# Chapter 4

## An Introduction to Alcohol: Man's Oldest Recreational Chemical

# Why do People Consume Alcohol?

- It is ingested by humans for its psychoactive effects
- Anthropological evidence suggests that early civilizations may have come about in response realization that surplus could last longer and be stored easier if allowed to ferment
- Beer, Wine and liquors have mild antibacterial properties thus they were safe to ingest (Dunn, 2013)
- Causes a euphoric feeling helping facilitate social interaction

# Brief history

- Beer dates back to 9,000 B.C.E., potentially as far back as 18,000 B.C.E. (Tucker, 2011)
  - Early forms of beer and wine were nutritious
- In pre-Christian Rome intoxication was seen as a religious experience.
- The Bible refers to alcohol as a gift from God

# Brief history

- By the start of the 19th Century public intoxication in European culture was viewed not as a sign of religious ecstasy but as a public disgrace
- Post World War I, the U.S. embarked on a social experiment known as Prohibition

# Alcohol Today

- In the US:
  - Alcohol content in beers:
    - 3.5% and 5%
    - Specialty beer can have as little as 3% to more than 9%
  - Alcohol content in wine:
    - 8% to 17%
    - Wine coolers: 5% to 7%
    - Fortified wines: 20-24%
  - Alcohol content in hard Liquors:
    - 30-50%, but can be up to 80%

# Social Drinking

- Alcohol abuse or addiction is defined as somebody who will not:
  - Require the daily use of alcohol to function
  - Make attempts to limit heavy alcohol use to a specific time (weekends for example), with periods of abstinence
  - Engage in continuous “binges” that may last for days, weeks, or months, interspaced with periods of abstinence
  - Engages in the daily use of alcohol in excess of what is prudent for health, or social norms

# Social Drinking

- The person with an alcohol use disorder will experience any of a wide range of medical, social, legal, or vocational consequences associated with heavy alcohol use
- The rare or social drinker does not meet any of these criteria

# Scope of alcohol use in the US

- 80-90% of US adults have drank at one point in their lives
- Average adult's annual consumption equivalent of 80 proof vodka:
  - US: 23.6 liters (or 6.23 gallons);
  - Russia 39.4 liters;
  - UK 33.4 liters;
  - Canada 24.4 liters

# Pharmacology of Alcohol

- The main route of alcohol absorption is through small intestine
- Factors affecting the speed of ingestion:
  - Compounds such as carbonated beverage or seltzer (increase)
  - High-fat foods (decrease)
  - Experience peak blood levels following a single drink:
    - Empty stomach – in 30 to 60 minutes
    - With food – 1 to 6 hours

# Pharmacology of Alcohol

- Different theories have tried to account for alcohol's intoxicating effects
  - Membrane fluidization theory
  - Tetrahydroisoquinoline (TIQ) hypothesis
  - Scientists now believe alcohol is a "dirty" drug affecting many neural systems
    - Gamma, Amino- Butyric Acis (GABA)
    - N-methyl-D-aspartate (NMDA) receptors for glutamate
    - Endogenous opiod system
    - Dopamine
    - Serotonin

# Biotransformation of alcohol

- Liver is primary organ
- Females less able to break down alcohol in blood
- About 10% of alcohol ingested is excreted unchanged through the lung, skin, and urine
- Biotransformation is accomplished in 2 steps:
  - Alcohol dehydrogenase (ADH) – breaks alcohol into acetaldehyde
    - Ultimately alcohol is biotransformed into carbon dioxide, water, and fatty acids

# Biotransformation (continued)

Speed rule of thumb

liver biotransforms

- about one mixed drink of 80 proof alcohol
- 4 ounces of wine
- One 12 ounce can of beer

every 60 - 90 minutes

# Alcohol-flush reaction

- Caused by genetic mutation. Liver unable to produce enough aldehyde dehyrogenase
  - 3% and 29% of people of European descent
  - 47 and 85% of people of Asian descent
- when blood levels of acetaldehyde reaches to 20 times that of those without this mutation, symptoms such as facial flushing, heart palpitations, dizziness, and nausea may occur

# Blood alcohol level (BAL)

- A measure of the level of alcohol actually in a given person's bloodstream
- Reported in terms of milligrams of alcohol per 100 milliliters of blood (mg/mL)
- Example: a BAL of 0.10 is one-tenth of a milligram of alcohol per 100 milliliters of blood

# Subjective side effects

- At low BACs, expectations play a major role in how they interpret alcohols' effects
- Disinhibition effect –
  - interferes with normal functions of inhibitory neutrons in the cortex
  - "forget" social inhibition

# Medical complications

- Hangover
- Effects on the cardiovascular system
- Effects on the gastrointestinal tract
- Effects on sleep for social drinker
- Social drinking and stroke
- Alcohol use and neurocognitive effects
- Drug interactions with social alcohol use
- Alcohol use and accidental injury or death

# Accidents

- Plays a major role in motor vehicle accidents
- Has been found to be a factor in 51% of all boating fatalities.
- 40-67% of all fire related fatalities
- 52% of patients treated at one major trauma center were found to have alcohol in their blood at the time of admission (Cornwell, et al., 1998)

# Interpersonal Violence

- There is a known association between alcohol use and interpersonal violence.
- It has been suggested that the alcohol-related disinhibition effect might explain, in part, the relationship between alcohol use and aggressive behavior
- In approximately 86% of homicides, 60% of sex offenses, 37% of physical assault, and 30% of child abuse, the perpetrator was under the influence of alcohol at the time of the offense (Greenfield, 2007; Parrott & Giancola, 2006).

# Alcohol use and the DSM-V

- Two alcohol related disorders that may relate to rare/social drinker:
  - Alcohol intoxication
  - Unspecified alcohol related disorder