



### **K6 A Retrospective Comparison of Blood- and Breath- Alcohol Results in Wisconsin Impaired Drivers 2001-2007**

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After attending this presentation, attendees will better understand the relationship between breath- and blood-alcohol measurements and be better able to assess the validity of breath alcohol results as applied to a population of suspected impaired drivers.

This presentation will impact the forensic community by providing useful data by which to assess claims of breath alcohol testing unreliability as well as providing practical data relating the theoretical blood:breath alcohol ratio in the target population of impaired drivers.

Laws in most jurisdictions define illegal per se alcohol impaired driving offenses in terms of both breath and blood alcohol concentrations. Even so, the relationship between breath and blood alcohol results is still raised as an issue in court cases and a comparison of the two can yield insight into the prevalence of falsely elevated breath alcohol results, as is frequently alleged. In this retrospective study data is compared from drivers arrested for impaired driving offenses in the State of Wisconsin who had both breath and blood alcohol specimens analyzed. Breath alcohol testing was conducted in the field on EC/IR and EC/IR II (Intoximeters, Inc., St. Louis, MO) breath alcohol analyzers. Breath alcohol results are obtained on duplicate breath samples and must agree with  $\pm 0.020$  g/210L. The lower of the two three decimal place acceptable results is truncated to two decimal places as the reported result. Blood specimens were collected by medical personnel and submitted by the arresting agency to the Wisconsin State Laboratory of Hygiene (WSLH). Blood analysis was performed by direct injection gas chromatography, with 10% done in duplicate per the testing protocol in effect during the study period. All testing was done as part of the routine investigation of impaired driving cases. Only positive breath and blood alcohol results obtained within three hours of each other were included in this study.

During the study period of 2001-2007 there were 1,744 cases that met the inclusion criteria. Of these cases there were 1,545 males with a mean age of 34.9 (16-84) and 199 females with a mean age of 35.8 (16-77). The mean reported breath alcohol concentration (BrAC) was 0.144 g/210L (0.01 – 0.40). The mean of the un-truncated individual BrAC results was 0.1510 g/210L (0.010-0.400). The mean blood alcohol concentration (BAC) was 0.1624 g/100ml (0.010-0.450). The mean difference (BAC-BrAC) between reported BrAC and reported BAC results was 0.018 (-0.046-0.100). There were 869 cases where the BrAC was collected before the BAC with a mean elapsed time of 0.89 hours (0.13 – 2.75). There were 875 cases where the BAC was collected before the BrAC with a mean elapsed time of 0.80 hours and range of 0.05 to 2.27 hours.

BAC results were adjusted for the alcohol elimination occurring between the breath test time and the time of blood collection using a rate of 0.019 g/100ml per hour. After adjustment the BAC – BrAC differences were a mean of 0.019 (-0.029-0.082). The reported BrAC exceeded the adjusted BAC in 105 cases (6.0%). Of these, only 23 (1.3%) exceeded the BAC by 0.010 or more (range 0.010-0.029). There were only five cases where the BrAC was 0.08 and the adjusted BAC was below 0.080. Of these only one differed by more than 0.010. Blood:Breath alcohol ratios were calculated using the time-corrected BAC and reported BrAC. The mean (SD) ratio was 2428:1 (295) (range 1622:1 – 6822:1).

The findings of this study are in agreement with others that have found that evidentiary BrAC results generally underestimate BAC in the driving population. The absence of significant overestimations of BAC by BrAC in this study provides strong evidence that alleged significant elevations of BRAC by mouth alcohol, GERD, potential interfering substances, variations in lung capacity, breathing disorders, etc. do not occur in the context of a well-regulated evidential breath testing program.

#### **Forensic Toxicology, Blood Alcohol, Breath Alcohol**