



Functional duality of ethanol on cancer

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ABSTRACT

A previous study showed that all kinds of wines or ethanol extended lifespan. Skrott et al. described the death-preventing effect of the alcohol-abuse drug disulfiram. However, this effect, perhaps mediated at least in part by overconsumption of ethanol, cannot be excluded. Carcinogenesis can be resulted from the local buildup of HCl. Similar in molecular structure to oxalate, wines or ethanol of all kinds and acetic acid extend lifespan, despite that ethanol is moderately carcinogenic. Cancer cells are likely to overproduce organic acids such as oxalate to counteract strong acids, and the insoluble calcium oxalate is stressful to cells. It is postulated that ethanol inhibits the generation of oxalate, and thus reduces cancer mortality. To confirm this hypothesis, an extensive epidemiological studies can be performed on cancer patients to show that heavy wine drinkers have lower mortality rates than control groups without the use of alcohol-abuse drugs. This experiment will illuminate the positive and negative sides of ethanol intake, and pave the way for establishing better strategies to treat cancer.

Background

A previous study demonstrated that all kinds of wines or ethanol extended lifespan [1], suggesting ethanol may have played important roles in cell survival. Skrott et al. discovered the death-preventing effects of the alcohol-abuse drug disulfiram [2]. Cancer onset can be resulted from the local buildup of strong acids such as HCl which is mutagenic [3,4], as calcium supplement neutralizes acids and reduces cancer risks. Similar in molecular backbone structure to oxalate, wines of all kinds and acetic acid are beneficial to a number of human diseases and extend lifespan [1,5–7], despite that ethanol possesses hydrogen bonds and attracts protons, and is consequently moderately carcinogenic to sensitive individuals after overconsumption (Fig. 1) [7]. Glycolic acid is widely used in skincare products to reduce age-related wrinkles. Alcohol intake was found to reduce the all-cause mortality risks among colorectal cancer patients registered within 90 days after diagnosis, and the effects were most pronounced in the highest category (30 g and more alcohol daily) compared with non-drinkers in colorectal cancer and rectal cancer sufferers [8].

Hypothesis

The death-preventing effects of the alcohol-abuse drug disulfiram can be attributed at least in part to the competitive inhibition of oxalate generation by ethanol. Cancer cells overproduce organic acids such as oxalate to counteract strong acids. Oxalate is stressful to cells.

Consequences of the hypothesis and discussion

A more extensive epidemiological study can be conducted that heavy ethanol or wine drinkers are compared with non-drinkers or modest drinkers on cancer mortality without the use of the alcohol-abuse drugs. This will ascertain the effects of ethanol, since the report by Skrott et al. cannot rule out the contribution of ethanol on the risk reduction of deaths from cancer. Similar epidemiological experiments can be performed on acetic acid intake, as oxalate, acetic acid, ethanol and glycolic acid share structural similarities and compete with each other in vivo. Oxalate levels in cancer cells and normal cells are monitored, and survival rates in the presence of calcium oxalate are investigated.

A previous study demonstrated that significantly higher oxalate levels were present on breast cancer samples versus normal breast tissues

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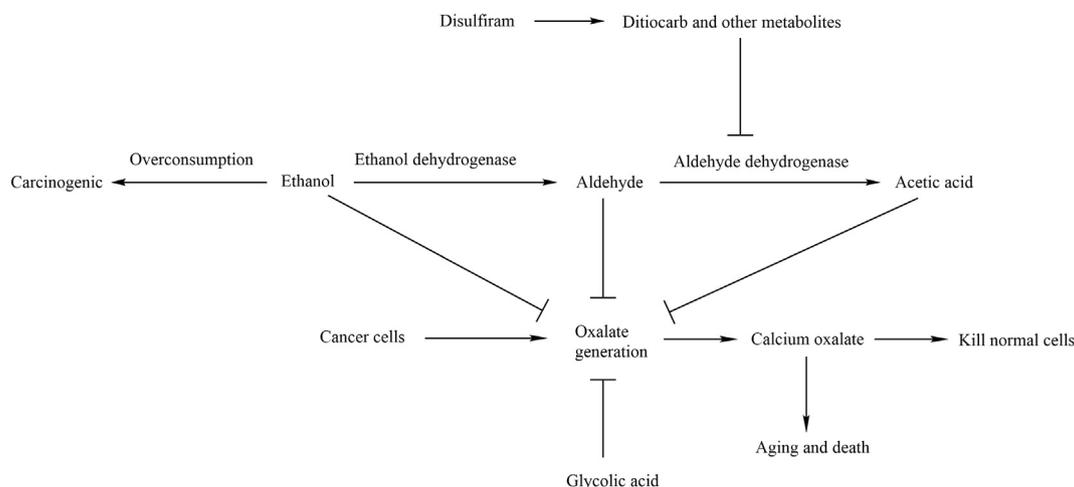


Fig. 1. Functional duality of ethanol.

[9], a telltale sign of the pathological roles of oxalate. Calcium oxalate is a primary component of kidney stones which in some occasions lead to kidney failure. Overconsumption of ethanol has negative impact on physical health [10]. Yet, it showed a positive side that ethanol extends human lifespans after moderate daily intake [1]. It is advised against the modest or over-consumption of ethanol for cancer-prone individuals or people with family history of cancer. Chinese vinegar factories reported near absence of cancer cases over long periods, suggesting that the volatile acetic acid may be an excellent surrogate of ethanol to inhibit oxalate generation and to reduce mortality [6,11–13].

Conflict of interest

None declared.

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