

## F7 Retrograde Extrapolation as a Part of Accident Reconstruction: A Case Study

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After attending this presentation, attendees will better understand of the different factors influencing the retrograde of ethanol concentration based on breath or blood ethanol reports.

This presentation will impact the forensic science community by utilizing and comparing the multiple equations used to obtain a retrograde range of ethanol concentration, their limitations, and their uses.

One of the goals of accident reconstruction is to recreate the circumstances at the time of a collision in order to determine the factors that contributed to or caused the collision to occur. Driver impairment by alcohol is one of the factors that can contribute to a collision and needs to be condidered in accident reconstruction. Because of injury or other factors involved in crash investigation, it is not uncommon that a traditional Driving Under the Influence (DUI) investigation, consisting of investigatory questions, observations of physical symptoms and behaviors, field sobriety testing, and field breath testing are not possible. Also, there may be a significant delay in obtaining the blood alcohol sample. The determination of the extent of alcohol intoxication at the time of the collision may then rest on a very limited amount of information.

Retrograde extrapolation is the technique used to estimate the blood alcohol level at an earlier time based on a later chemical test value. The accuracy of retrograde extrapolation is contingent on the elimination rate of alcohol and the phase of alcohol metabolism of the subject at the time of the collision. Because these factors are typically unknown, retrograde extrapolation in such cases has been criticized. Rather than presenting a single calculation based on uncertain assumptions, another approach would be to use the reasonable range of each variable and present several calculations that comprise the reasonable range of possible blood alcohol concentration at the time of the collision. The reasonable range of factors would include the measurement uncertainty of the blood alcohol test result, the typical range of ethanol elimination, the reasonable time to peak alcohol level, and the reasonable range of Widmark factors. Calculations can then be performed for an average value, a highest and lowest range of what might be expected.

This method of retrograde extrapolation was used in the case of a farmer who collided with a motorcyclist, resulting in the death of the motorcyclist. The farmer's blood alcohol level was tested at 0.03g/100ml a little more than three hours after the collision. This method of retrograde extrapolation was used to demonstrate the wide range of possible blood alcohol levels at the time of the collision, both assuming and not assuming that the subject was past the peak alcohol level at the time of the collision.

**Retrograde Extrapolation, Accident Reconstruction, Crash Blood Alcohol Content** 

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