

The Carcinogenicity of Alcohol consumption

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What is carcinogenicity?

The ability to cause cancer

Carcinogens - cancer causing agents,
may be:

Physical - e.g. ionizing radiation, -X
rays

Chemical - e.g. asbestos, tobacco
smoke

Genetic - i.e. inherited predisposition
e.g. BRCA 1 and 2

What is cancer?

The uncontrolled growth of cells, which may spread locally or to other parts of the body (metastasize)

Carcinomas - cancers of epithelial and glandular organs

Sarcomas - cancers of fibrous tissue and bone

Some carcinomas are caused by alcohol

Why are we concerned about cancer?

Cancer is the largest single cause of premature death

Cancer is not an optimal route to death

In 2007, 72,700 people will die from cancer, 34,300 women and 38,300 men

Causes

An agent may cause cancer:

- On its own - it is a necessary and sufficient cause of cancer
- With other factors or causes, e.g. tobacco and alcohol
- On the basis of susceptibility - genetic or acquired.

Most cancers have multiple causes

Determining the carcinogenicity of alcohol in experimental animals (IARC WG, 2007)

Administration of ethanol (alcohol) in drinking water caused:

- ❖ Liver cancer in male mice
- ❖ Head and neck cancers in rats
- ❖ Forestomach cancers in rats
- ❖ Mammary (breast) cancers in rats

Determining carcinogenicity of alcohol consumption in humans

We cannot perform experiments, we have to observe

- ❖ We compare alcohol consumption in people with cancers and people free of cancers
- ❖ We determine how much healthy people drink (if at all) and follow them for years to compare the occurrence of cancers in drinkers and non-drinkers

International Agency for Research on Cancer (IARC) evaluation of Alcohol consumption (2007)

26 scientists formed working group

Effects of alcohol consumption on risk of
29 cancers evaluated

Risks classified in terms of effects on
humans

IARC evaluation of Alcohol consumption (2007)

There is *Sufficient evidence* that Alcohol consumption increases the risk of:

- Breast cancer
- Colorectal cancer
- Cancer of the esophagus
- Liver cancer
- Larynx cancer
- Mouth and pharynx cancer

The degree of risk of alcohol consumption for Breast cancer

- Women who drink on average 3 or more alcoholic drinks a day increase their risk of breast cancer by about 50%

Women who drink 1–2 alcoholic drinks a day increase their risk of breast cancer by about 10%

Example: Pooling project on breast cancer

- 322,647 women followed for up to 11 years in 6 studies in Canada, the Netherlands, Sweden and the United States.
- All completed a food frequency questionnaire, including information on alcohol consumption
- 4335 women developed breast cancer

Pooling project: risk of breast cancer per amount of alcohol consumed

Grams alcohol/day	Relative risk
None	1.0
>0-<1.5	1.07 (1.0-1.2)
1.5-<5.0	0.99 (0.9-1.1)
5.0-<15.0	1.06 (1.0-1.2)
15.0-<30.0	1.16 (1.0-1.4)
30.0-<60.0	1.41 (1.2-1.7)
≥ 60.0	1.31 (0.9-2.0)

The degree of risk of alcohol consumption for Colon and Rectum cancer

- Women and men who drink on average 3 or more alcoholic drinks a day increase their risk of colon and rectum cancer by about 40%

Example: European Prospective Investigation of Cancer (Ferrari et al, 2007)

478,732 participants (70% women) from 10 countries, completed detailed dietary questionnaire (including data on alcoholic beverage consumption) and were followed for >6 years

Effect of lifetime alcohol consumption on colorectal cancer risk

Grams alcohol/day	Relative risk
None	1.0
>0-4.9	1.0 (0.7-1.3)
5.0-<15.0	1.05 (0.9-1.2)
15.0-<30.0	1.07 (0.9-1.3)
30.0-<60.0	1.23 (1.0-1.6)
≥ 60.0	1.98 (1.5-2.7)

Effect of lifetime alcohol consumption on colorectal cancer risk

This translates into an average 9% increase in risk for every drink consumed/day

The risk is higher for cancer of the rectum and distal colon (left sided) than for proximal (right sided) colon cancer

The effect of smoking upon risk from alcohol consumption

The effect of alcohol consumption on the risk of mouth, pharynx, larynx and esophagus cancers is to multiply the effect of smoking.

Heavy smoking increases the risk of these cancers by 8 to 10 fold. Heavy alcohol consumption combined with heavy smoking increase the risk of these cancers to 16 to 20-fold

Example: Risk from lifetime cigarette smoking and alcohol consumption on larynx cancer

Ounces of alcohol (thousands)	Cigarettes (thousands)			
	0	<150	150-299	≥ 300
0	1	2	4	8
<10	2	4	6	11
10-25	4	6	10	16
≥ 25	8	11	16	24

How alcohol consumption increases the risk of liver cancer

Heavy alcohol consumption increases the risk of liver fibrosis by damaging liver cells (cirrhosis).

People with alcohol-induced cirrhosis have an increased risk of dying from liver cancer, or liver failure.

Alcohol consumption does not increase the risk of:

- Lung cancer
- Endometrial, ovary and cervix cancer
- Bladder cancer
- Non-Hodgkins lymphoma
- Kidney cancer

Are there differences
according to type of Alcohol
consumed?

NO!

Wine, beer and liquor consumption
seem to have similar effects.

It is the amount of alcohol consumed
that is important

How much cancer does Alcohol consumption cause?

- ~ 6% breast cancer
- ~ 6% colorectal cancer (10% in men and 4% in women)
- ~ 20% head and neck cancer
- ~ 30% of liver cancer
- Approximately 3% of all cancers

How much cancer does Alcohol consumption cause?

- 1,338 women with breast cancer
- 1,140 men and 376 women with colorectal cancer
- 1,360 men and women (largely men) with head and neck cancer
- 405 men and women (largely men) with liver cancer

Conclusions

Alcoholic beverage consumption causes cancer in humans

The risk is largely restricted to heavy drinkers; moderate alcohol consumption increases the risk of cancer much less

However, women, because of the increased risk of breast cancer, are at almost as great a risk as men

Combining heavy smoking with heavy drinking considerably increases the risk of mouth, pharynx, larynx and esophagus cancers