Objectives

- Define Ethyl Alcohol.
- Define the term intoxication and explain why it occurs.
- Explain the process of ethyl alcohol in the human body from the time it is consumed until it is eliminated.
- Identify the physical characteristics and behavioral patterns of a person at differing blood alcohol content levels.

Objectives

- Explain equilibration of alcohol in the human body.
- Identify medical emergencies that may simulate alcohol impairment.
- List the symptoms of a diabetic and complex partial epileptic.

Alcohols

- Colorless, volatile, flammable liquids
- Created synthetically (distilled spirits) or through fermentation (beer and wine) or used as solvents, in drugs, cleaning solutions, etc.
- Alcohols are miscible in water
- Organic compounds composed of carbon, hydrogen, and oxygen atoms
- Ethanol, ethyl alcohol, ETOH, grain alcohol = drinking alcohol
- Alcoholic beverage (0.5% alcohol or >)

COMMON ALCOHOLS

<table>
<thead>
<tr>
<th>Name</th>
<th>Formula</th>
<th>Boiling Point</th>
<th>Uses</th>
<th>Toxicity &amp; Metabolites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol (Methyl Alcohol)</td>
<td>CH₃OH</td>
<td>64.5°C</td>
<td>Paint remover</td>
<td>Approx. 75ml Formic Acid</td>
</tr>
<tr>
<td>Ethanol (Ethyl Alcohol)</td>
<td>CH₃CH₂OH</td>
<td>78.3°C</td>
<td>Fuel</td>
<td></td>
</tr>
<tr>
<td>Isopropanol (Rubbing Alcohol)</td>
<td>CH₃CH-OH</td>
<td>82.3°C</td>
<td>Medicinal Antiseptic</td>
<td></td>
</tr>
<tr>
<td>Ethylene Glycol (Antifreeze)</td>
<td>CH₂-OH</td>
<td>198°C</td>
<td>Coolant</td>
<td>Approx. 100ml Oxalic Acid</td>
</tr>
</tbody>
</table>

All alcohols are poisons to the human body.

“IN TOXICATION”

.400 - .450 BAC ethanol: lethal for 50% of the population
PROOF Vs. PERCENT (%)

PROOF = PERCENT (X) 2
EXAMPLE: 15% RED WINE (X) 2 = 30 PROOF
PERCENT = PROOF (/) 2
EXAMPLE: 86 PROOF WHISKEY (/) 2 = 43%

One Beer / One Wine / One Whiskey

BEER:
12oz  X  5%  (4% - 6%) = .6 oz
WINE:
5oz  X  12%  (12% -15%) = .6 oz
WHISKEY:
1.5oz  X 40%  (80 Proof) = .6 oz

THREE PHASES OF THE ALCOHOL PROCESS

- ABSORPTION
- DISTRIBUTION
- ELIMINATION

All three phases occur at the SAME TIME

ABSORPTION

- INHALATION (least likely to cause intoxication)
- INJECTION
- INGESTION

ALCOHOL BEGINS TO ENTER THE BLOODSTREAM IN 1-2 MINUTES ON AN EMPTY STOMACH.

ON AN EMPTY STOMACH COMPLETE ABSORPTION CAN BE AS SHORT AS 45 MINUTES FOR A SINGLE BEVERAGE.

ON A FULL STOMACH COMPLETE ABSORPTION CAN TAKE UP TO 3 HRS.

*20% of alcohol is absorbed from the stomach.

*80% of alcohol is absorbed from the small intestines.

*ALCOHOL PENETRATES THE ORGAN MEMBRANES OF THE BODY UNCHANGED THROUGH DIFFUSION.
WHAT AFFECTS ALCOHOL ABSORPTION?
- Type and amount of food ingested (greatest effect)
- Carbonation
- Alcohol concentration in stomach
- High altitudes

Residual Mouth Alcohol
The alcohol which remains in the mouth and can affect the breath alcohol test.

DISTRIBUTION
How is alcohol transported throughout the human body?
Bloodstream
Equilibration

- Equilibration means balanced.
- As blood passes through tissue, alcohol diffuses in to it.
- Alcohol is attracted to water.
- Organs with high levels of water absorb alcohol faster.
  - Liver, Brain, Kidneys
- Parts of body with low levels of water absorb alcohol slowly.
  - Muscle, Bone, Fat

Alcohol distribution varies based on:

- Individual body tissue water content
- Gender

Average Man - 68% Water

100 lb. man: 200 lb. man:
68 lb. water 136 lb. water

- If both men consumed the same amount of alcohol and the 100 lb. man had an alcohol concentration of .100, what would be the BAC of the 200 lb. man?
- Approx. ½, or about .050

Average Woman - 55% Water

100 lb. man: 100 lb. woman
68 lb. water 55 lb. water

- If both consumed the same amount of alcohol and the 100 lb. woman had an alcohol concentration of .100, what would be the BAC of the 100 lb. man?
- Approx. .080 (55÷68=.8; .100X.8= .080)

If all of the below reached a specific BAC of .100, who had to drink the most alcohol to reach that BAC?

- 100 lb. woman
- 100 lb. man
- 200 lb. woman
- 200 lb. man

The Elimination Phase

The human body rids itself of ethanol.
**BREATH**

Alveolar Sacs

Bronchial Tubes

(Non-Metabolized Form)

**Other Forms of Elimination**

Excretion

• Non-metabolized Alcohol Molecules in Urine

Evaporation

• Non-metabolized Alcohol Molecules in Perspiration

10% Loss Through Breath/Urine/Sweat

**Metabolized Alcohol**

The Liver is the primary organ that eliminates alcohol

• It eliminates 90% of all alcohol

• Acetic Acid breaks down to CO₂ and water

• @ .015 grams (average) of alcohol per hour (alcoholics higher rate)

• Alcohol collects in the body when absorption outpaces elimination

**Alcohol Concentration Curve**

• Can be lower at time of test than time of arrest

• Can be same at time of test and time of arrest

• Can be higher at time of test than time of arrest

**Intoxication**

The reduction or loss of normal physical and mental faculties

**Alcohol is a ____________ drug.**
Judgment
- Social inhibitions
- Self evaluation
- Risk assessment
Euphoria
Loss of memory
Shortened attention span
Blurring of vision
Double vision
Glare recovery time
Light fixation
Positional Alcohol Nystagmus
Distance distortion
Hearing perception
Sense of smell
Sense of taste
Muscular coordination
Vasodilator
Diuretic
Danger: Exposure

Alcohol Concentration (gms/100 ml blood)

- .60-
- .44-
- .30-
- .08-
- .04-
- .02-
- .00-

AMA Study Released 1960

Coma/Death May Result from Central Nervous System Depression.
.30 Medical Attention May be Required/Jails will not accept.

All Persons become Intoxicated/Per Se

Most Persons Not Intoxicated/Per Se for Commercial Vehicle Operators
Per Se for under 21 yr.

B.A.C. World Record?

0.914

Behavioral & Physical Effects of Alcohol

- .30 Recommend that person be examined by medical professional before incarcerating.
- .20 Acquired Tolerance no longer effective
- .15 May become over-confident in driving ability
- .08 to .10 Too impaired to safely operate a motor vehicle. Complex Reaction Time is Tripled. Moral behavior is relaxed.
- .02 Bad Driving Habits Become Exaggerated

Tolerance

- The decreased effect of a given dose of a drug after repeated use.

Two Types:
- Natural
- Learned
Natural Tolerance
- Inborn
- Physical
- Stress

Learned Tolerance
- Behavioral
- Acquired
- Acute

Acute Tolerance
- Mellonby Effect

Medical Conditions
Certain diseases or illness can produce symptoms resembling alcohol intoxication.

Epileptic Complex Partial Seizure Behaviors
- Incoherent speech
- Glassy-eyed staring
- Aimless wandering
- Chewing
- Lip smacking
- Picking at clothing
- May be confused and tired after seizure

Diabetic Emergencies
**Low Blood Sugar**
- Sweating
- Pale skin
- Poor coordination
- Incoherent speech
- Rapid behavioral changes
- Stupor / staggering

**High Blood Sugar**
- Drowsiness
- Extreme thirst
- Slurred speech
- Nausea / vomiting
- Stupor / staggering
- Excessive urination
- Fruity / wine-like odor on breath (acetone)

*One out of every 20 people has diabetes.*