Chapter 3 – UPPERS
Overview

This chapter surveys the various stimulants, their history, effects and side effects, and the social context of their use.

General Effects Uppers are stimulants that initially increase energy and alertness. These are the world’s most widely used psychoactive drugs. Some give an intense rush while others are only mildly stimulating. These drugs vary in strength from cocaine and amphetamines (strong) to caffeine and nicotine (weaker). Stimulants also include drugs used to treat attention-deficit/hyperactivity disorder, diet pills, and plant stimulants such as khat, betel nut, ephedra, and yohimbe. New illicit stimulants include MDPV, mephedrone and cathinone deceptively sold as “bath salts”. Stimulants can cause severe health problems when they are abused. It is the rapid development of tolerance and the disrupting effect on brain chemistry that encourage abuse and addiction.

Cocaine & Amphetamines Cocaine and amphetamines are the strongest stimulants; they release excess neurotransmitters, principally epinephrine, norepinephrine, and dopamine. At lower doses, stimulation, confidence, aggressiveness, lack of hunger or thirst, increased heart rates, raised blood pressure, and alertness are the desired effects. At high doses or with prolonged use, neurotransmitter depletion, exhaustion, paranoia, psychosis, dehydration, unhealthy weight loss, and uncontrolled heart rates are common. The method of use can increase the abuse potential; smoking cocaine in its freebase chemical form known as “crack” is more addicting than snorting the drug.

Amphetamine Congeners Amphetamine congeners are drugs that are related to amphetamines but are not as strong. The most well known is methylphenidate, used to treat attention-deficit/hyperactivity disorders. There is much controversy over their use. Amphetamines such as Adderall are also used to treat ADHD. The other well-known amphetamine congeners are also used as diet pills such as dexfenfluramine, pemoline, and phentermine.

Plant Stimulants Worldwide, plant stimulants such as betel nuts and khat are used recreationally with the same frequency as coffee or cigarettes are used in the United States. Khat is popular in eastern Africa, the Middle East, and southern Arabia. Betel nuts have been used for more than two millennia; anywhere from 200 to 450 million people use betel nuts. Other plant and synthetic stimulants like ephedra, yohimbe, cathinone and pseudoephedrine have similar effects as methamphetamine.

Caffeine The most widely used stimulant, caffeine, is found in coffee, tea, caffeinated soft drinks and energy drinks. “Speedball” cocktails (mixing energy drinks with liquor) are currently popular in the western world. Worldwide, more people drink tea than coffee. Excess caffeine use can cause tolerance, withdrawal when use is stopped, and a mild dependence. Caffeine use disorder will be added to the Diagnostic and Statistical Manual of Mental Disorders in 2013.

Tobacco This stimulant kills 440,000 Americans each year either directly or through secondhand smoke. The addicting ingredient in tobacco is nicotine. The nicotine in tobacco was manipulated in the 1950’s by major tobacco companies (nicotine freebase) to make it more addictive. Smokers continue to smoke to maintain their blood- nicotine level. Tobacco first stimulates and then relaxes the body. Nicotine and other tobacco additives or smoking byproducts are toxic to every organ in the human body. Its use is linked to respiratory problems, cardiovascular disease, and cancer. Laws controlling the use, lawsuits against the tobacco companies, and higher public awareness of the dangers have cut cigarette use in half in this country, but worldwide, smoking rates are almost twice that of the United States.

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Extended Outline

I. GENERAL CLASSIFICATION (PP. 3.2-3.4)

Last year, 5.3 million Americans used cocaine, 850,000 used methamphetamine non-medically, 70 million smoked cigarettes, 150 million drank coffee, and 47 gallons of soft drinks (most caffeinated) were consumed per capita.

Worldwide, 200 million people used betel nut, Southeast Asians ingested yaa baa (a form of amphetamine) at a record pace, the majority of the male population in Ethiopia, Somalia, and Yemen used khat, and 1.3 billion smoked cigarettes. Stimulants are the drugs of choice in the restless world of the twenty-first century.

Some stimulants are found in plants: the coca shrub (cocaine), the tobacco plant (nicotine), the khat bush (cathinone), the ephedra bush (ephedrine), the betel nut palm (arecoline), and the coffee plant (caffeine). Other stimulants are synthesized in legal plants or street laboratories; methamphetamines, diet pills, methylphenidate (Ritalin®), MDMA, MDPV, and methylmethcathinone.

II. GENERAL EFFECTS (P. 3.5)

All stimulants increase the chemical and electrical activity in the central and peripheral nervous systems. Stimulants are used clinically to treat narcolepsy, obesity, and attention-deficit/hyperactivity disorder (ADHD). They are used illegally to fend off drowsiness, keep the user energized, increase confidence, reduce weight, and induce euphoria.

The major effects of stimulants result from the way they manipulate the brain’s natural energy chemicals. They cause addiction because they activate the brain’s reward/control pathway.

A. BORROWED ENERGY (p. 3.5)

Neurotransmitters responsible for most of the stimulants effects are epinephrine (E), norepinephrine (NE), and to a lesser extent, serotonin (5-HT) and dopamine (DA).

The nervous system naturally releases extra energy chemicals when the body needs energy. In contrast, stimulants force the release of these chemicals and infuse the body with excessive amounts of energy regardless of the need. The extra energy is manifested through physical activity, talking, and hyper vigilance. The effect is multiplied when strong stimulants (e.g., cocaine and amphetamines) are used because they block the natural reabsorption and metabolism of the energy chemicals that are released.

1. Crash & Withdrawal

   If stimulants are taken in excess, the energy supplies become depleted and the body is left without reserves. With stronger stimulants, this crash and its subsequent withdrawal symptoms and severe depression, can last for days, weeks, or occasionally months.

B. REWARD/CONTROL PATHWAY (p. 3.6)
All stimulants have some effect on the reward/control pathway. Normally, this center serves as a survival mechanism, giving a surge of pleasure when a physiological or psychological need is being satisfied (e.g., hunger, thirst, or sexual desire). Stronger stimulants release two to ten times as much dopamine as normal activities artificially over stimulating this pathway and falsely signal the brain that hunger, thirst, and/or other needs are being satisfied. Dopamine is the neurotransmitter most often involved in triggering these feelings of pleasure or satisfaction.

C. WEIGHT LOSS (p. 3.6)
Stimulants fool the body into thinking that hunger has been satisfied even though no food has been consumed - causing weight loss, which is one of the main reasons for their use. Tobacco also decreases appetite because of this effect.

D. CARDIOVASCULAR SIDE EFFECTS (p. 3.6)
Many stimulants, including nicotine and caffeine, constrict blood vessels, thus decreasing blood flow to tissues and organs, including the skin. The stronger stimulants can damage blood vessels, raise blood pressure and heart rate, and raise the risk of stroke.

E. EMOTIONAL/MENTAL SIDE EFFECTS (p. 3.6–3.7)
Stimulants initially increase confidence and induce euphoria, but as use continues talkativeness, restlessness, irritability, insomnia, and eventually, paranoia, aggression, and violence increase. High-dose or prolonged methamphetamine/cocaine use can cause drug-induced paranoia and psychosis by altering the levels of dopamine in the brain.

F. TOLERANCE & ADDICTION LIABILITY (p. 3.7)
Tolerance develops rapidly due many processes including down-regulation, or decreased number of dopamine and serotonin receptors in the brain. While the physical dependence of extended cocaine and methamphetamine use is not quite as severe as it is with heroin, the psychological dependence is just as powerful. Tolerance and dependence can also develop with methamphetamine congeners, caffeine, nicotine, and other milder stimulants.

III. COCAINE (P. 3.7–3.17)
Cocaine epidemics occur every few generations - the 1890s, 1920s, 1970s 1980s, and the 2000s. The development of crack, a smokable form of cocaine led to the most recent use epidemic.

A. BOTANY, CROP YIELDS & REFINEMENT (p. 3.7–3.8)
Cocaine grows mainly on the slopes of the Andes Mountains in South America (Peru, Bolivia, Ecuador, and mainly Colombia). The leaves of the coca bush contain 0.5% to 1.5% by weight of the alkaloid cocaine. The cocaine refinement technique is a multi-step process.

B. SMUGGLING & THE STREET TRADE (pp. 3.8–3.9)

In spite of a reported 18% reduction in Colombia’s coca crop, cocaine prices have remained stable and the purity has improved. This is partly due to Colombia growing about two-thirds of the world’s coca crop. Two-thirds of the cocaine smuggled into the United States in recent years has been trafficked by drug gangs and cartels centered in Mexico.

An estimated 200 to 400 metric tons flooded the U.S. market in 2007. It is estimated that about 865 metric tons of cocaine were produced in the Andean region in 2005, while Americans spent an estimated $36.1 billion (retail) on the drug in 2007.

Street prices vary from $50 to $200 per gram of powdered cocaine hydrochloride. “Rocks” of crack cocaine sell for $10 to $20. The 2008 National Household Survey on Drug Abuse estimated 1,411,000 dependent cocaine users in the U.S. The Drug Use Forecasting Program estimates at least twice that many.

C. HISTORY OF USE (p. 3.9–3.11)

Many landmarks in the history of coca and cocaine use coincide with the changing methods of use and the refinement of the substance.

1. Chewing the Leaf (p. 3.9)

   The Incas chewed the leaf for the juice, adding some lime or ash to increase absorption.

   16th century, Spanish conquistadors conquered the Incan Empire and controlled the trade. Today 90% of Indians living in coca-growing regions of South America chew coca leaf.

2. Coca to Cocaine (p. 3.9)

   Cocaine hydrochloride, synthesized in 1859, is 200 times more powerful by weight than the coca leaf. Karl Koller discovered its anesthetic properties and Sigmund Freud promoted its medical and psychiatric uses.

3. Drinking Cocaine (p. 3.10)

   In the late 1860s, cocaine wines were popular in France and Italy (Vin Mariani). It takes 15 to 30 minutes for the cocaine in wine to reach the brain.

   In the 1880s and 1890s, patent medicines laced with cocaine, opium, morphine, heroin, Cannabis, and alcohol became the rage.
4. Injecting Cocaine (p. 3.10)
Large doses could be injected into the body with the invention of the hypodermic needle in 1853. Injecting intravenously results in an intense rush within 30 seconds and produces the highest blood-cocaine level. If injected subcutaneously or intramuscularly, the high is delayed three to five minutes and is not as intense.

5. Snorting Cocaine (p. 3.10)
This method delivers the drug to the nasal mucosa and into the brain in three to five minutes. Peak effects take a few more minutes to occur. Due to capillary constriction, snorting cocaine is self-limiting, the more snorted the slower the absorption.

6. Mucosal & Contact Absorption (p. 3.11)
Cocaine can also be absorbed through mucosal tissues in the gums, cheeks, rectum, and vagina. It has topical anesthetic effects on all tissues it contacts.

7. Smoking Cocaine (p. 3.11)
When street chemists converted cocaine hydrochloride to freebase cocaine, it lowered the vaporization point to 98°C and made the drug smokable. When absorbed through the lungs, it reaches the brain in only 5 to 8 seconds. This method leads to an extreme binge pattern of use.

D. PHYSICAL & MENTAL EFFECTS (p. 3.11–3.16)

1. Metabolism (p. 3.11)
Cocaine is metabolized very rapidly so effects quickly dissipate. The half-life of cocaine in the body is 30 to 90 minutes. A metabolite of cocaine is detectable in the urine for up to 36 hours.

2. Medical Use (p. 3.11–3.12)
Cocaine is the only naturally occurring topical anesthetic, it is used in aerosol form to numb the nasal passages when inserting breathing tubes, to numb the eye or throat during surgery, and to deaden the pain of chronic sores.

3. Neurochemistry & the Central Nervous System (p. 3.12)
Cocaine prevents the reabsorption of epinephrine, norepinephrine, serotonin, and dopamine thus increasing their concentration in the synapse and intensifying their effects.

The Crash. By blocking the reabsorption of stimulant neurotransmitters, cocaine leaves them vulnerable to continued metabolism leading to the rapid depletion energy chemicals. So the crash after using cocaine can be intensely depressing. This depression can last a few hours, several days, or even weeks until the brain replenishes its stimulant neurotransmitters.

4. Sexual Effects (p. 3.12)
Cocaine at low doses enhances sexual desire, delays ejaculation, and is considered an aphrodisiac by many users. With higher doses and chronic use, sexual dysfunction becomes more common and the likelihood of high-risk sexual behavior and unusual sexual practices increases.
5. Aggression, Violence & Cocaethylene (p. 3.12–3.13)
Cocaine use is associated with increased aggression and violence, especially in those prone to violence. Emotional triggers and the fright center are overstimulated, inhibitory functions in the cortex are suppressed.

Cocaethylene, a byproduct of alcohol and cocaine together, increases violence as well as cardiovascular dangers. Its half-life is more than three times that of cocaine alone. Autopsies showed that 31% of all homicide victims in New York in the early 1990s had cocaine in their bodies.

6. Cardiovascular Effects (p. 3.13)
Physiologically, it is the cardiovascular system that is most affected by long-term cocaine use, raising the heart rate and constricting blood vessels, causing a 20- to 30-unit rise in blood pressure. Use leads to cellular changes, including damage to heart muscles (known as constriction bands), coronary arteries, and other blood vessels. Stroke is a possibility.

7. Neonatal Effects (p. 3.13, 3.14)
Cocaine use exposes the fetus to the drug within seconds. Miscarriage, premature birth, fetal stroke, placental separation, sudden infant death syndrome (SIDS), and blood vessel malformations are increased.

Many infant abnormalities have more to do with the mother's lifestyle rather than the drug itself. Good prenatal and postnatal care results in a toddler's emotional and physical development catching up to non-cocaine-exposed children.

8. Tolerance (p. 3.14)
Tolerance to the euphoric effects can begin to develop after the first injection or smoking session. Tolerance is partly related to the adaptation of the brain to a reduction of dopamine in the nucleus accumbens, which in turn diminishes the rewarding effects of the drug.

9. Withdrawal, Craving & Relapse (p. 3.14)
Although similar to the crash, withdrawal effects can last months or years. Symptoms include
- anhedonia, anergia, emotional depression,
- loss of motivation, anxiety, insomnia, agitation, and an intense craving.

A typical cycle of compulsive cocaine (or amphetamine) use is
- the crash
- a few days later, the user feels much better (euthymia);
- a week or 10 days later, craving builds and emotional depression increases;
- two to four weeks after vowing to abstain, craving and depression build to a fever pitch often leading to a slip and relapse.
10. Overdose (p. 3.15)
Cocaine was involved in 32% of ER visits in major cities in 2007; most often, an overdose was not fatal. In 2,000 to 3,000 U.S. cases every year, death occurs, usually within 40 minutes to five hours after exposure (occasionally the next morning). “Kindling” effects of cocaine causes increased risk for toxic effects the longer it is used.

11. Miscellaneous Effects (p. 3.15)
Formication refers to sensations on or under the skin that feel like hundreds of tiny bugs (“coke bugs”).
Dental Erosion is caused by malnutrition, poor dental hygiene, the erosive effects of acidic cocaine, and oral dehydration.
Seizure occurs in 2% to 10% of regular cocaine users.
Gastrointestinal Complications. include gastric ulcerations, tract perforations, colonic ischemia, etc.,
“Crack or Meth Dancing” is involuntary writhing, flailing, jerky, and sinuous movement, of the hands, arms and sometimes legs.

12. Cocaine Psychosis & Other Mental Problems (pp. 3.15–3.16)
Because cocaine increases dopamine, repeated use can trigger stimulant-induced paranoid psychosis. It is difficult for clinicians to differentiate between a pre-existing psychosis and a cocaine-induced psychosis. Symptoms usually disappear after a period of abstinence.

E. OTHER PROBLEMS WITH COCAINE USE (p. 3.16)
1. Polydrug Use
Cocaine’s stimulating effects can be so intense that the user needs a downer to take the edge off, e.g., alcohol, heroin, or a sedative-hypnotic. Cocaine combined with a downer is known as a “speedball”. Cigarette smokers are 22 times more likely to also use cocaine.

2. Adulteration & Contamination
Street cocaine is usually adulterated so when the drug is used intravenously, diluents, bacteria, and viruses are also injected. The hepatitis C infection rate for IV drug users is 50% to 90%. In 2009, 69% of U.S. street cocaine samples contained levamisole, a dangerous veterinary de-worming medicine.

F. COMPULSION (pp. 3.16–3.17)
The reasons for compulsive use including
- recapturing the initial rush
- avoiding the crash
- avoiding life’s problems
- controlling the symptoms of a mental illness.
There is a hereditary predisposition to use; the drug induces alteration of brain chemistry that causes cravings and manifests a binge pattern of use.

**IV. SMOKABLE COCAINE (crack, freebase) (PP. 3.17–3.20)**
The smokable-cocaine epidemic began in 1981 when a cheap chemical process to make cocaine smokable was developed. The addictive nature of smokable cocaine was the primary reason for the epidemic. The media has lost interest in reporting about crack but it is still a serious problem. The epidemic waned in the 1990s but smokable cocaine is still a problem and 72% of all those admitted for cocaine treatment are crack smokers.

**A. PHARMACOLOGY OF SMOKABLE COCAINE (pp. 3.17–3.18)**
Making cocaine suitable for smoking (freebasing, “basing,” or “baseballing”) involves precipitating out pure cocaine freebase crystals. “Cheap basing” or “dirty basing” involves baking soda, water, and heat until clumpy crystals precipitate out (“crack”); there are more impurities with this method.

The converted freebase cocaine, made by either method
1. has a lower melting point than the powdered form,
2. reaches the brain faster,
3. is more readily absorbed by fat cells of the brain, and
4. delivers a much higher dose of cocaine in the system over a short period of time.

Crack and freebase are just different chemical forms of cocaine that makes them smokable. Smoking results in more addiction problems. In those treated for cocaine addiction, 70% are crack smokers though more cocaine users snort or inject the drug.

**B. EFFECTS & SIDE EFFECTS (pp. 3.18–3.19)**
The rush from smoking crack lasts as little as 5 to 10 seconds and a subsequent euphoria, excitement, and arousal lasts several minutes more. Crack is always used in an intense binge pattern. Physical side effects include thirst, coughing, tremors, dry skin, slurred speech, and blurred vision. As use becomes chronic, chest pains, sore throat, black or bloody sputum, hypertension, weight loss, insomnia, tremors, and heart damage can occur. Other effects include crack keratitis, crack thumb, and torch burns to the face and hands. Unwanted psychological effects of chronic use include paranoia, intense craving, asocial behavior, hyperexcitability, hallucinations, etc.

1. **Respiratory Effects**
   Chest pains, pneumonia, cough, crack lung, hemorrhage, respiratory failure, and death due to the drug’s effect on the respiratory control center of the brain can occur. Crack lung is defined by pain, breathing problems, and fever that resemble pneumonia. Respiratory problems are further aggravated when the user also smokes cigarettes.
2. Polydrug Abuse
Some smokers combine freebase and marijuana ("champagne," "caviar"), crack with PCP or ketamine ("space basing," "whack"), freebase cocaine and smokable tar heroin ("hot rocks"), and cocaine and wine coolers (crack coolers), etc.

3. Overdose
Usually overdose is marked by a very rapid heartbeat and hyperventilation, often accompanied by a feeling of impending death. Most people survive, but several thousand die usually from cardiac arrest, seizure, stroke, respiratory failure, or severe hyperthermia.

C. OTHER CONSEQUENCES OF CRACK USE (pp. 3.19–3.20)
1. Economic Consequences
Crack is not cheaper per gram than cocaine hydrochloride; it is just sold in smaller units. One gram of cocaine sells for about $100. One-tenth of a gram converted to a crack rock sells for about $20. Successful dealers become addicted to the money and the lifestyle that comes with dealing.

2. Drug Gangs
The majority of small-time cocaine dealers make just enough money to support their own habit. The large scale economic potential is so great that gangs (e.g. Bloods, Crips, Jamaican, Colombian and Mexican) are organized around its sale and distribution. Along with homicide and other crime associated with gang activity, cocaine-related arrests account for 42% of all U.S. drug arrests. Federal penalties changed in late 2010 to reduced the disparity between crack and powder cocaine sentencing because a disproportionate number of minorities were being imprisoned for cocaine trafficking.

3. Social Consequences
Addictive use of the drug has social ramifications, e.g., high rates of neglect, abandonment, and child abuse. There is also a high rate of crime associated with crack use that has a major negative impact on families in many inner-city communities.

D. COCAINE VS. AMPHETAMINES (p. 3.20)
Price. Cocaine is more expensive.
Quality of the Rush or the High. Many users report that the rush and the high from cocaine is greater than that from amphetamines but amphetamines release greater amounts of energy.
Duration of Action. Cocaine’s major effects last about 40 minutes; amphetamine’s effects last four to six hours.
Manufacture. Cocaine is plant derived; amphetamines are synthetic.
Methods of Use. Snorting, smoking, and shooting (injecting) are the preferred methods of use for both, methamphetamines can also be ingested.
Addiction Rate. Methamphetamine leads users into addiction more quickly than cocaine and users enter treatment sooner.

V. AMPHETAMINES (PP. 3.20–3.28)

A. CLASSIFICATION (p. 3.20)
Amphetamines are a class of powerful synthetic stimulants with effects similar to cocaine but lasting much longer. Amphetamines are usually snorted, injected, or taken orally.

There are several different types of amphetamines: amphetamine, methamphetamine, dextroamphetamine, and dextro isomer methamphetamine (or “crystal meth,” the most common). All produce similar effects.

B. HISTORY OF USE (p. 3.21–3.24)
Worldwide more than 35 million people used amphetamines and methamphetamines in 2009, compared to 18 million cocaine users, 18 million heroin users, and 165 million marijuana users.

1. Discovery
Amphetamine was synthesized in 1887 and methamphetamine in 1919. The drugs’ stimulant qualities and medical applications were not utilized until the 1930s when Methedrine® and Benzedrine® inhalers were marketed as bronchodilators. The drugs were taken to energize the user, counter low blood pressure, reduce the need for sleep, and suppress appetite. Amphetamine tablets were widely used during World War II by Allied, German, and Japanese forces to keep pilots and soldiers alert. More than 225 million doses were handed out during the Vietnam conflict. Amphetamines were also used to treat narcolepsy (a chronic sleep disorder), some cases of epilepsy, and depression.

2. Japanese Epidemic
Abuse of amphetamines in Japan continued after World War II. There are 1 to 2 million amphetamine abusers in Japan.

3. Diet Pills
In 1970, an estimated 6% to 8% Americans used prescription amphetamines, for weight loss.

4. Street Speed
The peak of the “speed” craze occurred in the late 1960’s. The hippy/counter culture movement was fueled by both diverted and illegally manufactured amphetamines.
In response to the amphetamine epidemic, the Comprehensive Drug Abuse Prevention and Control Act of 1970 classified amphetamines as Schedule II drugs, making them difficult to obtain.

The most popular form of street speed was the “crosstop” tablet smuggled into the U.S. from Mexico.

In the late 1980s and 1990s there was a resurgence in abuse of illicit methamphetamines, particularly “crank” (methamphetamine sulfate), and “crystal meth” (dextro isomer methamphetamine hydrochloride).

5. “Ice”

In the 1990s, “crystal meth” (“ice,” “glass,” “batu,” or “shabu”), was trending toward major abuse. Many Asian countries saw severe abuse problems with this drug (“shabu,” “batu,” “ya ba”, etc). In Arab countries, phenethylline (Captagon®) a drug that is metabolized in the body into amphetamine has seen recent abuse.

C. CURRENT USE

Licit Use. Amphetamines are used to treat attention-deficit/hyperactivity disorder, narcolepsy, and obesity.

Illicit Use. Historically, stimulant epidemics last 10 to 15 years. Due to the intensity of the high and the severity of the side effects, meth abuse eventually becomes self-limiting. The current cycle began in the 1980’s and continues into 2011, the number of admissions for amphetamine addiction has doubled in the past 10 years.

The typical user is a white male between the ages of 19 and 40. Meth use is particularly rampant in the gay community. The number of HIV/AIDS cases in the gay community exceeds that of other populations due to high-risk sexual behavior and the use of contaminated needles.

D. METHAMPHETAMINE MANUFACTURING

Meth was originally manufactured by biker gangs, today Mexican gangs and drug cartels are involved in its manufacture and distribution.

There are more than 300 ways to manufacture methamphetamine using ephedrine and pseudoephedrine. Super labs run by Mexican cartels manufacture most of the meth available in the U.S.

To control mom and pop meth labs, many states enacted laws requiring pharmacies to limit the amount of pseudoephedrine-containing cold tablets that could be purchased at one time.

The Federal Combat Meth Act of 2005 limits access to meth precursors. The international controls placed on meth precursors by Mexico and other countries have caused the drug gang to smuggle in new precursors like P2P to produce meth. The price of a gram is $200 to $300.

The chemicals used in the manufacturing process are dangerous to the environment. In 2005 in the United States, 12,484 polluted methamphetamine laboratories and dumpsites were seized and decontaminated, primarily by the DEA and state law enforcement agencies.
Recently “ya ba,” manufactured in Thailand, Laos, and Myanmar, has become a problem. These little brightly colored methamphetamine pills are being smuggled into the United States and other countries in ever-increasing amounts.

E. EFFECTS (p. 3.24–3.25)
1. Routes of Administration

**Snorting** methamphetamine causes irritation and pain to the nasal mucosa.

**Intravenous** use causes a more intense high than snorting or swallowing; however, it often causes pain in the blood vessels.

**Oral** ingestion fell out of favor because of the drug’s bitter taste and the length of time it takes to reach the brain.

**Smoking** “crank” or “ice” is similar to smoking freebase cocaine (in a pipe).

Regardless of the route of administration – the effects last four to six hours compared to 10 to 90 minutes for cocaine.

F. NEUROCHEMISTRY (p. 3.25)

Amphetamines increase norepinephrine, epinephrine, and dopamine in three ways:

- they force the release of these neurotransmitters in nerve terminals
- intake pumps reverse function and spit out extra neurotransmitters
- they block the enzymes that metabolize the excess neurotransmitters.

Prolonged amphetamine use alters brain chemistry in a way that increases craving. This process also occurs with cocaine.

In one study the brains of meth users showed an average loss of 11.3% of their limbic gray matter, particularly the hippocampus, areas associated with craving, emotions, mood, and memory.

Users with a strong tendency to relapse have subdued activity in five different regions of the brain. This implies that those with a tendency to relapse have an impaired decision-making ability and find it hard to refuse a craving.

G. PHYSICAL EFFECTS & SIDE EFFECTS (p. 3.25–3.26)

Small-to-moderate doses create extra energy, increase heart rate, raise body temperature, trigger rapid respiration, raise blood pressure, dilate bronchial vessels, and suppress appetite.

Methamphetamine abusers go on binges, or “runs,” remaining awake and active for 3, 4, or 10 days at a time.

Tolerance to amphetamines is pronounced. Users go from 15 to 30 mg per day to 5,000 mg after months of use.

Long-term use can cause sleep deprivation, heart and blood vessel toxicity, and severe malnutrition. Malnutrition, cravings for sweet foods,
poor dental hygiene, and severe oral dehydration often result in bad gums and rotted teeth.
Withdrawal from methamphetamine or cocaine results in physical and emotional depression, extreme irritability, nervousness, anergia, anhedonia, and craving.
Large amounts can cause an overdose, resulting in convulsions, hyperthermia, stroke, cardiovascular overstimulation, and collapse.

H. NEONATAL EFFECTS (p. 3.26–3.27)
In the United States, almost half of all methamphetamine abusers are women. Damage to the fetus of a pregnant drug abuser can stem from the direct effects of the drug as well as the consequences of a chaotic lifestyle. Risks include
• irritable baby syndrome at birth;
• premature delivery and congenital deformities;
• placental separation;
• intrauterine stroke;
• higher risk for HIV and hepatitis B or C.
Developmental risks include:
• growth and developmental delays
• learning disabilities
• increased incidence of ADHD
• increased risks for rage disorder
• greater incidence of SIDS.

I. MENTAL & EMOTIONAL EFFECTS (p. 3.27–3.28)
Amphetamines initially produce a mild-to-intense euphoria, a sense of well-being and confidence, alertness, and sexual impulsivity. After prolonged use, irritability, paranoia, anxiety, aggression, mental confusion, poor judgment, impaired memory, and hallucinations can result from unbalanced neurotransmitters.
Amphetamines release neurotransmitters that mimic sexual gratification so they are sometimes used to augment sexual activity.
The increased suspiciousness, paranoia, and overconfidence created by the use of meth leads to misinterpretations of others’ actions which sometimes leads to violent reactions.
Excess methamphetamine or cocaine use can trigger amphetamine/cocaine psychosis. Symptoms include hallucinations, loss of contact with reality, and pressed speech that is almost indistinguishable from true schizophrenia or paranoid psychosis. The disturbed user will usually return to some semblance of normalcy after the brain chemistry has been rebalanced which takes a few days or weeks.
Dextromethamphetamine ("ice," or "crystal meth") stimulates the brain more than other amphetamines, resulting in more overdoses and a quicker disruption of neurotransmitters.

**VI. AMPHETAMINE CONGENERS (p. 3.28–3.30)**

Amphetamine congeners are stimulant drugs that are chemically dissimilar but pharmacologically related to amphetamines and that produce many of the same effects.

**A. ADHD, METHYLPHENIDATE (Ritalin®) & CONCERTA® (p. 3.28–3.29)**

Methylphenidate (Ritalin®) is the most widely used amphetamine congener. Although it is prescribed as both a mood elevator and a treatment for narcolepsy, it is most often prescribed for attention-deficit/hyperactivity disorder. Amphetamines such as Adderall® and Dexedrine® are also widely prescribed for ADHD.

1. **Diagnosis of ADHD**

   There is no explicit diagnostic test for ADHD. Controversy surrounding the extent and the severity of the disorder continues. Some physicians use brain-imaging techniques to look for telltale signs. One of the main deficits is in the executive control part of the brain.

   **Classification.** In the United States, the 3 subtypes of ADHD according to the *DSM-IV-TR* are:
   - ADHD, combined type
   - ADHD, predominantly inattentive type (also known as Attention Deficit Disorder, ADD)
   - ADHD, predominantly hyperactive-impulsive type

2. **Epidemiology**

   Between 3% and 7.4% of all school age children in the United States could be diagnosed with ADHD; it is two to three times more prevalent in boys than girls. 2.9% to 16.4% of adults could be diagnosed with ADHD.

3. **Pharmacotherapy for ADHD**

   Stimulants are prescribed to treat ADHD. Dopamine depletion is one of the main causes, and amphetamines or amphetamine congeners release dopamine (and serotonin).

   More than 22 million prescriptions per year are issued for ADHD stimulants:
   - methylphenidate (Ritalin®, Focalin XR, and Concerta®) (10 million prescriptions per year);
   - d-amphetamine (Adderall®) (7.7 million prescriptions)
• lisdexamfetamine (Vyvanse®)
• atomoxetine (Strattera®) and guanfacine (Intuniv, Tenex®), non-stimulant ADHD medication (5.8 million prescriptions); and
• pemoline (Cylert®)

Other therapies include dietary and lifestyle changes, education, exercise, behavior modification, and psychotherapy. Some research has shown methylphenidate alone worked as well as methylphenidate and therapy for ADHD.

4. Concerns Regarding ADHD Pharmacotherapy
The FDA has received reports of psychosis or mania and hallucinations among patients treated with ADHD medications. Increased abuse of these substances was seen in the mid-2000s due to diversion of methylphenidate and Adderall® to nonmedical use. Methylphenidate, has strong addictive liability. It has been sold on the street and used as a party drug. The U.S. military bars anyone who used methylphenidate in adolescence from military service. There are also grave concerns about the long-term effects of giving strong stimulants to children.
There is a high occurrence of ADHD in drug abusers with an increased risk for substance abuse in adults with untreated ADHD. One study of boys with ADHD who were treated with stimulants, including Ritalin®, were 84% less likely to abuse drugs and alcohol when they get older compared with those who are not treated. Research supports the need to treat ADHD patients with medications throughout their lives.

B. DIET PILLS (p. 3.31)
At any given time, 24% of men and 38% of women in the United States are trying to lose weight. Presently only 2% to 3% use diet pills. In the fifties, sixties, and seventies, amphetamine based diet pills saturated the market. In addition to aiding weight loss, they also caused heart problems, malnutrition, and dependence. Amphetamine congeners, diet pills like Adipex® and Obetrol® with similar side and toxic effects were the next generation that saturated the market.
American Home Products has paid approximately $4.8 billion to settle claims brought against two amphetamine congener diet pills—fenfluramine and dexfenfluramine (fen-phen)—that caused heart-valve damage. Other amphetamine congeners like pemoline and atomoxetine can cause liver damage.
Diet pills (amphetamines and amphetamine congeners) are recommended only for short-term use.

VII. LOOK-ALIKE & OVER-THE-COUNTER (OTC) STIMULANTS (PP. 3.31–3.32)
A. LOOK-ALIKES (p. 3.31)
In the 1980s the look-alike stimulants contained ephedrine and occasionally pseudoephedrine (anti-asthmatics), phenylpropanolamine (PPA a decongestant and mild appetite suppressant), and caffeine (a stimulant). In the early 1980s the FDA banned the OTC sale of products containing two or more of these ingredients. When overused, these products are somewhat toxic, especially when combined.

B. OTHER OVER-THE-COUNTER STIMULANTS (p. 3.32)
Pseudoephedrine and phenylpropanolamine, which have decongestant, mild anorexic, and stimulant effects, were previously found in hundreds of allergy and cold medications. After restrictions were placed on pseudoephedrine and warnings about phenylpropanolamine surfaced, drug manufacturers turned to other drugs, such as phenylephrine, that couldn't be made into amphetamines and had fewer stimulant or other unwanted side effects. Caffeine has been sold as an OTC stimulant for years, e.g., NoDoz® and Vivarin.

VIII. MISCELLANEOUS PLANT STIMULANTS (P. 3.32–3.35)
Worldwide, dozens of plants or their extracts with stimulant properties have been used for centuries by hundreds of millions of people; plants include khat, betel nut, yohimbe, and ephedra.

A. Khat & Methcathinone (p. 3.32–3.33)

1. Khat (“qat,” “shat,” & “miraa”)
Khat is the driving economic force in Somalia, Yemen, and a few other countries in eastern Africa, southern Arabia, and the Middle East.
The khat shrub is 10 to 20 ft. tall. The fresh leaves and tender stems are chewed and the juice is swallowed. Dried leaves and twigs are crushed for tea or made into a chewable paste.
The main psychoactive ingredient, cathinone, has a half-life of about 90 minutes. It produces a mild euphoric effect along with exhilaration, talkativeness, hyperactivity, wakefulness, aggressiveness, enhanced self-esteem, and loss of appetite. Side effects of excess use include anorexia, tachycardia, hypertension, dependence, chronic insomnia, and gastric disorders. Withdrawal from chronic abuse results in similar symptoms as seen with amphetamine addiction.

2. Methcathinone, methylmethcathinone and MDPV
Methcathinone, also known as methylmethcathinone and mephadrone is a synthetic version of cathinone that was originally synthesized in 1957 in the United States, but it was rejected for production due to side effects. The formula became widely available in Russia, and by the early 1980s, methcathinone manufacturing and illicit use were widespread. It has been estimated that 20% of illicit-drug abusers in the Russian Republic use methcathinone. There has been a dramatic increase in abuse of this drug
in Europe. In the US, mephadrone and another analog of cathinone, methylenedioxypyrovalerone (MDPV) was sold as synthetic cocaine or synthetic amphetamine and disguised as “bath salts” Side effects include nervousness, labored respiration, and lack of coordination.

B. BETEL NUTS (p. 3.33–3.35)
Specific references to betel nuts (seeds of the betel palm, Areca catechu) date back 23 centuries. The nut has been widely used in India, Pakistan, the Arab world, Taiwan, Malaysia, the Philippines, New Guinea, Polynesia, southern China, and some countries in Africa. Today anywhere from 200 million to 450 million people worldwide use betel nuts as a recreational drug and as a medication.

The main active ingredient, arecoline, increases levels of epinephrine and norepinephrine. The effects of betel are similar to those of nicotine or strong coffee and include a mild euphoria, excitation, and a decrease in fatigue. The betel nut (husk and/or meat) is usually chewed in combination with another plant leaf (such as peppermint or mustard) and slaked lime. The juice of this mixture stains the teeth and the mouth dark red over time.

Tissue damage to mucosal linings of the mouth and the esophagus is common. Gutkha is a commercial betel nut product, heavily marketed in India. “Betel quids” are commercially prepared betel nut product in Taiwan.

C. YOHIMBE (p. 3.35)
Yohimbine, a bitter spicy extract from the African yohimbe tree, can be brewed into a stimulating tea or used as a medicine. It is reported to be a mild aphrodisiac. The yohimbine in the bark is extracted and formulated into either tablets or a tincture for oral ingestion. Yohimbine has been reported to produce a mild euphoria and occasional hallucinations; in large doses it can be toxic and cause death by respiratory paralysis.

D. EPHEDRA (Ephedrine) (p. 3.35)
The ephedra bush (Ephedra equisetina) contains the drug ephedrine. This mild-to-moderate stimulant is used medicinally to treat asthma, narcolepsy, allergies, and low blood pressure. Extract of ephedra has been used by athletes for an extra energy boost, but overuse can lead to heart and blood vessel problems. The National Football League banned ephedrine use by players because of the potential risk of cardiovascular damage. Ephedra is sold as an herbal stimulant in a wide variety of tablets and capsules.

Natural ephedra, synthetic ephedrine, and pseudoephedrine are also the main ingredients in the synthesis of methamphetamine and methcathinone. Laws are in place that reduce the importation and sale of these precursors.

IX. CAFFEINE (P. 3.35)
Caffeine is the most popular stimulant in the world. It is found in coffee, tea, chocolate, soft drinks, energy drinks, 60 different plants, and hundreds of OTC and prescription medications.

A. HISTORY OF USE (p. 3.36–3.38)

1. Tea
After water, tea is the most widely consumed beverage in the world. It was present in China as early as 2700 B.C. The tea ceremony was and still is an important ritual in Japanese homes.

The Boston Tea Party in 1774 reflected the importance of this psychoactive substance in colonial life as irate Bostonians threw tea into Boston Harbor to protest a tax on tea. Today the primary exporters of tea are India, China, and Sri Lanka. Black tea comprises 75% of the world’s tea, green tea 22%.

2. Coffee
Coffee was first cultivated in Ethiopia around A.D. 650. Use spread to Arabia in the thirteenth century and finally to Europe by the fifteenth century. Coffee and tea generated huge revenues. The drink was so stimulating that many cultures banned it as too intoxicating.

Each coffee drinker in the U.S. consumes about 20 lbs. of coffee per year. There has been an incredible growth in the number of specialty coffeehouses. As of 2009, Starbucks® operated 16,680 stores in 49 countries.

3. Cocoa
Cocoa is the product of the roasted and ground beans of the cacao tree (Theobroma cacao) it was first used in the New World by Mayan and Aztec royalty as an unsweetened drink, a spice, as food, as a stimulant, and a currency. There is a small amount of caffeine in chocolate.

4. Caffeinated Soft Drinks (colas)
The average American consumed the equivalent of 780 eight-ounce glasses of soft drinks (most caffeinated) in 2009. Caffeinated soft drinks (colas) often use caffeine extracted from the process of decaffeinating coffee. Dental and obesity problems are related to the high sugar contents of soft drinks.

5. Energy Drink Phenomenon
With 80 mg of caffeine, Red Bull® has more than twice the amount of caffeine in a 12 oz. Coca Cola® (35 mg) but less than half that of 8 oz. of brewed coffee (135 mg). In addition to caffeine, Red Bull® also contains taurine, ginseng, guarana, glucose or glucuronolactone, B-complex vitamins, minerals, and carbohydrates to provide a quick energy boost. Rockstar®, Blast®, Zoom®, Killer Buzz®, and Cocaine® are other brands.
Some countries banned the sale of energy drinks because of cardiovascular concerns and excess dehydration. The practice of mixing alcoholic beverages with energy drinks to create a type of “speedball cocktail” is responsible for intoxication and compromised health.

6. Other Plants Containing Caffeine
Other plants containing caffeine include guarana, mate, and yoco, all are found in South America. Guarana is the national drink of Brazil; maté is the most popular caffeinated drink in Argentina.

B. PHARMACOLOGY (p. 3.38)
Caffeine is an alkaloid of the chemical class called xanthines. Its half-life in the body is 3 to 7 hours, so it takes 15 to 35 hours before 95% of the caffeine is excreted. 20% of U.S. adults consume more than 350 mg of caffeine per day. 3% consume more than 650 mg daily.

Caffeine Content of Various Drinks & Medications (table 3-2 p. 3.37)
- Brewed coffee (8 oz.) 135 mg
- 5-minute tea brew 60 mg
- Mountain Dew® 54 mg
- Coca-Cola® 35 mg
- Milk chocolate (4 oz.) 24 mg
- Red Bull® energy drink (8 oz) 80 mg
- Dextrim® (1 capsule) 200 mg
- NoDoz® Max. (1 tablet) 200 mg

U.S. per-capita consumption of caffeine is 211 mg per day (about two cups of regular coffee plus a cola); in Sweden its 425 mg and in the United Kingdom, 445 mg. In the U.S. Tea is responsible for 17% of the per-capita daily consumption of caffeine, 16% soft drinks, and 60% coffee.

C. PHYSICAL & MENTAL EFFECTS (p. 3.39)
Medically, caffeine is used as a bronchodilator in asthma patients. It can counteract a sudden drop in blood pressure and is found in a number of OTC preparations. Nonmedically, caffeine is a mild stimulant. In low doses (100 up to 300 mg), it can increase alertness, dissipate drowsiness or fatigue, and facilitate thinking. It releases the brain’s stimulants and inhibits adenosine.
At doses of more than 350 mg (3 to 4 cups of coffee) per day, anxiety, insomnia, gastric irritation, high blood pressure, nervousness, and flushed face can occur. Caffeine is lethal at about 10 grams (100 cups of coffee). People who are prone to panic attacks should avoid caffeine.
Coronary heart disease, ischemic heart disease, heart attacks, intestinal ulcers, diabetes, and some liver problems are occasionally seen in long-term, high-dose caffeine users.
D. TOLERANCE, WITHDRAWAL & ADDICTION (p. 3.41)

Tolerance to the effects of caffeine does occur. PET scans of habitual coffee drinkers indicated a need to drink coffee to activate their brain to a normal state.

Withdrawal symptoms appear in 12 to 24 hours, peak in 24 to 48 hours, and last two to seven days. The most common withdrawal symptom is a throbbing headache. Lethargy, depression, decreased alertness, sleep disturbances and irritability are other symptoms.

Dependence can occur with daily intake levels of 500 mg. (about 5 coffees or 10 colas) or more. Coffee creates a milder dependency than do amphetamines or cocaine.

X. NICOTINE (PP. 3.41–3.55)

Although the number of smokers in the U.S. has been on the decline in recent years, about 22% of Americans are regular smokers. Rates of regular tobacco use in other countries are higher. Hospitals estimate that 15% to 40% of patients have tobacco-related diseases.

A. HISTORY (p. 3.41)

1. American Indians & Tobacco

Tobacco was venerated as a sacred; it was used in spiritual and health rituals in ancient Mesoamerica. The use of tobacco didn’t reach Europe and Asia until the late 1400s when it was introduced by Columbus and other explorers. Europeans used it for recreation and as a medicine.

Smoking tobacco in a pipe several times a day was the most common form of use in early America, but in the eighteenth century chewing tobacco and snuff became popular until the end of World War I.

2. Growth of Cigarette Smoking

The technical and social developments that increased the use of tobacco included:

- the cigarette rolling machine
- a milder strain of tobacco
- lower prices
- aggressive advertising and marketing
- freebase nicotine (a more addictive form of the chemical)

Today, the average heavy smoker in the U.S. smokes 20 to 40 cigarettes per day, or more than 10,000 per year.

In 2008

- 36.9 million Americans smoked cigarettes every day
- 13.1 million smoked cigars, 1.88 million smoked pipes
- 8.67 million used smokeless tobacco.
3. Smokeless Tobacco

Moist snuff, the most popular form of smokeless tobacco in America, is finely chopped tobacco that is placed in the mouth next to the gums. Gutka, a form of moist snuff popular in India, consists of betel nuts, betel leaves, tobacco paste, clove oil, glycerin, spearmint, menthol, and camphor.

Powder snuff (dry snuff) is a fine powder that is most often gently inhaled or rubbed on the gums.

Loose-leaf tobacco is stuffed into the mouth and chewed to release the nicotine-laden juice. New smokeless tobacco products were introduced in the mid 2000s featured tobacco in pouches, and nicotine Strips, Orbs and Sticks. These products were developed as a socially acceptable alternative to smoking. Some believe they were developed to capture young people’s interest in using tobacco products.

B. PHARMACOLOGY (p. 3.43)

1. Nicotine

Nicotine, a central nervous system stimulant, disrupts the balance of endorphins, epinephrine, dopamine, and acetylcholine. Acetylcholine affects heart rate, blood pressure, memory, learning, reflexes, aggression, sleep, sexual activity, and mental acuity. The release of dopamine makes a smoker feel satisfied and calm thus resulting in tranquilizing as well as stimulating effects.

The average tobacco leaf contains 2% to 5% nicotine, the principle ingredient responsible for cardiovascular and psychoactive effects. Smoking delivers nicotine to the brain in 5 to 8 seconds; chewing tobacco or snuff in 3 to 8 minutes. The average cigarette contains 10 mg of nicotine but delivers only 1 to 3 mg of that to the lungs due to side stream smoke. Smoking accounts for 90% of all tobacco use in the U.S. In India chewing tobacco is more popular (85% of all men)

2. Freebase Nicotine

Internal tobacco industry memos discovered in the 1990s provided evidence of an awareness of the addictive quality of nicotine which was referred to as its “impact” on users. The memos released by the Tobacco Settlement Act of 1999 revealed that cigarette manufactures began adding ammonia compounds to tobacco in cigarettes as early as the 1960s. The compounds altered the nicotine released into a freebase form of the molecule which made tobacco more addictive in much the same way altering cocaine to freebase cocaine increases its addictive potential. Manufacturers could decrease the nicotine content of their products while making them more addictive. In 2009 the FDA was granted authority to regulate tobacco for the first time in history.

3. Other Reasons for Continued Use
• Social context, ritual aspects of lighting up, perception of smoking as an adult activity
• Desire to manipulate mood
• Rebellion
• Perception that smoking is sexually attractive
• Craving and addiction

The two most common reasons are weight control and self medication for depression.

Weight Control. Nicotine suppresses appetite and increases metabolism. On average, smokers weigh 6 to 9 lbs. less than nonsmokers. Fear of regaining weight prevents many smokers from quitting.

Self-Medication. Major depression occurs twice as often in smokers than in non-smokers. Smokers who have experienced at least one episode of major depression are 50% less likely to quit than those who exhibit no major depression.

C. TOLERANCE, WITHDRAWAL & ADDICTION (p. 3.45–3.47)

1. Tolerance
Physiological adaptation to the initial effects of nicotine develops quite rapidly. A few hours of smoking are sufficient for the body to begin learning how to handle these new toxins. Tolerance does not continue to build as it does with other stimulants.

2. Withdrawal
Withdrawal from a one or two pack-a-day habit can cause headaches, nervousness, fatigue, hunger, severe irritability, poor concentration, depression, increased appetite, sleep disturbances, and intense nicotine craving. The severity of these symptoms, particularly craving, is the main cause of relapse. A true physiologic dependence or tissue dependence develops through increased acetylcholine nicotinic receptors resulting in withdrawal when nicotine levels drop in brain. A smoker smokes to avoid unpleasant withdrawal symptoms. This process is known as negative drug reinforcement.

The sense of relaxation and well-being that most smokers receive from a cigarette is, in fact, the sensation of the withdrawal symptoms being subdued. Smokers try to maintain a constant level of nicotine in the bloodstream and the brain.

3. Addiction
Studies show that in the U.S. 25% of those who try a cigarette become daily habitual users. Only 1/10 of those who try alcohol become daily abusers. 80% of smokers say they want to quit, and another 10% want to limit the amount they smoke. Nicotine provides much less pleasure than other addictive drugs but significantly more people who try nicotine (compared to other drugs) become daily abusers. In many countries the
rate of daily use is higher: 50% in China, 40% in England, and 50% in Japan. Globally, 12% of women and 47% of men smoke.

Craving is a “self-determined nicotine state of consciousness” or “state dependence.” State dependence describes a person’s desire to achieve a certain mental and physical state that may be neither pleasurable nor objectionable but it is a state with which they are familiar and therefore comfortable.

Teen surveys have found that an adolescent smoker is 3 times more likely to also abuse alcohol, 8 times more likely to abuse marijuana, and 22 times more likely to abuse cocaine. Studies indicate that outcomes from drug addiction treatment are more positive when tobacco cessation is included in the overall treatment strategy.

D. AGE OF FIRST USE (p. 3.47)
The age of first use of any addictive substance is the most significant indicator that an individual will become habituated to that substance in adulthood. Those who began tobacco or other addictive drug use at age 8 to 12 are five times more likely to become an addict that those who began use at age 18 or 19. Those who delay their first use until after 19 are 18 times less likely to develop an addiction. Prevention should be targeted at delaying first use as long as possible.

E. EPIDEMIOLOGY (p. 3.47)
In 2009, 170 million Americans (over half of the U.S. population) had tried tobacco at some time in their lives and 60 million had used in the past 30 days. Most of were cigarette smokers but 8.7 million were smokeless tobacco users.

Use of smokeless tobacco has declined in twelfth-graders from 12.2% in 1995 to 8.4% in 2009.

The incidence of tobacco use is highest among American Indians or Native Alaskans (47.7%) and lowest in Asian Americans 2.7%. Among Blacks, 27.8%, Whites 26.6%, and Hispanic or Latino Americans (21.1%) use tobacco.

F. SIDE EFFECTS (p. 3.47–3.50)
Tobacco contains 4,000 to 4,800 chemicals; 400 are toxins, and 69 are known cancer-causing substances (e.g. cadmium, hydrogen cyanide, and arsenic). Cigarette smoke contains fine particles of carcinogenic tar and nitrosamines.

In 2000, tobacco smoking was estimated to have caused 5.4 million premature deaths worldwide, 392,000 in the U.S. alone. Most of these deaths are from lung cancer, heart disease, and lung disease. Another 50,000 U.S. nonsmokers die from secondhand smoke.

About 8.6 million U.S. residents have at least one serious illness caused by smoking. For every smoking-related death, 20 more live a lower quality of life. The health-related economic losses in the U.S. due to smoking cost $193 billion every year.
1. Longevity
In the U.S. adult smokers lose an average of 14 years of life from smoking. U.S. premature deaths caused by smoking and secondhand smoke totaled 443,000 in 2008. A British study found that smoking shortened a life by an average of 10 years.

2. Cardiovascular Effects
Smoking accelerates plaque formation and hardening of the arteries, the major cause of heart attacks. In 2008 in the United States, one-third of the 442,000 deaths from smoking-related illnesses were due to cardiovascular disease. Worldwide 11% of all cardiovascular deaths are due to smoking. A 2009 report showed that limiting secondhand smoke in the U.S. cut the incidence of heart attacks by 5% to 47%.

3. Respiratory Effects
Cigarette smokers have a high rate of bronchopulmonary disease, such as emphysema, chronic bronchitis, and chronic obstructive pulmonary disease (COPD). Approximately 80% to 90% of COPD deaths (from emphysema and chronic bronchitis) are due to smoking.

4. Cancer
Men who smoke are 22 times more likely to develop lung cancer than men who don’t; women who smoke are 12 times more likely. Approximately 85% of men with lung cancer and 75% of women with lung cancer smoke. The most likely culprits are the tars and other byproducts of combustion that a smoker inhales. Pipe and cigar smokers are more likely to get cancers of the larynx, mouth, and esophagus in addition to lung cancer.

5. Smokeless-Tobacco Effects
The effects of chewing are almost identical to the effects of smoking, including a slight increase in energy, alertness, blood pressure, and heart rate. One health advantage of smokeless tobacco over cigarettes is the lack of lung involvement; however, smokeless tobacco delivers more nicotine into the body than smoking cigarettes.
Smokeless tobacco irritates the tissues of the mouth and the digestive tract. Gums can become inflamed, causing dental problems and the risks of oral, pharyngeal, and esophageal cancers are increased. Users have a 50% higher risk factor for developing cheek and gum cancer than nonusers. Cardiovascular problems are just as severe with smokeless tobacco.

6. Fetal Effects
If a woman smokes during pregnancy less oxygen is available for her fetus which contributes to a lower than average birth weight and a higher
incidence of crib death (SIDS). Pregnant smokers are also twice as likely to miscarry and have spontaneous abortions as nonsmokers.

G. BENEFITS FROM QUITTING (pp. 3.50–3.51)
- Within 20 minutes of quitting blood pressure, pulse rate, and the temperature of hands and feet drop to normal levels.
- Within 8 hours, carbon monoxide levels drop and oxygen levels increase to normal.
- Within 24 hours, the risk of a sudden heart attack decreases.
- Within 1 week the risk of heart attack decreases, breathing improves and blood vessels began to relax.
- Within 2 to 12 weeks, circulation improves, lung function increases up to 30%, and the complexion improves.
- Within 5 years, the heart disease death rate returns to that for a nonsmoker and the lung cancer death rate decreases 50%.
- Within 10 to 15 years, the risk of all major diseases caused by smoking decreases to nearly that of someone who never smoked.

H. TREATMENT FOR TOBACCO ADDICTION (p. 3.51)
Medications approved to suppress cravings for nicotine during cessation include varenicline (Chantix®) and bupropion (Zyban®). These have been shown to have initial success rates of 44% and 30.5% respectively when used along with counseling. The other medical treatment consists of nicotine replacement products to prevent cravings and shift use of nicotine into non-smoking exposures. These include nicotine patches, inhalers, gums, nasal sprays, and lozenges.

I. THE TOBACCO INDUSTRY & TOBACCO ADVERTISING (pp. 3.51–3.54)

1. The Business of Tobacco
In 2008 U.S. cigarette sales were at their lowest point in 58 years, about 16 billion packs. As American sales declined tobacco companies shifted their focus to increasing sales overseas, producing cheap generic brands, smokeless tobacco products, and adding more nicotine per cigarette. These efforts raised the number of tobacco users worldwide to 1.3 billion. Three companies control almost 90% of the U.S. market. The Altria Group (Marlboro®, Virginia Slims®, and Basic®) captures 49.2% of all tobacco sales. After higher taxes made cigarettes more expensive, the tobacco industry responded by adding flavorings and marketing cheaper generic products aimed at younger smokers. Hand-rolled, flavored bidi cigarettes from India contain three times the nicotine content of American cigarettes.
Electronic cigarettes heat a nicotine solution in a cigarette-shaped device into vapor thus avoiding combustion and smoke. These are alleged to be safer than smoking but no research confirms this allegation.

2. Advertising
Tobacco advertising, including premiums, promotional allowances to retailers, and other expenditures, exceeds $13 billion a year, about $290 for every adult smoker. In 2008 the top cigarette brands and their share of their market were Marlboro®, 41%; Newport®, 9.7%, Camel, ® 6.7%, Doral,® 3.8%, Basic,® 3.5%, and Winston,® 3.2%. White and Hispanic smokers prefer Marlboro® (42% and 60%) over Newport® (16.5% and 18.6%). Black smokers prefer Newport® (44%) over Marlboro® (8.1%). Studies show that teen smoking is more addictive to the user than starting during adulthood. Comprehensive bans on all tobacco advertising in other nations have had a significant effect on reducing tobacco consumption.

3. Laws & Lawsuits
Lawsuits on behalf of dead or living smokers with cancer are expanding and many are successful.
In 2010 every state had laws regarding smoking in public spaces and buildings.
The major tobacco companies agreed to pay states $246 billion in settlements to help pay for the medical costs of tobacco-induced illnesses and to finance smoking-prevention campaigns. Many state governments redirected the funds allocated for antismoking campaigns.
The Family Smoking Prevention and Tobacco Control Act of 2009 prohibit adding anything to tobacco or smoke that would result in a characterizing flavor. This is to prevent children and teens from trying tobacco products at a young age. Menthol was exempted from the bill.

4. Secondhand Smoke
The battle over secondhand smoke began in the 1990s. It is estimated that one person dies from secondhand smoke (usually from cardiovascular disease) for every eight-smoker deaths. This represents 40,000 to 50,000 deaths each year. Side stream smoke from a smoldering cigarette contains up to 4 times the amount of toxins found in smoke directly inhaled through a filtered or nonfiltered cigarette.

J. THE 2004 & 2006 SURGEON GENERAL’S REPORT ON HEALTH CONSEQUENCES OF SMOKING (p. 3.54–3.55)
Since the first Surgeon General’s Report in the 1960s, the number of U.S. smokers has diminished by half and men’s cancer deaths have declined. The report reiterates, however, that smoking remains the leading preventable cause of disease and premature death in the United States. Smoking is shown to harm every organ of the body. The report determined that the lack of progress in tobacco control is attributable
more to the failure to implement proven strategies than to a lack of knowledge about what to do.

**XI. CONCLUSIONS (P. 3.55)**

Compare the use of stimulants to gain energy and confidence with natural methods, where energy supplies are replenished through sleep, relaxation, exercise, nutrition, and a healthy lifestyle. Natural methods create energy supplies before they are needed and provide for replenishment. Chemical methods drain the body causing it to shut down to recover and allow tolerance and psychological dependence to develop. The resulting excess use damages neurochemistry and most body systems.
Chapter 3 - UPPERS

Classroom or Small Group Discussion Topics

1. Considering the serious health risks associated with powerful stimulants, like cocaine and amphetamines, what would make a person use? Are the negative side effects simply discounted or could they believe the feelings they get from using will outweigh the dangers?

2. Identify the social and political factors that contributed to the cocaine and crack epidemic in the 1980's?

3. Identify the physical/medical/behavioral signs and symptoms indicating a person is under the influence of each of the following drugs:
   - cocaine
   - amphetamines
   - nicotine
   - caffeine

   What are some behavioral and physical signs and symptoms indicating a person is dependent on each of the following drugs?
   - cocaine
   - amphetamine
   - nicotine
   - caffeine

4. Create a grid (example below) with three columns. Ask students to identify a stimulant drug for each column (legal/licit or illegal/illicit) and provide information and explain the differences between the effects, consequences and patterns of use for substances in each category.

   In what ways is the information in each column similar or different?

<table>
<thead>
<tr>
<th></th>
<th>Legal/Licit Stimulant</th>
<th>Illegal/Illlicit Stimulant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Effects</td>
<td></td>
<td></td>
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<tr>
<td>Physical Effects</td>
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<tr>
<td>Legal Consequences</td>
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<tr>
<td>Social Consequences</td>
<td></td>
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<tr>
<td>Patterns of Use</td>
<td></td>
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</tr>
<tr>
<td>Patterns of Abuse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Discuss the cyclical patterns of popular substances of abuse. Provide the students with a timeframe of stimulant drug epidemics from 1970 to present day.
   - Since 1970 when has cocaine use has been at epidemic levels?
     Note specific trends for powder cocaine and crack cocaine.
- When has amphetamine use been at epidemic levels? Note specific trends for various types of amphetamines including "speed", methamphetamine, Adderall, Ritalin, etc.
- Give examples of generational amnesia (forgetting the severe problems associated with widespread drug use).

6. Discuss the use of plant based stimulant drugs in cultures around the world.
   - Where and how is *Catha edulis* (Khat/Quat/Ghat) used and how do the societies that use it structure their day around this plant based stimulant?
   - Where and how are betel nuts used and how does it fit within the cultures and societies that use it?
   - Where and how is unrefined coca leaf used and how does it fit within the cultures and societies that use it?
   - Discuss ways mild plant based stimulant use might be similar to or different from the use of coffee or colas in the U.S.

7. Discuss how the expansion of amphetamine use can affect a community (e.g., crime, environmental pollution, and violence).

8. Ask the students to discuss ways smokers who are concerned about the health hazards of smoking could reduce the harm of smoking to themselves and to those around them. Is quitting the only solution?
Chapter 3 - UPPERS

Critical Thinking & Class Exercises

1. Provide students with materials to build a model or illustrate how cocaine affects neurotransmitters in the brain (e.g., markers and paper, to make drawings, or marbles and glue, clay etc for an assemblage).
   Show how the use of amphetamines initially stimulates an individual but ultimately results in decreased energy.

2. Break into small groups and discuss the repercussions of “synthetic cocaine and amphetamine” sold in head shops and online as plant food and bath salts.

3. Referencing specific ads or marketing campaigns, ask students to analyze how audiences are targeted to sell cigarettes, energy drinks, and coffee through the use of language, graphic imagery, emotional overtones, implied promises, product endorsements, etc.

4. Have students discuss how various cultures have developed in relation to the types of stimulant drugs (licit or illicit) readily available, e.g. khat in Somalia, cocaine in Columbia, coffee and tobacco in the United States.

5. Collect ads for energy drinks and evaluate whether or not the copy used to describe the benefits of an energy drink could be used to advertise amphetamines or another stimulant.

6. Log on to the Phillip Morris web site
   Read their information on the health consequences of smoking. Is this a sincere effort or a strategy to avoid further litigation and legal restrictions on their product?
   How does cigarette marketing differ in other countries?
   Their international web site:

   Explore the different points of view including the issue of the disproportionate use of menthol cigarettes by African Americans.

8. Why does secondhand smoke through side-stream smoke exposure contain four times more toxins than directly inhaled mainstream smoke?.

9. Should smoking cigarettes, E-Cigarettes, cigars, and pipes be completely banned from all public places? Why? Why not?