

# Blood Alcohol

Understanding quantitative  
blood alcohol testing  
in drunk driving cases.





# Testing

**By Patrick T. Barone and Jeffery S. Crampton**

**D**runk driving cases involving blood draws are considerably more complicated to litigate than are those involving breath testing. While the attorney is confronted with a test result that is usually more reliable than with breath, the foundational requirements are considerably more substantial. The testing process is not infallible, and understanding this process is critical if the defense attorney hopes to appropriately represent a blood draw client. This article will present an overview of the typical blood draw case, from the blood draw through the actual testing.

## **The Search Warrant**

Most blood is drawn after the client has refused to offer a breath sample, and a court has authorized a warrant. Thus the warrant and affidavit in support should be examined to determine if they are properly supported by probable cause. What evidence is there to support the police officer's conclusion that your client was intoxicated? Under limited circumstances it may be appropriate to file a motion to quash the warrant, such as when the warrant is based on insufficient probable cause.<sup>1</sup> Keep in mind, however, that in the context of a drunk driving case, a warrant for blood may be supported entirely by the results of a preliminary breath test.<sup>2</sup>

## **The Blood Draw**

The next area of inquiry is the blood draw itself. Michigan law indicates that only a licensed physician, or an individual operating under the delegation of a licensed physician, who is qualified to withdraw blood and is acting in a medical environment, may withdraw blood at a peace officer's request to determine the amount of alcohol in a person's blood.<sup>3</sup> However, the phrase "qualified to draw blood" is rather broadly defined, and a person can be qualified simply by education, training, or experience.<sup>4</sup>

As with breath testing, there are administrative rules that cover blood testing.<sup>5</sup> These rules cover how the test results should be expressed, the acceptable techniques for blood testing, the calibration of the test equipment, and the collection and handling of the blood. Additionally, the state police lab promulgates its own rules for blood testing. These rules can be obtained by sending a Freedom of Information Act request to the state police laboratory in Lansing. All of the applicable rules should be reviewed to determine if there are any defects that could affect the foundational requirements.

Case law also indicates that the party seeking introduction must show (1) that the blood was timely taken, (2) from a particular identified body, (3) by an authorized licensed physician, medical technologist, or registered nurse designated by a licensed physician, (4) that the instruments used were sterile, (5) that the blood taken was properly preserved or kept, (6) and labeled, and (7) if transported or sent, the method and procedures used therein, (8) the method and procedures used in conducting the test, and (9) that the identity of the person or persons under whose supervision the tests were conducted is established.<sup>6</sup>

The type of swab used to disinfect the draw site is also an important issue. The state police kit contains a non-alcohol swab, and it should be determined whether or not this swab was used. The kit also contains two grey-stoppered vials, and these contain sodium fluoride, a preservative used to prevent coagulation and neo-generation of alcohol. It should also be determined whether or not the proper vials were used, and the expiration date of the kit itself. Some of this information can be obtained in the defendant's first discovery demand, but a thorough examination of these facts and issues usually requires an evidentiary hearing.<sup>7</sup> If the case being defended is a felony, then the appropriate inquiry can take place at the preliminary examination, as long as defense counsel has made a timely request for the laboratory technician's appearance at the preliminary examination.<sup>8</sup>

### Chain of Evidence

As with all evidence collected by the authorities, the prosecutor must show a proper chain of evidence. In other words, the prosecutor must show that the blood that was tested was the same blood that left the defendant's arm. In Michigan, the state police provide a blood draw kit, which is essentially a box containing everything necessary for a proper blood draw. After the sample is collected, the blood is usually sent by mail to the state police laboratory for testing.

Look at the labeling of the specimen and make sure everything was coded and labeled correctly. It should also be noted that the vials contained in the blood draw kits are sealed with vacuum stoppers. It would therefore be very easy to introduce ethanol through the stopper, and such tampering would not be visible from a simple visual examination of the vials themselves. The administrative rules require that the vials be sealed in a way that ensures their integrity, but unlike other states, police officers in Michigan will only seal the box containing the subject's blood. The vials themselves are not sealed.

### Integrity of the Blood Sample

What was the condition of the blood when it reached the lab? Is it possible for coagulation to have occurred? If so, then it is also possible that there was the neo-generation of alcohol through microbial fermentation. When human blood decomposes, naturally occurring microbes can change the sugars in the blood into alcohol. This is the same type of fermentation that occurs in the manufacture of beverage alcohol. It is possible for the state police laboratory to detect whether this has occurred by analyzing the level of glucose in the subject sample, or to examine the ratio of ethanol to carbon dioxide in the headspace gas. This is not done in Michigan.

See if there is any indication of the condition of the sample after it reached the lab, but before it is tested. Did the technician note any coagulation of the sample? This might occur with an expired kit, or if the person who drew the blood did not gently tip the vial back and forth to mix the anti-coagulant with the sample. If the sample was coagulated, then was the sample centrifuged prior to testing? If so, then this probably resulted in a false high result, because only the liquid portion of the blood was tested, rather than whole blood complete with its cellular material. If neo-generation of ethanol is suspected, then glucose levels in the blood sample should be tested by an independent lab to determine the ratio of ethanol to carbon dioxide.

If the blood was not tested by the state police lab, but instead was tested by a local hospital, then it is likely that serum rather than whole blood testing was performed. The scientific literature suggests that this can cause a reading that is 11 percent to 20 percent too high. If the sample is close to the per se limit, then this analysis

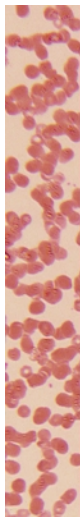
## Fast Facts:

- The administrative rules require that vials of blood be sealed in a way that ensures their integrity, but unlike other states, police officers in Michigan will only seal the box containing the subject's blood, not the vials.
- When human blood decomposes, naturally occurring microbes can change the sugars in the blood into alcohol.
- The administrative rules regarding blood testing cover how the test results should be expressed, the acceptable techniques for blood testing, the calibration of the test equipment, and the collection and handling of the blood.

can become crucial. If serum blood was tested, then it should be determined whether or not a hematocrit, which measures the ratio of the volume of packed red blood cells to the volume of whole blood was run on the subject's blood. The hematocrit ratio permits a more accurate "conversion" of the test result from the serum level to the necessary whole blood level.

### The Testing Procedure

As indicated above, there are administrative rules that apply to the testing procedure. The state police lab has also promulgated rules that dictate how these tests are to be run. The state police lab uses a process known as gas chromatography. Gas chromatography is essentially a function of time and temperature. In running the test,



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the sample is first mixed with one of two internal standards, either 1-propanol or t-butanol. Each sample is then tested separately by two different chromatograms, and the lab reports the lower of the two results.

Once the sample is diluted, it is then heated to produce a vapor. The vapor is then passed through a glass column. The vapor is then timed and measured as it passes out of (elutes out) the other end of the column. The chromatograph itself produces a chromatogram, which is a read-out that looks something like an EKG. The peak measurement or curve on the chromatograph is then compared with a calibration curve, and the

amount of blood alcohol is determined by reading where this sample peak passes over or meets the calibration curve. Defense counsel should make every effort to obtain through discovery both the subject defendant's chromatogram as well as the calibration curve. These can then be evaluated by the defense expert.

There are many other areas of this procedure that are susceptible to defense challenge. The first is the method by which the gas chromatograph is calibrated. The glass columns are replaceable, and



after a period of time become fatigued (fail to produce appropriate results with known solutions). When a new glass column is inserted for the first time it must be calibrated, and this requires adjusting the temperature of the machine.

In other words, the temperature of the chromatograph is adjusted to make sure that the column measures a known sample appropriately. These adjustments are based on running a known sample containing methanol, ethanol, isopropanol, and acetone, and observing how the column responds at various temperatures. These adjustments are made despite the fact that the now-rescinded written methods or techniques promulgated by the state police pursuant to the administrative rules<sup>9</sup> provided for a column temperature of 100 degrees Celsius. This is a salient point because, as indicated above, the analysis is based in part on temperature. Thus, in questioning the person who calibrates the machine, defense counsel should inquire into the maintenance of the chromatograph used, particularly as it pertains to the last time the glass column was replaced, what temperature this new column was calibrated at when replaced, and at what temperature the subject sample was analyzed.

Close attention should also be given to the manner in which the calibration curve is produced. A common method is to take samples of known alcohol solutions and run them through the chromatograph, thus producing the calibration curve. The rules promulgated by the Michigan State Police provide for a seven-point calibration curve. These calibration samples are usually prepared in the laboratory and are therefore subject to human error. During cross-examination defense counsel should assess whether the laboratory equipment used was properly cleaned both before and after testing, and whether it was free from any contaminants such as acetone and alcohol.

Additionally, defense counsel should inquire into the method by which the ethyl alcohol used to make the calibration samples is stored and handled, and also inquire as to the training and experience of all laboratory personnel involved anywhere in the process. Alcohol's inherent volatility can also cause the calibration samples to be incorrect if the absolute ethanol used to prepare them is stored improperly.

Once the calibration curve is produced, its soundness is evaluated by running a second set of controls, also produced in the laboratory. A negative control of deionized water is also run through the two chromatographs. Finally, once the calibration curve is calculated and tested, a known human blood control is analyzed. It is only after this final calibration and testing procedure is complete that an unknown blood sample can and should be tested.

One might argue that the entire calibration procedure turns on the accuracy of the human blood sample, and therefore, defense counsel should include in their discovery demand a request for the lot number and accompanying literature for the human blood control used in testing their client's case. The literature indicates that the human blood used in these controls is first washed using a solution containing sodium fluoride, with sodium azide added as a preservative. The use of washed blood is

itself suspect as alcohol reacts differently in this solution than in human whole blood.

There is also a certain amount of error inherent in these purchased samples, and this may be as high as 20 percent. The literature will indicate exactly what this error is for the lot number used. As indicated above, due to the volatility of ethanol, additional error may occur based on the way the sample is stored.

It appears that the error inherent in the human blood control is in addition to the error inherent in the chromatogram itself. The methods and techniques promulgated by the Michigan State Police require that the blood testing be performed on two separate chromatograms, and provide for and allow a difference between them of up to 0.02 percent. This is essentially a recognition by the state police that the machines can be no more than .02 percent accurate.

## Conclusion

When representing a defendant where blood alcohol testing is involved, it is important to first preserve the blood samples. Moreover, it is critical to understand how blood testing is conducted at the state police laboratory, and the inherent limitations in the laboratory's testing procedure. Only after this information is understood can the practitioner be prepared to file motions to exclude the blood evidence, or, failing that, effectively cross-examine the laboratory experts in effort to produce reasonable doubt as to the reliability of the test results. ◆

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## Footnotes

1. The search warrant statute is found at MCL 780.651 et seq. For a discussion regarding the sufficiency of a search warrant see, *People v Moten*, 233 Mich 169 (1925); *People v Sobczak-Obetts*, 463 Mich 687 (2001).
2. See e.g., *People v Tracy*, 435 Mich 853 (1990).
3. MCL 257.625a(6)(c).
4. MCL 333.16215.
5. Administrative Rule 325.2671 et. seq.
6. *People v Cords*, 75 Mich App 415, 254 NW2d 911 (1977).
7. See, e.g., *People v Krulikowski*, 60 Mich App 28, 230 NW2d 190 (1975), MCL 764.15 and MCL 257.625a.
8. MCL 600.2167a.
9. Administrative Rule 325.2672(3).