

FUNDAMENTAL PRINCIPLES OF BREATH TESTING: AN IMPERFECT MEANS TO A LEGITIMATE END

Presented by Steven Epstein
Barket Epstein & Kearon, LLP
666 Old Country Road - Suite 700
Garden City, New York 11530
(O) 516-745-1500 (C) 516-650-1297
Sepstein@barketepstein.com
October 10-13, 2018
The Bellagio Hotel, Las Vegas, NV





A DAY IN DWI HISTORY

 September 10, 1897, a London cabdriver named George Smith was working for the Electric Cab Company.





A DAY IN DWI HISTORY

- Mr. Smith collided with a building at 165
 Bond Street. He was the first person in
 recorded history to be arrested for DWI and
 admitted...
- "Having had two or three glasses of beer."
- He was later convicted and fined 20 shillings.

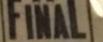


A DAY IN DWI HISTORY

- Purpose Keep streets safe
- Common Law DWI
- Focus on impaired driving







New York got the breaks from Utah ... The lid is offl The 36th and most necessary State to ratify repeal of the Prohibition Amendment had dillied and dallied yesterday while New York fumed and then "out of consideration for the rest of the nation" ... New York in particular ... the long-dry Mormons opened their hearts and east their ballots for repeal hours ahead of the time expected. ... Then the fun began!

> Utah can't have a drink until Jan. 1, anyway because of state laws to be repealed-but they agreed to let us have ours. And did New York like the

TRUCKS OFF!

Trucks started rumbling. Retail liquor stores lighted up-to remain so until 8 o'clock only. Restauratours and hotel proprietors smiled and scurried after a day of worry and gloom.

A moving hand turned the light to one side and there was clicer and guisty and laughter where there had been gloom for thirteen een days; and in moving the hand turned the light away. from that side where this cheer and galety had beand left it in the dark.

For New York / grows; how era and hidden fare will be the old, said goodby to the spend;





December 5, 1933

- 21st Amendment gave birth to a vibrant industry eager to quench the thirst of Americans.
- Drunk driving became a fast-growing problem.
- What evolved was the use of blood alcohol levels as a litmus test.



Why Test Blood Alcohol Levels?

 Quantification of the amount of alcohol in a person's blood can determine what impact the alcohol has had on that person's ability to operate a vehicle.

 Because of the way alcohol is diffused into the blood and carried through the circulatory system including the brain.



Why Test Blood Alcohol Levels?



 Once the ethyl alcohol reaches the brain it can impact cognitive functioning and a person's ability to drive.



The Trouble with Blood?

- The sample collection is invasive.
- Drawing the sample can be difficult.
- The process is costly.
- Can't make determinations in the field.
- Its processes require additional laboratory analysis.



Breath Testing Timeline

- In 1927, Dr. Emil Bogen demonstrated that breath samples could give an indication of the subject's blood alcohol concentration.
- In 1938, the first breath testing device was put into use by law enforcement officers in the field. This invention, called a "drunkometer," was the creation of Professor Rolla Harger of Indiana University.



Breath Testing Timeline



- Drivers were asked to breathe into a rubber balloon, which was attached to a tube of purple solution of potassium permanganate in sulphuric acid.
- Chemical test?



Breath Testing Timeline

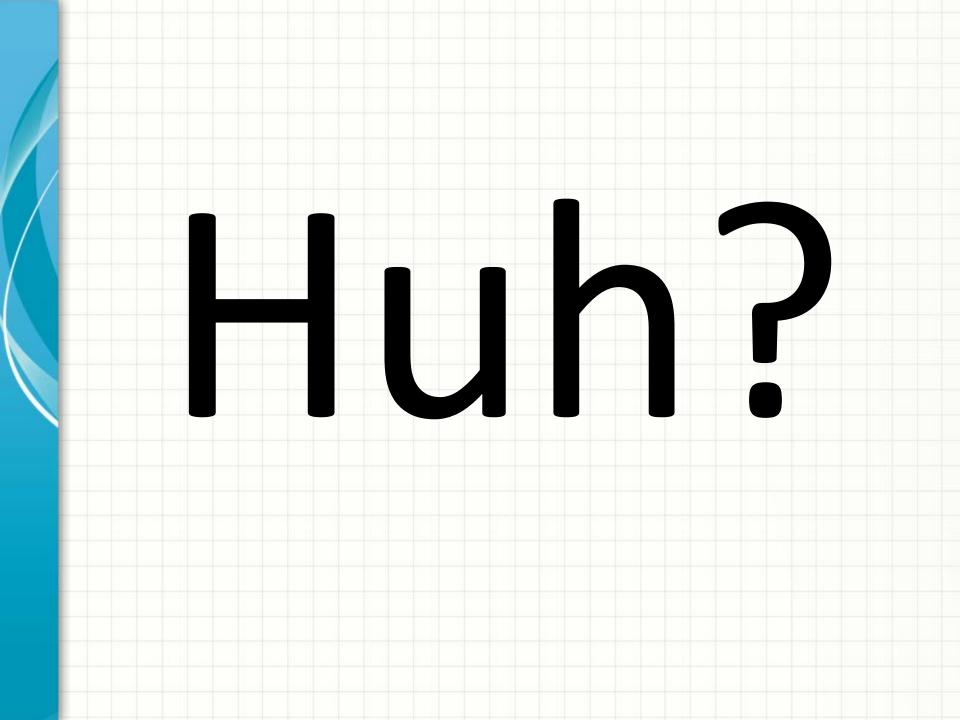
- If there was alcohol in someone's breath, the chemical solution changed color; the darker it got, the more alcohol the motorist had in his system.
- From the shade of the liquid, law enforcement officers could estimate the alcohol level in a person's bloodstream.

Fundamental Principles of Breath Testing



Henry's Law

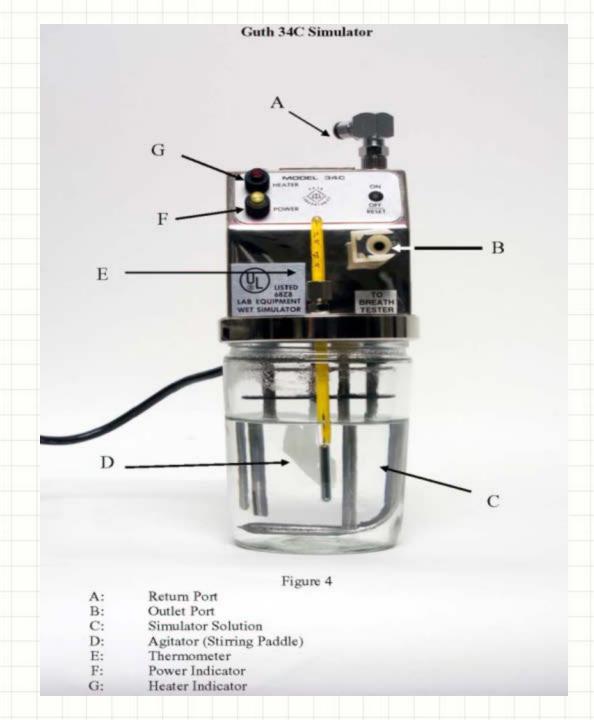
- Henry's law, formulated by William Henry in 1803, is bedrock principal of breath testing
- Simply stated, the concentration of a volatile substance in the air above a fluid is proportional to the concentration of the volatile substance in the fluid."





Henry's law Requirements:

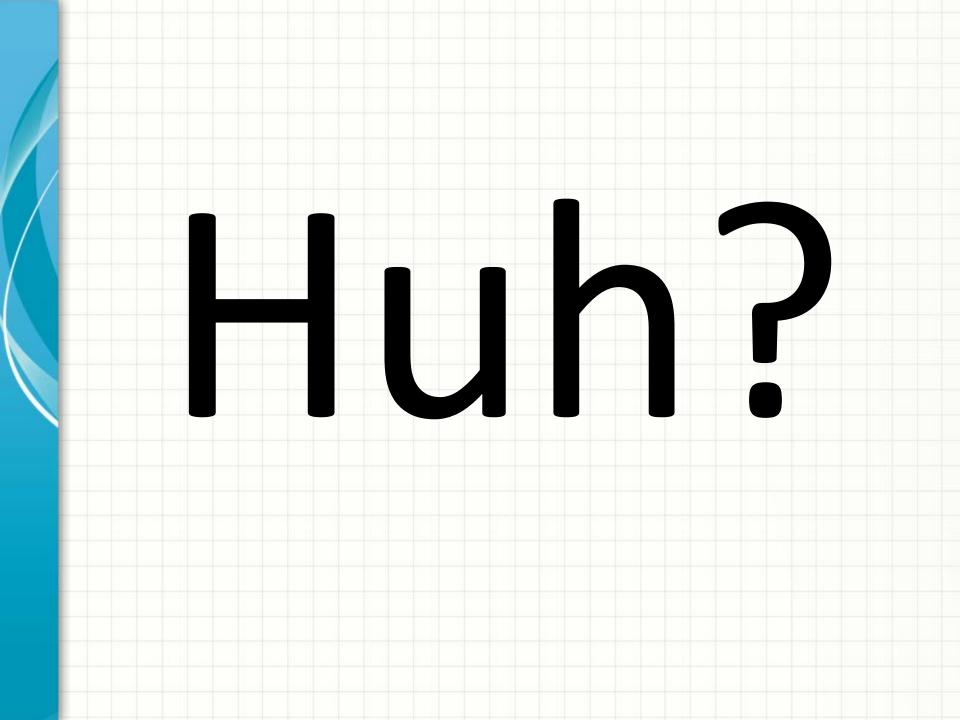
- Closed system
- Known and constant pressure
- Known and constant temperature
- Reaches equilibrium





The Beer-Lambert Law (or Beer's law)

- Beer's Law provides that there is a linear relationship between absorbance and the concentration of an absorbing species.
- Molecules absorb energy, but only energy of a certain wave length will be absorbed by a molecule of any given compound.



C_2H_5OH

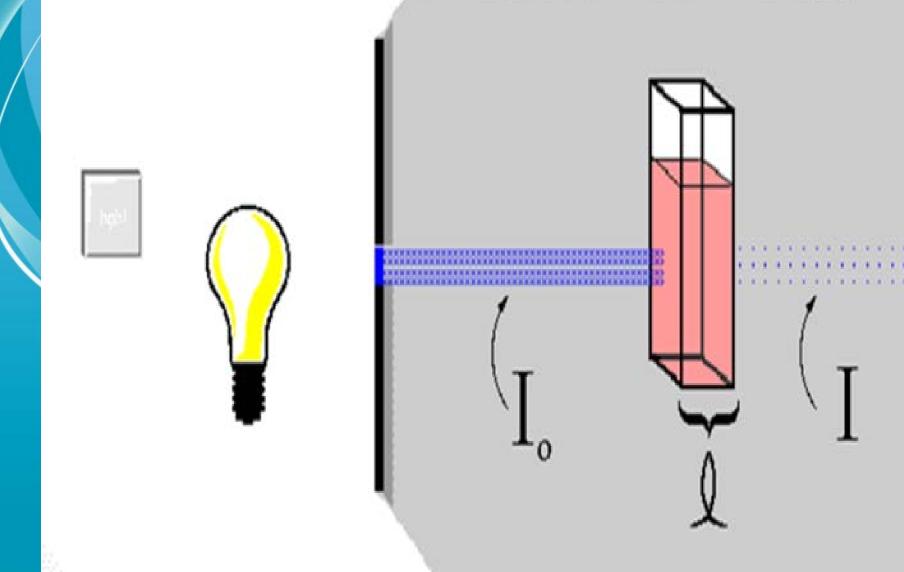




The Beer-Lambert Law (or Beer's law)

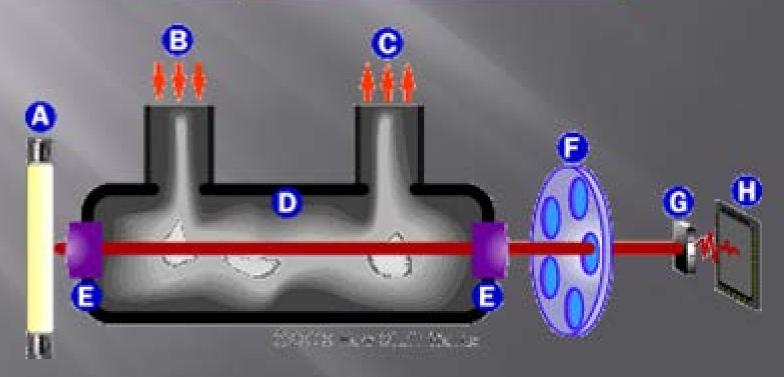


The Beer-Lambert Law: A= Ecl



Fundamentals of Infrared Spectrophotometry

Quartz lamp
 (IR source)
 B Breath input
 B Breath outlet
 Microprocessor
 Sample chamber





Henry's Law & Breath Testing

 The theory is that by analyzing the amount of ethyl alcohol found in the breath (gas) we can quantify the amount of ethyl alcohol in the blood (liquid).





Key Things to Remember from Time Travel

 The ability to measure BrAC quickly and inexpensively brought "per se" statutes.

 "Per se" statutes became a tool to make getting convictions easier because whether a person's ability to drive is impaired is far more amorphous, and harder to prove than whether a person has a BAC above a proscribed limit.





We Have Cast Too Wide a Net

 The need for simplicity in prosecutions has caused the casting of too wide a net. The scientific premises on which breath testing for blood alcohol quantification is based have been over-extended and taken us far from the original purposes of drunk driving laws which were to make our streets safe from impaired drivers.



Scientific Community Concerns

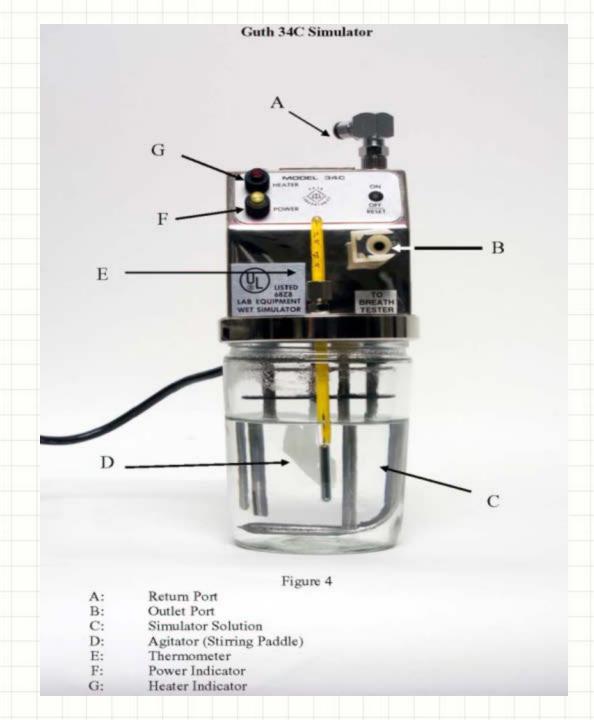
 The reliance on quantifying blood alcohol concentration by analyzing a person's breath sample has been generally accepted in our courts, but that acceptance has not been shared by many members of the scientific community including forensic toxicologists.



Scientific Community Concerns

 The Society of Forensic Toxicologists (SOFT) sponsors technical publications to improve the forensic toxicologists' skills and knowledge. One such publication is the Forensic Toxicology Laboratory Guidelines. Although the guidelines review methodology of blood and urine testing for alcohol, SOFT did not consider breath testing as a method to quantify blood alcohol levels.

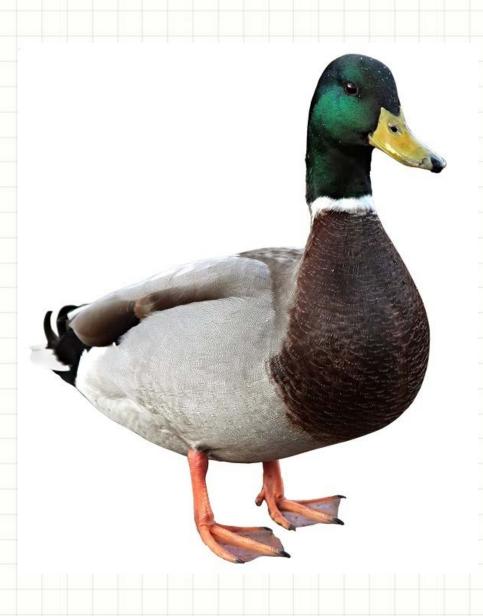
CERTIFICATION is often incorporated within the protocol for a subject breath test, and when incorporated, the subject test is said to be valid when the certification measures within the permitted uncertainty range.



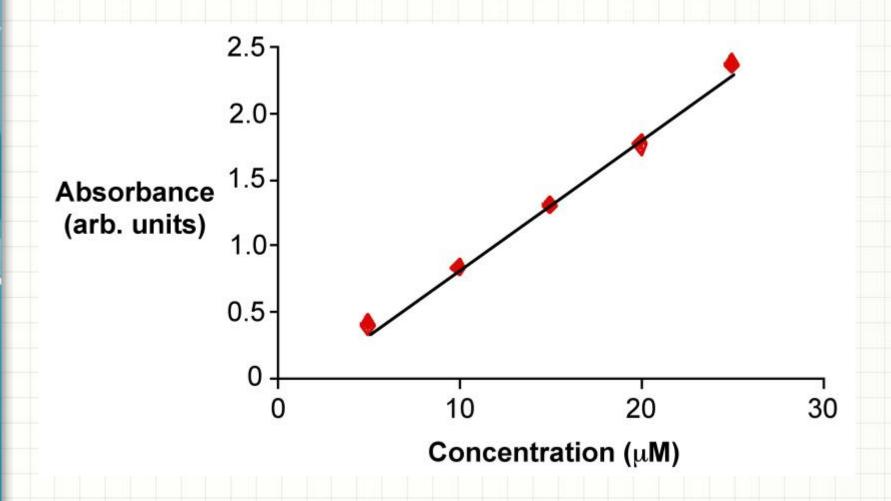
CALIBRATION is the process of presenting a known sample to a machine, and instructing the machine to reset itself so that if the identical stimulus is observed in the future, the machine will report the measurement that is communicated as part of the calibration - it changes the way the machine operates for all future uses.



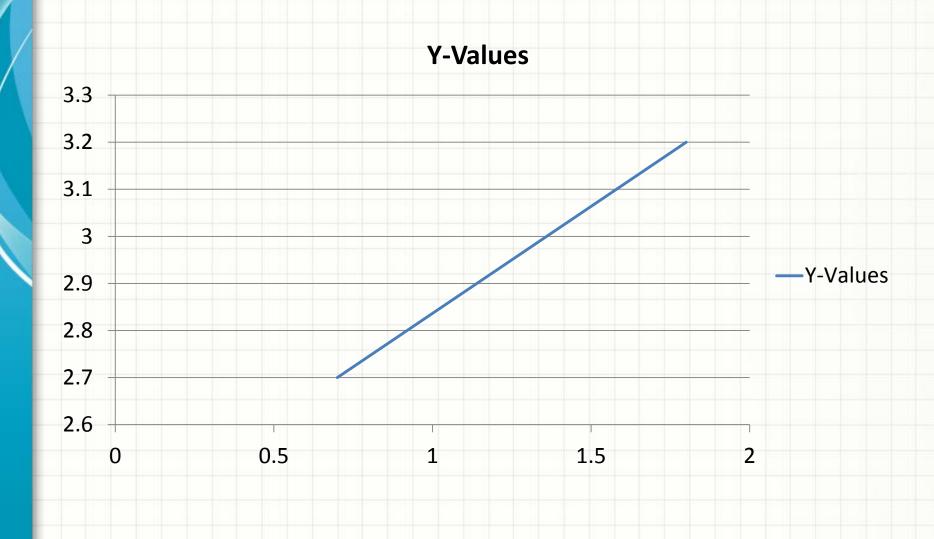
This is a Bear!!!!!!!



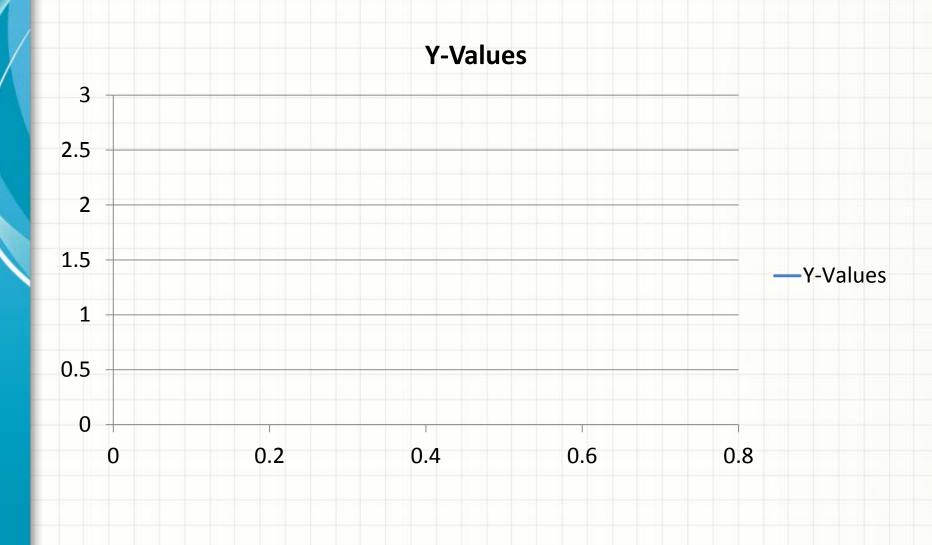
5 Point Curve



2 Points



Single Point Certification





"You Should Never, Never Doubt What No One Is Certain About"

- Uncertainty of Measurement
- Not Error Margin
- BAC Never Exact
- Must be reported!
- +/- .01?
- Why does this matter?



PAY NO ATTENTION TO THE MAN BEHIND THE CURTAIN



Body Temperature Matters

- Henry's Law
- Manufacturer agrees e.g. Simulator
- Client's temperature not taken
- The machine assumes expired breath temperature is 34° Celsius. *Is it correct?*



34° C is wrong

- In 1998 the International Association for Chemical Testing (IACT) published a literature review where they agreed that the average expired breath temperature was 35° C.
- Others have suggested it is as high as 37° C.

- In 1989 Fox and Hayward performed a study to measure how much breath readings are affected by having an elevated core body temperature.
- The BRAC increased over the BAC "8.6% for each degree Celsius increase in deep-core body temperature."
- Still think .08 = .08?
- Fox, G.R. and Hayward J.S., Effect of Hyperthermia on Breath-alcohol Analysis, Journal of Forensic Science, 34(4): 836-41, July, 1989.



BREATH TESTING MACHINES ARE
PROGRAMMED TO RECOGNIZE THAT FOR
EVERY ONE PART OF ALCOHOL IN ONE'S
BLOOD, THERE ARE 2100 PARTS OF ALCOHOL
IN ONE'S BREATH





Not One Size Fits All

• 1100:1 to 3400:1

 If client has a true partition ratio of less than 2100 to one, the machine will actually artificially inflate true blood alcohol level.

Partition Ratio

Here's how to calculate your client's
 BAC if he has a lower partition ratio.

 (Client's BAC) / 2100 X (lower partition ratio) = BAC

Partition Ratio

.100 / 2100 = .000047619

 $.000047619 \times 1500 = .07$

- This quality assurance program must consider, among other things:
 - -the test subject;
 - -the analysis process;
 - —the manner a test result is reported and recorded; and
 - inspection and maintenance of the devices used for breath testing.

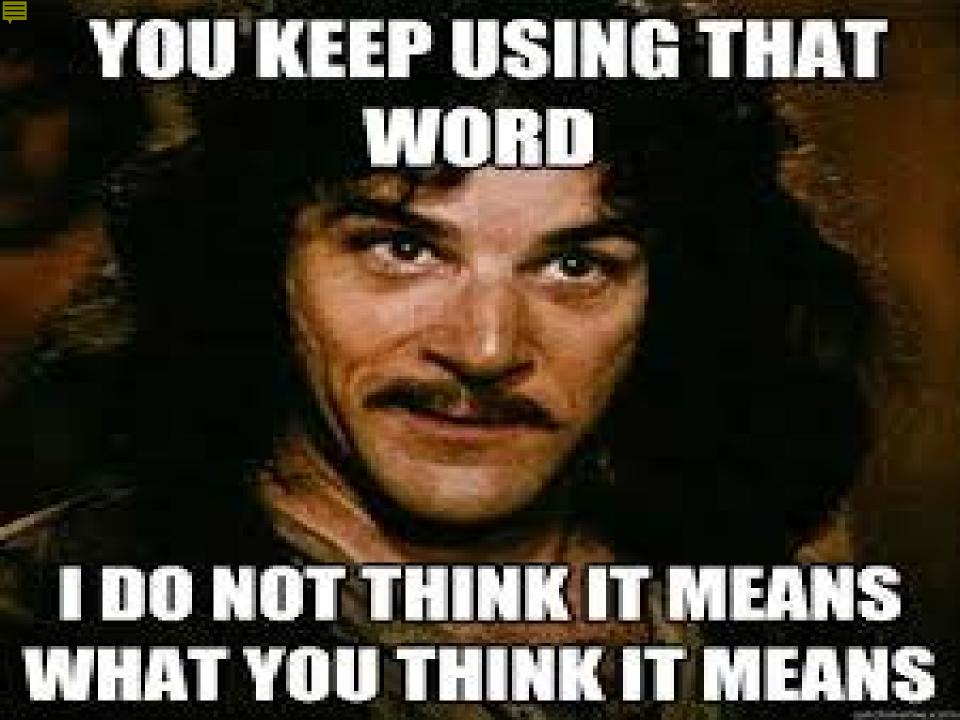


- Particularly important are:
 - a pre-test deprivation-observation period of at least 15 minutes
 - –an analysis of at least duplicate breath specimens.

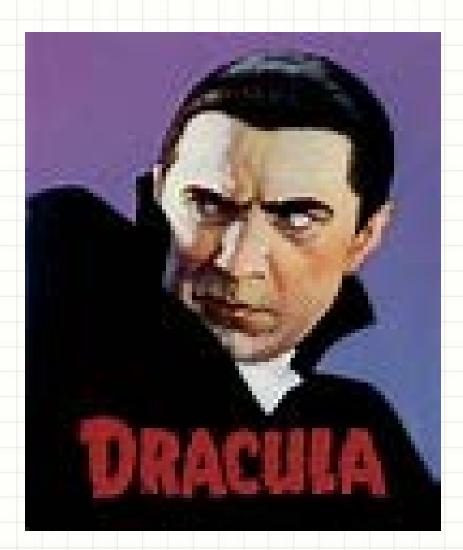
Despite this, in many states there is still only one breath sample being tested and the quality of the pre-test deprivation-observation is low.

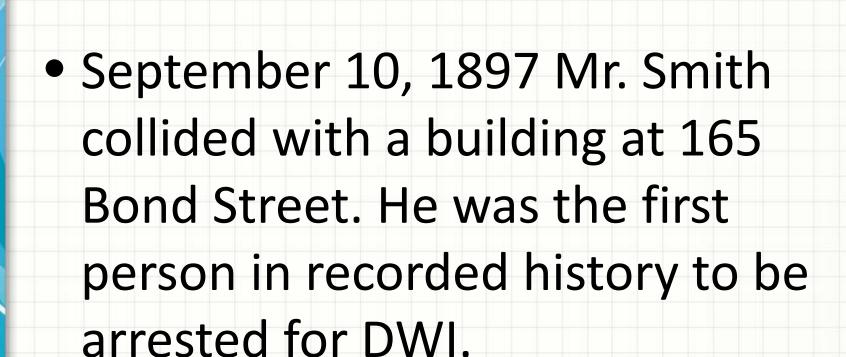
 Even the way the result is recorded, i.e., without a reported margin of uncertainty, takes the testing beyond the scientific foundation on which it is built.

 This is especially important considering the tremendous impact even a .01 difference in blood alcohol concentration can make. It not only can affect whether charges will be brought, but also what level charges and whether a certain plea bargain will be offered to a defendant.



What does Dracula Have to Do with DWI?





 165 Bond Street was the home of Sir Henry Irving, an English stage actor.

 In the summer of 1897 Irving employed a young man as a manager for his Lyceum theater and then allowed him to take up residence at 165 bond street where in 1897 he began to write a novel. That young man...

What does Dracula Have to Do with DWI?

- Was Bram Stoker.
- The novel was Dracula



 And that is what Dracula has to do with DWI!

Me in front of 165 Bond St.

