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Urinary ethyl glucuronide as measure of alcohol consumption and cardiovascular disease: a population-based cohort study

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Background/Purpose: Moderate alcohol consumption has been associated with a lower risk of cardiovascular disease (CVD) and all-cause mortality compared to heavy drinkers and abstainers, but this relationship remains heavily debated. The vast majority of studies thus far relied on self-reported alcohol consumption, since an accessible and specific objective marker is lacking. Urinary ethyl glucuronide (EtG) is a metabolite of alcohol and has shown good agreement with self-reported alcohol consumption in population research. The aim of this study was to examine the association of EtG, as an objective biomarker of alcohol consumption, with CVD and all-cause mortality in a prospective, population-based cohort and to compare this new measure to self-reported alcohol consumption.

Methods: In 5,718 participants of the PREVEND cohort, free of CVD, EtG levels were measured in 24-hour urine samples at baseline and questionnaires on alcohol consumption were administered. Participants were followed for occurrence of first major CVD and all-cause mortality. Cox proportional hazards regression models, adjusted for age, sex and CVD risk factors were fitted, in which EtG level was analyzed both as a continuous and as a categorical variable. In these latter analyses, EtG level was divided into six categories (undetectable EtG levels and quintiles of detectable EtG) and the second category was used as the reference. Similar models were fitted for self-reported alcohol consumption divided into five categories: abstention, light (1-4 glasses/month), light-moderate (2-7 glasses/week), moderate (1-3 glasses/day) and heavy consumption (= 4 glasses/day), with light consumption as the reference.

Results: Mean age at baseline was 52.8 years, 51.4% was male. During 8.3 years (IQR 1.1) of follow-up, 644 (11.3%) first CVD events occurred. All-cause mortality comprised 293 events. Categories of EtG levels were not significantly associated with CVD (P for trend = 0.08), whereas moderate self-reported alcohol consumption was associated with a lower risk of CVD (hazard ratio (HR) moderate vs light alcohol consumption: 0.72 (95% CI 0.56 – 0.93), P for trend = 0.002). We found a non-linear relationship between EtG and all-cause mortality (see figure), with lower HRs for the third and fifth category compared to the reference category and no difference in HRs for the other categories (HRs Q3: 0.53 (0.30 – 0.95) and Q5: 0.55 (0.32 – 0.95)). A similar association between self-reported alcohol consumption and all-cause mortality was found, in which only moderate consumers tend to have a lower HR as compared to light consumers (HR 0.69 (0.48 – 1.00), P for trend = 0.11).

Conclusion: This is the first population-based prospective cohort study in which EtG was used as biomarker of alcohol consumption. We found discordant results between urinary EtG and self-reported alcohol consumption
in the association with CVD. However, the associations with all-cause mortality were comparable.