

Curt E. Harper, Ph.D., F-ABFT



- 1 Chief Toxicologist at the Alabama Department of Forensic Sciences
- 2 17 years of experience
- 3 Certified Drug Recognition Expert Instructor
- 4 Fellow of the American Board of Forensic Toxicology

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Disclosure

- DrugImpairment.com paid me for my services.
- This work was not associated with my employment at Alabama Department of Forensic Sciences (ADFS).
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- I have no other financial disclosures.

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Courtroom Testimony in Alcohol Cases: Important Topics

Curt E. Harper, Ph.D., F-ABFT

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Objectives/Topics

- Explain how to testify about ethanol pharmacokinetics, covering absorption, distribution, metabolism, and elimination
- Provide guidance on testimony regarding the Dubowski table and an overview of its history and evolution
- Demonstrate how to effectively testify on ethanol pharmacodynamics, emphasizing its effects on behavior and impairment



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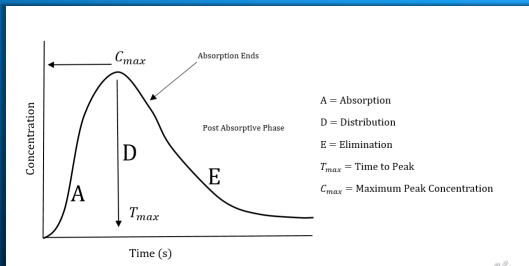
Introduction

- Witness Types
 - Fact
 - Expert (Opinion)
- Pharmacology
 - Pharmacokinetics v. Pharmacodynamics
- Forensic Toxicology
 - Human Performance (DUI)



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Ethanol Pharmacokinetics



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R. G. Turner. Blood Alcohol and Its Relation to Intoxication in Man. 1935.

Degree of Intoxication		
Intoxicated	Under the influence of liquor. Able to stand, but talk and walk not normal	
Markedly Intoxicated	Able to stand but falls frequently	
Alcoholic Stupor	Not able to stand but would attempt to answer questions and attempt movements	
Coma	Unable to move or answer	
0.1	0.2	Not intoxicated
0.21	0.3	Intoxicated
0.31	0.4	Marked intoxication
0.41	0.5	Alcoholic stupor
0.5	0.6	Coma



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Clarence Muehlberger (NSC) 1938

Table I. Five Stages of Alcohol Influence in Relation to BAC and UAC and the Clinical Signs and Symptoms of Intoxication According to a Table Constructed by Clarence Muehlberger and Published by the NSC in 1938 (63)

Stage of alcohol influence	Ethyl alcohol level (g/100 mL)		Clinical
	Blood	Urine	
Subclinical	0.01-0.12	0.01-0.16	Normal by ordinary observations. Slight change by special tests. Decreased inhibitions. Emotional instability. Slight incoordination. Slowing of stimuli response.
Stimulation	0.09-0.21	0.13-0.29	
Confusion	0.18-0.30	0.26-0.42	Disturbance of sensation. Decreased pain sense. Staggering gait. Slurred speech.
Stupor	0.27-0.39	0.38-0.54	Marked stimuli decrease. Approaching paralysis. Complete unconsciousness. Depressed reflexes. Subnormal temperature. Anesthesia. Impairment of circulation. Stertorous (labored) breathing. Possible death.
Coma	0.36-0.48	0.51-0.67	

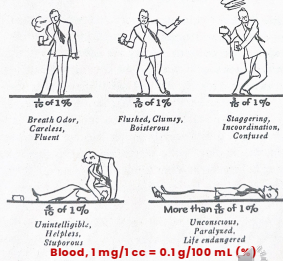
AW Jones. Dubowski's stages of alcohol influence and clinical signs and symptoms of drunkenness in relation to a person's blood-alcohol concentration - Historical background. JAT 2024.



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WHAT ABOUT ALCOHOL

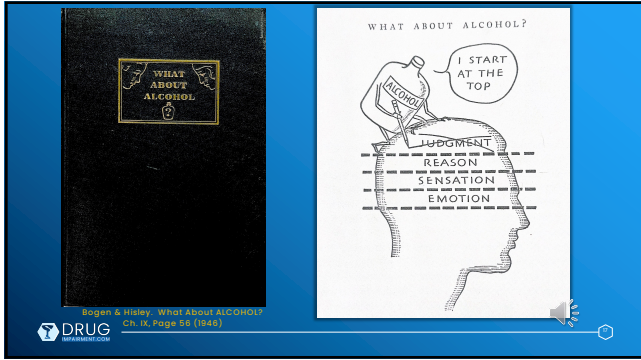
EFFECTS OF ALCOHOLIC CONTENT OF THE BLOOD.



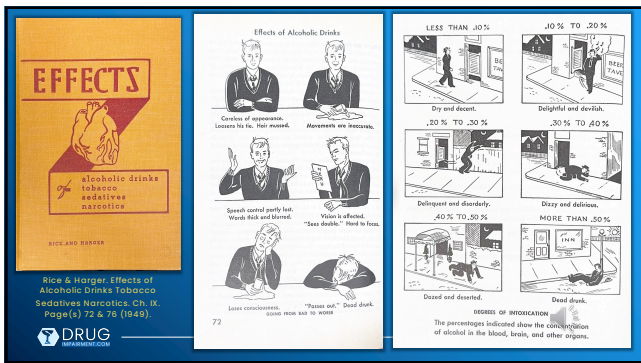
Blood, 1 mg/1 cc = 0.1 g/100 ml (%)



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Dubowski
1957
Police

Synthesis of:
Bogen
Emerson
Turner
Harger
Muehlberger

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POLICE 1979 30 1007



STAGES OF ACUTE ALCOHOLIC INFLUENCE/INTOXICATION

BUTYL ALCOHOL LEVELS (Per Cent by Weight)		STAGE OF ALCOHOLIC INFLUENCE	CLINICAL SIGNS/SYMPTOMS
W OAD	ORINE		
0.01-0.05	0.01-0.07	Sobriety	No apparent influence Behavior nearly normal by ordinary observation Slight changes detectable by special tests
0.05-0.12	0.04-0.16	Euphoria	Mild euphoria, sociability, talkativeness Increased self-confidence; decreased inhibitions Diminution of attention, judgment, and control Loss of efficiency in fine performance tests Emotional instability; decreased inhibitions Loss of critical judgment
0.09-0.25	0.12-0.34	Excitement	Impairment of memory and comprehension Decreased sensory response; increased reaction time Some muscular incoordination
0.18-0.30	0.34-0.41	Confusion	Disorientation; mental confusion; dizziness Exaggerated emotional states (fear, anger, grief, etc.) Disturbance of sensation (diplopia, etc.) and of perception of color, form, motion, dimensions Decreased pain sense Impaired balance; muscular incoordination; staggering gait; slurred speech
0.37-0.40	0.37-0.54	Stupor	Apathy; general inertia; approaching paralysis Markedly decreased response to stimuli Marked muscular incoordination; inability to stand or walk Vomiting; incontinence of urine and feces Impaired consciousness; sleep or stupor
0.35-0.50	0.47-0.67	Coma	Complete unconsciousness; coma; anesthesia Depressed or abolished reflexes Subnormal temperature Incontinence of urine and feces Disturbance of circulation and respiration Possible death
0.45-	0.60-	Death	Death from respiratory paralysis

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Low BACs



- Support of 0.05%
 - NTSB, NSC, AMA
 - Utah, Other countries
- Martin. A Review of Alcohol-Impaired Driving: The Role of Blood Alcohol Concentration and Complexity of the Driving Task. 2020.
- Phillips. Official blame for drivers with very low blood alcohol content: there is no safe combination of drinking and driving. 2014.

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Definitions



- **Impairment** - A state of diminished performance in physical or mental ability as a result of a medical condition or after the consumption of alcohol or intake of other psychoactive drugs. Impairment is reflected in a person's decreased ability to perform skilled tasks, such as driving. (Jones)
- **Impairment** - Within-person temporary reduction in performance varying as a function of the pharmacokinetic curve of alcohol. Those signs may be subtle, and not always visible to the naked eye. (Fiorentino)

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Definitions

- **Intoxication** - The intoxicated state, when this is caused by excessive drinking is referred to as drunkenness, or inebriation. (Jones)
- **Intoxication** - An advanced stage of impairment when visible signs of alcohol use become apparent (Harper)
- **"Intoxicated and drunk** have become interchangeable in everyday usage, with "drunk" indicating a greater level of alcohol effects. The common point between the words, however, is that they both imply that the signs and symptoms of alcohol consumption are observable." (Fiorentino)

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Signs and Symptoms

<p><u>Signs (See)</u></p> <ul style="list-style-type: none"> • Balance & Coordination • Thick, slurred speech • Loud, boisterous, belligerent • Bloodshot, glassy eyes • Flushed face • Odor of alcohol • Droopy eyelids • Vomiting 	<p><u>Symptoms (Feel)</u></p> <ul style="list-style-type: none"> • Dizzy • Disoriented • Drowsy • Nauseous
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Visible versus Invisible

<p><u>Visible (Senses)</u></p> <ul style="list-style-type: none"> • Balance & Coordination • Thick, slurred speech • Loud, boisterous, belligerent • Bloodshot, glassy eyes • Flushed face • Odor of alcohol • Droopy eyelids • Vomiting 	<p><u>Invisible (Tests)</u></p> <ul style="list-style-type: none"> • Impaired Cognitive Function • Slowed Reaction Time • Impaired Divided attention • Sensory impairment (vision) • Reduced inhibitions
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Some Tips For Recognizing Visibly Intoxicated Persons

"Visible intoxication" is intoxication that you can see. If you can tell by looking at someone that the person has been drinking or using other drugs, the person is visibly intoxicated. Remember, IF YOU ARE NOT SURE, DON'T SELL!

Some common signs of visible intoxication include:



- Swaying, staggering or stumbling when walking
- Falling down
- Eyes that are bloodshot, glassy or look drowsy
- Difficulty handling money
- Slurred, rambling, loud or noisy speech
- Clumsy
- Difficulty standing

Please note: This is not an all-inclusive list. There may be signs of visible intoxication not listed.

50 Signs of Visible Intoxication can be found under Signs at https://www.oregon.gov/olc/olc/Pages/licenses_forms_publications.aspx

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Nausea and Vomiting

- Most naïve or novice drinkers would vomit when their BAC rises rapidly to surpass 0.12%. (Jones 2024)
- Most light-to-moderate drinkers seldom tolerate the amounts of ethanol necessary to reach a BAC of 0.15%
- Binge drinking is required to reach such high BAC.

Slurred Speech



- A typical clinical sign of intoxication e.g. after drinking alcohol or taking certain drugs resulting in imprecise speech articulation including deviation in rate, pitch and intensity and often an incorrect production of consonants & vowels. (Jones)

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Mellanby Effect



- The effects of a given dose of ethanol is more pronounced during rising period of the blood alcohol curve (absorption phase) compared with the falling period (post-absorptive phase).
- Impact: Individuals may underestimate their level of impairment particularly during falling phase.

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Intoxication is not always visible


- Visible intoxication will be present in most naïve and chronic drinkers (>50%) at BACs >0.15%.
- Most chronic drinkers with tolerance (>50%) will not display visible intoxication at BACs <0.15%.
- Majority of all drinkers (>84%) will be visible intoxicated at $\geq 0.20\%$.
- Visible intoxication is affected by tolerance and may mask intoxication even at BACs that would produce unconsciousness or death in some drinkers.

DRUG   Brick & Erickson. Intoxication is not always visible. Alcoholism. 2009.

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DRAM Shop Cases


- Central issue = visible intoxication
- Lawsuit against a bar or restaurant sells alcoholic drinks, brought after one of the establishment's patrons got drunk and got into an accident
- Unlawful to serve "visibly intoxicated" individual
- TIPs (**T**raini**n**g for Intervention Procedures)
- Burden of proof: More likely than not



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"Heavy or Moderate Drinking"


- NIAAA defines heavy drinking as follows:
 - For men, consuming ≥ 5 drinks on any day or ≥ 15 per week
 - For women, consuming ≥ 4 drinks on any day or ≥ 8 per week
- SAMHSA defines heavy alcohol use as binge drinking on ≥ 5 days in the past month.
- HHS & DOA defines drinking in moderation as limiting intake to ≤ 2 drink in a day for men and ≤ 1 drink in a day for women, when alcohol is consumed



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Alcohol Relative Risk of Being Involved in a Traffic Crash

BAC (%)	Grand Rapids Original (1974)	Grand Rapids Revisited (1999)
0.00	1.00	1.00
0.01	0.92	1.03
0.02	0.96	1.03
0.03	0.90	1.06
0.04	1.08	1.18
0.05	1.21	1.38
0.06	1.41	1.63
0.07	1.52	1.88
0.08	1.85	2.65
0.09	1.95	3.54
0.10	5.33	4.79
0.11	5.83	6.44
0.12	4.94	8.90
0.13	4.94	12.60
0.14	10.04	16.38
0.15	10.04	21.18
0.16	41.88	29.48
0.17	21.38	38.05
0.18	21.38	50.58
0.19	21.38	65.32
0.20	21.38	81.79
0.21	21.38	97.76
0.22	21.38	117.72
0.23	21.38	134.26
0.24	21.38	146.90
0.25	44.08	158.88




Blomberg "The Long Beach/Fort Lauderdale relative risk study" Journal of Safety Research, 2009.

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High Risk Populations

- < 21 years
- Commercial Drivers
- Motorcycles
- Older Drivers



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Conclusions

- Using Dubowski Table in Court
 - Understand its purpose and evolution
 - Peer reviewed and published
 - Authoritative source in the field
- Impairment versus Intoxication
- Visible versus Invisible

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References

1. IACT Newsletter 2012. Dubowski Table.
2. Brick & Erickson. Intoxication is not always visible. Alcoholism 2009.
3. AW Jones. Dubowski's stages of alcohol influence and clinical signs and symptoms of drunkenness in relation to a person's blood-alcohol concentration – Historical background. JAT 2024.

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Contact Info:
Curt E. Harper, Ph.D., F-ABFT
Forensic Toxicologist
Toxconsult@drcurtharper.com



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