

### Association Between Sugar-Sweetened Beverage Intake and Liver Cancer Risk in the Women's Health Initiative

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**Objectives:** Intake of sugar-sweetened beverage (SSB), a postulated risk factor for obesity, diabetes, and cardiovascular disease, may drive insulin resistance and inflammation which are strongly implicated in liver carcinogenesis. However, evidence on the association between SSB intake and liver cancer is scarce. We hypothesized that higher SSB intake would be associated with a greater risk of liver cancer.

**Methods:** We included 90,504 women aged 50–79 years from the Women's Health Initiative Observational Study and Clinical Trials excluding Dietary Modification Trial participants. SSB intake was defined as the sum of soft drinks and fruit drinks (1 serving = one 12 fl. oz can or 355 ml), which was assessed by a validated food frequency questionnaire administered at baseline between 1993 and 1998. Incident liver cancers were reported by self-administered questionnaires and further confirmed by medical record review. Cox proportional hazards regression models were used to estimate multivariable hazard ratios (HRs) and 95% confidence intervals (CIs) with adjustment for age, race and ethnicity, education, alcohol intake, smoking status, body mass index, non-steroidal anti-inflammatory drug use, physical activity, total caloric intake, and history of diabetes.

**Results:** After a median of 18.7 years follow-up, 205 women had confirmed liver cancer. Approximately 7.3% of women consumed  $\geq 1$  serving/day of SSB. Higher SSB intake was associated with a 78% greater risk of liver cancer (HR  $\geq 1/\text{day}$  vs never to  $< 3/\text{month}$  = 1.78, 95%CI = 1.09–2.95,  $P_{\text{linear trend}} = 0.007$ ) as compared to intake of  $< 3$  servings/month. Non-statistically significant positive associations with liver cancer were observed for fruit drinks (HR  $\geq 1/\text{day}$  vs never to  $< 3/\text{month}$  = 1.55, 95%CI = 0.88–2.75) and soft drinks (HR  $\geq 1/\text{day}$  vs never to  $< 3/\text{month}$  = 1.73, 95%CI = 0.76–3.94). Results were similar after further adjustment for coffee/tea intake, or history of liver diseases, or when liver cancer cases diagnosed within the first 2 years of follow-up or those with history of diabetes were excluded.

**Conclusions:** Our findings suggest SSB as a potential modifiable risk factor for liver cancer in postmenopausal women. Studies in men and diverse populations are needed to examine these associations more comprehensively.

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