dose-dependent manner from 20+ grams of alcohol per day.

Colon and Rectum (Colorectal)

Corrao et al (2004)[30] were among the first to demonstrate a significant positive and linear relationship between alcohol and cancers of the colon and rectum. Risk of these cancers increase with alcohol consumption in a dose-dependent manner from 20+ grams of alcohol per day.[6, 18, 20] The most likely mechanism through which alcohol consumption increases the risk for colorectal cancer is by enhancing inflammation.[31, 32]

The risk does not seem to vary by type of beverage or gender and there does not appear to be a modification effect of tobacco.[6, 18]

Liver

The risk for primary liver cancer increases with alcohol consumption. There is a dose-response effect for alcohol on risk of liver cancer, however, it is difficult to accurately determine as cirrhosis and other liver disorders often predate cancer of the liver.[20] These liver diseases commonly lead to a decrease in or the cessation of consumption of alcoholic beverages many years before the occurrence of cancer.[18, pp 386-7] Risk of liver cancer from alcohol use does not seem to vary by type of beverage.[6]

It seems that the risk for liver cancer decreases after cessation of drinking, but more research is needed for a reliable estimate of the rate of decline.[33]

"For every 10g of alcohol consumed regularly each day, risk of female breast cancer increases by about 12%."

Breast

There is a positive linear relationship between alcohol and risk of female breast cancer. For every 10g of alcohol consumed regularly each day, risk of female breast cancer increases by about 12%.[18]

There have been a large number of meta-analysis on the relationship between breast cancer and alcohol including a recent summary meta-analysis of 15 individual meta-analyses. Shield et al (2016)[34] found that among 15 meta-analyses published over the past 16 years, all but 2 studies showed a dose-response relationship between alcohol and breast cancer. Risk of breast cancer is increased at all levels of alcohol consumption including lower levels. It is likely that alcohol influences breast cancer risk through its unfavorable effects on hormone levels and related biological pathways.[35]

Misclassification of drinker status in observational studies is relatively common (e.g. mixing ex-drinkers in with lifetime abstainers or occasional drinkers in low level drinkers) and it has been hypothesized that this may influence study outcomes. However, a meta-analysis controlling for misclassification error concluded that breast cancer risk estimates remained largely unchanged by ex-drinker bias (the most common form of misclassification) but that risk was underestimated when occasional drinkers were incorrectly combined with abstainers.[36]

Stomach

A meta-analysis of the relationship between alcohol and risk of stomach cancer found a strong effect, particularly for beer and liquor such that for each 10g of alcohol consumed the risk of stomach cancer increased by about 5%.[37] However, most meta-analyses conclude that only heavier drinkers (> 25g/day) are at higher risk of stomach cancer.[20, 38] According to a recent review by the WCRF/AICR, there is strong evidence that consuming about three or more alcoholic drinks per day increases the risk of stomach cancer.[8, pp 3-5]



Other cancers probably caused by alcohol consumption

Pancreas

Evidence that high alcohol intake (i.e. ≥ 30 g/d) may be causal for increased risk of pancreatic cancer is mounting.[18, p 447] Bagnardi et al (2015)[20] for instance reported that compared to abstainers, heavy drinkers had about a 20% higher risk of pancreatic cancer. Similar conclusions were drawn by Tramacere et al (2010).[39] Although analysts have attempted to control for potential confounders there remains the possibility that residual confounding by tobacco use may partly explain the relationship. It is also not yet clear whether risk may vary by beverage type or body mass index.[18, p 447] It has been suggested that the inflammatory changes in chronic pancreatitis related to heavy alcohol use may be a possible mechanism.

Prostate

In its 2010 and 2012 reports, IARC concluded that there was limited or inconclusive evidence of a causal role for alcohol in the development of prostate cancer.[6, 18 p 448] However, in the IARC's 2014 World Cancer Report, Rehm and Shield noted that several meta-analyses indicated a significant and positive dose-response relationship between alcohol use and risk of prostate cancer.[12 p 98]

Bagnardi et al (2015)[20] for instance showed that drinkers had a higher risk of prostate cancer than abstainers and that risk increased as alcohol intake increased. A new meta-analysis by Zhao et al (2016)[40] which paid specific attention to study quality including drinker misclassification bias and control for confounding, also found a significant dose–response relationship between level of alcohol intake and risk of prostate cancer starting at low volume consumption (<24 g p/day). The relationship was stronger in the studies free of ex-drinker misclassification error.

The biological mechanisms by which alcohol might influence prostate cancer risk are not yet well developed, however, candidate hypotheses include DNA damage and changes in the repair and expression of genes, increased estrogen concentration, a role as a solvent for other carcinogens (e.g. tobacco use) and changes in folate metabolism.[41]



Several meta-analyses indicate a significant and positive dose-response relationship between alcohol use and risk of prostate cancer.



Tim Stockwell,

Professor of Psychology, co-author, specialising in better methods of determining whether low level alcohol consumption improves or harms people's health.

What motivates you?
"My motivation is based on the fact that alcohol policy is formulated in line with corporate interests and that the public health perspective is neglected in favour of improving the economy by increasing revenue. I'm also interested in harm reduction when it comes to alcohol, tobacco and illegal drugs. I believe in developing better methods of protecting the most vulnerable members of society and those who have developed an addiction."

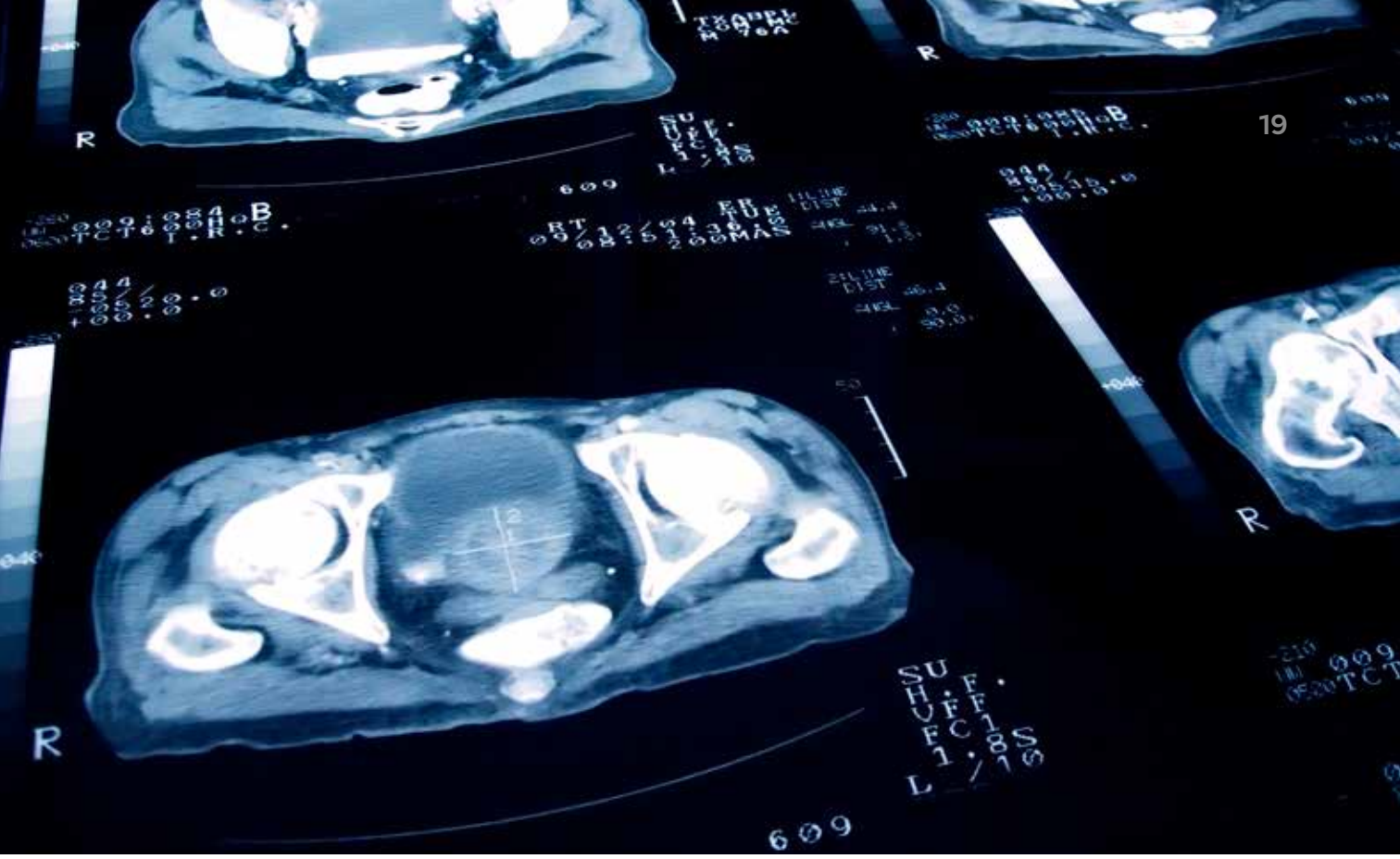
Why is the partnership aspect of the report important to you?
"It's an unusual opportunity to meet with like-minded colleagues from other countries to discuss the latest research and its consequences. I always learn from the group meetings and feel sharper mentally afterwards. I also appreciate the fact that the process results in the science being presented to a wider audience and helps increase awareness of the links between alcohol and public health."

Why is this report necessary?
"It feels as though we're at a crossroads when it comes to alcohol policy and science that is similar to the one in the 1960s when we became aware of the link between lung cancer and cigarettes. The information that alcohol increases the risk of cancer, irrespective of the amount of alcohol, poses a very real threat to current alcohol consumption levels and to the investments in alcohol marketing. We need to shine a spotlight on the latest research in this field to bring about a change in behaviour and attitudes so that we can minimise the risk of alcohol-induced cancer."

Cancer possibly caused by alcohol

There are other types of cancer that are associated with alcohol consumption but that are not yet considered causally related by IARC. Based on a meta-analysis of the risk of cancers by Bagnardi et al (2015)[20], in addition to the 10 cancers covered in this report, alcohol consumption was associated with increased risk of malignant melanoma, and heavy levels of consumption were associated with increased risk for lung and gallbladder cancers. With respect to melanoma, another recent meta-analysis by Rota et al (2014)[42] showed a relative risk of 1.20 for drinkers (any amount) compared to no/occasional drinkers, with higher risk for heavy drinkers. However, when only a subset of studies that adjusted for sun exposure were analyzed, the risk was substantially reduced and no longer significant. This suggests that a large proportion of studies in this literature have not adequately adjusted for confounding by sun exposure (the major risk factor for malignant melanoma). However, it remains possible that alcohol interacts with exposure to sunlight as it is present in perspiration after consumption. Further research is needed on this topic.

Alcohol consumption is also negatively associated with renal cancer, thyroid cancer, and lymphoma. Causal pathways have yet to be confirmed, however, for alcohol's role in these cancers.



Possible underestimation of alcohol-related cancers

As research in this area develops, it is likely that more cancers will be confirmed as having a convincing causal association with alcohol consumption. In addition, it is important to note that many epidemiological studies have been found to have systematic biases which can lead to underestimation of risk.

In particular, the majority of long term studies on alcohol use and later risk of diseases compare the level of risk against people deemed to be "abstainers" but fail to exclude people from this group who have given up or greatly reduced their consumption for health reasons. This makes the groups of current drinkers look good by comparison.

Among cancer studies, Zeisser et al (2014)[36]found that elevated risk of breast cancer was only evident for light drinkers in studies that made sure to compare this group with complete abstainers. **Recently, Zhao et al (2016)[40] showed that when former drinkers were removed from the reference group of abstainers, the risk of prostate cancer increased threefold for low volume drinkers.** Increasingly, modern studies are taking care to avoid misclassifying former and occasional drinkers as abstainers and it is likely that future estimates of alcohol-caused cancer rates will be higher. In the present report, we applied latest WHO methods which include a partial correction for former but not occasional drinker bias by making separate estimates for former drinkers. These kinds of biases in studies lead to both an under-estimation of disease risks and an overestimation of health benefits at low levels of consumption.[43]

Methods used to estimate alcohol caused cancers in Sweden

We applied WHO approved methods to estimate alcohol caused deaths and hospitalizations in Sweden, first developed as part of the Global Burden of Disease study which undertakes this task globally every five years (Lim et al, 2012, Rehm et al, 2010).[44, 45] The methods involve estimating the proportions of hospitalizations and deaths with cancer diagnoses that can be attributed to alcohol consumption in the Swedish population. Further methodological details can be found in an online appendix. In applying these methods we drew upon the meta-analyses published recently by Bagnardi et al (2015)[20] on a wide range of cancers, Corrao et al (2004)[30], and, for prostate cancer, a meta-analysis from Zhao et al (2016).[40]

We accessed official Swedish mortality data from the Health and Welfare online statistical database (http://www.socialstyrelsen.se/statistics/statisticaldatabase/causeofdeath) containing cause of death data for years 1997–2014. A request was also made to the Swedish Patient Registry data on hospitalizations by age (five years grouped), gender, most responsible diagnosis (ICD-10 codes) that occurred between 1998 and 2014. From these data we accessed those for which some form of cancer was recorded as the primary cause of the hospitalization or death. We then applied the WHO methods to estimate the proportions of known (e.g. cancers of the liver, esophagus, breast) or probable alcohol-related cancers (e.g. prostate, pancreatic) that were caused by alcohol use. In order to make these estimates, it was necessary to identify a) what is the increased risk of each cancer according to level of daily alcohol consumption based on comprehensive reviews of all internationally published scientific studies and b) how many men and women of different ages typically consume alcohol at different levels. This last estimate is based on a combination of official estimates of alcohol sales, unrecorded consumption and recent national surveys.



Estimating the contribution of alcohol to cancer is, like many areas of scientific investigation, subject to some uncertainty. For example, studies used to estimate the relationship between alcohol consumption and the risk of developing various types of cancer are “observational” studies, meaning that those who already drink are compared to those who don’t drink in terms of the likelihood of developing cancer. Because people are not randomly assigned to drink (or not) in observational studies, there may be other differences between drinkers and non-drinkers that could obscure the true relationship between alcohol and cancer. Also, in many studies, alcohol consumption

"Estimating the contribution of alcohol to cancer is, like many areas of scientific investigation, subject to some uncertainty."

is measured at only one point in time, or is measured inaccurately or incompletely. This can also affect the observed relationship between various levels of alcohol consumption and cancer. However, for some cancers discussed in this report, it appears that studies that do a better job of overcoming some of the limitations with the available data find that the effect of alcohol is stronger than is typically estimated. In addition, we may not have included all the cancers that may be causally related to alcohol consumption, either because of limitations of existing studies or because there have not enough high-quality studies to make such determinations. Overall, it is likely that our estimates of the number of alcohol-attributable cancer deaths and hospitalizations are conservative.

We used current alcohol consumption estimates to generate estimates of current alcohol-attributable cancer mortality for Sweden. However, there is a time gap between exposure to a carcinogen and the progression to cancer. Therefore, even though recent consumption can continue or hasten the progression to cancer, previous consumption also plays a role, and former drinkers (many of whom consumed excessive amounts of alcohol) also have an increased risk of cancer. For this reason, some researchers use a lagged analysis in which alcohol consumption at a prior point in time (e.g., 10 years ago) is used to determine current cancer mortality. Had we used this assumption, our estimates of alcohol-attributable cancers would have been higher than the results presented in this report, since alcohol consumption was somewhat higher in Sweden 10 years ago, and rates of alcohol attributable cancers were approximately 15% higher than they are today (see figure 1).



Even though recent consumption can continue or hasten the progression to cancer, previous consumption also plays a role.



Tim Naimi,

Researcher in medicine and public health, co-author, focusing on the effects of alcohol policy and the health effects of so-called moderate alcohol consumption.

What motivates you?
"I want to help improve public health."

Why did you want to contribute to this report?
"The subjects under discussion are interesting ones and the people involved are fantastic. It's scientifically stimulating and helps build friendships, networks and partnerships in the field."

RESULTS

In this report, we examine alcohol-related cancer deaths and hospitalizations for Sweden. We assessed 10 cancers. Within these, we considered **eight types of cancers (oral, pharyngeal, laryngeal, esophageal, stomach, liver, colorectal, female breast) that are considered clearly causally related to alcohol by WHO endorsed panels of scientific cancer specialists** (either IARC or the WCRF) and another two cancer types, pancreas and prostate, that likely to be causally related to alcohol based on recent evidence, as discussed earlier. For each of these 10 cancer types there is a significant, positive dose-response relationship between alcohol consumption and the risk of death from those cancers based on one or more meta-analyses. There are also plausible biological pathways that have been identified as to how alcohol may cause each

Table 1

Increased risk of cancer per standard drink/day (1 standard drink = 12 g of alcohol)

CANCER SITE	GENDER	12G	24G	36G	48G	60G	72G	84G
Oral	Both	37 %	82 %	136 %	200 %	271 %	349 %	432 %
Pharyngeal	Both	37 %	82 %	136 %	200 %	271 %	349 %	432 %
Oesophagus	Both	17 %	37 %	61 %	88 %	119 %	155 %	196 %
Colorectal	Both	8 %	16 %	25 %	35 %	46 %	57 %	69 %
Liver	Both	9 %	19 %	28 %	38 %	48 %	58 %	68 %
Laryngeal	Both	19 %	41 %	66 %	96 %	131 %	171 %	216 %
Breast	Female	11 %	23 %	37 %	52 %	69 %	88 %	109 %
Stomach	Male	0 %	0 %	20 %	20 %	20 %	20 %	20 %
	Female	0 %	0 %	223 %	223 %	223 %	223 %	223 %
Pancreatic	Both	1 %	3 %	6 %	9 %	13 %	18 %	23 %
Prostate	Male	3 %	5 %	8 %	11 %	14 %	17 %	20 %

REF: BAGNARDI ET AL 2015, CORRAO ET AL 2004, ZHAO ET AL 2016

of these types of cancer.

For the 10 cancers assessed we estimated a total of 996 alcohol-attributable cancer deaths among Swedish adults in 2014 (4.5% of all cancer deaths in 2014), including 596 deaths among men (5.1% of all cancer deaths among men) and 400 deaths among women (3.8% of all cancer deaths among women) (Table 2). These include 795 alcohol-attributable cancer deaths (3.6% of all cancer deaths) involving the eight cancers that are clearly causally related to alcohol consumption. Colorectal cancer was responsible for the largest number of alcohol-caused cancer deaths among the entire population (294) and men (181), while breast cancer was responsible for the largest number of alcohol attributable cancer deaths among women (150). In 2014, alcohol accounted for 10.7% of all breast cancer

Table 2

Total and alcohol-attributable deaths for ten cancers in Sweden, 2014

	MALE		FEMALE		TOTAL	
CANCER SITE	DEATHS	AAD(%)*	DEATHS	AAD*	DEATHS	AAD*
Oral cancer	108	44 (41.1 %)	76	17 (21.7 %)	184	61 (33.1 %)
Pharyngeal cancer	85	36 (42.5 %)	33	8 (24.5 %)	118	44 (37.5 %)
Oesophageal cancer	357	88 (24.5 %)	95	13 (13.3 %)	452	100 (22.2 %)
Stomach cancer	355	19 (5.3 %)	257	30 (11.5 %)	612	48 (7.9 %)
Colorectal cancer	1,417	181 (12.8 %)	1,354	113 (8.3 %)	2,771	294 (10.6 %)
Liver cancer	435	61 (14.0 %)	263	23 (8.6 %)	698	84 (12.0 %)
Laryngeal cancer	48	12 (25.0 %)	12	2 (14.2 %)	60	14 (22.8 %)
Breast cancer	6	0	1,398	150 (10.7 %)	1,404	150 (10.7 %)
Total of 8 cancers	**2,811**	**441 (15.7 %)**	**3,488**	**354 (10.1 %)**	**6,299**	**795 (12.6 %)**
Pancreatic cancer	863	47 (5.4 %)	929	46 (5.0 %)	1,792	93 (5.2 %)
Prostate cancer	2,398	108 (4.5 %)	0	0	2,398	108 (4.5 %)
Total of 10 cancers	**6,072**	**596 (9.8 %)**	**4,417**	**400 (9.1 %)**	**10,489**	**996 (9.5 %)**
Total deaths for all cancer	**11,667**	**596 (5.1 %)**	**10,620**	**400 (3.8 %)**	**22,287**	**996 (4.5 %)**

NOTES: 1. AAD = ALCOHOL-ATTRIBUTABLE DEATHS 2. ALL NUMBERS APPLY TO THE POPULATION AGED 15+ IN EACH GENDER CATEGORY 3. MALE AADS + FEMALE AADS MAY NOT EXACTLY ADD TO TOTAL AADS DUE TO ROUNDING

"Colorectal cancer was responsible for the largest number of alcohol-caused cancer deaths among the entire population and men."

deaths in Sweden.

Swedish drinking guidelines (<14 drinks for men, and <9 drinks per week for females; 1 standard drink = 12g) (Table 3). Overall, 29% of all alcohol-attributable cancer deaths were due to consumption at or below recommended guideline levels. The leading type of alcohol attributable cancer deaths attributable to consumption at or below the

Table 3

Percentage of alcohol attributable cancers in Sweden 2014 above and below drinking guidelines

CANCER SITE	BELOW GUIDELINES	ABOVE GUIDELINES	FORMER DRINKERS
Oral cancer	36 %	59 %	5 %
Pharyngeal cancer	33 %	62 %	5 %
Oesophageal cancer	36 %	55 %	10 %
Stomach cancer	0 %	25 %	75 %
Colorectal cancer	33 %	43 %	24 %
Liver cancer	34 %	46 %	20 %
Laryngeal cancer	37 %	54 %	9 %
Breast cancer	32 %	42 %	27 %
Total for eight cancers	**32 %**	**46 %**	**23 %**
Pancreatic cancer	9 %	25 %	66 %
Prostate cancer	28 %	31 %	41 %
Total for ten cancers	**29 %**	**42 %**	**29 %**

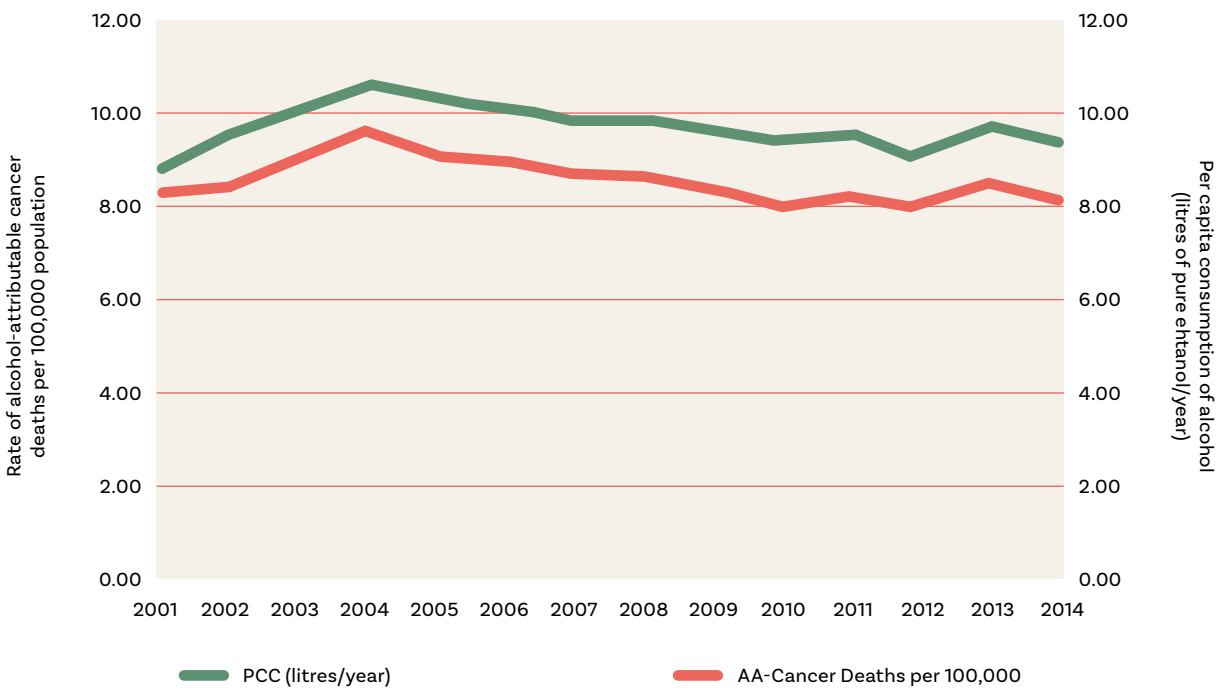
guidelines was colorectal (n=97). The cancers with the highest percentage of deaths attributable to low consumption were oral and laryngeal (both 36%).

Over time there has been an 7.3% increase in the number of alcohol-attributable cancer deaths from the eight cancers that are clearly causally related to alcohol consumption, from 741 in 2001 to 795 in 2014. During this period, per capita ethanol consumption has increased 13.4%, from 8.2 liters per capita in 2000 to 9.3 liters per capita in 2014.

We estimated there were 4192 alcohol-attributable cancer hospital admissions (4.7% of all cancer admissions) from the 10 cancer types in 2014, including 3593 admissions (4.0% of all cancer admissions) from

Figure 1

Rates of alcohol-attributable cancer mortality and per capita consumption in Sweden, 2001 to 2014.



the eight cancers that are clearly causally related to alcohol consumption (Table 4). The number of alcohol-attributable cancer admissions was largest for colorectal cancer (1055), breast cancer (922), and oral cancer (551). The total cost for hospital care of alcohol caused cancers in 2014 was 324 million Swedish krona.

The World Health Organization compared international rates of alcohol-attributable cancer deaths from seven cancers (oral, pharyngeal, laryngeal, esophageal, liver, colorectal, female breast) for 2013. In Sweden, there were 8.2 alcohol-attributable cancer deaths per 100,000 population. In comparison with other Scandinavian countries, Sweden's rate was similar to those in

Table 4

Alcohol-attributable hospitalizations for ten cancers in Sweden, 2014

	MEN		FEMALE		TOTAL		COSTS FOR HOSPITAL CARE (SEK)
CANCER SITE	NO	%	NO	%	NO	%	
Oral cancer	406	44.6 %	145	23.2 %	551	35.9 %	45,294,202
Pharyngeal cancer	258	45.0 %	64	27.4 %	322	39.9 %	20,653,446
Oesophageal cancer	246	26.0 %	48	14.2 %	295	22.9 %	24,367,519
Stomach cancer	55	5.4 %	78	12.5 %	133	8.1 %	12,500,738
Colorectal cancer	666	13.3 %	389	8.5 %	1,055	11.0 %	110,797,002
Liver cancer	157	14.5 %	51	8.9 %	208	12.6 %	18,395,079
Laryngeal cancer	95	27.9 %	13	14.7 %	107	25.2 %	7,144,855
Breast cancer	0		922	11.8 %	922	11.7 %	43,568,417
Total of 8 cancers	**1,883**	**19.0 %**	**1,710**	**11.5 %**	**3,593**	**14.5 %**	**282,721,258**
Pancreatic cancer	112	5.6 %	105	5.0 %	217	5.3 %	16,874,214
Prostate cancer	382	5.0 %	0		382	5.0 %	24,601,710
Total of 10 cancers	**2,376**	**12.1 %**	**1,816**	**10.7 %**	**4,192**	**11.5 %**	**324,197,183**
Total for all cancer	**2,376**	**5.3 %**	**1,816**	**4.0 %**	**4,192**	**4.7 %**	

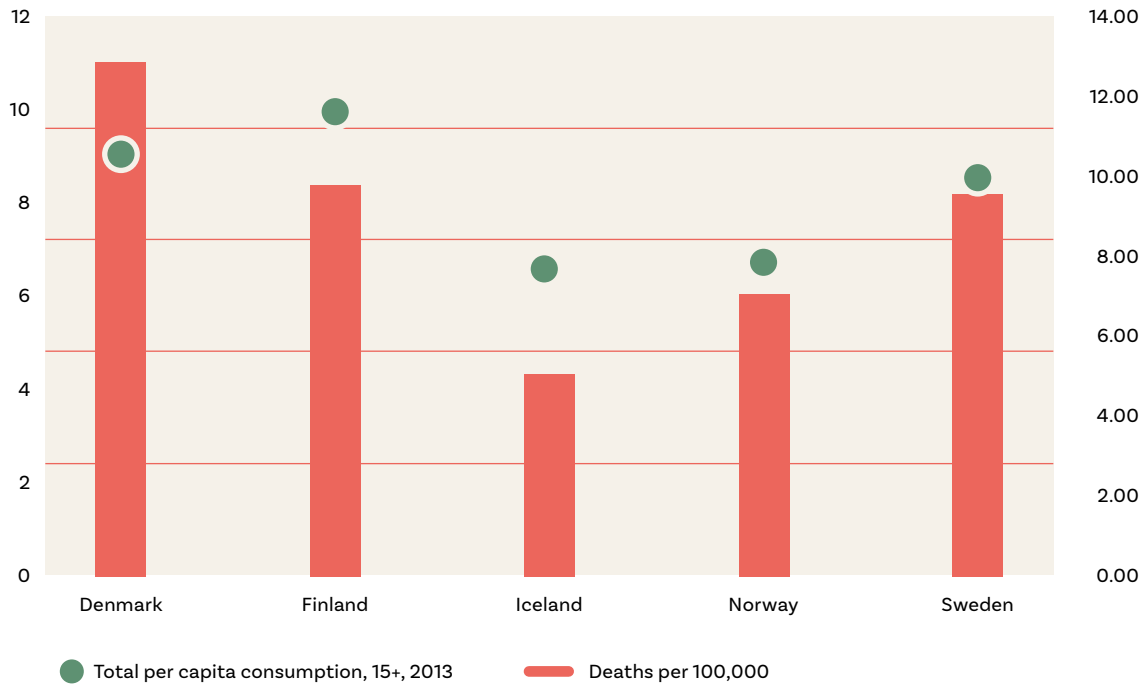
NOTES: 1. ALL NUMBERS APPLY TO THE POPULATION AGED 15+ IN EACH GENDER CATEGORY 2. MALE ALCOHOL-ATTRIBUTABLE HOSPITALISATIONS (AAHS) + FEMALE AAHS MAY NOT EXACTLY ADD TO TOTAL AAHS DUE TO ROUNDING

Finland, higher than those in Iceland and Norway, and lower than those in Denmark (Figure 2) where per capita alcohol consumption was the highest. Rates of alcohol-related cancer mortality was generally correlated with per capita consumption in Scandinavian countries.

"Rates of alcohol-related cancer mortality was generally correlated with per capita consumption in Scandinavian countries."

Figure 2

Alcohol attributable death rates from cancer (per 100,000 inhabitants) and total per capita consumption, Nordic countries, 2013.



REF: IHME (HTTP://VIZHUB.HEALTHDATA.ORG/GBD-COMPARE/, ACCESSED 2016-07-13) AND "INFORMATION ON THE NORDIC ALCOHOL MARKET 2014", ALKO AND NATIONAL INSTITUTE FOR HEALTH AND WELFARE (THL), HELSINKI 2014



Harold Holder,

Alcohol researcher, co-author, specialising in alcohol and public health.

How did you become interested in alcohol and addiction?
"I started researching treatment methods, but quickly realised that alcohol was also the root of numerous societal problems – not just those caused by people who abuse alcohol, but by those with hazardous consumption levels. That, in turn, made me see alcohol as a public health issue and not just as something that affects the few who develop serious alcohol use disorders."

Why did you want to donate your time to make this report possible
"I'm approaching retirement age and it's become increasingly important for me to be able to contribute research that can reduce the harmful effects of alcohol. During my career, I've prioritised getting my research published in scientific journals, but the number of decision-makers who read scientific articles is vanishingly small, so it's been hugely satisfying for me to have this opportunity to share my expertise in a more easily accessible form. Basically, it's a fitting end to my career."

What does this partnership mean to you?
"It's given me the chance to spend interesting, effective time together with colleagues, whom I like and respect, with the aim of making the latest research relevant. For me, that's both important and very rewarding."

Awareness

Many Swedes do not know that alcohol causes cancer. In an EU study, only 23% of Swedes agreed completely that there was an association between alcohol and cancer and an additional 33% tended to agree; the lowest proportion observed across all EU countries.[47]

Furthermore, research findings of the link between alcohol and cancer have led to little action among many Swedish agencies with concerns for public health. In contrast to equivalent agencies in other European countries, few steps have been taken to inform the Swedish public about the role of alcohol for cancer. Public health principles confirm that people and policy makers have a right to know the facts when making decisions regarding health and lifestyle, including drinking. While there are currently no official drinking guidelines there exists suggested guidelines from the Swedish National Institute of Public Health.[46] **While these guidelines suggest no more than 14 drinks per week for men and 9 for women,** emerging data about alcohol and cancer suggest a need for review. While the levels indicated in the 2005 report were representative of the views of the research community then, new research has prompted revised guidelines in several countries, at lower levels. New Swedish guidelines now need to take the evidence of the association between alcohol and cancer into account as well as growing evidence for skepticism regarding cardiac benefits at low levels of consumption.[48]

In an EU study, only 23% of Swedes agreed completely that there was an association between alcohol and cancer; the lowest proportion observed across all EU countries



Fact

Critically, the evidence summarised in this report indicates that a considerable proportion of all cancer cases and deaths are caused by moderate or low levels of alcohol consumption.





Sven Andréasson,

Alcohol researcher, co-author, specialising in public health, prevention, and the treatment of alcohol- and drug-related problems.

Why did you choose to focus on the subject of alcohol?
"For a physician specialising in social medicine, alcohol and drugs are a big issue, simply because they're an underlying cause of so many health problems."

What motivates you?
"I'm motivated by identifying better solutions to alcohol- and drug-related problems and reducing problems and suffering."

Why is this report important to you?
"It's important that doctors are informed and that they play an active role in reducing the harmful effects of alcohol."

Why do we need a report on the link between alcohol and cancer?
"Cancer is a major cause of illness and death – it's the second largest after cardiovascular disease. Cancerous diseases are also increasing rapidly as people are living longer, so it's incredibly important that we understand both the causes of cancer and the methods of preventing it."

Prevention policy

On the aggregate level, the most effective way to reduce alcohol consumption is to reduce both the economic and physical availability of alcohol.

Cancer is a group of serious malignant, often lethal, disorders. Even if treatment for these disorders has made impressive progress, a cancer diagnosis remains a very serious threat to the wellbeing and survival for many people. This report estimates that between 795 and 996 Swedes died prematurely due to cancers caused by alcohol in 2014. All these deaths are entirely preventable. In the case of alcohol, the message is clear: reduced alcohol consumption leads to reduced cancer. The challenge then is to implement prevention policies that effectively reduce alcohol consumption.

On the aggregate level, the most effective way to reduce alcohol consumption is to reduce both the economic and physical availability of alcohol. In a hierarchy of effective measures, the price instrument comes highest, whether through a system of minimum prices and/or through increased alcohol taxation. At the next level come restrictions on physical availability. In Sweden, the state-owned, alcohol retail monopoly has proved effective in reducing consumption. Regulating the number of outlets, either licensed premises for drinking, or the number of shops, and their opening hours, also contributes to reduced drinking. Age limits effectively reduces drinking among young people.

These measures for reducing availability require popular understanding and support, which calls for ongoing advocacy. Lessons from prevention research indicates that effective prevention is a combination of awareness raising and availability reduction. One way, among others, to increase awareness of the role of alcohol for cancer is to include warning messages on alcohol containers, in the same manner as is done with tobacco. The message should clearly state that alcohol increases the risk of cancer, with the risk increasing with the



Strategies to raise awareness

1. Highly visible health warnings containing the clear message that alcohol causes cancer are made compulsory on all alcohol containers.
2. National low risk drinking guidelines are developed which incorporate new knowledge about the cancer risks from even low volume consumption.
3. Medical practitioners routinely advise their patients about the need to reduce cancer risks by limiting alcohol consumption.
4. Rates of alcohol caused cancers in Sweden are regularly assessed and publicly reported each year.

more that is drunk. Research suggests that warning messages are more believable if designating specific cancers.[49] We strongly suggest that all Swedish citizens have a right to know that widely consumed beverage alcohol poses significant cancer risks even at low levels of consumption. It is the responsibility of government to ensure that all potential consumers are made aware of this scientifically established fact. Labelling of alcohol containers is an ideal method of raising awareness of these significant health risks, accompanied by other methods using multiple electronic, print and digital media.

Furthermore, information about alcohol and health is a responsibility for medical practitioners. Medical associations have high credibility and are important voices in public discussions and can use this to disseminate new evidence in their society. At the individual level, the responsibility for practitioners is to provide advice to their patients.

In summary, we recommend the following actions to reduce risk of future alcohol involved cancers. They represent a collection of preventive actions which should be taken together rather than individually.

Policies to reduce alcohol consumption

Policies to reduce population level alcohol consumption are the most effective means of reducing the cancer risk from alcohol. These include policies to:

1. Maintain and/or increase both the floor and average price of alcohol prices;
2. Reduce the times and places at which alcohol is available for sale;
3. Maintain the government alcohol retail monopoly; and
4. Reduce private sources of alcohol.

It is the responsibility of government to ensure that all potential consumers are made aware of this scientifically established fact.



Frida Dangardt

Researcher in cardiovascular diseases, co-author, specialising in risk factors and effects.

How did you come to focus on the subject of alcohol?
"We hear a lot about alcohol allegedly being good for our cardiovascular systems, but there really is no hard evidence and the quantities of alcohol involved are so small that they bear no relevance to real life consumption. After that, all we see are negative effects."

What motivates you?
"People feeling better! By passing on research, we give people the option of making up their own minds and changing their lifestyles. Research results can also be used to influence our decision-makers."

Why is this report important to you?
"I want to be able to make a difference at societal level, and I'm keen to see research becoming known and being presented in an easily accessible way. And the chance to work with congenial, gifted and productive colleagues is very rewarding, too."

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Addiction doesn't discriminate

Some people can enjoy a glass of wine with dinner on a Saturday night, while others want more – and more often. Professor of Health Psychology, **Claudia Fahlke**, heads an interdisciplinary research group aiming to find out what leads to a person becoming addicted and why that addiction is so hard to break.

TEXT: CAROLINE FISCHER



Claudia Fahlke

Work: Professor of Health Psychology and a licenced psychologist. Representative of CERA – an interdisciplinary centre for education and research into addiction at Gothenburg University (www.cera.gu.se).
Proud of: That I have helped interest an increasing number of psychologists in researching and working in the field of addiction, and that I am the first female professor of psychology at Gothenburg University.
Leisure: Research, gardening, plants and literature.
Future: We must build a future with greater equality of care and treatment and one in which there are more female professors.

A majority of Swedes regard alcohol consumption as having positive or neutral consequences for themselves but negative ones for society as a whole. They also tend to perceive the problems associated with alcohol consumption as being least in their immediate circle and greatest at national level. These are just some of the findings of a subsidiary study conducted as part of the long-running "Alcohol opinion: the role of problem perception" project at the SOM Institute (Society, Opinion, Media) of Gothenburg university. The study's responses show that we are keen to distance ourselves from alcohol problems and that when it comes to ourselves and to our nearest and dearest, alcohol problems are a long-standing taboo subject. Losing control over one's alcohol consumption is often associated with feelings of shame and that as much we appreciate the party animal who lets rip on a Saturday night, we are equally disapproving of the person who continues to drink on Sunday.

We're slow to make the connection...

Claudia Fahlke, a licenced psychologist and Professor of Psychology at Gothenburg University, and her research group are monitoring socially established individuals with

AUD (Alcohol Use Disorder) to find out more not only about the causes of addiction, but about why that addiction is so hard to break. The goal is to identify effective methods of helping more people to escape their addiction.

"The majority of the people we study are employed, have a family, and are not suffering from any complicated mental problems. They don't have a history of heavy abuse stretching back to their youth: what they do have is a successive increase in consumption throughout adulthood.

There is a strong element of denial involved, and Claudia Fahlke notes that many initially not only deny that their alcohol consumption has reached problematic levels, but also downplay situations in which things have gone wrong as a result of their drinking.

"But during the course of our conversation, most of them come to the realisation that their tiredness may be due to alcohol and admit that their situation at work, or their relationship with their partner or their teenage child, is going downhill."

It's human nature to push problems away, which is why many of them have a ready explanation for situations that indicate AUD. But once their thoughts start revolving around alcohol and they find themselves prioritising it when planning their day or an activity, then it's time to start thinking about how much they are actually drinking.

"The majority of the people we study are employed, have a family, and are not suffering from any complicated mental problems."

"There are some good online tools nowadays that can help you work out whether your alcohol consumption levels are hazardous, and if you find you are in the danger zone, it's probably time to start cutting down. Another potential wake-up call is when you wake up in the morning and don't have the energy to do what you'd actually planned to do today, such as taking your kids to the football match. When that happens, you've had too much to drink the night before."

There's no way of predicting who will become addicted

Research

It is currently unclear whether the brain can ever recover totally from an addictive disease. **Research has shown that the chances of living a drug- and alcohol-free life increase if an individual is capable of remaining clean/sober for 5–7 years.** The majority – approximately 80% – will, however, relapse with 12 months. There is currently no fully effective method of treating addiction disorders, with treatment usually comprising therapy and medication. One well-known, tried and tested method of treatment is the 12-step programme, while medicines can be used to help reduce alcohol cravings and binge drinking, and to extend alcohol-free periods, giving the brain a chance to recover. Research is currently being conducted with the aim of identifying new pharmaceutical products to treat addictive disorders, and of combining existing treatments more effectively.

SOURCE: THE SWEDISH BRAIN FOUNDATION

Diagnostic criteria for addiction

1. **Increased tolerance** – need for substantially greater quantities due to a substantially reduced effect.
2. **Abstinence** – characteristic abstinence symptoms or a need for a "hair of the dog."
3. **Using alcohol in larger amounts** or for longer periods of time than intended.
4. Lasting desire or **failed attempts to limit or control** consumption.
5. Spending large amounts of time **getting hold of alcohol,** using alcohol, or recovering from the effects of alcohol, for example.
6. **Important activities** – at work or in leisure time, social activities, etc. – being neglected or reduced due to alcohol consumption.
7. Use of alcohol, for example, continues, despite an awareness of the worsening of **physical or psychological disorders.**



– sensitivity to alcohol is an individual thing. A diagnosis of addiction is linked to a number of criteria that address such issues as tolerance development, cravings for alcohol, and whether you continue to drink despite being aware of the negative consequences. Claudia Fahlke says that it is hard to identify a common denominator that predicts who may become addicted, but one thing that she and her fellow researchers are seeing is that many of the people they study describe a childhood characterised by emotional neglect.

"These people often say that there was something missing in their childhood – not that they had experienced anything dramatic or traumatic, but more that they had a sense of not being liked or "seen" by their parents."

Other factors that can play a part in an addiction problem include a genetic predisposition and sensitivity to stress, but attitudes to alcohol in social settings can also be important.

Alcohol as a part of everyday life

Sweden is an individualistic country and most people are relatively well off. We like travelling and enjoy taking on new tastes and experiences. We have a long tradition of romanticising spirits and, at the same time, appreciate and have adopted the continental lifestyle, and we are increasingly drinking alcohol as part of our everyday lives.

"Alcohol is everywhere you look. We see it daily in advertising, it's part of socialising after work with our colleagues, and it's on the dinner table alongside the traditional Thursday pea soup. When I walk home from my department, I pass numerous attractive outdoor cafés and bars, and as soon as the sun comes out, the chairs are full of people wrapped up in blankets with a glass of beer or wine on the table in the early afternoon. Being exposed to alcohol on



"More and more celebrities are now coming forward and talking about their own addictions and saying that they have decided to abstain."

a daily basis, coupled with the fact that alcohol is so easily available, has an effect on our consumption patterns."

Claudia Fahlke believes that there is a need for more research-based information on the various consequences of alcohol consumption.

"Ultimately, it's the politicians who decide. Some of them understand that alcohol is an important issue, but the question still has a low priority. I think, in part, it's the fact that the issue touches a bit close to home for many of them, but also that "it's someone else's problem. The discussion often becomes one of human rights – the right to make your own choices – but at the same time, most of us know someone who has some form of AUD, and where their freedom of choice is actually severely restricted."

But this tolerance of everyday drinking also raises the question of what our attitudes towards alcohol should be. Many people are taking an interest in safe daily consumption levels and are starting to ask themselves whether wine is actually good for them.

"The degree of openness in discussions about consumption has increased, which has reduced the stigma associated with abuse. Not only that, but more and more celebrities are now coming forward and talking about their own addictions and saying that they have decided to abstain."

And as the taboo in relation to alcohol consumption breaks down, more and more people are finding the courage to talk about the negative effects of alcohol on both society and individuals.

"When I was doing my Ph.D. in the early 1990s and started teaching, there was little interest on the part of psychology students: they said that they didn't want to work with people with alcohol problems. What these stu-

dents didn't understand was that many of those with AUD also experience depressive symptoms and suffer various forms of anxiety and angst. I'm seeing a real change in this attitude nowadays, with students actively requesting additional lectures and writing essays on the subject, and with psychologists actually specialising in the field. There's an understanding of the fact that as a psychologist, one is going to encounter people with addictions."

The power of habit

Current figures indicate that approximately 80% of the people treated for AUD will relapse at some point over a 12-month period. This might sound like a depressing figure, but Claudia Fahlke emphasises that relapses are a matter of definition and that the figure is more or less the same for other diseases that require a change in lifestyle.

"It's not, in other words, a question of poor treatment. It's a human phenomenon – we find it hard to break bad habits, whatever they may be, and that's why it's so important not to penalise a person for a relapse."

Many people already feel deeply ashamed after relapsing and suffer the resultant disappointment in them expressed by friends and family, and Claudia Fahlke stresses the importance of not excluding these patients.

"In this type of situation, we need to find out what happened, what triggered the relapse. It's also important that the patient feels that they can always come back to us, even after they have completed their programme of treatment."

Finding answers to the question of why it is so hard to effect a change is not easy, but Claudia Fahlke is keen to see more research conducted in this area. What are the mechanisms that make it harder for a person to change their lifestyle and habits, even when they are aware of the negative social, mental and physical consequences of their drinking?

"We have, for example, found that a particular variation in dopamine production can result in the individual finding it harder to re-educate themselves, i.e. to change existing habits. This can, in turn, have direct consequence for the psychological treatment they receive, given that all treatment is based on the principle that the patient will, in the long term, change their alcohol consumption habits. If you find it hard to change your behavioural patterns, the risk of a relapse will obviously increase."

"It's a human phenomenon – we find it hard to break bad habits, whatever they may be, and that's why it's so important not to penalise a person for a relapse."

So despite the wealth of knowledge that exists when it comes to addiction, more research is needed in order to identify effective methods of helping people who have developed an addiction.

"The very fact that the subject is such an important one makes it an interesting area in which to carry out research, and there is so much more to be done. People with addictions need all the help they can get." •

IQ's 2014 Alcohol Index reveals three trends relating to the way in which alcohol is viewed

1. **A more restrictive view of intoxication** in public contexts. Getting drunk at restaurants or a company party, for example, has become less socially acceptable.
2. **A more fluid or loose attitude towards intoxication** in private contexts. Getting drunk in a private setting is clearly more socially acceptable than doing so in a public one. The trend is, however, for fewer people regarding it as outright acceptable and more people regarding it as neither acceptable nor unacceptable.
3. **A permissive attitude towards everyday drinking.** There is currently widespread acceptance for drinking alcohol in everyday situations. Only 18% of respondents in IQ's 2014 Alcohol Index, for example, state that drinking a couple of glasses of wine or beer at a restaurant on a weekday is wrong.

THE SURVEY COMPANY, NOVUS, USED TELEPHONE INTERVIEWS TO CARRY OUT THE SURVEY CONTAINED IN THE IQ 2014 ALCOHOL INDEX.

Should the alcohol industry be regulated in the same way as the tobacco industry?

Alcohol consumption contributes to many diseases and social problems and large costs to society. Restrictive alcohol policies have been shown to reduce consumption. The alcohol industry is nevertheless allowed to influence political decisions.

TEXT: PER LEIMAR

The tobacco and alcohol industries are treated very differently in political and international contexts. An article in the journal Global Public Health compares the industries and finds many similarities. The authors question the relatively weak policy approach to alcohol, and that the alcohol industry is allowed to participate in political decision-making processes.

Tobacco industry practices to undermine policy were well documented was in the 1990s. As a consequence, an international convention on tobacco control was created which not only regulates the sale and marketing of tobacco products but also exclude the tobacco industry from participating in political processes on regulation of tobacco. For alcohol, the situation is different and the alcohol industry often plays an important role in political decisions both globally and in many countries.

The article notes that the similarities between the industries are numerous. The development of sales in low- and middle-income countries with the help of sophisticated marketing and pricing strategies is one example. Although the political activities of the alcohol industry have not been studied as much as tobacco industry's, the authors state that the alcohol industry is active at all levels of the political process, from setting the agenda to implementation and evaluation. The industry strive to create long-term relationships with decision makers and portray themselves as key players in the political process. In this way industry views are heard and accommodated to by policy-makers. In Africa, the industry has even managed to draft almost identical policies for four national governments.

The authors recommend that more research is done on the political activities of the alcohol industry and that the measures used against tobacco can also be a model for alcohol policy measures. Public health alcohol policy advocates can also learn from the tobacco control movement's successes and their strategies to influence policy.

"Youth, which the guidelines is supposed to protect from marketing, is exposed to alcohol marketing to a greater degree than in the past"

The alcohol industry often say that the industry should themselves develop guidelines for marketing, so-called self-regulation, instead of marketing legislation. In a review of studies comparing industry guidelines with the industry's marketing in practice, all included studies found violation of guidelines. Youth, which the guidelines is supposed to protect from marketing, is exposed to alcohol marketing to a greater degree than in the past and the authors of the review notes that the aim of self-regulation to protect vulnerable groups against alcohol advertising does not work. •

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It's important to talk about alcohol

Alcohol is an underlying cause of many diseases and symptoms, but the shame associated with hazardous use and the stigmatisation of those unable to control their alcohol intake mean that it is still difficult to talk to a patient about their alcohol consumption, says **Jonas Sjögreen**. But that doesn't mean that we should avoid talking about alcohol.

TEXT: CAROLINE FISCHER



Jonas Sjögreen

Work: Retired, but works as a tutor, teacher and examiner in general medicine. Provides consultation courses on how to talk to patients about alcohol.

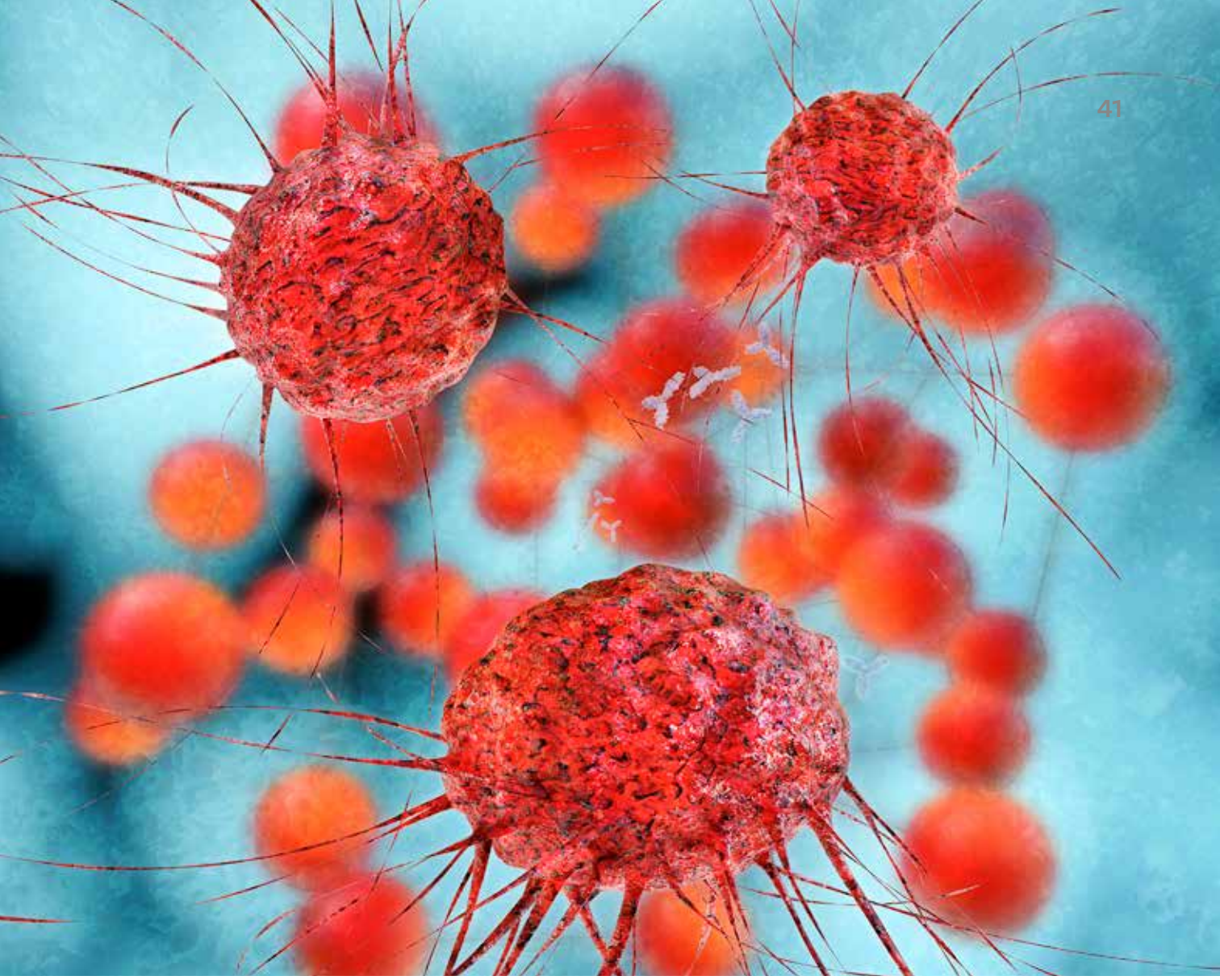
Most proud of: That I refuse to give up my social engagement, e.g. in the refugee issue.
Leisure: I spend a lot of my time at my country place in Sörmland, often with my family and friends. I jog in the forest, go canoeing, and sing in a choir.

As a medical student at Uppsala University, Jonas Sjögreen was tasked with asking a patient about their alcohol habits. The patient had bleeding stomach ulcers but swore blind that he didn't drink alcohol, or at least that he didn't drink any more than other people. Jonas Sjögreen allowed himself to be convinced and assumed that the patient was telling the truth because he couldn't see any reason why the patient would lie. As a GP at Ulleråker alcohol clinic, he met the man with stomach ulcers again. The man turned out to be a regular patient with a severe alcohol addiction.

"The feeling of having missed a patient with severe alcohol problems and the realisation that alcohol can be an underlying cause of many diseases and symptoms was key in determining the path I would take in medicine from that point on."

And ever since then, Jonas Sjögreen has taken an interest in alcohol-related issues, initially by working extra in an alcohol advisory services clinic.

"It was there that I came to understand that alcohol problems can appear anywhere. Most of the people who came to us for help were just ordinary people."



Alcohol sensitivity is an individual thing

Most of those whose alcohol usage has become hazardous are, in other words, functioning social individuals without any major health problems, but commonplace symptoms such as high blood pressure, sleep disorders, or stomach problems can be related to a patient's alcohol consumption, without them being aware of it. Studies have also shown that even very low levels of alcohol consumption can have negative consequences for an individual's health and can be either an underlying cause of a symptom, or something that worsens an existing condition.

Alcohol is soluble in both fat and water and can enter every organ in the body, which means it can affect the entire body. Alcohol also affects cellular membranes by increasing their permeability. When cell membranes are permeable, other toxins can also enter the cells, which can not only cause cancer, but also affect a number of other metabolic processes.

A person's sensitivity to alcohol – and that of their organs – is also highly individual and difficult to predict, both for the patient and for medical personnel.

"And even if there is a link between alcohol and a presenting symptom, it's always about average levels, and the fact that an individual and an organ can be extremely sensitive in comparison with another individual or organ. Which means that a person with a genetic predisposition to high blood pressure can damage their health at relatively low alcohol consumption levels if that person also has a sensitivity."

All of which means, according to Jonas Sjögreen, that it is impossible to recommend a safe limit for alcohol consumption, precisely because the effect of alcohol on the body and the organs is so multifaceted and so unpredictable.

"If you have alcohol molecules present in your blood, they can be having an effect. My job as a physician is to listen to the patient's symptoms, but neither the patient nor I know whether these symptoms are due to alcohol. What I can say, however, is that alcohol is a common cause of certain symptoms that can be triggered by small quantities, depending on just how sensitive the individual is."

"It was there that I came to understand that alcohol problems can appear anywhere. Most of the people who came to us for help were just ordinary people."

Let's talk about alcohol

In the 1990s, Jonas Sjögreen and fellow GP, Charlotte Hedberg, started the "Hazardous Use Project", which aims to come up with ways of talking to patients about alcohol. Opinions differ as to whether one should, as a doctor, ask about a patient's alcohol consumption, and the subject is widely discussed. On the one hand, many in the health care sector are keen to see questions about alcohol regarded as just another health question, no different from the routine questions doctors ask about diet, exercise and smoking. On the other hand, according to Jonas Sjögreen, alcohol consumption is still such a sensitive and shameful issue that in many doctors' experience, asking a patient about their alcohol consumption is potentially disruptive to the doctor-patient relationship, damaging the trust levels vital to discussions with patients. Patients also find it extremely difficult to calculate their alcohol consumption in standard glasses – the metric currently used and the one recommended by the Swedish National Board of Health and Welfare – precisely because the measurements vary depending on the size of the wine glass or the alcohol content of the drink. It is also common for alcohol consumption to vary from one week, month or year to another, which makes the overall calculation even more difficult.

"If both the doctor and the patient feel uncomfortable discussing alcohol, it's not uncommon for them to avoid even raising the subject, and as a result, the doctor misses the chance to provide relevant information about the harmful effects of alcohol. Another common scenario is for medical personnel to breathe a sigh of relief and tick the relevant box after dutifully asking routine questions about alcohol consumption and contenting themselves with a simple answer – and thereby missing the chance to provide the patient with factual information about how there might be a connection between alcohol and the patient's symptoms."

Sjögreen believes that it is not up to doctors to determine how a patient chooses to live their lives, but that if a doctor is prescribing blood pressure medication for the rest of that patient's life, they must also tell the patient that alcohol can be harmful, even in small doses.

So how can medical personnel approach the question of alcohol consumption without guilt-tripping the patient? Jonas Sjögreen comes back to the patient with high blood pressure. Neither the doctor nor the patient know whether alcohol consumption is an underlying cause, so this is a golden opportunity to ask the patient whether he or she would like to take part in an experiment, i.e. to try being alcohol-free for a while in order to see whether it has an effect on their blood pressure.

"Instead of saying, "You should…", you ask the patient whether they would consider halving their consumption or being completely alcohol-free for a period of a number of weeks. This approach makes it easier for both the doctor and the patient to reach an agreement."

There is also a strong link between alcohol and not only blood pressure, but a number of symptoms that can be influenced and worsened by alcohol consumption – anything from recurring headaches and insomnia to heart palpitations, anxiety and depression. And in these cases, Jonas Sjögreen believes that the patient must be made aware of the effects of alcohol.

Medical culture and norms do not differ from those found in society as a whole, and a great deal has happened in a relatively short space of time when it comes to attitudes to alcohol.

"I think that the last few years have shown signs that we may be seeing a breakthrough in this respect. More people are talking openly about their abuse and more people are choosing to abstain from alcohol, and this has helped enable us to talk more openly about alcohol consumption. I'm also seeing an increasing interest on the part of students and my colleagues in discussing the question of alcohol."

Symptoms where there may be a link to alcohol

Stomach: irritation of the stomach lining and a deterioration in gastric function.
Liver: varying degrees of damage, with cirrhosis as the most advanced stage.
Pancreas: pancreatitis.
Heart: high blood pressure, atrial fibrillation.
Skin: worsening or triggering of dermatological complaints, such as psoriasis or seborrheic dermatitis.
Brain: dementia-like symptoms, cerebral haemorrhage.
Infertility: alcohol can cause impotence in men and infertility in both men and women.
Psychological impact: depression, angst, anxiety and insomnia. Can worsen existing mental conditions.
Accidents: fall-related injuries, traffic accidents, and violence in close personal relationships.
Cancer: oesophagus, stomach, gastrointestinal tract, breast, and liver.

Alcohol policies have long-term effect on consumption

A Swedish study has shown that alcohol policies have long-term effect in a population. Groups that grew up during periods with restrictive alcohol policies had lower consumption than groups that grew up in periods with liberalized policies. The difference between groups remained even when alcohol policies change in adult age.

TEXT: PER LEIMAR

Alcohol taxes, monopolies, opening hours and age limits have all been shown to be effective in reducing consumption and harm from alcohol. But if the policy has an effect over time, in different age groups have not been studied before. A new Swedish study shows that those that grow up during a period with restrictive alcohol policy have a lower alcohol consumption throughout life even if alcohol policies change. We are all affected in the same way by alcohol policy in adult life, but retain the consumption difference.

Alcohol policy seems therefore to have both an immediate and a long-term effect. The study has looked at the differences between groups that grew up during the liberal "medium-beer-experiment" period of 1965–1977, in the restrictive period of the 1980s and the liberal period after 1995.

Alcohol policy in the Nordic countries, with the exception of Denmark, have been based on three central pillars: increased prices through taxation, limited availability and reduction of alcohol industry interests. In Sweden, the restrictions were sometimes loosened. Between 1965 and 1977, medium beer was sold in grocery stores, instead of at the state alcohol monopoly Systembolaget. This increased the number of stores that sold beer. The age limit was also lower. Another example is the period after Sweden joined the EU in 1995. Tax on beer was lowered and alcohol taxes in general were not increased in line with inflation as before. The state monopoly on wholesale and import was abolished and the tax-free allowances when travelling from another EU country was removed. In the period of 1978 to 1991,



alcohol policy was more restrictive. Medium beer had been taken back to Systembolaget in 1977 partly due to significant increase in youth consumption. Taxes were increased, alcohol advertising was banned and opening hours at Systembolaget were shortened.

A Swedish study shows that those who grew up during the period of the medium beer experiment and the period after EU accession in 1995, had a higher alcohol consumption in adulthood, compared to those that grew up during the restrictive period in the 1980s. All groups were affected in the same way by the later changes in the policy but the difference between the groups was retained. The effects were similar for women and men. •

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Is moderate alcohol consumption good for health?

Many studies on alcohol and heart disease shows that "moderate" drinkers have reduced risk of the disease. In the same way total mortality seems also to be reduced in "moderate" drinkers compared to those who do not drink alcohol. The question is: Is this true?

TEXT: PER LEIMAR

Many of us have sometime read that moderate alcohol consumption can be beneficial for health, but in recent years these studies are questioned by researchers. Many arguments point to that these results are due to methodological errors in the studies and that alcohol does not protect health.

One of the errors is that many studies include former drinkers in the comparison group of "abstainers", where this category would include both life-time abstainers and those who did drink in the past but stopped. Many people who stop drinking alcohol do it for health reasons. Comparing the groups it can look as the group of abstainers have more health problems than the "moderate" drinkers. But the worse health of such an abstainer group may even be caused by the alcohol consumed by the group who quit drinking.

An analysis of 87 studies on alcohol and total mortality found that when you remove studies with this "former drinker" and other errors, the positive effect of alcohol disappeared. •

"An analysis of 87 studies on alcohol and total mortality found that when you remove studies with this "former drinker" and other errors, the positive effect of alcohol disappeared."

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