SPECIAL REPORT

The IARC Perspective on Alcohol Reduction or Cessation and Cancer Risk

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Globally, ethanol — the principal form of alcohol in alcoholic beverages — is the most widely used psychoactive substance.[1] In 2019, 44% of the global population 15 years of age or older had consumed alcohol in the previous year. The prevalence of alcohol consumption varies considerably according to geographic region, ranging from 4% in the World Health Organization (WHO) Eastern Mediterranean Region to at least 60% in the European, American, and Western Pacific Regions, and is higher among men than among women.[2]

The International Agency for Research on Cancer (IARC) classified alcoholic beverages as carcinogenic to humans (Group 1) on the basis of sufficient evidence of causality for oral, pharyngeal, laryngeal, esophageal (squamous-cell), liver (hepatocellular), colorectal, and breast cancers[3-5] (hereafter referred to as alcohol-related cancers). Ethanol in alcoholic beverages and acetaldehyde that is associated with consumption of alcoholic beverages are also classified as carcinogenic to humans (Group 1).[4,5] Worldwide, in 2020, an estimated 741,300 new cancer cases (4.1% of all new cancer cases) were attributable to alcohol consumption (6.1% among men and 2.0% among women) (Table 1).[6] Recently, the WHO stated that "no safe amount of alcohol consumption for cancers and health can be established."[7]

In 2010, the 63rd World Health Assembly endorsed the Global Strategy to Reduce the Harmful Use of Alcohol (resolution WHA63.13).[8] Consistent with the objectives outlined in the Global Strategy is increasing knowledge about the potential benefits of alcohol reduction or cessation for decreasing alcohol-related cancer risks. From February through May 2023, the *IARC Handbooks of Cancer Prevention* Program convened a Working Group of 15 scientists (all of whom are coauthors of this article) from eight countries to review published studies and qualitatively evaluate the strength of epidemiologic evidence on the potential for alcohol reduction or cessation to reduce alcohol-related cancer risk and of mechanistic evidence on the potential effects of alcohol reduction or cessation to reduce alcohol-related carcinogenesis (no studies in experimental animals with a cancer outcome were available). Presented here is a summary and evaluation of the evidence. Details on the scope and objectives of the Program and the guiding principles and procedures of the review and evaluation are described in the *IARC Handbooks* Preamble for Primary Prevention.[9]

EPIDEMIOLOGIC STUDIES

STUDY SELECTION AND DATA ANALYSIS

Randomized, controlled trials, individual case–control and cohort studies, meta-analyses, and pooled analyses with alcohol-related cancer incidence or mortality outcomes were eligible for inclusion. No randomized, controlled trials of alcohol reduction or cessation were identified. The Working Group reviewed all informative studies with data to assess alcohol reduction or alcohol cessation as compared with continuing (i.e., current) consumption in relation to alcohol-related cancer risks (Table 2). Individual studies that were included in meta-analyses or pooled analyses, pooled analyses or meta-analyses with overlapping studies, studies with fewer than five

Global Population Attributable Fractions and Number of New Cancer Cases Attributable to Alcohol Consumption in 2020, According to Cancer Site and Sex.*

Cancer Site	All		Men		Women	
	Population Attributable Fraction	No. of New Cases†	Population Attributable Fraction	No. of New Cases†	Population Attributable Fraction	No. of New Cases†
	%		%		%	
All sites excluding nonmelanoma skin cancer (ICD-10 codes C00–C97 excluding C44)	4.1	741,300	6.1	568,700	2.0	172,600
Lip and oral cavity	20.2	74,900	25.9	66,700	7.3	8,200
Pharynx	22.0	39,400	25.3	37,000	7.4	2,500
Larynx	15.0	27,600	16.6	26,400	4.7	1,200
Esophagus‡	31.6	189,700	39.2	163,100	14.3	26,600
Colon	8.1	91,500	13.0	76,900	2.7	14,600
Rectum	9.0	65,100	13.0	57,300	2.7	7,800
Liver§	17.3	154,700	22.7	141,300	5.0	13,400
Female breast	4.4	98,300	—	—	4.4	98,300

* Data are from Rumgay et al.[6] ICD-10 denotes *International Classification of Diseases, 10th Revision*.
† The number of new cases has been rounded to the nearest 100,000. The number of cases for each cancer site may not sum to the total according to sex or for all sites because of rounding.
‡ The alcohol-attributable number of cases of esophageal cancer is for squamous-cell carcinoma; the population attributable fractions are for all esophageal cancers.
§ The alcohol-attributable number of cases of liver cancer is for hepatocellular carcinoma; the population attributable fractions are for all liver cancers.

cancer cases in persons who formerly drank alcoholic beverages, studies of precursor lesions, or studies without information about continuing consumption were not eligible for inclusion.

Most studies compared alcohol-related cancer risks for cessation with lifetime abstention. However, to assess whether alcohol cessation can reduce alcohol-related cancer risk requires comparing risks for cessation with continuing consumption. Therefore, when necessary, relative risks, odds ratios, and confidence intervals were recalculated to compare risks for alcohol cessation with continuing consumption (referred to below as "recalculated").[10]

Tobacco smoking is an established cause of most alcohol-related cancers (i.e., oral cavity, pharynx, larynx, esophagus, liver, and colorectum), and modest associations have been observed for female breast cancer.[5] Smoking cessation reverses the smoking-related risk of upper aerodigestive tract cancers (i.e., oral cavity, pharynx, larynx, and esophagus).[11] Therefore, potential confounding by smoking status and duration of smoking cessation were carefully considered and were a particular concern in the influential International Head and Neck Cancer Epidemiology Consortium pooled analysis of data from 13 case–control studies.[12] To address this concern, the Working Group conducted two sets of recalculations. First, the odds ratios for alcohol and smoking status and duration of alcohol and smoking cessation relative to the single reference category of current alcohol consumption and current smoking in the study publication[12] were recalculated[10] so that "current" (i.e., continuing) alcohol consumption was the reference category in each smoking stratum. Next, a random-effects meta-analysis was used to calculate odds ratios for duration of alcohol cessation adjusted for smoking status and duration of smoking cessation.

Reverse causation may occur if symptoms of undiagnosed cancer led to alcohol cessation, which could result in the appearance of higher cancer risk associated with cessation than with continuing consumption. A strategy for mitigating reverse causation is to assess associations for categories of duration of alcohol cessation. Therefore, the studies in which these associations were available were influential in the evaluation,

Table 1. Type and Number of Epidemiologic Studies Reviewed and Strength of the Evidence That Alcohol Reduction or Cessation Reduces Alcohol-Related Cancer Risk, According to Cancer Site.

Cancer Site	Type and No. of Studies	Strength of the Evidence*
Oral cavity	2 Cohort studies 5 Case–control studies (all hospital-based) 1 Pooled analysis of 4 population-based and 8 hospital-based case–control studies	Sufficient
Esophagus	4 Cohort studies 11 Case–control studies (3 population-based and 8 hospital-based) 1 Pooled analysis of 2 cohort studies 1 Meta-analysis of 4 hospital-based case–control studies	Sufficient
Larynx	3 Cohort studies 3 Case–control studies (all hospital-based) 1 Pooled analysis of 2 population-based and 7 hospital-based case–control studies	Limited
Colorectum	10 Cohort studies 6 Case–control studies (3 population-based and 3 hospital-based) 1 Pooled analysis of 3 cohort studies	Limited
Breast	11 Cohort studies 10 Case–control studies (4 population-based, 4 hospital-based, and 2 both)	Limited
Pharynx	2 Cohort studies 6 Case–control studies (4 hospital-based, 1 population-based, and 1 friend- or family-based) 1 Pooled analysis of 4 population-based and 9 hospital-based case–control studies	Inadequate
Liver	9 Cohort studies (1 involving only participants with alcohol-related liver disease) 3 Case–control studies (all hospital-based)	Inadequate

* According to the criteria described in the preamble of the *IARC Handbooks* for primary prevention,[9] "sufficient evidence" indicates that a causal preventive association between the intervention and cancer in humans has been established; "limited evidence" indicates that a causal preventive association between the intervention and cancer in humans is plausible; and "inadequate evidence" indicates that the current body of evidence does not enable a conclusion to be drawn about the presence or absence of a preventive association between the intervention and cancer in humans.

and more weight was given to associations for long-term cessation.

EVIDENCE AND EVALUATION FOR SPECIFIC CANCER SITES

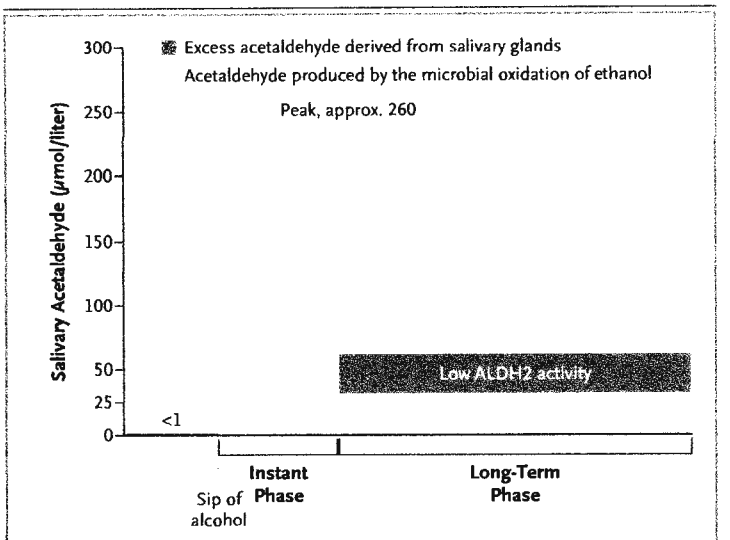
In 2021, the Working Group for *IARC Handbooks* Volume 19 on oral cancer prevention found sufficient evidence that "quitting alcohol consumption decreases the risk of oral cancer."[13] For the review described here, the international pooled analysis,[12] which for oral cancer included 12 studies, was the only study with data on duration of alcohol cessation. In an analysis that included adjustment for pack-years of smoking and drinks per day, longer duration of cessation was inversely associated with risk; odds ratios were 0.81 (95% confidence interval [CI], 0.61 to 1.07) for up to 4 years of cessation, 0.77 (95% CI, 0.52 to 1.15) for 5 to 9 years of cessation, 0.66 (95% CI, 0.47 to 0.92) for 10 to 19 years of cessation, and 0.45 (95% CI, 0.26 to 0.78) for at least 20 years of cessation (long-term). The odds ratios for long-term alcohol cessation were substantially lower in the strata of 1 to 2 drinks per day (odds ratio, 0.59; 95% CI, 0.22 to 1.57) and 3 or more drinks per day (odds ratio, 0.43; 95% CI, 0.28 to 0.67) than in the stratum of less than 1 drink per day (odds ratio, 0.98; 95% CI, 0.54 to 1.77). Consistent with tobacco use modifying the effect of alcohol consumption, the odds ratio for long-term alcohol cessation as compared with continuing consumption was lowest in the current smoking stratum (odds ratio, 0.40; 95% CI, 0.18 to 0.88). After adjustment for more detailed smoking history, the recalculated odds ratios were 0.75 (95% CI, 0.57 to 0.98) for 5 to 19 years of alcohol cessation and 0.75 (95% CI, 0.43 to 1.33) for long-term cessation. In most studies reviewed, alcohol cessation was also associated with lower oral cancer risk than continuing consumption. No studies of alcohol reduction were identified. Given the consistent evidence of a reduced risk of oral cancer associated with long-term alcohol cessation from the influential pooled analysis, and in agreement with the previous evaluation, the Working Group

concluded that there was sufficient evidence that alcohol reduction or cessation reduces oral cancer risk.

The evaluation of esophageal cancer risk also relied primarily on the epidemiologic evidence for duration of alcohol cessation. In the smoking-adjusted meta-analysis of four case–control studies,[14] two of which also adjusted for amount of alcohol consumed, a higher risk for up to 5 years of cessation was noted as compared with continuing consumption. However, lower risks were observed after 5 to 10 years of cessation (odds ratio, 0.85; 95% CI, 0.79 to 0.92), 10 to 15 years of cessation (odds ratio, 0.85; 95% CI, 0.79 to 0.92), and at least 15 years of cessation (odds ratio, 0.35; 95% CI, 0.31 to 0.39). A similar pattern was observed in a multicenter case–control study,[15] which also adjusted for cumulative alcohol and cumulative tobacco consumption, with odds ratios decreasing to 0.46 (95% CI, 0.19 to 1.16) for at least 20 years of cessation. In most other studies that included categories of at least 10 years of alcohol cessation, risk was lower in the longest-term cessation category. In addition, the associations for alcohol cessation were below 1 in most studies. In a large cohort study based on the South Korea National Health Insurance Service database,[16] alcohol reduction was not associated with reduced risk as compared with stable consumption. In that study, the median follow-up time was only 6.4 years, which may not be adequate for observing reduced cancer risks. Overall, the many studies that show an inverse association between duration of cessation and esophageal cancer risk, even after adjustment for tobacco and alcohol consumption, enabled chance and confounding to be ruled out with reasonable confidence. Therefore, the Working Group concluded that there was sufficient evidence that alcohol reduction or cessation reduces esophageal cancer risk.

For laryngeal cancer, in the international pooled analysis,[12] long-term alcohol cessation (≥20 years) was associated with a 31% lower relative risk as compared with continuing consumption (odds ratio, 0.69; 95% CI, 0.52 to 0.91), but no pattern of association was apparent for shorter durations of cessation. As with oral cancer, the odds ratio for long-term alcohol cessation was lowest in the highest stratum (≥3 drinks per day) of consumption (odds ratio, 0.28; 95% CI, 0.09 to 0.86), and no association was observed in the stratum of 1 drink per day (odds ratio, 0.99; 95% CI, 0.56 to 1.74). After adjustment for detailed smoking history, the recalculated odds ratio for long-term alcohol cessation was 0.80 (95% CI, 0.56 to 1.13). In all the studies of alcohol cessation, evidence suggested a lower risk (associations ranged from 0.31 to 0.95), but in nearly all the studies, the confidence intervals included 1. Alcohol reduction over a 2-year period was not associated with reduced risk across most categories of consumption in the previously described cohort study.[16] Because of the weaker association for long-term cessation as compared with that of oral cancer in the pooled analysis,[12] and because confounding by smoking cessation and chance could not be ruled out with reasonable confidence, the Working Group concluded that there was limited evidence that alcohol reduction or cessation reduces laryngeal cancer risk.

Alcohol reduction in relation to colorectal cancer risk was assessed in four cohort studies. In a large cohort study from 10 European countries, alcohol reduction was inversely associated with risk (hazard ratio per 12 g of ethanol per day, 0.86; 95% CI, 0.78 to 0.95).[17] In the Norwegian Women and Cancer Study (NOWAC), results also suggested a lower risk of colorectal cancer associated with alcohol reduction.[18] In the other two studies, alcohol reduction was not associated with a lower risk.[16,19] Only two studies assessed duration of alcohol cessation and colorectal cancer risk. In a hospital-based case–control study,[20] duration of cessation was inversely associated with risk (odds ratio, 1.37 [95% CI, 0.91 to 2.06] for <5.5 years; 0.66 [95% CI, 0.42 to 1.06] for 5.5 to 15 years; and 0.52 [95% CI, 0.31 to 0.86] for >15 years); results were similar for colon and rectal cancer. In a cohort study of cancer mortality,[21] in which only 13 deaths from colon cancer and 10 deaths from rectal cancer were noted among men who reported alcohol cessation, no clear patterns of reduced risk were seen. Results from studies of alcohol cessation were inconsistent. Overall, although a reduced risk of colorectal cancer associated with alcohol reduction was reported in a large prospective study,[17] and an inverse association for duration of cessation was observed in a case–control study,[20] given the inconsistencies among studies and the few studies on duration of cessation, the Working Group concluded that there was limited evidence that



Schematic Representation of Salivary Acetaldehyde Concentrations after a Dose of Alcohol.

This figure is adapted from Salaspuro.[29] In the absence of alcohol intake or tobacco smoking, salivary acetaldehyde concentrations are below 1 μmol per liter. In the instant phase after a sip of 40% alcohol (5 ml kept in the mouth for 5 seconds), ethanol distributes rapidly to the aqueous phase of the oral cavity and remains there at high concentrations for up to 20 minutes. Simultaneously, there is microbial production of acetaldehyde at high concentrations from ethanol for up to 15 to 20 minutes, with a peak at approximately 260 μmol per liter. The *ALDH2* genotype has no effect on this phase.[30] In the long-term phase, alcohol is distributed evenly to the water phase of the body, including saliva, within 30 minutes after its ingestion. In persons with active ALDH2 enzyme, this results in acetaldehyde concentrations of, on average, approximately 25 μmol per liter, whereas in persons carrying the *ALDH2* variant with low activity, acetaldehyde concentrations are twice as high (mean, approximately 53 μmol per liter). The long-term phase lasts as long as ethanol is present in the body and depends on the total amount of alcohol ingested.

alcohol reduction or cessation reduces colorectal cancer risk.

The Working Group used meta-analytic techniques to assess the association between alcohol cessation as compared with continuing consumption and breast cancer risk; the summary relative risks were 0.89 (95% CI, 0.75 to 1.05) for 10 case–control studies, 0.96 (95% CI, 0.89 to 1.04) for 6 cohort studies of cancer incidence (1 cohort study of cancer mortality was not included), and 0.95 (95% CI, 0.88 to 1.01) for all the studies combined. Any benefit of alcohol cessation may be limited to hormone receptor–positive breast cancer, which is more strongly associated with alcohol consumption than hormone receptor–negative breast cancer.[22] In a cohort of postmenopausal women, the recalculated hazard ratios for cessation were 0.90 (95% CI, 0.77 to 1.04) for estrogen or progesterone receptor–positive breast cancer and 1.18 (95% CI, 0.88 to 1.58) for estrogen or progesterone receptor–negative breast cancer.[23] In addition, in a population-based case–control study, the recalculated odds ratios were 0.85 (95% CI, 0.58 to 1.23) for estrogen receptor–positive breast cancer and 1.00 (95% CI, 0.44 to 2.28) for estrogen receptor–negative breast cancer.[24] For alcohol reduction, in NOWAC, which had the longest follow-up time (median, 14.2 years), alcohol reduction was associated with lower breast cancer risk.[18] However, no consistent patterns of association for alcohol reduction were observed in three other cohort studies,[16,25,26] in which follow-up time ranged from 6.4 to 10.8 years. Taken together, an inverse association between alcohol cessation and breast cancer risk is plausible, but this association may be limited to hormone receptor–positive tumors. Given the consistent, but modest and imprecise, inverse associations between cessation and breast cancer risk observed and the few studies with analyses stratified according to hormone-receptor status, the Working Group concluded that there was limited evidence that alcohol reduction or cessation reduces breast cancer risk.

For pharyngeal cancer, there were no studies on alcohol reduction and two studies of duration of cessation. In the international pooled analysis,[12] the odds ratio for long-term cessation (as compared with continuing alcohol consumption) and oropharyngeal or hypopharyngeal cancer risk was 0.74 (95% CI, 0.50 to 1.09), but after adjustment for detailed smoking history, the recalculated odds ratio was 0.95 (95% CI, 0.56 to 1.61). In the only other study of duration of cessation, the recalculated odds ratios for both categories of duration of cessation were greater than 1.[27] Associations for alcohol cessation were inconsistent. Overall, the Working Group concluded that there was inadequate evidence that alcohol reduction or cessation reduces pharyngeal cancer risk.

For liver cancer, an inverse association for alcohol cessation with risk was observed in a cohort study involving only persons with alcohol-related liver disease.[28] In contrast, relative risks for cessation or duration of cessation (or both) were near or greater than 1 in all other studies involving participants without alcohol-related liver disease. Because bias due to reverse causation and competing risk could not be ruled

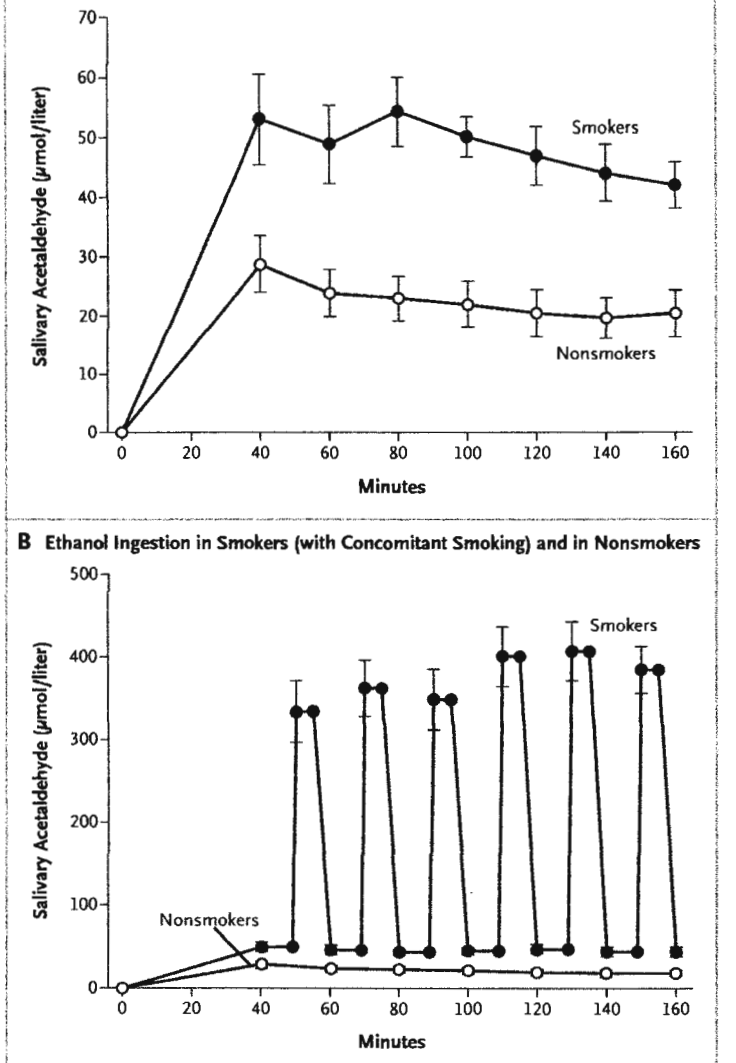
out, the Working Group concluded that there was inadequate evidence that alcohol reduction or cessation reduces liver cancer risk.

MECHANISTIC STUDIES

On ingestion, ethanol is oxidized to acetaldehyde by alcohol dehydrogenase (ADH) and then to acetate by aldehyde dehydrogenase (ALDH).[5] Exposure to high levels of acetaldehyde, a potent genotoxic metabolite, is a major determinant of alcohol-related carcinogenesis, particularly in the upper aerodigestive tract.[5] The local oxidation of ethanol to acetaldehyde is mostly catalyzed by microbial ADH enzymes. In contrast, the capacity of the oral or gut microbiome and mucosa to eliminate acetaldehyde is limited because of low ALDH activities, which results in accumulation of acetaldehyde at genotoxic concentrations in saliva (Fig. 1), gastric juice, and colonic contents.[31] This exposure to acetaldehyde is markedly enhanced by two other major risk factors for alcohol-related cancers: genetic polymorphism of human ADH and ALDH2 enzymes and tobacco smoking. In persons with low ALDH2 activity (*ALDH2*2* heterozygotes), ethanol metabolism results in double the concentration of salivary acetaldehyde for as long as ethanol stays in the body (Fig. 1).[32] Continuous smoking combined with continuous heavy alcohol consumption induces changes in oral microbial flora, especially in microbial strains that are high acetaldehyde producers,[33] which may contribute to the observed synergistic effect of alcohol consumption and tobacco smoking on oral cancer risk.[5] In addition, after an ethanol challenge, among persons who smoke, salivary acetaldehyde levels during concomitant smoking were 7 times as high as those in nonsmoking participants (Fig. 2).[34]

Genotoxicity is the best-described mechanism by which alcohol consumption causes cancer. Acetaldehyde — even at low concentrations — reacts with DNA, resulting in DNA damage, including chromosomal aberrations and DNA adducts, which may in turn lead to mutations.[35] DNA damage may also result from other genotoxic pathways producing various reactive oxygen species (ROS) through induction of the ethanol-inducible CYP2E1 enzyme. These ROS can lead to lipid peroxidation, oxidative stress, and perturbations in DNA repair.[4,5]

Other mechanisms of alcohol-related carcino-



Synergistic Effect of Alcohol Consumption and Tobacco Smoking on Salivary Acetaldehyde Concentration.

This figure is adapted from Salaspuro and Salaspuro.[34] Acetaldehyde is present in tobacco smoke; without concomitant ethanol intake, salivary acetaldehyde concentration immediately increases to approximately 260 μmol per liter on tobacco smoking but declines rapidly within 10 minutes. Panel A shows that after an ethanol challenge (0.8 g of ethanol per kilogram of body weight) but without concomitant smoking, mean salivary acetaldehyde concentrations in persons who smoke (smokers) were 2 times as high as those in persons who do not smoke (nonsmokers). Panel B shows the effect of alcohol consumption and concomitant smoking. After an ethanol challenge, among smokers, salivary acetaldehyde levels (area under the curve) during concomitant smoking (i.e., 1 cigarette every 20 minutes) were 7 times as high as those in nonsmokers. Each peak corresponds to one cigarette smoked. Differences in acetaldehyde concentrations were significant ($P<0.05$) at all time points in Panel B. In both panels, the peak that would correspond to the instant phase of alcohol consumption alone does not appear because in these experiments, acetaldehyde was first measured 40 minutes after ethanol intake.

Strength of the Evidence That Alcohol Reduction or Cessation Reverses Alcohol-Related Carcinogenic Mechanisms.

Mechanism	Strength of the Evidence*
Local exposure in saliva to genotoxic concentrations of acetaldehyde after ethanol ingestion (eight studies)	Strong
DNA damage (i.e., chromosomal aberrations, micronuclei, and DNA adducts) (nine studies)	Strong
Intestinal permeability (six studies) and microbial translocation (three studies)	Strong

* According to the criteria described in the preamble of the *IARC Handbooks* for primary prevention,[9] "strong evidence" indicates that there are a substantial number of high-quality studies involving humans that consistently link the intervention to a mechanistic pathway by which it could prevent cancer.

genesis have been proposed, some of which may apply to the breast or liver, where local acetaldehyde concentrations are unlikely to be high.[36] Alcohol consumption alters the composition of the gut microbiota and leads to epithelial-barrier dysfunction and increased intestinal permeability, resulting in increased translocation of microbes and microbial products across the mucosa. Microbial translocation and endotoxemia trigger systemic inflammation, with the potential to increase cancer risk through oxidative stress, changes in cytokine levels, and impaired immune responses. Alcohol consumption also decreases folate absorption and inhibits enzymes critical for one-carbon metabolism and DNA methylation. Among postmenopausal women, alcohol consumption increases circulating concentrations of estradiol, testosterone, and other sex hormones while reducing sex hormone–binding globulin concentrations.[37]

The Working Group reviewed and assessed all available studies that examined the effects of alcohol cessation on the mechanisms potentially involved in alcohol-related carcinogenesis (no data were available on alcohol reduction). Most studies involved persons with alcohol use disorder who were attending rehabilitation programs. These studies examined different biomarkers of genotoxicity, oxidative stress, epigenetic factors, changes related to the endocrine system, changes in the microenvironment, inflammatory and immune responses, and changes in the oral and gut microbiome, measured after various periods of abstinence. No data were available on the effects of alcohol cessation on sex hormones among women.

Overall, on the basis of strong evidence for three mechanisms (Table 3), the Working Group concluded that there was sufficient evidence from mechanistic studies that alcohol cessation reduces alcohol-related carcinogenesis. Studies on ethanol metabolism provide strong evidence that alcohol cessation leads to a rapid decrease in salivary acetaldehyde concentrations (Fig. 1), resulting in the immediate elimination of alcohol-related local exposure of the upper aerodigestive tract and colon to acetaldehyde; this is particularly relevant for persons with low ALDH2 enzyme activity. There was strong evidence that in the context of continuous heavy alcohol consumption, alcohol cessation results in a decrease in DNA chromosomal aberrations and micronuclei in peripheral-blood mononuclear cells within a few months to several years,[38] and in a rapid reduction or elimination of acetaldehyde–DNA adduct formation in cells of the oral cavity.[35] Finally, there was strong evidence that among persons with alcohol use disorder, alcohol cessation reverses increased intestinal permeability and microbial translocation.[39,40]

CONCLUSION

We provide here a comprehensive review and evaluation of the available evidence on alcohol reduction or cessation and cancer risk. On the basis of the epidemiologic evidence (in particular, large studies of long-term alcohol cessation), the Working Group concluded that alcohol reduction or cessation decreases the risk of oral cancer and esophageal cancer. The review also revealed scientific gaps on some or all alcohol-related cancers, including the duration of cessation necessary to observe a reduced risk, reduction in consumption, patterns of consumption over the life course, risk of molecular or anatomical subtypes of cancer, and biologic mechanisms that mediate variations in the associations of duration of cessation. Addressing these gaps would strengthen the epidemiologic and mechanistic evidence on the potential benefits of alcohol reduction or cessation in cancer causation and thus indirectly further support alcohol-control measures to reduce consumption.

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