Alcohol is the oldest and most widely used psychoactive drug in the world. Throughout history, societies' attitudes towards beer, wine, and distilled liquors has wavered between prohibition, temperance, and free use. It is legal in most countries; Islamic countries prohibit its use.

This chapter surveys the chemistry of alcohol, its pharmacology (including effects on the brain’s neurotransmitters), and physiological/psychological effects and reviews the classification of beverages containing alcohol.

Although the absorption and distribution of alcohol via the circulatory system varies among individuals (and genders) everyone’s metabolism eliminates the alcohol at a fairly fixed rate. Blood alcohol concentration (BAC) correlates to the severity of alcohol effects.

The desired effects of alcohol are dose dependent and include relaxation, lowering of inhibitions, and a certain high. The side effects include decreased alertness, exaggerated emotions, slurred speech, unsteady gait, heart problems, cirrhosis of the liver, and neurological damage. Alcohol causes more health, domestic, social and legal problems than any other psychoactive drug, especially for heavy and/or long term drinkers. Between 15% and 25% of emergency room patients test positive for alcohol and 40% of industrial fatalities involve alcohol.

Binge drinking has increased at colleges. Many freshmen continue their high school drinking patterns their first year of college, by their senior year most have learned how to control their drinking.

A movement known as the Amethyst Initiative advocates lowering the legal drinking age in the U.S. despite the problems student drinking causes such as lower grades, binge drinking, and “second-hand” drinking (exposure of non-drinkers to violence, unwanted sexual advances and vandalism).

Polydrug abuse, mental health complications, violent behaviors, impaired driving, and damage to a fetus during pregnancy are some of many negative consequences associated with alcohol abuse.

Drinking patterns vary depending on the culture of the individual. Research shows that as people assimilate into American culture, their drinking patterns change. The road to alcoholism varies depending on family history, childhood abuse, peer pressure, and the availability of alcohol.
Chapter 5 - DOWNERS: ALCOHOL

I. OVERVIEW
   A. Introduction
   B. History (also see chapter 1)

II. ALCOHOLIC BEVERAGES
   A. The Chemistry of Alcohol
   B. Types of Alcoholic Beverages
      1. Beer
      2. Wine
      3. Distilled Spirits (liquor)
      4. Other Alcoholic Beverages

III. ABSORPTION, DISTRIBUTION, & METABOLISM
   A. Absorption & Distribution
   B. Metabolism
      1. Blood Alcohol Concentration (BAC)

IV. DESIRED EFFECTS, SIDE EFFECTS, & HEALTH CONSEQUENCES
   A. Levels Of Use
      1. Abstention
      2. Experimentation
      3. Social/Recreational Use
      4. Habituation
      5. Abuse
      6. Addiction
   
   B. Low-To-Moderate-Dose Episodes
      1. Physical Effects
      2. Psychological Effects
      3. Neurotransmitters Affected by Alcohol
      4. Sexual Effects
   
   C. High-Dose Episodes
      1. Physical Effects of Intoxication
      2. Mental & Emotional Effects
      3. Alcohol Poisoning (overdose)
      4. Blackouts
      5. Hangover
      6. Sobering Up
   
   D. Chronic High-Dose Use
      1. Digestive System & Liver Disease
      2. Other Digestive Organs
      3. Cardiovascular Disease
      4. Nervous System
      5. Sexual Desire & the Reproductive System
      6. Cancer
7. Systemic Problems
8. Mental/Emotional Effects

E. Mortality

V. Addiction (Alcohol Dependence/Alcoholism)
   A. Classification
      1. Early Classifications
      2. E. M. Jellinek
      3. Modern Classifications
      4. The Disease Concept of Alcoholism
   B. Heredity, Environment, & Psychoactive Drugs
      1. Heredity
      2. Environment
   C. Tolerance, Tissue Dependence & Withdrawal
      1. Tolerance
      2. Withdrawal
   D. Directions In Research

VI. Other Problems with Alcohol
   A. Polydrug Abuse
   B. Alcohol & Mental Problems
   C. Alcohol & Pregnancy
      1. Maternal Drinking
      2. Fetal Alcohol Spectrum Disorders (FASD)
      3. Paternal Drinking
   D. Aggression & Violence
   E. Driving Under The Influence
      1. Injuries & Suicide

VII. Epidemiology
   A. Patterns Of Alcohol Consumption
   B. Population Subgroups
      1. Men & Women
      2. Adolescents
      3. College Students & Learning
      4. Older Americans
      5. U.S. Military
      6. Homeless

C. Underrepresented Populations
   1. African Americans
   2. Hispanics
I. OVERVIEW (PP. 5.2–5.5)

A. INTRODUCTION (pp. 5.2–5.3)

Worldwide:
- There are 2 billion drinkers worldwide. Alcohol is consumed in all but Islamic countries.
- China's alcohol consumption has doubled, India's has risen 50% in the last 20 years;
- Russian men consume the equivalent of six to seven bottles of vodka per capita per year.
- Approximately 2 million people die annually due to alcohol and 76 million have an alcohol use disorder.

In the United States:
- last month about 129 million Americans had at least 1 drink; 16 million of this group are considered heavy drinkers;
- 25% to 30% of hospital admissions are due to complications from alcohol;
- about half of all murder victims and murderers were drinking alcohol at the time of the crime.

B. HISTORY (p. 5.3)

Alcohol is the oldest known and, at present, the most widely used psychoactive drug in the world. People were drawn to alcohol for the mental/emotional effects. Thirsty farmers discovered that grapes as well as the starch in potatoes, rice, corn, fruit, and grains could be fermented into alcohol (beer or wine). The first civilized settlements were created to ensure a regular supply of grain for food and beer, grapes for wine, and poppies for opium.

1. The Legal Drug

Throughout history alcohol has been used as a reward, a food (grain-rich beer), a cure-all, a sacrament, a substitute for water, a social lubricant, a tranquilizer, and as a source of revenue from taxes.

Almost every country has periods in its history when alcohol use was restricted or banned. Those prohibitions were usually rescinded.
The Gin Epidemic in England in the 1700s illustrated how poverty, unrestricted use, and industrial despair coupled with the higher concentration of distilled alcohol cause abuse and, for many, addiction. Efforts to curtail abuse included increased taxes and severe limits on production.

In colonial America, alcohol was a part of everyday life. The founding fathers encouraged the cultivation, manufacture, and sale of whiskey and rum and used the taxes to finance the American Revolution (and the slave trade).

In 1920 the U.S. government officially prohibited the production and sale of alcohol but widespread flouting of the Prohibition amendment and pressure by those who wanted to drink (and those who wanted the revenue from excise taxes) led to the repeal of Prohibition 13 years later.

II. ALCOHOLIC BEVERAGES (PP. 5.5–5.8)

A. THE CHEMISTRY OF ALCOHOL (p. 5.5)

There are hundreds of different alcohols
- ethyl alcohol (ethanol, grain alcohol) is the least toxic and is found in all alcoholic beverages;
- methyl alcohol (wood alcohol), isopropyl alcohol (rubbing alcohol, shellac, etc.);
- butyl alcohol, used in many industrial processes

Other components produced during fermentation, known as congeners, contribute to the distinctive tastes, aromas, and colors of alcoholic beverages.

Ethyl alcohol and carbon dioxide are produced from the fermentation that occurs when airborne yeast feeds on sugars in mash.

B. TYPES OF ALCOHOLIC BEVERAGES (pp. 5.5–5.8)

- Beer is produced from fermented grain.
- Wine is produced from fermented fruit.
- Distilled spirits with different concentrations of alcohol are made from fermented grains, tubers (e.g., potatoes), vegetables, and other plants. They can also be distilled from wine or other fermented beverages.

1. Beer

Brewing beer and making bread date back about 10,000 years to Neolithic times. Beer includes ale, stout, porter, malt liquor, lager, and bock beer. The differences among beers have to do with the type of grain used, the fermentation time, and whether they are top- or bottom-fermenting beers.

The alcohol content of most lager beers is 4% to 5%; ales, 5% to 6%; ice beers, 5% to 7%; malt liquors, 6% to 9%; light beers are only 3.4% to 4.2% alcohol.

CONSUMPTION OF BEER - Liters per Capita
### Beer vs. Wine

<table>
<thead>
<tr>
<th>Country</th>
<th>Beer</th>
<th>Wine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>131</td>
<td>22</td>
</tr>
<tr>
<td>England</td>
<td>103</td>
<td>13</td>
</tr>
<tr>
<td>United States</td>
<td>95</td>
<td>20</td>
</tr>
<tr>
<td>France</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Italy</td>
<td>103</td>
<td>59</td>
</tr>
</tbody>
</table>

### 2. Wine

In some early cultures, beer was the beverage of common people and wine was the drink of priests and nobles.

Most wines are made from the extracted juices of grapes, though some are made from berries, other fruits or starchy grains (e.g., Japanese saké rice wine).

European wines contain 8% to 12% alcohol; U.S. wines have 12% to 14% alcohol content. New techniques can produce wine with 16% alcohol. Wine coolers are usually diluted with juice and contain an average of 6% alcohol.

### 3. Distilled Spirits (liquor)

Beverages with greater than 14% alcohol were not available outside of Asia until about A.D. 800 when the Arabs discovered distillation, the process of liquid separation by evaporation and condensation. This eventually led to the production of distilled spirits such as brandy, whiskey, vodka, and gin.

Brandy is distilled from wine, rum from sugar cane or molasses, whiskey and gin from grains, and vodka from potatoes. The higher the alcohol proof, the quicker the drinker becomes inebriated.

#### PERCENTAGE OF ALCOHOL BY VOLUME

**WINE**

- Unfortified (red, white): 12–16%
- Fortified (sherry, port): 17–21%
- Wine cooler: 6%

**BEER**

- Regular beer: 4–5%
- Light beer: 3.4–4.2%
- Malt liquor: 6–9%

**LIQUORS & WHISKEYS**

- Bourbon, whiskey, Scotch, vodka, gin, brandy: 40–50%
- Everclear®: 95%

### 4. Other Alcoholic Beverages

These include the high potency mixed drinks favored by young adults (shooters like Flaming Dr. Pepper) and alcoholic energy drinks.
Absorption of alcohol into the bloodstream occurs at various sites along the gastrointestinal tract, including the stomach, the small intestines, and the colon.

In men, 10% to 20% of the alcohol is absorbed by the stomach. Most of the alcohol enters the capillaries in the walls of the small intestines through passive diffusion.

Women register higher blood alcohol concentrations than men from the same amount of alcohol. Thus chronic alcohol use causes greater physical damage to women than to men. Female alcoholics have death rates 50% to 100% higher than male alcoholics.

Alcohol is absorbed into the bloodstream and partially metabolized by the liver. The highest levels of blood alcohol concentration occur 30 to 90 minutes after drinking.

Factors that speed absorption:
- increasing the amount consumed
- drinking on an empty stomach
- heating the alcohol

Factors that slow absorption:
- eating before or while drinking
- consuming high fat/ high calorie foods

About 90% to 98% of alcohol is neutralized through metabolism (mainly oxidation) by the liver and then by excretion through the kidneys and the lungs as water and carbon dioxide.

The variation in people’s reactions to alcohol is due in part to hereditary factors that affect the metabolic efficiency of ADH and ALDH.

Metabolism occurs at a relatively defined continuous rate. About 1 oz. of pure alcohol (1.5 drinks) is eliminated from the body every three hours. An individual’s reaction and level of impairment depends on their drinking history, behavioral tolerance, mood, and a dozen other factors. It takes 30 to 90 minutes after ingestion to reach maximum blood alcohol concentration.

A BAC table measures the concentration of alcohol in an average drinker’s blood. For purposes of law enforcement a BAC of 0.08 is considered legal intoxication in all 50 states.
A. LEVELS OF USE (pp. 5.10-5.11)
Escalating patterns of use:
1. **Abstention** (nonuse)
2. **Experimentation** (use for curiosity with no subsequent seeking behavior)
3. **Social/Recreational Use** (sporadic infrequent use - no established pattern)
4. **Habituation** (established pattern of use with no major negative consequences)
5. **Abuse** (continued use despite negative consequences)
6. **Addiction** (compulsion to use, inability to stop use, major life dysfunction with continued use)

The effects of alcohol depend on the amount, the frequency, and the duration of use.

B. LOW-TO-MODERATE-DOSE EPISODES (pp. 5.11–5.13)
Most studies show that small amounts of alcohol and infrequent mild intoxication episodes do not have negative health consequences. The exceptions include women who are pregnant and men or women who have preexisting physical/mental health problems, have a history of addiction, are allergic to alcohol, and/or have a high genetic/environmental predisposition to addiction.

1. **Low-to-Moderate-Dose Use: Physical Effects**
   **Therapeutic Uses.** Alcohol is used as a topical disinfectant and as a body rub to reduce fever. Systemically, ethanol is used to treat methanol and ethylene glycol poisoning.

   **Desired Effects.** Some people enjoy the taste, have found that the drinks quench their thirst, relax muscle tension, stimulate the appetite, lower inhibitions, and reduce the incidence of heart disease and plaque formation thus lowering the risk of stroke.

   **Sleep.** Alcohol is often used as a sleep aid, particularly if anxiety is causing insomnia. However, disturbances in sleep patterns can occur, decreasing daytime alertness, and impairing performance. **Chronic**

2. **Low-to-Moderate-Dose Use: Psychological Effects**
For some people alcohol lowers inhibitions, increases self-confidence, and promotes sociability. It calms, relaxes, sedates, and reduces tension.

If someone is lonely, depressed, angry, or suicidal, the depressant and disinhibiting effects of alcohol can deepen negative emotions. Vehicular crashes, legal conflicts, and high-risk sexual activity are some of the consequences.
3. Neurotransmitters Affected by Alcohol

Alcohol causes GABA to lower psychological inhibitions and eventually slow down all of the brain processes.

The release of serotonin raises mood then depletes it causing depression.

Dopamine release gives a surge of pleasure.

Glutamate intensifies the effects of dopamine.

The release of endorphins and anandamides enhances the reinforcing effect.

4. Low-to-Moderate-Dose Use: Sexual Effects

Alcohol’s physical effects on sexual functioning are closely related to blood alcohol levels. In low doses alcohol usually increases desire in females and males but slightly decreases erectile ability and delays ejaculation.

More than half of college students believe that alcohol facilitates sexual opportunities.

C. HIGH-DOSE EPISODES (pp. 5.13–5.15)

1. High-Dose Use: Physical Effects

Intoxication is the result of the amount and speed with which alcohol is consumed as well as the psychological mood, expectation, mental/physical tolerance, and past drinking experience of the drinker.

Binge drinking is defined as consuming five or more drinks at one sitting for males and four or more for females. About 44% of college students say they are binge drinkers and 21% (of the totals) say they binge regularly.

Heavy drinking is defined as five or more drinks in one sitting at least five times a month. After enough drinks are consumed, the depressant effects of the alcohol take over. Blood pressure is lowered, motor reflexes are slowed, digestion and absorption of nutrients become poor, body heat is lost as blood vessels dilate, and sexual performance is diminished.

Level of Impairment vs. Rising Blood Alcohol Concentration

0.08 Blood Alcohol Concentration
Death from lung and heart failure
Coma

0.05 Blood Alcohol Concentration
Coma

© 2011, CNS Productions, Inc
Life-threatening unconsciousness
Difficulty in rousing
Incapacitation, loss of feeling
Confused speech
Inability to walk without help
Slurred speech
Exaggerated emotions
Argumentative and often hostile behavior
Unsteadiness standing or walking
Clumsiness, exaggerated emotions
Slowed reaction time
Further loss of coordination
Impaired ability to drive
Reduced social inhibitions
Decreased alertness
Some loss of muscular coordination
Lowered inhibitions, feelings of relaxation

0.01 Blood Alcohol Concentration

2. High-Dose Use: Mental & Emotional Effects
Mental confusion, mood swings, loss of judgment, and emotional turbulence at higher doses are common along with slurred speech, progressive mental confusion and loss of emotional control. Sleep becomes disturbed and erratic.

3. High-Dose Use: Alcohol Poisoning (overdose)
When large amounts of alcohol are consumed the drinker is at risk for depression of the central nervous system (CNS) possibly leading to respiratory and cardiac failure, then to unconsciousness (passing out), coma, and death. Some clinicians use a BAC level of 0.40 as the threshold for alcohol poisoning. When other depressants are used, the danger is greatly increased.

4. High-Dose Use: Blackouts
About one-third of all drinkers report experiencing at least one blackout. During a blackout a person acts normally and is awake and conscious but afterward cannot recall anything that was said or done afterward. When a drinker has only partial recall of events, it is known as a brownout.

A possible indicator of susceptibility to blackouts is a dampening of the P3 or P300 brain wave that affects cognition, decision-making, and processing of short-term memory. This dampening is found in alcoholics and their young sons.

5. High-Dose Use: Hangovers
The effects of a hangover can be most severe many hours after alcohol has been eliminated from the system. Typical effects include nausea, occasional vomiting, headache, etc. More severe withdrawal symptoms usually occur with chronic high-dose users.

6. High-Dose Use: Sobering Up
Alcohol is eliminated from the system at a constant rate. Coffee, exercise, or a cold shower will not speed up the process nor cure a hangover. Feeling better comes only after rest and sufficient recovery time.

D. CHRONIC HIGH-DOSE USE (pp. 5.15–5.19)
1. Digestive System & Liver Disease
The main impact of alcohol on the digestive system is caused by its direct effects on organs and tissues. Chronic drinking inevitably compromises the liver.

**Fatty liver** - the accumulation of fatty acids in the liver can occur after just a few days of heavy drinking.
Approximately 10% to 35% of heavy drinkers develop alcoholic hepatitis and 10% to 15% develop cirrhosis.

**Alcoholic hepatitis** causes inflammation of the liver, areas of fibrosis (formation of scar-like tissue), necrosis (cell death), and damaged membranes. It usually takes months or years of heavy drinking to develop this condition.

**Cirrhosis** occurs once alcohol kills too many liver cells and causes scarring. It is the most advanced form of liver disease caused by drinking and is the leading cause of death among alcoholics.

**Alcohol Use vs. Cirrhosis**
It is estimated that alcoholic cirrhosis is a major factor in about 80% of all cases of cirrhosis in the United States. About 13,000 Americans die from cirrhosis each year.

Heavy-drinking countries such as France and Germany have rates of cirrhosis two to three times higher than the United States.

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate of Cirrhosis per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>15.4</td>
</tr>
<tr>
<td>Italy</td>
<td>13.9</td>
</tr>
<tr>
<td>Spain</td>
<td>12.2</td>
</tr>
<tr>
<td>France</td>
<td>12.1</td>
</tr>
<tr>
<td>United States</td>
<td>7.7</td>
</tr>
<tr>
<td>Japan</td>
<td>7.2</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6.4</td>
</tr>
</tbody>
</table>

2. Other Digestive Organs
Excessive amounts of alcohol can cause acid stomach and diarrhea. Gastritis (stomach inflammation) is common among heavy drinkers as are inflammation and irritation of the esophagus, small intestine, and pancreas (pancreatitis). Other serious disorders include ulcers, stomach hemorrhage, gastrointestinal bleeding, and the increased risk of cancer.

Alcoholics may suffer from primary malnutrition, including vitamin B1 deficiency. Alcohol can also cause hypoglycemia (too little
sugar [glucose]) or hyperglycemia (too much sugar) depending on nutrition.

3. Cardiovascular Disease
Chronic heavy drinking is associated with a variety of heart diseases, including hypertension (high blood pressure) and cardiac arrhythmias. Cardiomyopathy—an enlarged, flabby, and inefficient heart—is found in some chronic heavy drinkers. The risk of stroke and other intracranial bleeding increases within 24 hours of a drinking binge.

4. Nervous System
Chronic high-dose use causes direct damage to nerve cells which can have far-reaching consequences in susceptible individuals. Dementia (deterioration of intellectual ability, faulty memory, disorientation, and diminished problem-solving ability) is another consequence of heavy drinking.

Two serious diseases due to brain damage cause by chronic alcoholism and thiamine (vitamin B1) deficiency are Wernicke’s encephalopathy and Korsakoff’s psychosis.

5. Sexual Desire & the Reproductive System
Female. Although light drinking lowers inhibitions, prolonged use decreases desire, the intensity of orgasm and causes sexual dysfunction.

Male. Though low-to-moderate levels of alcohol can lower inhibitions and enhance the psychological aspects of sexual activity, the depressant effects soon kick in. Over time, alcohol abuse can lead to an inability to experience normal sexual relationships.

6. Cancer
Breast Cancer. The association between heavy drinking and breast cancer is clear. The evidence linking drinking small amounts of alcohol and the incidence of breast cancer is less compelling.

Other Cancers. The risk of cancer of the mouth, throat, larynx, and esophagus is six times greater for heavy alcohol users, seven times greater for smokers, and an astonishing 38 times greater for smokers who also drink alcohol. Liver cancer is also a risk in those with long-standing cirrhosis.

7. Systemic Problems
Musculoskeletal System. Alcohol leeches minerals from the body causing a risk of fractures. Direct toxic effects can cause myopathy (painful swollen muscles).

Dermatologic Complications. The reddish complexion and other skin conditions of chronic alcoholics is caused by dilation of blood vessels near the skin, malnutrition, jaundice, thinning of the skin,
and liver problems. Acne rosacea, psoriasis, eczema, and facial edema are also common.

**Immune System.** Heavy drinking may disrupt white blood cells and in other ways weaken the immune system, resulting in greater susceptibility to infections.

8. **Chronic High-Dose Use: Mental/Emotional Effects**
With chronic high-dose use, almost any mental, emotional, or psychiatric symptom could occur including hallucinations, paranoia, severe depression, insomnia, intense anxiety, and problems with memory.

**E. MORTALITY (p. 5.19)**
Heavy drinkers are likely to shorten their life span by 15 years.

### SOME ALCOHOL-RELATED CAUSES OF DEATH

<table>
<thead>
<tr>
<th>Diseases (direct cause)</th>
<th>Diseases (indirect cause)</th>
<th>Injuries, etc. (indirect cause)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholic psychoses</td>
<td>Tuberculosis</td>
<td>Accidents; plane, cars, etc.</td>
</tr>
<tr>
<td>Alcoholism</td>
<td>Cancer: mouth, liver, stomach</td>
<td>Homicides</td>
</tr>
<tr>
<td>Seizure activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nerve degeneration</td>
<td>Diabetes</td>
<td>Falls</td>
</tr>
<tr>
<td>Heart disease</td>
<td>Hypertension</td>
<td>Drowning</td>
</tr>
<tr>
<td>Alcoholic gastritis</td>
<td></td>
<td>Suicides</td>
</tr>
</tbody>
</table>

V. **ADDITION (alcohol dependence/ alcoholism)**

(PP. 5.19−5.24)

10% to 12% of the 140 million adult drinkers in the U.S. are alcohol dependent. Alcoholism is 2 to 3 times more prevalent in men.

**A. CLASSIFICATION (pp. 5.19-5.21)**

1. **Early Classifications**
Classifications are developed to serve as a framework by which an illness or a condition can be studied systematically.
Early pioneers in alcohol research were Dr. Benjamin Rush, Dr. Thomas Trotter, Alcoholics Anonymous, Yale’s Laboratory of Applied Psychology, etc.

2. **E. M. Jellinek**
Jellinek, in his landmark book *The Disease Concept of Alcoholism*, proposed five types of alcoholism: alpha, beta, gamma, delta, and epsilon. Gamma and delta alcoholics were considered true alcoholics.

3. **Modern Classifications**
Four scientific developments led to a deeper understanding of alcoholism:

- discovery of the nucleus accumbens, the reward pathway in the 1950s;
- discovery of endogenous neurotransmitters, e.g., endorphins, in the 1970s;
- genetic research tools developed in the 1980s and 1990s provided insights into hereditary influences;
- imaging techniques became more sophisticated in the 1990s and 2000s; scientists could actually see the brain on drugs.

Current classifications include:

- **Type I & Type II Alcoholics.** (Cloninger & colleagues)
- **Type A & Type B Alcoholics.** (Dr. T. F. Babor and colleagues at the University Of Connecticut School Of Medicine).

4. The Disease Concept of Alcoholism

Much of the current research in the treatment of alcoholism is based on the disease concept.

The American Society of Addiction Medicine and the National Council on Alcoholism and Drug Dependence defined alcoholism as follows:

“Alcoholism is a primary chronic disease with genetic, psychosocial, and environmental factors influencing its development and manifestation. The disease is often progressive and fatal. It is characterized by impaired control over drinking, preoccupation with the drug (alcohol), use of alcohol despite adverse consequences, and distortions in thinking, most notably denial. Each of these symptoms may be continuous or periodic.”

B. HEREDITY, ENVIRONMENT & PSYCHOACTIVE DRUGS

(p. 5.21−5.22)

1. Heredity

Family studies, twin studies, animal studies, and adoption studies show strong genetic influences particularly in severe alcoholics. It is widely accepted that several genes have an influence on a person’s susceptibility to alcoholism and other drug addictions. Other markers for a strong genetic influence are a tendency to have blackouts, a greater initial tolerance to alcohol, an impaired decision-making area of the brain, a major shift in personality while drinking, an impaired ability to learn from mistakes, retrograde amnesia, and a low level of response (LR) to alcohol.

2. Environment

Environmental factors that have overwhelming influences are: alcohol and/or other drug–abusing parents, friends, and/or relatives; chaotic familial relationships; peer pressure; and
extreme stress. Sexual, physical, and/or emotional abuses experienced at a young age are the most powerful environmental factors.

3. Alcohol & Other Drugs
Once genetic and environmental factors have determined susceptibility, the toxic effects of alcohol and other drugs that change neurochemistry come into play.

C. TOLERANCE, TISSUE DEPENDENCE & WITHDRAWAL (pp. 5.22–5.23)

1. Tolerance
Tolerance is a process through which the brain defends itself against the effects of alcohol. Dispositional (metabolic) tolerance occurs when the body changes so that it metabolizes alcohol more efficiently.

The liver eventually becomes less able to metabolize the alcohol, a process called reverse tolerance.

Pharmacodynamic tolerance means brain cells become more resistant to the effects of alcohol.

Behavioral tolerance means drinkers learn how to “handle their liquor” by modifying their behavior.

Acute tolerance starts to develop with the first drink.

Select tolerance means that tolerance does not develop equally to all the effects of alcohol.

2. Withdrawal
Hangovers can occur with any level of drinking, from experimentation to addiction. More-severe withdrawal symptoms occur with chronic high-dose use.

About 85% to 95% of those who experience withdrawal have only minor rather than life-threatening symptoms. Major withdrawal symptoms usually develop after 48 to 87 consecutive days of heavy drinking.

Minor symptoms include rapid pulse, sweating, increased body temperature, hand tremors, anxiety, depression, insomnia, and nausea or vomiting.

Major symptoms include tachycardia; transient visual, tactile, or auditory hallucinations and illusions; psychomotor agitation; grand mal seizures; and delirium tremens.

Medical care for a chronic alcohol abuser must be considered in any course of treatment.

In less than 1% of serious cases of alcohol withdrawal, full-blown delirium tremens, called “the DTs,” occurs.

Neurotransmitters & Withdrawal. Initially alcohol increases the effectiveness of GABA. Over time the brain decreases the number of GABA receptors, resulting in hyperarousal causing anxiety,
increased muscular activity, tachycardia, hypertension, and occasionally, seizures.

**Kindling.** Kindling, also known as *inverse tolerance*, actually intensifies subsequent withdrawal symptoms and can cause seizures.

**D. DIRECTIONS IN RESEARCH** (pp. 5.24–5.25)

Hereditry research is seeking to identify the genes that make a user more susceptible to addiction (e.g., DRD2A1 allele, ALDH2).

Research into environmental causes of alcoholism is evaluating specific changes in an addict's surroundings that will decrease the use of alcohol and other drugs.

Examining drug-caused physiological and psychological changes that occur with chronic and high-dose use also keeps many researchers occupied.

**VI. OTHER PROBLEMS WITH ALCOHOL** (PP. 5.25–5.32)

**A. POLYDRUG ABUSE** (p. 5.25)

Most users of illicit drugs also drink alcohol, and most alcohol abusers use other drugs.

Alcohol can be used to come down off a three-day methamphetamine run.

Compulsive gamblers drink while gambling or gamble while drinking.

Polydrug abuse has become so common that treatment centers must often treat simultaneous addictions.

**B. ALCOHOL & MENTAL PROBLEMS** (pp. 5.25–5.26)

Alcohol is often used to change one's mood or mental state. The mood could be mild anxiety, confusion, boredom, or sadness. The mental state could be symptoms of a pre-existing mental illness such as depression or a personality disorder.

The incidence of major depression among alcoholics is about 28% and anxiety 37%. Excess alcohol or withdrawal can induce symptoms of mental illness. Heavy drinking raises the levels of neurochemicals that cause tension and depression. Any psychiatric diagnosis must take into account the possibility of drug- and alcohol-induced symptoms.

A client with co-occurring disorders often continues to relapse because the psychiatric problems have not been addressed. Both conditions must be treated to achieve an effective recovery.

The actual incidence of personality disorders, particularly borderline personality disorder and antisocial personality disorder is under debate.

**C. ALCOHOL & PREGNANCY** (pp. 5.26–5.29)

1. Maternal Drinking
Alcohol use during pregnancy is the leading cause of mental retardation in the United States. Excess drinking during pregnancy is responsible for increases in the number of miscarriages and infant deaths, causes more problem pregnancies, and results in smaller and weaker newborns.

A survey of pregnant women in the United States found that 12.4% consumed alcohol at some point in their pregnancy, 4% used in a binge pattern, and 0.7% were heavy drinkers;

In a survey of mothers with fetal alcohol syndrome (FAS) babies, about 89% used alcohol with at least two other drugs during pregnancy. Most of the women had been physically or sexually abused and often there was a history of alcohol or drug abuse in the family. In another study, 69% of the mothers of FAS babies died before their children reached adolescence.

2. Fetal Alcohol Spectrum Disorder (FASD)

Diagnosticians look to four factors to diagnose alcohol-involved problems: retarded growth, facial deformities and problems with the heart and limbs, CNS involvement e.g., delayed intellectual development and behavioral problems, and prenatal alcohol exposure by the mother.

Fetal alcohol spectrum disorder (FASD) refers to the whole range of alcohol affected births.

- FAS (fetal alcohol syndrome) involves all four mentioned problems.
- PFAS (partial fetal alcohol syndrome) is like FAS without growth or facial anomalies.
- ARND (alcohol-related neurodevelopmental disorder) is marked by CNS abnormalities;
- ARBD (alcohol-related birth defects) is marked by any number of physical anomalies.
- FAE (fetal alcohol effects) is now ARND and ARBD.

Alcohol kills cells and changes the wiring of a fetal brain. Huge gaps during brain development destroy natural connections that can never be regained.

FAS IQ scores range from 20 to 120 with an average of 79. For the other syndromes it ranges from 49 to 142 with an average of 90.

Other problems include:
- difficulty with short-term memory,
- problems storing and retrieving information,
- difficulty making good judgments, forming relationships, etc.

These cognitive/behavioral deficits are not unique to alcohol exposure. Many other substances and physiological conditions
can cause similar symptoms in children so FASD diagnoses are often missed.

Studies estimate that FAS births occur in 0.33 to 2.9 cases per 1,000 live births worldwide.

**Critical Period.** The brain is most vulnerable to alcohol in weeks 3 through 8, at the onset of embryogenesis (formation of the embryo).

**Critical Dose.** One study concludes that seven standard drinks per week or less by pregnant mothers will not trigger neurobehavioral effects. However, a single prolonged contact with alcohol lasting four hours or more is enough to kill vast numbers of brain cells.

In truth, there is no way to determine if a baby might be at risk from even very low levels of alcohol exposure.

### 3. Paternal Drinking

There is now evidence that some of the detrimental effects of alcohol on the fetus may also be transmitted by paternal alcohol consumption. Adolescent male rats subjected to high alcohol intake produced both male and female offspring suffering from abnormal development.

Observations of male children of alcoholic fathers indicate no gross physical deficits but do show an association with intellectual and functional deficits.

**D. AGGRESSION & VIOLENCE (pp. 5.29–5.31)**

Most research suggests that some people have an inherent tendency toward violence. Alcohol has been shown to increase aggression by interfering with GABA (the main inhibitory neurotransmitter) in ways that provoke intoxicated people with pre-existing aggressive tendencies. Alcohol encourages the release of pent-up anger, hatred, and desires. In addition, low serotonin decreases impulse control.

Misjudging intentions can also cause a person to perceive a threat where none exists, leading to a violent overreaction.

Based on victim reports, 15% of robberies, 26% of aggravated assaults, and 50% of all homicides involve alcohol use. About 30% of the victims of violent crime reported that the offender had been drinking alcohol at the time of the offense.

Any type of violence can cause permanent biochemical changes in the victim, changes that can make them more susceptible to drug abuse and other emotional problems.

Depending on the study, 34% to 74% of sexual assault perpetrators had been drinking as had 30% to 79% of the victims.

**E. DRIVING UNDER THE INFLUENCE (pp. 5.31–5.32)**

In 2009, one-third of traffic fatalities and one-third of vehicle accidents involved alcohol, down from 2005.
If a driver’s BAC (blood alcohol concentration) registers above the legal limit of 0.08, no additional impairment testing is required to determine guilt.

Officers often check eye movement if a driver is suspected of being impaired because alcohol causes the eyes to start jerking if they try to follow a moving object (nystagmus test).

Two-thirds of those arrested for DUI have never been arrested before. More disturbing is the fact that only one driver is arrested for every 300 to 1,000 drunk-driving trips.

Prevention strategies including lowering the BAC limit from 0.10 to 0.08, the threat of license revocation, losing revoking a license, raising the drinking age, a zero-tolerance policy for those under 21, impounding vehicles, educating bar tenders, waiters, anyone who serves alcohol, and requiring treatment for convicted drivers have reduced the number of alcohol-related traffic fatalities and injuries over the years.

1. Injuries & Suicide

15% to 25% of emergency room patients tested positive for alcohol or reported alcohol use, with relatively high rates among those involved in fights, assaults, and falls. Alcoholics are 16 times more likely to die in falls and 10 times more likely to become burn or fire victims; 31% of those involved in boating fatalities had a BAC of .10 or more; 40% of industrial fatalities and 47% of injuries involved alcohol.

Compared to the general population, the suicide rate for adult alcoholics is twice as high.

VII. EPIDEMIOLOGY (PP. 5.33–5.42)

A. PATTERNS OF ALCOHOL CONSUMPTION (p. 5.33–5.34)

A person’s culture is one of the primary determinants of their drinking behavior. Different drinking patterns are found in wet and dry drinking cultures (excluding non-drinking Muslim countries).

- **Wet drinking cultures** (e.g., Austria, France, and Italy) sanction almost daily use and integrate social drinking into everyday life.
- **Dry drinking cultures** (e.g., Denmark, Norway, and Sweden) restrict the availability of alcohol and tax it more heavily.
- Canada, England, Germany, Ireland, and the United States exhibit combinations of both wet and dry cultures. Patterns such as binge drinking in social situations are common.

Other cultural patterns.

- Alcohol plays a very minor role in China.
- In Japan, most of the men and half of the women drink.
- In Russia, vodka is traditionally consumed in large quantities between meals.
• In England, 70% drink regularly, beer accounts for 66% the alcohol consumption.

B. POPULATION SUBGROUPS (p. 5.34–5.39)
1. Men & Women
In all age groups, men drink more per drinking episode than women do, regardless of the culture. Men also have more adverse social and legal consequences and develop problems with alcohol abuse or alcohol dependence at a higher rate than women although proportionally, more women than men die from cirrhosis.

**ALCOHOL ABUSE WITHIN THE PAST MONTH (2009)**

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any alcohol use</td>
<td>57.7%</td>
<td>45.9%</td>
</tr>
<tr>
<td>Binge drinkers</td>
<td>31.6%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Heavy drinkers</td>
<td>10.8%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Alcohol problems become greater for women in their thirties, men’s become greater in their twenties. Alcohol-dependent women, as a group, drink about one-third less alcohol than alcohol-dependent men.

**WOMEN & ALCOHOL PROBLEMS**

<table>
<thead>
<tr>
<th>More At Risk</th>
<th>Less At Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger women</td>
<td>Older women (60+)</td>
</tr>
<tr>
<td>Loss of role (mother, job)</td>
<td>Multiple roles</td>
</tr>
<tr>
<td>Never Married</td>
<td>Married</td>
</tr>
<tr>
<td>Divorced, separated</td>
<td>Widowed</td>
</tr>
<tr>
<td>White women</td>
<td>Black women</td>
</tr>
<tr>
<td>Childhood sexual abuse</td>
<td></td>
</tr>
</tbody>
</table>

The rate of alcoholism in relatives of females diagnosed with alcoholism is somewhat higher than in relatives of male alcoholics. Proportionally, more women than men die from cirrhosis of the liver, circulatory disorders, suicide, and accidents. Because society is more accepting of men who are alcoholics than it is of women who are alcoholics, women are less likely to seek treatment.

3. Adolescents
The younger an individual starts drinking, the more likely he or she will have a problem later in life.
In a major survey of students, *Monitoring the Future*, the percentages of teenagers who had been drunk in the past month were:

<table>
<thead>
<tr>
<th>Grade</th>
<th>1999</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>eighth grade</td>
<td>9.4%</td>
<td>5.4%</td>
</tr>
<tr>
<td>tenth grade</td>
<td>22.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>twelfth grade</td>
<td>32.9%</td>
<td>27.4%</td>
</tr>
</tbody>
</table>

Adolescent binge drinkers were also 17 times more likely to smoke than nonbinge drinkers.

Alcohol can encourage unsafe sexual practices, which lead to higher rates of unplanned pregnancies, sexual aggression, and sexually transmitted diseases.

When an adolescent is heavily involved in alcohol, their emotional growth becomes limited.

### 4. College Students & Learning

Drinking usually has negative effects on learning and maturation.

<table>
<thead>
<tr>
<th>Grade Average Drinks per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D or F</td>
</tr>
</tbody>
</table>

- Male students binge more than female students (48.6% to 40.9%);
- White students (50.2%) are more likely to binge than Hispanic (34.4%), Asian/Pacific Islander (26.2%), or Black (21.7%) students;
- Residents of fraternity houses (75.4%) drink more than dormitory residents (45.3%),
  off-campus residents (54.5%), or married residents (26.5%).

Binge drinking in college leads to about 1,700 deaths per year, 696,000 physical assaults, 599,000 injuries, and 97,000 sexual assaults.

### 5. Older Americans

People 65 and older have the lowest prevalence of problem drinking and alcoholism due to spontaneous remission with age, limited resources, a body less able to handle alcohol, and more illness that exaggerate the effects of alcohol.

By 2020, 34 million Americans will be 65 or older. The percentage of undiagnosed heavy drinkers among the elderly is high because of secrecy.
Research indicates that patterns of drinking persist into old age. In nursing homes as many as 49% of the patients have drinking problems.

The average 65+ American takes two to seven prescription medications daily, making alcohol/prescription drug interactions common. More than 150 prescription and over-the-counter medications interact negatively with alcohol.

About one-third of elderly alcohol abusers are of the late-onset variety. Diagnosis of drug or alcohol problems in the elderly is made more difficult because of the coexistence of other physical or mental problems.

It is often a patient’s physician who recognizes an alcohol problem while providing treatment for other medical conditions. A brief intervention by the physician can direct the patient to get the help he or she needs. People 65 and older have the lowest prevalence of problem drinking and alcoholism.

6. Homeless

There are several kinds of homeless:
- situationally homeless (lost job, bankruptcy, divorce);
- street people, who have made the streets their home;
- chronic mentally ill, squeezed out of inpatient mental facilities; and
- homeless substance abusers, particularly alcohol abusers.

Estimates of the total number of homeless people range from 754,000 in one study to 1.5 million in another. The average length of homelessness is six months. The homeless population is made up of:
- 47% single males, 16% single females;
- 34% are families with children;
- 17% are employed, 18.7% are veterans, and 23% disabled;
- 45% African American, 5.7% Hispanic, and 41.1% White.

It is estimated that:
- 8% have HIV or AIDS,
- 23% could be considered mentally ill,
- 30% have serious substance-abuse problems.

One common denominator among all of these groups is a lack of affiliation with any kind of support system. A comprehensive program to alleviate drug and mental problems among the homeless must involve outreach.

Nationwide, there are 438,000 emergency and transitional year-round beds for the homeless.

C. UNDERREPRESENTED POPULATIONS (pp. 5.39–5.42)
Diverse cultural traditions make a great contribution to alcohol use and abuse patterns.

1. African Americans
In 2008, heavy use of alcohol was lower among African Americans (5%) than among Whites (8%) and Hispanics (5%) as in previous years. Use on a monthly basis by African American men (42%) is also less than that by White men (57%).

Peak drinking for African Americans occurred after the age of 30, whereas drinking among Whites peaked at a younger age. A long history of spirituality along with a strong matriarchal family structure, are two factors which limit abuse and aid in treatment.

Medical problems brought on by heavy drinking among African Americans are more severe.

2. Hispanics
In 2010 there were 47 million Hispanics in the United States, or about 15.5% of the total population. Hispanic cultures include Mexican American (60%), Puerto Rican (9.5%), Cuban American (3.2%), and dozens of other Spanish-speaking cultures.

Drinking increases in the Hispanic community among both sexes as education and income increase. One of the problems with alcohol abuse and addiction in the Hispanic community is a lack of culturally relevant treatment facilities and personnel.

Hispanic women drink considerably less than Hispanic men.

In treatment, positive outcomes depend on strong family involvement plus an appreciation of the values of dignidad, respeto, y cariño (dignity, respect, and love).

3. Asians & Pacific Islanders (APIs)
Asians and Pacific Islanders (APIs) are the fastest-growing ethnic group in the United States. They currently constitute only about 4.5% of the total population.

Asians and Pacific Islanders are reported to have the lowest rate of drinking and drug use in the U.S. As APIs became more highly acculturated, drinking increases but culture helps deter heavy drinking.

In one study in Los Angeles, Filipino Americans and Japanese Americans were twice as likely to be heavy drinkers as Chinese Americans. Korean Americans have the highest number of abstainers.

Fewer APIs seek treatment because of the stigma involved in admitting that there is a problem. Treatment centers with API counselors on staff and specific API programs in place have a higher API treatment population.

4. American Indians & Alaskan Natives
The 2.7 million American Indians and Alaskan Natives in the United States represent more than 300 tribal or language groups.
In general, drinking patterns vary widely among these tribes who make up about 1% of the population. Some tribes are mostly abstinent, some drink moderately, and some have high rates of heavy drinking and alcoholism.

It is the pattern of heavy binge drinking among males in various tribes, especially on reservations, which accounts for the highly visible American Indian alcoholic.

Historically, American Indians drank only weak beers or other fermented beverages and usually just for ceremonial purposes. When distilled alcoholic beverages were introduced, most American Indian cultures did not have time to develop ethical, legal, and social customs to handle the stronger drinks.

The abuse of alcohol accounts for 5 of the 10 leading causes of death in most American Indian tribes. One study in Oklahoma found that alcohol-related causes of death varied from less than 1% to 24% among the 11 tribes surveyed, compared with 2% for African Americans and 3% for Whites.

**VIII. CONCLUSIONS (PP. 5.42)**

Because alcohol causes many serious health and societal problems, its use has often been restricted or banned by almost every country. Most restrictions are ultimately overturned because of demand and the lure of tax revenues by governments.

It can take three months or 30 years to become an alcoholic—or it may never occur. Alcohol is a psychoactive drug that can cause irreversible physiological changes, making the user susceptible to alcoholism with heavy continued use.
Chapter 5 – DOWNERS: ALCOHOL

Discussion Topics

1. What kinds of provisions have societies made to control the problems of excess alcohol use?

2. How could someone use the BAC table to plan an evening of drinking? Using the BAC table, give some specific examples.

3. Ask students to summarize their perception of the various stages of alcohol use. Include frequency, amount, effects, and thought processes at each of these stages.
   a. experimental
   b. social/recreational
   c. habituation
   d. abuse
   e. addiction

4. Should safe drinking be taught in the home and/or at school even though it is illegal for underage people to drink?

5. What kinds of programs have been, or could be, effective in reducing binge and heavy drinking on campus?

6. What benefits or effects do college students seek from drinking? What negative consequences are most commonly experienced by college students who drink?

7. What are the effects of secondhand drinking, i.e., effects experienced by those who come in contact with drinkers?

8. What are some specifically male expectations when they drink? What are some specifically female expectations when they drink?

9. Discuss how culturally relevant alcohol and other drug treatment might work for several underrepresented populations (e.g., Native American, Hispanic). How would treatment differ? What aspects of traditional, non-culturally relevant treatment would be difficult for the client?
Chapter 5 – DOWNERS: ALCOHOL

Critical Thinking & Class Exercises

1. Have students write arguments for and against prohibition of alcohol as if they had to argue it in a court of law, discussing such aspects as legality, enforcement, cost, and effectiveness.

2. Have students collect 10–20 alcohol and cigarette ads and discuss what attitudes and values are being presented in relation to the advertiser’s product.

3. Ask students to develop 10 rules for responsible alcohol consumption (a “drinking etiquette”) that will both prevent harm to, and respect the rights of, the drinker, others around the drinker, and society at large.

4. Have groups of students create an informative and entertaining ad that stresses moderate and safe drinking and have the groups explain the rationale behind the message.

5. Ask students to describe their first drinking experiences.
   a. Was alcohol the focus of, or incidental to, the experience?
   b. What did they feel during the experience, immediately after?
   c. How did they view the experience at the time, today?

6. In the context of a discussion of alcohol binge drinking and abuse, ask students to give examples of excuses or statements indicating denial.
   a. rationalization (“In college everyone drinks.”);
   b. denial (“I can stop anytime I want.”);
   c. projection (“I don’t have a problem with my drinking, you do.”);
   d. excuse (“I drink only when I’ve had a hard day.”);
   e. misinformation (“I’m not an alcoholic, I only get bombed on the weekends.”).