Observations Incidental to Alcohol Intoxication Tests

RALPH F. TURNER,

Associate Professor, Department of Police Administration, Michigan State College,
East Lansing, Michigan.

My personal experience with chemical tests for intoxication dates back to 1939, at which time, in the capacity of Laboratory Supervisor of the Kansas City Missouri Police Department, I had occasion to determine alcohol levels in subjects suspected of being under the influence of alcohol by analysis of blood, breath and/or urine samples. In addition to these routine analyses, several controlled experiments were performed. In the following brief remarks, I shall endeavor to present a number of observations and opinions which are the results of this experimental work, and also, discuss one or two findings which have not been reported in the literature.

On November 18 and 19, 1941, the Missouri State Highway Patrol and the Kansas City Missouri Police Department conducted a series of drinking-driving tests involving 28 subjects solicited on a voluntary basis. The participants were all male adults from diverse walks of life and represented various economic, professional, and cultural levels. A "line" and "figure 8" driving test were used. The "line" test consisted of two four-inch white lines laid down eight inches apart and one-hundred thirty-eight feet in length. At each end and at twenty-three foot intervals, transverse lines bearing six inch graduations were laid down, dividing the double lines into six sections for the purpose of scoring. The test driver started his car, which was parked some distance from the end of the line and at an angle to it, maneuvered it to the line and then drove with the left wheels between the two white lines. The observer at the far end gave a signal to stop at a designated point, the driver being requested to bring his car to a smooth and even halt as near to the designated spot as possible. The operator was judged on his ability to drive both forward and in reverse, staying within the lines and being able to stop close to the designated point.

The "figure 8" test consisted of two fifty-foot circles with four sets of stanchions, each eight feet apart, outlining each circle. The driver was judged by the number of stanchions touched or knocked down, the number of times the clutch was slipped, the number of stops, the number of brake applications, and the time in
seconds required to negotiate the course.

The usual "walking a line", card sorting, and visual acuity tests were given to each subject following the driving experience. This was followed by a breath test and the collection of blood and urine samples whenever possible.

Normal standards were obtained for each driver during the morning hours. Approximately one hour after a modest lunch, the subject was given two ounces of 86 proof (approximately) whiskey which could be consumed either with or without a mix within ten minutes. He was then put through the above described schedule, which required thirty minutes, after which he received another drink and repeated the routine, continuing until he was incapacitated or unwilling to repeat the tests. General observations following this experiment were:

1. In every case, the drivers showed improved reaction and driving characteristics following the first and second drink.

2. Visible signs of intoxication became apparent when the blood alcohol level neared 0.08%.

3. Driving ability became erratic when the alcohol level was between 0.08 and 0.15%.

4. Concentrations between 0.15 and 0.17% indicated that all drivers could no longer manipulate their vehicles with any degree of accuracy, and the drivers admitted that they were definitely intoxicated.

On the second day, one group of four was allowed to play cards while consuming twelve ounces of whiskey, after which they were put through the driving test. Their performance was considerably more erratic than the subjects who had been engaging in the mild activity associated with the routine tests.

At the conclusion of this experiment, it was felt that even though the tests of the second day were made more difficult than the first, the results could not be correlated accurately with normal driving conditions. Even though the subjects were willing to cooperate in a scientific experiment, they were consciously or sub-consciously striving to attain a good score. The tests, also, did not include any measure of judgment, a rather elusive, yet highly important factor in our traffic accident picture.

In 1948, we began a series of tests supported by the National Safety Council Committee on Tests for Intoxication designed to investigate the reliability and comparability of chemical tests for intoxications. With the assistance of Dr. C. W. Muehlberger, 127 subjects were studied. Alcohol levels were determined by analysis of the blood, breath, and urine. Three breath testing devices were used, i.e.: Drunkometer, Intoximeter, and Alcometer in conjunction with commonly accepted methods of blood and urine analysis.

Four subjects were tested at one time, again being selected from various walks of life. Experimental sessions began at 7:00 p.m. and continued for five to eight hours. Every attempt was made, within the limitations of a laboratory, to create an informal atmosphere. Hors d'oeuvres were served, and the subjects were encouraged to play cards, engage in conversation, etc. when not being involved in a particular test. In addition to alcohol determinations, several psychological tests were con-
ducted. These consisted of handwriting examinations, fatigue studies, extensive Rorschach tests, subjective and objective interviews.

In evaluating the results of this experiment, every attempt was made to interpret the results in terms of the questions routinely raised in court. Conclusions were as follows:

1. When the three methods of blood alcohol determination by analysis of the breath were used in the manner recommended by their authors, the results obtained were in close agreement (± 0.015%) with results obtained by direct analysis of the blood.

2. It is believed that differences of the order of ± 0.015% alcohol in different analytical procedures are not significant to the problem under discussion, namely, the value of a chemical test for intoxication as a matter of real evidence to be considered by the court. Since individuals vary in their response to alcohol by margins which are far in excess of the error in chemical analysis, such analytical deviations are of little significance. It should be pointed out that the determination of “intoxication” by these methods is in reality measuring a physiological process. Because of inherent human variability it is futile to attempt to obtain the degree of scientific precision commonly associated with some physical measurements.

3. It is believed that with a proper interpretation of the results obtained by analysis of either the blood or breath, assuming that all analytical work has been carried out in a proper manner, the methods employed by Bennett (breath analysis by Drunkometer, Intoximeter and Alcometer procedures and blood analysis) may be used with confidence and the results so obtained will be reliable.

4. Before ingested alcohol can be eliminated from the body by way of the urine, it must first be absorbed from the stomach and small intestine into the blood stream, carried by the blood to the kidneys, filtered out through the kidneys into the secreted urine in the same ratio as the relative water content of blood and urine (1 : 1¼) and then stored in the bladder for an indefinite period prior to voiding. If, prior to the onset of drinking, the bladder already contained some non-alcoholic urine, the alcohol content of the voided urine may be misleading as an index of the degree of alcohol influence. Thus the alcohol concentration of the voided urine reflects the average alcohol concentration of the secreted urine during the interval since the previous voiding. For these reasons, the concentration of alcohol in the urine might be expected to afford a less reliable index of alcohol intoxication than the alcohol content of blood, breath or saliva.

5. In 127 subjects tested, when the concentration of alcohol had reached or exceeded 0.15% in the blood, as indicated by analysis of either the blood or breath, impairment of some type was noted in every case. In most cases, impairment was evident far below this 0.15% limit.

**Recommendations**

It is not within the province of this report to comment on the relative merits of various interpretations of intoxication or on the term “intoxication” per se. However, our experimental data coupled with the psychological and subjective examinations indicate that the results of a
chemical analysis should not be the sole criterion upon which an officer's judgment is based. The results of a chemical test should be employed to confirm conclusions drawn from clinical and physical diagnoses. It should also be emphasized that arbitrary decisions based up the so-called "0.15% line of demarcation" be avoided. This value has often been advanced as the dividing line between the "drunk" and the "sober". Such a position is not in accordance with the observed facts, for the vast majority of persons who have 0.12% or 0.13% alcohol in their blood are decidedly impaired with respect to their automobile-driving capabilities.

Serious consideration should be given to a downward revision of this figure which has become so firmly entrenched in the minds of many who are confronted with this problem daily. Greater emphasis should be placed on corroborating factors which are invariably brought to light in the "borderline" cases.

The recommended Uniform Vehicle Code delineates three zones of blood alcohol concentration for the guidance of law enforcement officials: i.e., 0.00-0.05% safe; 0.05-0.15% questionable; above 0.15%, definitely under the influence. As a result of the work described in this paper, it is recommended that the lines of demarcation be amplified in the following manner: 0.00-0.05% safe; 0.05-0.10% possibly under the influence; 0.10-0.15% probably under the influence; above 0.15% definitely under the influence.

It is recommended that additional study be devoted to clarification and understanding of the term "intoxicated" for legal purposes. Chemical tests, important and valuable as they are, should not constitute the sole basis for determining the guilt or innocence of the accused where other evidence is obtainable.1

1. The second part of the Michigan State College study was directed toward an investigation of the reputed tolerance to alcohol of certain individuals. Preliminary work was conducted on animals, followed by observations of human subjects. Because of limitations of time and the complexity of the problem, it was impossible to reach any definite conclusions concerning the basis for variability in response to alcohol. All data is of a preliminary nature and indicates that additional research is necessary.

As a result of the above described experiments coupled with several years' experience in the courtroom, I should like to express some personal opinions, which can best be summarized by quoting our Chairman, Dr. Leon Greenberg, who stated, "The panacea for hangover will be at hand when people learn to drink sensibly. It won't come in the form of a pill. It will come in the form of intelligence." I suggest that while we know there is no simple antidote for the physical discomforts of over indulgence in alcohol, neither can we solve our problem of alcohol and road traffic by the pronouncement of some scientific formula which will establish a man's degree of sobriety. To be sure, we have ample scientific evidence to delineate the minimum danger zone, but I seriously doubt that great "questionable" area, which includes so many of our subjects, can be clarified simply by applying equations and reagents. To provide a more reasonable administration of justice for the
vast majority of those defendants who do not have the benefit of high priced counsel and expert witness, we must enlist the knowledge and contributions of the psychologist, the jurist, the sociologist, the member of AA, and the layman. I am reminded of a recent criticism directed at scientists, wherein they were accused of being illiterate and irresponsible. Illiterate because they could not communicate the results of their work to the general public, and irresponsible because they neglected their moral responsibility to inform those who are supporting their work. I feel that when the potential life or liberty of a fellow human is being weighed on the scales of justice, the scientist who is interested in this problem of alcohol and road traffic must do more than interpret his results in terms of pure figures.

Reference