

The Effect of ALDH2 Gene Polymorphism and Alcohol Intake on the Risk of Cancers: a Systematic Review and Meta-analysis

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Background

Aldehyde dehydrogenase 2 (ALDH2) polymorphism is common in East Asians. The loss of function in ALDH2 mutation predisposes carriers of the polymorphism to oxidative damage of alcohol and potentially increased risk of developing cancer.

Objectives

To evaluate the association between ALDH2 polymorphism and cancer risk.

Materials and Methods

We reviewed 7,764 papers and 2 monographs from Ovid (EMBASE, MEDLINE), Web of Science, PsycINFO, EBSCO (CINAHL), Cochrane Library, IARC, CNKI and Wanfang Med. After NOS quality assessment, we included 53 studies for our systematic review and 34 studies in the meta-analysis.

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Results

In our meta-analysis, we found that drinkers with a ALDH2 genotype of GA or AA are associated with higher risk of developing head and neck, liver, oesophageal, oral and pharyngeal, and stomach cancer (Table 1, Figure 1): RR = 1.44 (95% CI: 1.24, 1.66), 1.39 (95% CI: 1.16, 1.67), 3.00 (95% CI: 1.82, 4.95), 2.85 (95% CI: 1.42, 5.72) and 1.22 (95% CI: 1.09, 1.36) respectively, compared to non-drinkers with normal GG genotype.

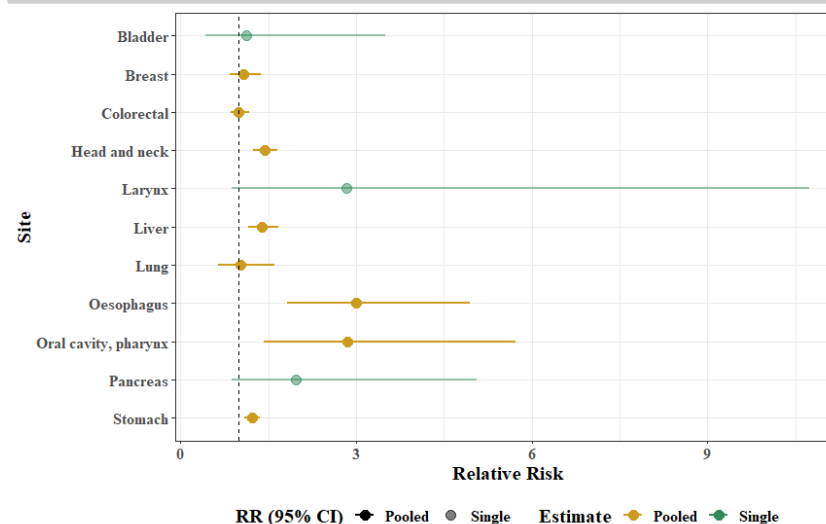


Figure 1: Relative risks for various cancers of ALDH2 deficient drinkers compared to normal non-drinkers

Outcome	Pooled
Bladder	1.12 (0.43-3.5)
Breast	1.08 (0.85-1.38)
Colorectal	1 (0.86-1.17)
Head and neck	1.44 (1.24-1.66)
Larynx	2.83 (0.88-10.74)
Liver	1.39 (1.16-1.67)
Lung	1.03 (0.65-1.61)
Oesophagus	3 (1.82-4.95)
Oral cavity, pharynx	2.85 (1.42-5.72)
Pancreas	1.98 (0.87-5.06)
Stomach	1.22 (1.09-1.36)

Table 1: Relative risks for various cancers of ALDH2 deficient drinkers compared to normal non-drinkers

Conclusion

The ALDH2 mutation is associated with increased risk of head and neck, liver, oesophageal, oral and pharyngeal, and stomach cancer. The total burden of alcohol attributable cancer may be underestimated as alcohol consumption is rising in East Asia, where ALDH2 polymorphism is prevalent.