

# Incidental Positives in Ethyl Glucuronide Testing-Results in Two Volunteers

Doug Lewis, U.S. Drug Testing Laboratories, Des Plaines, IL and Pamela Bean, PhD, Millennium Strategies, Madison, WI

## Background

There is a degree of overlap between positives for EtG from intentional consumption and innocent positives from incidental exposures. Incidental exposure refers to ethanol exposure from sources other than alcoholic beverages. Examples of such products containing ethyl alcohol include some over the counter cough medications, mouth wash or mouth rinse, food items such as vanilla extract, cooked foods containing ethanol and hand sanitizers. A positive EtG result from any of these sources does not constitute an analytical false positive, but rather is a TRUE POSITIVE indicating that ethanol has been used in some form. Individuals in total abstinence or zero-tolerance programs are cautioned about the use of such products and may not be excused if they claim a positive EtG is the result of incidental exposure.

## Objectives

This study analyzed the effects of incidental alcohol exposure, unrelated to the consumption of alcohol beverages, in the detection of Ethyl glucuronide (EtG) in urine and describes simple approaches to overcome the generation of incidental EtG positive results.

## Study Design

The effect of unintentional use on EtG testing was examined by exposing two adult volunteers (male and female), who abstained from consuming alcoholic beverages during the length of these studies, to different concentrations of alcohol containing mouthwash, hand sanitizers and alcohol vapors in air. After exposure, urine samples were collected at 2, 4, 6, 8, and 18 hours (first void) and EtG was analyzed using liquid chromatography-tandem mass spectrometry.

## Methods

The specimens were analyzed at United States Drug Testing Laboratories for creatinine and ethanol on an Olympus AU640 using standard protocols. The limit of detection for urine ethanol was 3 mg/dL. EtG determinations were performed on an Applied Biosystems API 2000 LCMSMS with electrospray ionization in the negative mode. Chromatography was performed using an Agilent Technologies 1100 series liquid chromatography workstation. Separation was accomplished isocratically on a Thermo Electron 50 x 2.1 mm Hypercarb column with 3.0 um particle size using 0.1% formic acid/6% acetonitrile as the mobile phase. The determined limit of detection was 38.7 ng/mL, the limit of quantitation was 97 ng/mL, and the upper limit of linearity was 10,000 ng/mL.

## Subjects

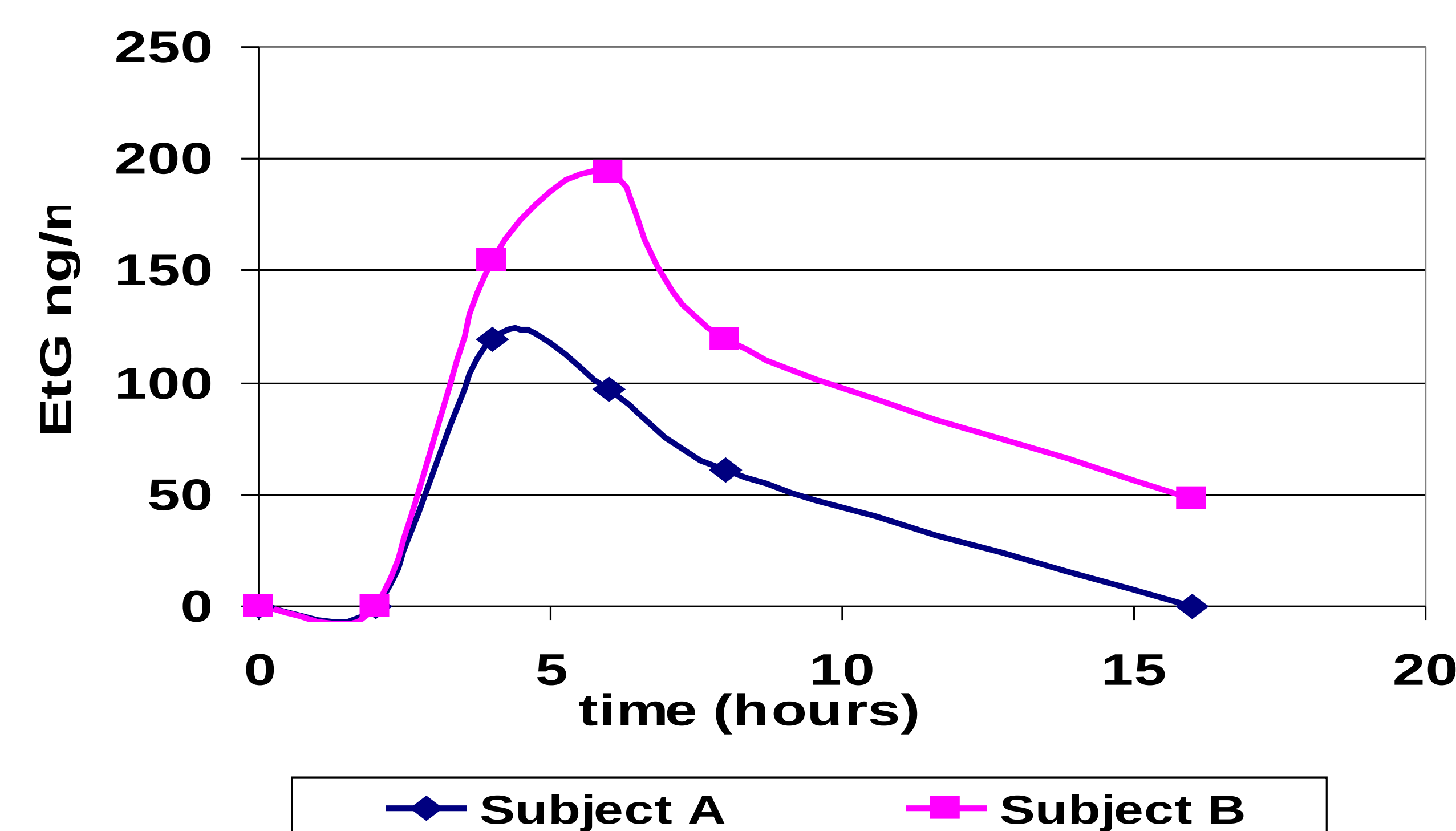
In house data collected at USDTL used two subjects (middle age, both Caucasians, male and female) who abstained from consuming alcoholic beverages during the length of these studies.

## Results

### Mouthwash

The results of these experiments show that it is possible to generate detectable concentrations of EtG in urine by using ethanol-containing mouthwash as directed on the manufacturer's label. The highest EtG concentration achieved over an 8-hr period was 194 ng/mL (Figure 1).

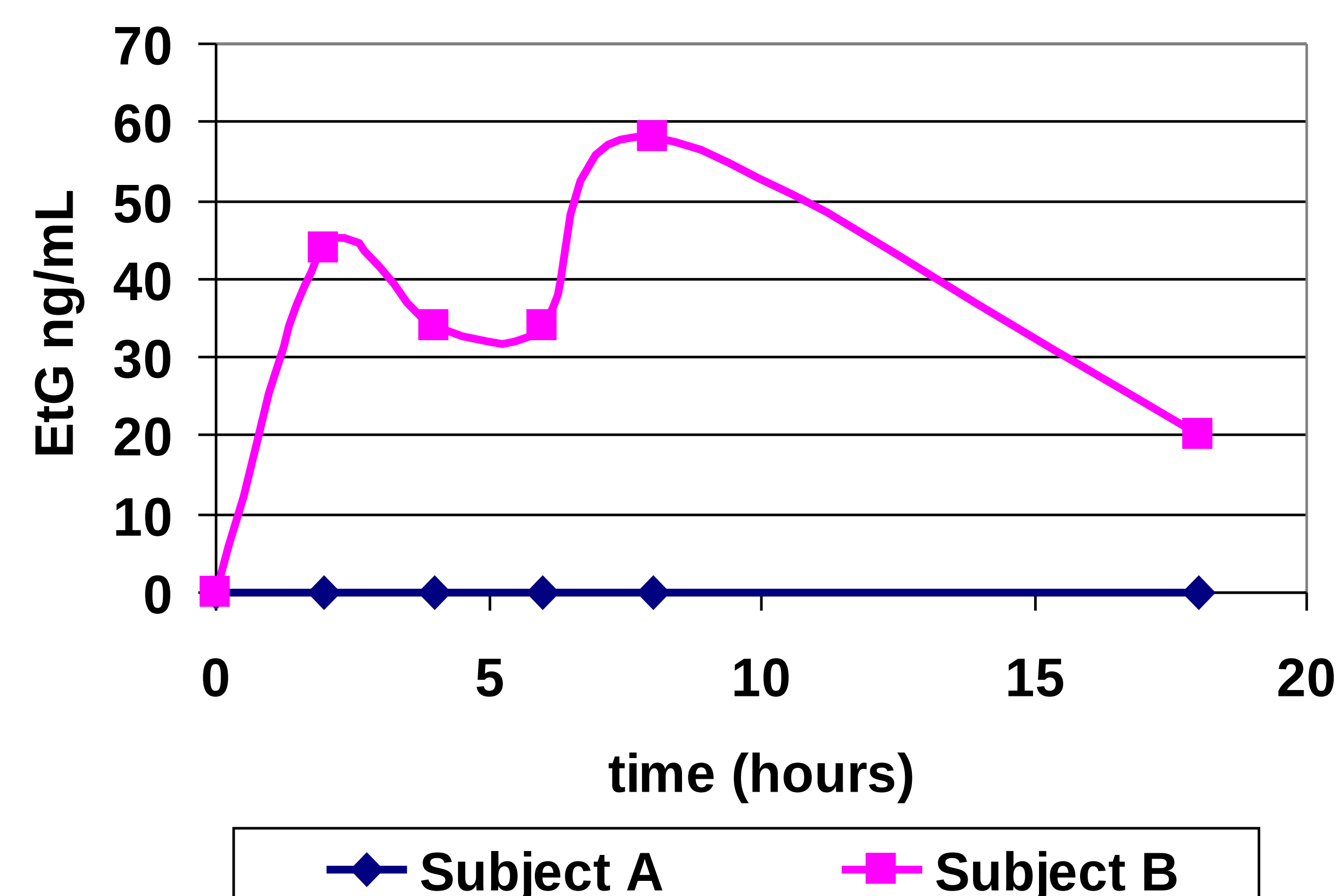
Figure 1: Normalized EtG Concentrations versus Time After Using Ethanol Containing Mouthwash



### Hand Sanitizer

The results showed no detectable concentrations of EtG in the female volunteer; the highest EtG concentration achieved in the male was 58 ng/mL (Figure 2). The female volunteer was then asked to use an excessive amount of hand sanitizer (2.0 g) at the same time periods, and the highest EtG concentration achieved was 799 ng/mL 3 hr after exposure to the product (data not shown).

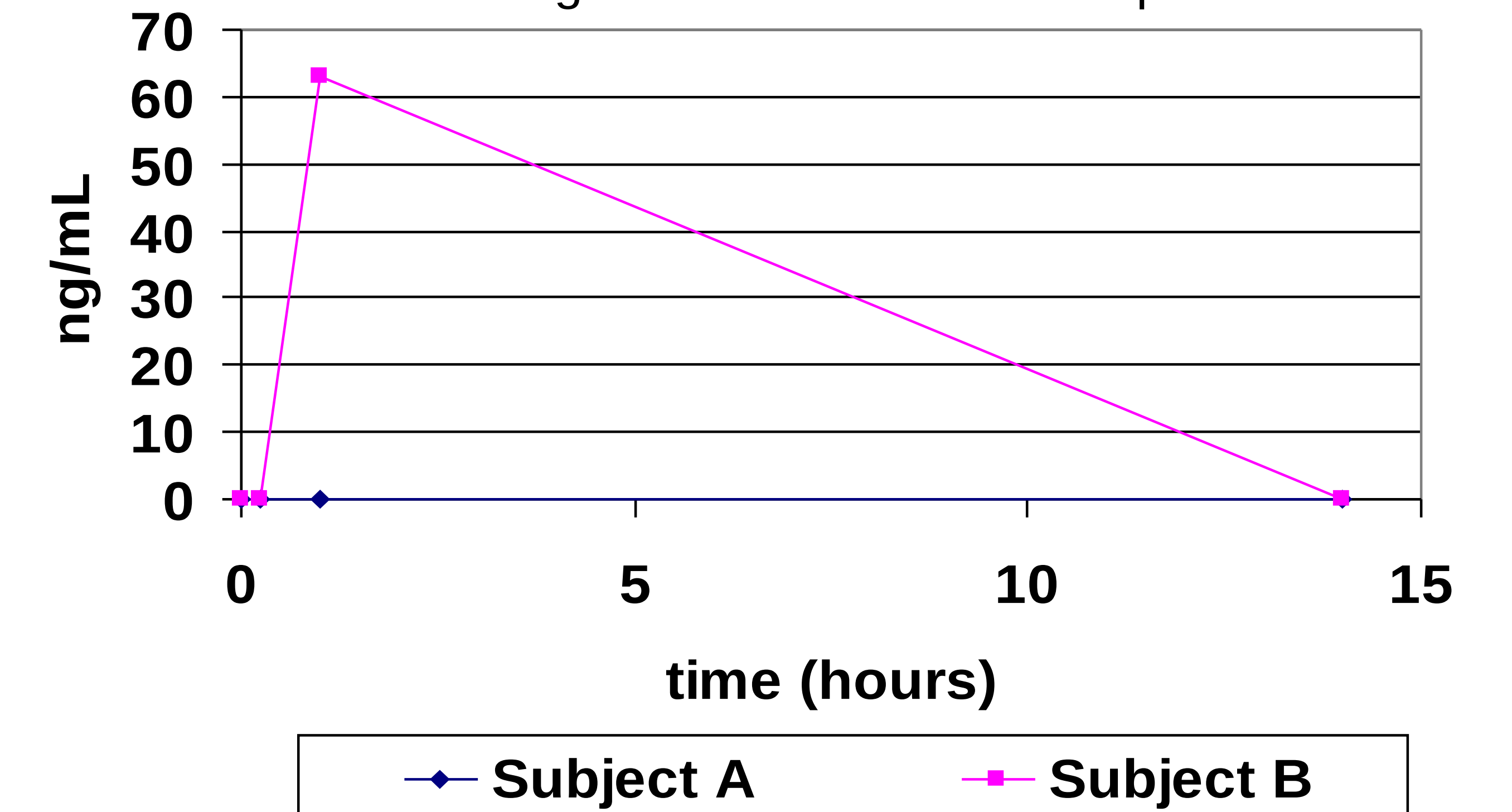
Figure 2: Normalized EtG Concentrations versus Time After Using A Hand Sanitizer



## Inhalation of Ethanol Vapor

The results of the testing showed that one subject had no detectable levels of EtG and another subject showed a detectable level at 124 ng/mL. Based on these results, it seems highly unlikely that exposure to ethanol in most workplaces will provide enough vapor to trigger a positive unintentional EtG result.

Chart 1: Normalized EtG Concentrations versus Time Following Inhalation of Ethanol Vapors



## Conclusions

These results show that ethanol-containing products can produce small concentrations of EtG. However, very simple strategies can be used to overcome incidental positive results. For instance, it is highly recommended that recovering health professionals, who by contract have agreed on total abstinence after drug and alcohol therapy, choose alcohol-free personal hygiene products.

## Recommended Cut-offs

Currently, it is recommended that different EtG cutoffs are used to select a monitoring level that best fits the program goals for the client. The current recommended cutoffs are:

- 100 ng/mL: appropriate in zero-tolerance programs because of the restrictions placed on the clients.
- 250 ng/mL: a relatively safe cutoff for most programs that can enforce limitations on use of ethanol-containing products.
- 500 ng/mL: chosen to further reduce the possibility of positives being related to anything other than actual consumption of alcohol.

The establishment of a cutoff that can clearly distinguish consumption of alcoholic beverages from exposure to alcohol in other products is another venue to increase EtG diagnostic performance and clinical benefit.