"Drugs and Behavior".

In Section 1 of this course you will cover these topics:

- Drugs And Behavior Today
- Drug-Taking Behavior: The Personal And Social Concerns
- How Drugs Work In The Body And On The Mind
- The Major Stimulants: Cocaine And Amphetamines

Topic : Drugs And Behavior Today

Topic Objective:

At the end of this topic student would be able to understand:

- Social Messages and Social Realities Concerning Drug Use
- Two Ways of Looking At Drugs and Behavior
- Drugs in Early Times
- Drugs in The Nineteenth Century And Twentieth Century
- Patterns of drug use in the United States

Definition/Overview:

Drug: A drug, broadly speaking, is any chemical substance that, when absorbed into the body of a living organism, alters normal bodily function. There is no single, precise definition, as there are different meanings in drug control law, government regulations, medicine, and colloquial usage.

In pharmacology, Dictionary.com defines a drug as "a chemical substance used in the treatment, cure, prevention, or diagnosis of disease or used to otherwise enhance physical or mental well-being." Drugs may be prescribed for a limited duration, or on a regular basis for chronic disorders.

Recreational drugs are chemical substances that affect the central nervous system, such as opioids or hallucinogens. They may be used for perceived beneficial effects on perception, consciousness, personality, and behavior. Some drugs can cause addiction and habituation.

Drugs are usually distinguished from endogenous biochemicals by being introduced from outside the organism. For example, insulin is a hormone that is synthesized in the body; it is

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called a hormone when it is synthesized by the pancreas inside the body, but if it is introduced into the body from outside, it is called a drug.

Many natural substances such as beers, wines, and some mushrooms, blur the line between food and drugs, as when ingested they affect the functioning of both mind and body.

Key Points:

1. Social Messages and Social Realities Concerning Drug Use

We live in a society that sends mixed messages with respect to drug use. Warning labels on cigarette packs and public service announcements caution against serious health hazards of tobacco use, while cigarette smoking remains glamorized in movies. Public officials admit to drug use (primarily marijuana smoking) earlier in their lives; yet marijuana remains classified as an illegal drug in the same category as heroin. Public anti-drug campaigns co-exist with pro-drug-use messages on Internet web sites.

Two themes predominate in the text. The first theme concerns the immense diversity of drugs in our society, both legal and illegal. As many problems arise from legal drugs as from illegal ones. The second theme focuses on acknowledging that drug abuse and its associated problems extend to men and women of all ages, all ethnic and racial groups, geographic regions, and socioeconomic levels.

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2. Two Ways of Looking At Drugs and Behavior

We can focus on specific substances that alter our feelings, our thoughts, our perception of the world, and our behavior as well as the circumstances in our lives that lead to drug-taking behavior.

Psychoactive drugs are those drugs that influence the functioning of the brain and hence our behavior. Some psychoactive drugs are licit (legal) and others are illicit (illegal). In the case of licit drugs, there is legal availability to the general public in the United States, though in the cases of alcohol and nicotine, access carries a minimum-age requirement.

Drug dependence can be examined on three levels. On a behavioral level, dependence is characterized by intense craving and, in most cases, a need for increasingly greater quantities

in order to get the same desired effect. On a physiological level, dependence corresponds to the appearance of long-lasting changes in the brain. On a social level, the pattern of dependence is influenced by the social context in which drug-taking behavior occurs.

A drug is typically defined as a chemical substance that, when taken into the body, alters the structure or functioning of the body in some way. Nutrients considered to be related to normal functioning are excluded from this definition.
Drugs can also be differentiated from non-drugs in terms of whether the substance has been *intended* to be used primarily as a way of inducing a bodily or psychological change.
Drug use can be considered as either instrumental or recreational, depending on the intention of the user. Instrumental use means that a person is taking a drug with a specific socially-approved goal in mind. Recreational use means that a person is taking the drug for the purposes of acquiring the effect of the drug itself.

Drug abuse refers to drug-taking behavior that produces some form of physical, mental, or social impairment. Drug misuse refers to cases in which a prescription or nonprescription drug is used in an inappropriate manner. Recreational use of prescription pain medications such as Vicodin, OxyContin, Percocet, Demerol, and Darvon is an example of drug misuse that can lead to drug abuse.

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We need to understand the historical foundations of drug use, the ways in which our society has responded to problems associated with drug use and how our attitudes have changed over time.

3. Drugs in Early Times

Systematic drug use probably began thousands of years ago through shamanism, a practice among primitive societies in which an individual (shaman) acts as a healer through a combination of induced trances and plant-based medicines.
Examples of early medications are recorded in an Egyptian scroll called the Ebers Papyrus, dating back to 1500 B.C. More than 800 prescriptions are listed. Some contain ingredients with true medicinal value, such as castor oil and opium. However, it is difficult to evaluate the usefulness of most of these early medications because of the placebo effect.

The placebo effect results in an change in a patients condition on the basis of the patients belief that he or she would be changed in some way, but not on the basis of the physical effects of the medication received.

4. Drugs in The Nineteenth Century And Twentieth Century

During the nineteenth century, great strides were made in the field of medicine, such as the emerging development of vaccines and anesthetic drugs. Nonetheless, widespread and uncontrolled access to psychoactive drugs such as opium and cocaine through patent medicines during this period created significant social problems. The adverse societal and personal effects of these drugs eventually became increasingly evident in the early twentieth century.

Beginning in the early nineteenth century, increasing opposition to alcohol use in the United States (the temperance movement) resulted in the Prohibition era (1920-1933).

Following World War II, antibiotic medications such as penicillin and streptomycin revolutionized efforts to control bacteria-borne infectious diseases. By the mid-1950s, psychiatric medications for treating schizophrenia such as chlorpromazine (Thorazine) emerged on the mental-health scene.

Beginning in the late 1960s, the recreational use and widespread popularity of marijuana, hallucinogens such as LSD, and other psychoactive substances among young people brought the concerns of drug use into segments of American society that had previously ignored them.

In the 1980s, increased use of cocaine and later crack cocaine emerged as a major social concern. By the 1990s, cocaine and crack cocaine prevalence rates subsided, but heroin abuse reemerged, along with new designer drugs (structural analogs) created by altering the chemical structure of illicit drugs while mimicking their psychoactive effects, and club drugs such as Ecstasy, GHB, ketamine, Rohypnol, methamphetamine, and LSD. By the late 1990s, a growing array of herbal and non-herbal dietary supplements purported to have psychoactive properties became available to the general public.

In the new millennium, there are new challenges and social concerns. First, there is increased attention to significant problems created by the abuse of alcohol, steroids, inhalants, nicotine

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as well as abuse of better-known illicit drugs such as marijuana, heroin, cocaine, and hallucinogens. Second, for the first time, there is a new generation of young people contending with drug-taking behavior who are children of an earlier generation that had recreational drug experiences of their own at the same age. Interestingly, a recent study has found no relationship between prior marijuana use among parents and marijuana use by their children.

5. Patterns of drug use in the United States

Confidential questionnaires and surveys are the only practical means for gaining information about the prevalence rates and patterns of drug use. For young people in the United States from Grade 8 through Grade 12, as well as college students and young adults, the most prominent survey is the Monitoring the Future study conducted by the University of Michigan on an annual basis since 197

The National Survey on Drug Use and Health (formerly known as the National Household Survey) obtains drug-prevalence information for populations within the United States across the life span

In 2005, 38% of high school seniors reported use of any illicit drug over the previous year, and 34% reported marijuana use during this period. The 2005 figures are substantially lower than those reported during the illicit-drug prevalence peak in 1979 (54 percent and 51 percent, respectively). One in twenty seniors in 2005 had used cocaine, one in twenty had used inhalants on a recreational basis, and one in fifty had used LSD in the past year.

3 College students report lower annual prevalence rates in the use of illicit drugs in general, compared to high school seniors, with the exception of cocaine, hallucinogens, and alcohol. In 2005, about half of high school seniors (47 percent) reported alcohol use in the last month, and 28% reported an instance of binge drinking. These figures are down substantially from comparable surveys in 1980, when 72 percent reported alcohol consumption and 41 percent reported binge drinking.

About 14% of high school seniors in 2005 smoked cigarettes on a regular basis, and 8% smoked at least a half a pack per day.

In general, fewer college students smoke cigarettes than high school seniors, a difference

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attributed more to the differences in the two populations than any developmental change in smoking behavior.

A troubling trend during the 1990s was the decline in the percentages of high school students, college students, and young adults who regarded regular drug use as potentially dangerous. In general, over the years, prevalence trends with regard to drug use form an almost perfect mirror-image to the percentages of young people who perceive drug use as presenting great risk of harm.

In 2004, about 10 percent of the U.S. population over the age of 26 reported using an illicit drug over the past year (nearly 18 and 19 million people). About 7 percent reported using marijuana or hashish (nearly 13 million people) over the past year. About 4 percent reported engaged in the nonmedical (recreational) use of a prescription-type pain reliever, tranquilizer, stimulant, or sedative. F. Factors influencing drug-taking behavior
Vulnerability toward drug-taking behavior is shaped by two separable groups of factors in a persons life. Risk factors are those circumstances that make it more likely that a person might be involved in drugs. Protective factors are those circumstances that make it less likely that a person might be involved in drugs. The most influential risk factor for drug-taking behavior s peer influence, as measured by the reported number of friends who use drugs. As many as forty protective factors have been recently identified by the Search Institute in Minneapolis . These protective factors are influential in increasing the resistance toward several high-risk behaviors, besides drug-taking behavior. G. Looking to the future and learning from the past

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A general pattern of drug-taking behavior over time is that specific drugs will come into and fall out of favor. There is always something old and something new in the U.S. drug scene. As cocaine use declined in popularity during the 1990s, for example, heroin reemerged as a major drug of abuse. In recent years, prescription painkillers have become increasingly popular drugs of abuse.

A serious concern has been the popularity of so-called club drugs, typically ingested in dance clubs and bars. Examples include MDMA (Ecstasy), GHB, Rohypnol, ketamine, methamphetamine (speed, meth, crystal meth), and LSD. Toxicity increases substantially when these drugs are combined with alcohol.
While not as problematic as club drugs, the increasing prominence of herbal and non-herbal

based products, packaged and marketed as dietary supplements, have raised significant concerns.

They are not officially classified as drugs, and governmental regulations are substantially weaker than with regard to prescription or nonprescription (OTC) drugs. In some cases, dietary supplements are used recreationally and adverse reactions can occur. In the instance of ephedra, for example, serious medical risks are involved. In 2004, all sales of ephedra in the United States were banned.

Topic : Drug-Taking Behavior: The Personal And Social Concerns

Topic Objective:

At the end of this topic student would be able to understand:

- Toxicity
- The DAWN reports
- Physical and Psychological Dependence
- Psychiatric definitions of substance dependence and substance abuse
- Special problems in drug abuse
- Drugs, violence, and crime
- Governmental Policy, Regulation, and Laws
- Enforcement Of Drug Laws On A Local And International Scale

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Definition/Overview:

Drug-Taking Behavior: The term "drug seeking" has been used for at least 25 years, possibly much longer, not only in the United Statesbut also in Canada, New Zealand, and Australia. Although the term is most often used in the United States in reference to obtaining opioids, it has also been used in relation to other medications such as benzodiazepines and amphetamines.

The obvious meaning of the term "drug seeking" in relationship to opioids is patient behavior designed to obtain analgesics for pain relief. This alone is not unacceptable or unusual. That raises the question, When does this behavior become inappropriate, causing the patient to be labeled a drug seeker?

The term "drug seeking" is rarely defined, leaving the reader to infer the meaning by the context in which it is used. A recent article on definitions related to the medical use of opioids did not even include the term "drug seeking.

Key Points:

1. Toxicity

The toxicity of a drug refers to the potential physical or psychological harm that a drug might present to a user. If harmful effects are short-term or temporary, the drug has some level of acute toxicity. If effects are long-term or acquired over time, the drug has some level of chronic toxicity. Issues of chronic toxicity are examined in the context of drug tolerance and/or drug dependence.

A dose-response curve is a graph of the percentage of a population that experiences some response as a function of dosage level. An ED50" refers to the dosage that produces an response in 50% of the population. A LD50" refers to the dosage that is lethal for 50% of the population. In general, the further apart the ED-response and LD-response curves, the safer (less toxic) the drug.
Two ratios, the therapeutic index (LD50 over ED50) and the margin of safety (LD1 over ED99), provide information regarding a drugs relative safety. The higher the ratio, the safer (or less toxic) the drug. It should be pointed out, however, that these measures cannot be calculated for street drugs that have unknown dosage levels and possible contaminants.

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News reports of well-known public individuals who have died as a direct consequence of drug misuse or abuse are vivid reminders of the hazards of drug use, but they can be misleading when attempting to arrive at an idea about the toxicity of particular drugs within a general population.

2. The DAWN reports

The Drug Abuse Warning Network (DAWN) is a system for reporting drug-related emergencies in U.S. metropolitan hospitals. These occurrences are referred to as drug-related ED visits (ED being an abbreviation for emergency department).

In 2004, almost one-third (30 percent) of drug-related ED visits were due to an adverse reaction to the correct dose of a prescription or over-the-counter (OTC) drug, and about one-

eighth (12 percent) are due to some degree of overmedication. Less than 10 percent were due to the accidental ingestion of a drug, a suicide attempt, or malicious poisoning.
In 2004, about one-third (35 percent) of drug-related ED visits were either the use of one or more illicit drugs, the use of alcohol in combination with other drugs, or the nonmedical use of prescription or OTC drugs. Among illicit drug-related ED visits, the use of cocaine accounted for 19 percent, marijuana 11 percent, heroin 8 percent, and stimulants (including amphetamines and methamphetamines) 5 percent.

DAWN statistics are not reported for ED visits involving alcohol use alone by individuals who are 21 years or older. If all emergencies related to alcohol use alone were reported, the numbers would far exceed those related to any other drug. An examination of other ED-related circumstances would be obscured. However, nearly one-fifth (18 percent) of all drug-related ED visits involve the use of a licit or illicit drug (or drugs) ingested in combination with alcohol.

Current DAWN statistics on drug-related deaths in the United States are not reported on a nationwide basis but instead in terms of individual metropolitan areas. Although the demographics and size of these areas vary widely, some generalizations can be made. Across regions, however, opiate drugs and cocaine are the two most frequently represented in drug-related deaths. Alcohol is commonly in third place. Medications to treat anxiety and depression are typically either in fourth or fifth place. Multiple-drug (polydrug) use is commonly responsible for drug-related deaths. Marijuana is far less prominent in drugrelated deaths.

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DAWN reports provide information only regarding the acute toxicity of drugs. C. Behavioral tolerance and drug overdose

Tolerance refers to the capacity of a certain dosage of a drug to have a gradually diminished effect as the drug is taken repeatedly. Due to tolerance, a drug user requires a higher dosage in order to maintain an equivalent response.
Drug-taking behavior can be highly influenced by the surroundings in which that behavior occurs. In these cases, tolerance effects are maximized when drugs are used in the same environment or under the same circumstances. This process, referred to as behavioral tolerance (alternatively, conditioned tolerance), is related to classical or Pavlovian conditioning principles.

Environmentally-induced withdrawal symptoms can increase the chances of craving the drug when the individual is in an environment that is associated with prior drug-taking behavior.

3. Physical and Psychological Dependence

In cases of physical dependence, the drug abuser continues the drug-taking behavior in order to avoid physical withdrawal symptoms that would occur when that behavior ceases. In cases of psychological dependence, the continuance of drug-taking behavior is motivated by a craving for the pleasurable effects of the drug.

The concept of physical dependence is largely based upon the experiences of heroin abusers, since heroin cessation produces significant physical withdrawal symptoms. The cessation of other abused drugs, however, produces little or no physical withdrawal symptoms. In these cases, animals can be shown to demonstrate incessant and intense attraction to the drugs, resulting in patterns of self-administration.

Current experts in the field of drug abuse assert that the distinction between physical and psychological dependence has outgrown its usefulness in understanding patterns of drug-taking behavior.

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4. Psychiatric definitions of substance dependence and substance abuse

The Diagnostic and Statistical Manual, Fourth Edition (DSM-IV) of the American Psychiatric Association identifies two general conditions related to drug-taking behavior: Substance dependence and substance abuse. Substance dependence identifies a situation in which an individual displays signs of dependence with respect to a certain drug: tolerance, withdrawal, unintentional overuse, preoccupation with the drug, or continued drug use despite major drug-related problems. Substance abuse identifies a situation in which drug-taking behavior continues despite recurrent social, occupational, interpersonal, or legal problems related to that behavior.

Substance dependence and substance abuse are preferred terms rather than drug dependence and drug abuse because there is often confusion in the public mind as to the definition of a drug, particularly in instances of alcohol and nicotine use.

The World Health Organization (WHO) specifies criteria for substance dependence that are similar to that of the American Psychiatric Association. WHO does not, however, use the

term, substance abuse. Instead, WHO uses the term hazardous use or harmful use. They have argued that the term, substance abuse, is oriented to socially-determined consequences rather than effects of health.

5. Special problems in drug abuse

A particular problem in drug abuse involves drug-taking behavior of women who are pregnant at the time. The developing fetus is subject to the toxic effects of the ingested drug.

Injecting drugs carry the additional hazard of spreading disease through shared or non-sterile needles. Hepatitis and HIV infections are two prominent examples of health hazards associated with injected drug use.

6. Drugs, violence, and crime

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The Arrestee Drug Abuse Monitoring (ADAM) program in the U.S. Department of Justice tracks the percentage of arrestees in major U.S. cities who have tested positive for an illicit drug. It is an attempt to connect drug-taking behavior with violence and crime, though the connection between drugs and these behaviors is far from simple. Drug-related violence can be discussed in three categories: pharmacological violence, economically-compulsive violence, and systemic violence.

Pharmacological violence refers to acts of violence resulting from the influence of a particular drug. Some drugs can increase the likelihood of violent behavior, while others can decrease it. In general, ADAM statistics reflect the fact that many arrestees have some illicit drug in their system at the time of arrest. However, the length of the detection period in standard urine analysis tests for illicit drugs (ranging from a matter of several hours to 2 4 two months, depending on the drug) makes it difficult to determine whether an offense was committed as a direct result of the influence of a particular drug. Nonetheless, there is no question that alcohol as a drug can induce pharmacological violence.

Economically compulsive violence refers to acts of violence resulting from the need to finance the cost of purchasing a particular drug. The market conditions for drug sales represent an influential factor for this form of violence. As drug prices increase, economically compulsive violence goes up. The type of economically compulsive crime committed in association with drug use varies by gender. Males are likely to commit crimes against persons

or property, whereas females are more likely to commit crimes against the public order, such as prostitution.

Systemic violence refers to acts of violence that are related to drug dealing and the heightened violence within a network of illicit drug distribution. Systemic violence became a major social problem during the late 1980s, when crack cocaine abuse was at its height.

7. Governmental Policy, Regulation, and Laws

Between 1900 and 1970, U.S. drug policy changed from a philosophy of laissez-faire (do as you please) to an increasingly restricted philosophy with respect to drug access and use. The Harrison Act of 1914 was the first legislation to restrict access to opiate drugs and cocaine. At that time, the U.S. Treasury Department was entrusted with drug law enforcement responsibilities. After 1970, responsibilities moved to the U.S. Justice Department. Under the Harrison Act, opiate drugs were defined as narcotics. Eventually cocaine was included in the narcotic category, though its pharmacology and behavior effects are diametrically opposite to opiates.

In 1970, the Comprehensive Drug Abuse Prevention and Control Act classified drugs in terms of five schedules of controlled substances. Schedule I drugs include heroin, LSD, mescaline, and marijuana. By definition, Schedule I drugs have no acceptable medical use.

Schedule I and II refer to drugs presenting the highest level of abuse potential and carry the most stringent restrictions on their possession and access. Schedule V drugs present the least abuse potential and are the most accessible among controlled substances.
In 1988, the Anti-Drug Abuse Act set penalties for money laundering when associated with drug smuggling and sales and established the position of a cabinet-level drug czar to coordinate federal drug-law enforcement. Drug policy in the United States presently originates from the White House Office of National Drug Control Policy.

Since 1970, the responsibility for drug-law enforcement has moved from the Department of the Treasury to the Department of Justice, ending the era of U.S. drug regulation based upon taxation.

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8. Enforcement Of Drug Laws On A Local And International Scale

The federal Drug Enforcement Administration (DEA) is responsible for limiting the supply of illicit drugs in the United States. A majority of the funds budgeted for drug control purposes is used for restricting the supply of drugs, as opposed to the demand for drugs by individuals. Several billions of dollars are currently spent each year in attempts to stop the trafficking of illicit drugs and their importation into the United States from other countries, principally nations in Central and South America.

Additional federal agencies involved in drug control include the U.S. Customs and Border Patrol Agency, the U.S. Coast Guard and other branches of the U.S. military, and the Immigration and Naturalization Service. Government agents are stationed overseas, working with the Departments of Defense and State, to limit exportation of illicit drugs at the source.

Increasing pressure is being place on changing official drug-control policy from a goal of zero tolerance (i.e., a complete and total cessation of illicit drug trafficking and illicit drug-taking behavior) to a goal of harm reduction. The goal of a harm reduction policy focuses on minimizing the social and psychological costs associated with drug-taking behavior rather than the elimination of the behavior itself.

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Topic : How Drugs Work In The Body And On The Mind

Topic Objective:

At the end of this topic student would be able to understand:

- How drugs enter the body
- How Drugs Exit The Body
- Factors Determining The Physiological Impact Of Drugs
- The Nervous System
- Biochemistry Of Psychoactive Drugs
- Neurotransmitters
- Physiological Aspects Of Drug-Taking Behavior
- Psychological Factors In Drug-Taking Behavior
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Definition/Overview:

Drugs: Drugs generally work by interacting with receptors on the surface of cells or enzymes (which regulate the rate of chemical reactions) within cells. Receptor and enzyme molecules have a specific three-dimensional structure which allows only substances that fit precisely to attach to it. This is often referred to as a lock and key model.

Most drugs work because by binding to the target receptor site, they can either block the physiological function of the protein, or mimics it's effect. If a drug causes the protein receptor to respond in the same way as the naturally occurring substance, then the drug is referred to as an agonist. Examples of agonists are morphine, nicotine, phenylephrine, and isoproterenol. Antagonists are drugs that interact selectively with receptors but do not lead to an observed effect. Instead they reduce the action of an agonist at the receptor site involved. Receptor antagonists can be classified as reversible or irreversible. Reversible antagonists readily dissociate from their receptor. Irreversible antagonists form a stable chemical bond with their receptor (eg, in alkylation). Examples of antagonist drugs are: beta-blockers, such as propranolol.

Instead of receptors, some drugs target enzymes, which regulate the rate of chemical reactions. Drugs that target enzymes are classified as inhibitors or activators (inducers). Examples of drugs that target enzymes are: aspirin, cox-2 inhibitors and hiv protease inhibitors (see below).

Many drug companies will design structural variants for compounds that bind receptor sites in hope of making a compound that is more effective. Until recently design of new drugs was very difficult. Scientists had no way to know what the binding site of the protein looked like. Scientist now have a powerful new tool. Molecular modeling allows researchers to view the 3-D structure of proteins and their binding sites using data from X-ray crystallography and NMR spectroscopy . The synthesis of several recent drugs (including HIV Protease Inhibitors for treatment of AIDS) have been assisted using the 3-D structure of protein.

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Key Points:

1. How drugs enter the body

Oral administration involves ingesting a drug by mouth, digesting it, and absorbing it into the bloodstream through the gastrointestinal tract. Orally administered drugs have a relatively long absorption time and require specific pharmacological features and circumstances for

successful passage into the bloodstream. Enzymes in the liver break down (metabolize) the structure of certain drugs, reducing the amount that eventually enters the bloodstream. This function of the liver is referred to as first-pass metabolism.

Administration by injection allows a drug to be delivered directly into the bloodstream, bypassing the digestive process. Examples of an injection administration include intravenous (into a vein), intramuscular (into a muscle), and subcutaneous (underneath the skin) procedures. Of these possibilities, an intravenous injection is the fastest form of drug administration. Heroin, for example, injected into the forearm, arrives at the brain in less than fifteen seconds.

Inhalation refers to the ingestion of a drug in a gaseous or vaporous state into the lungs. It is an extremely rapid form of drug administration. One inhalation method (smoking), burning a substance and breathing 5 0 the smoke-borne particles in the air, has the disadvantage of carrying toxic particles produced by the burning process into the throat and lungs.

Absorption of drugs can be accomplished by dissolving the drug and allowing it to pass through the skin or thin membranes. Intranasal and rectal administration involves thin mucous membranes of the nose or rectum, respectively. Transdermal patches permit drugs to be absorbed slowly through the skin. Alternative methods under development include small silicon chips containing a grid of microscopic needles that painlessly pierce the skin and allow the passage of large molecules into the bloodstream.

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2. How Drugs Exit The Body

The body eliminates drugs through a series of biotransformation processes in which the drug is chemically changed into forms called metabolites. A number of factors determine the rate of biotransformation during the elimination process. These factors include the quantity of the drug (alcohol is an exception, its elimination rate being independent of the quantity ingested), the age of the individual, and the drugs fat-solubility. A fat-soluble drug will be eliminated more slowly than a water-soluble drug, all other factors being equal.

The elimination half-life is an amount of time required for the drug to be reduced in the bloodstream by fifty percent. Each additional interval of time reduces the quantity of the drug by half until there is a negligible amount remaining.

3. Factors Determining The Physiological Impact Of Drugs

One factor that impacts on a drugs physiological effect is the time interval between two successive administrations of the drug. Time-release forms of medicines allow for a continual

absorption over a longer period of time than would be the case with a single dose.

A second factor is the interacting effect of two different drugs administered at the same time. Drug combinations can be additive, hyperadditive, or antagonistic. An additive effect produces an end-result that is the mathematical sum of the effects of the two drugs separately. A hyperadditive effect produced by a combination of two or more drugs is referred to as synergism. If two drugs are perfectly antagonistic, each one cancels out the effect of the other.

Some drugs can interact with each other during chronic usage. Cross-tolerance between two drugs is a phenomenon in which the tolerance that results from the chronic use of one drug induces a tolerance effect with regard to a second drug that has not been used before. Alcohol, barbiturates and some antianxiety medications, for example, show cross-tolerance. Cross-dependence is a phenomenon in which one drug can be used to reduce the withdrawal symptoms following the discontinuance of another drug. Cross-dependence provides the means for continuing an abused drug in the guise of a new one.

Features of the individual who is taking the drug can influence the effect of the drug. Such features include weight, gender, ethnic background, and race.

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4. The Nervous System

The nervous system is divided into the central nervous system (brain and spinal cord) and the peripheral nervous system. The peripheral nervous system either brings information in from the environment (sensory pathways) or out to the muscles (motor pathways). Motor control is exerted either through somatic nerves leading to skeletal muscle or autonomic nerves leading to cardiac or smooth muscle.

Autonomic nerves are divided into sympathetic and parasympathetic divisions. Increased activity in sympathetic autonomic nerves produces body changes that are oriented toward dealing with some kind of emergency or stress. Increased activity in parasympathetic autonomic nerves produces body changes that are oriented toward calm, rest, nurturance, and internal maintenance.

The brain is divided into the hindbrain, midbrain, and forebrain. The hindbrain is concerned with basic life-support functions and primitive functions. The midbrain is a center for the control of important sensory and motor reflexes, body movements, and the processing of pain information. The forebrain is concerned with motivational and emotional activity (hypothalamus and limbic system) and complex information-processing (cerebral cortex).

Of all the areas within the cerebral cortex, the most recently evolved is a region closest to the front of the brain called prefrontal cortex.

5. Biochemistry Of Psychoactive Drugs

Psychoactive drugs work by virtue of their effects on the functioning of specialized cells called neurons. Neurons are cells that receive and transmit information. The principal components of a neuron are cell body, dendrites, and the axon. There are an estimated 100 billion neurons in the brain alone.

Communication between neurons is accomplished at the synapse. Synaptic communication can be either excitatory (causing an increase in the activity of the receiving neuron) or inhibitory (causing a decrease in the activity of the receiving neuron).

Synaptic communication comprises a sequence of four basic processes: storage of neurotransmitters in the synaptic vesicles, neurotransmitter release from the synaptic knob, binding to receptor sites, and reuptake of neurotransmitter into the synaptic knob whence it came.

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6. Neurotransmitters

Synaptic communication is achieved through the action of special molecules called neurotransmitters. Seven major neurotransmitters in the brain are acetylcholine, norepinephrine, dopamine, serotonin, gamma aminobutyric acid (GABA), glutamate, and a group of neurotransmitters referred to as endorphins. Whether a neurotransmitter has an excitatory or inhibitory effect depends upo9n the nature of the receptor at the synapse. Thus, excitation requires the activation of excitatory receptors and inhibition requires the activation of inhibitory receptors.

Psychoactive drugs change the functioning of these and other neurotransmitters at the synapse or alter the functioning of receptors that are sensitive to these molecules. As examples, antianxiety drugs stimulate GABA receptors in the brain, cocaine and amphetamines increase dopamine and norepinephrine activity, LSD stimulates serotonin receptors, phenylcyclidine (PCP) and ketamine block one subgroup of glutamate receptors, and opiates (morphine, heroin, and codeine) stimulate endorphin activity.

7. Physiological Aspects Of Drug-Taking Behavior

The blood-brain barrier limits the passage of drugs and other molecules from the bloodstream to the brain. Drugs that are fat-soluble and have relatively small molecular size have a relatively easier passage across the blood-brain barrier.

Tolerance effects, the decreased effectiveness of a drug taken in successive administrations, are achieved in two basic ways. Metabolic tolerance occurs when the biotransformation processes in the liver are lessened over time. Cellular tolerance occurs when neuronal receptors become less sensitive to the drug over time.

The craving response of individuals to certain psychoactive drugs constitutes a major aspect of the process of drug dependence. Two key elements are the neurotransmitter dopamine and a region of the brain called the nucleus accumbens where dopamine is active. Recent studies have shown that dopamine triggers the pursuit of reinforcing events as well as the reinforcement itself. In effect, dopamine represents both the chicken and the egg in the process of drug dependence.

8. Psychological Factors In Drug-Taking Behavior

A drug effect can be considered as a three-way interaction of the drugs pharmacological properties, the individual taking the drug (set), and the environment within which drug-taking behavior occurs (setting). The lower the drug dose, the greater contribution will be made by set and/or setting.

The specific response to a drug can be influenced by the set of expectations a person may have about what the drug will do. This phenomenon accounts for the effectiveness of inert substances called placebos. Genuine physiological changes can occur due solely to the expectation of the drug user.

Due to expectation effects, the study of psychoactive drugs must have certain methodological safeguards. Drugs are tested against a placebo substance that looks and tastes like the drug but lacks the active ingredients of the drug. In the double-blind research procedure, neither the research administering the drug or placebo nor the individual receiving the drug or placebo knows which substance is which. A double-blind procedure ensures that drug effects are not influenced by either the researchers expectations or the subjects expectations.

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Topic : The Major Stimulants: Cocaine And Amphetamines

Topic Objective:

At the end of this topic student would be able to understand:

- The history of cocaine.
- How cocaine works in the brain.

- Patterns of cocaine abuse.
- Treatment programs for cocaine abuse.
- The history of amphetamines.
- How amphetamines work in the brain.
- Patterns of methamphetamine abuse.
- Stimulant treatment for attention deficit/hyperactivity syndrome (ADHD).

Definition/Overview:

Cocaine : Cocaine (benzoylmethyl ecgonine) is a crystalline tropane alkaloid that is obtained from the leaves of the coca plant. The name comes from "coca" in addition to the alkaloid suffix -ine, forming cocaine. It is both a stimulant of the central nervous system and an appetite suppressant. Specifically, it is a dopamine reuptake inhibitor, a norepinephrine reuptake inhibitor and a serotonin reuptake inhibitor which mediates functionality of such as an exogenous DAT ligand. Because of the way it affects the mesolimbic reward pathway, cocaine is addictive.

Its possession, cultivation, and distribution are illegal for non-medicinal and non-government sanctioned purposes in virtually all parts of the world. Although its free commercialization is illegal and has been severely penalized in virtually all countries, its use worldwide remains widespread in many social, cultural, and personal settings.

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Key Points:

1. The History Of Cocaine

Cocaine is derived from small leaves of the coca shrub, indigenous to the Andes in South America. Its use as a stimulant dates back 5,000 years.

In the nineteenth-century, coca leaves and their active ingredient, cocaine, was a staple in many patent medicines and tonics. Until 1903, coca leaves were part of the recipe for Coca-Cola. Now, all that remains of this past recipe is decocainizied flavor essence.

In the 1880s, Sigmund Freud attempted to show the benefits of cocaine, but he became disenchanted with the idea after realizing the dependence potential of the drug.

2. Acute And Chronic Effects Of Cocaine

The primary acute effect of cocaine is a powerful burst of energy and increased well-being.

Often these responses are followed by irritability and depression.

The stimulant effects of cocaine are produced by an excitation of the sympathetic autonomic system and an inhibition of the parasympathetic autonomic system. These changes can lead to a cerebral hemorrhage, cardiac arrhythmia, or congestive heart failure.

Repeated and continued use of cocaine can result in depression, paranoia, hallucinations (cocaine psychosis), and abnormalities of the nose if cocaine has been snorted.

Medical applications of cocaine are limited to its use as a local anesthetic. In the brain, cocaine enhances the activity of dopamine and norepinephrine. Recent studies have shown that long-term cocaine exposure causes a depletion of dopamine receptors, a loss that is observed as long as four months following the last instance of cocaine use. As a result, there is a decline in the experience of pleasure from any life experience. Ironically, the acute effects of euphoria from cocaine may no longer be strong, but cocaine abusers crave the drug more than ever.

In a phenomenon called the kindling effect, repeated cocaine administrations cause a hypersensitization to the drug. This effect is the opposite of drug tolerance and quite unlike the chronic effects of other psychoactive drugs.

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3. Present-Day Cocaine Abuse

Cocaine is extracted from the coca plant. Coca leaves are first treated to yield coca paste, with a cocaine purity of approximately 60 percent. An additional step converts the paste into a water-soluble drug called cocaine hydrochloride (about 99 percent pure cocaine).

Free-base cocaine is produced by converting the salt form of cocaine to a free base. Crack cocaine is produced in a similar manner, though the process is considerably less hazardous than with free base cocaine.

The effect of smoked crack cocaine exceeds that of snorted powered cocaine, perhaps due to the fact that inhalation through the lungs is an extremely fast administration route to the brain.

Physical signs of possible cocaine abuse include dilated pupils, increased heart rate and irritability, paranoia, sneezing and nose irritability, depression, insomnia, decreased appetite, and significant weight loss.

While crack cocaine abuse remains a problem, the number of new crack cocaine abusers, as of 2006, has declined substantially, particularly in the inner-city communities of the United States.

4. Patterns Of Cocaine Abuse

The peak in the prevalence of cocaine abuse occurred around 1986, with reports of abuse beginning to be prominent around 197

About that time, a cheaper and smokable form of cocaine, crack cocaine, began to be popular. Crack abuse quickly became a major personal and social problem, particularly in low-SES communities. At present, the prevalence of crack abuse is down considerably and so are the problems, including the levels of violence and crime that have been associated with it.

While overall prevalence rates of cocaine abuse have declined, emergency department cases related to cocaine use continue to rise. According to the DAWN statistics , cocaine accounts for the greatest proportion (19 percent) of all drug-related ED visits that involve an illicit drug, and it is frequently cited as second only to heroin in terms of drug-related deaths.

5. Treatment Programs For Cocaine Abuse

The initial phase of cocaine abuse treatment is detoxification and total abstinence. Afterward, the primary difficulty is a matter of resisting extreme feelings of craving for the drug.

Cocaine Anonymous, modeled after Alcoholics Anonymous, is a popular self-help support group organization for cocaine abuse treatment. Cognitive-behavioral therapy is also useful, in which cocaine abusers learn new ways of acting and thinking in response to their social environment.

A recent experimental treatment to reduce cocaine craving is the administration of an antiepileptic drugs, gamma vinyl-GABA (GVG), presently available as Vigabatrin. There is preliminary evidence of its success and large-scale clinical trials are currently underway.

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6. Amphetamines

Amphetamines are derived from a Chinese medicinal herb. Its isolation was achieved in 1887 and its first commercial synthesis in 192

Amphetamine quickly gained the reputation as a stimulant and bronchial dilator.

Amphetamine abuse in the United States reached a peak around 1967, declining slowly over the 1970s. Since the mid-1990s, however, patterns of abuse have resurfaced in the form of methamphetamine.

A potent form of amphetamine is dextroamphetamine (d-amphetamine). Methamphetamine (meth, speed) is a modified and more potent form of d-amphetamine, allowing it to pass more quickly across the blood-brain barrier.

In general, amphetamines increase dopamine and norepinephrine activity in the brain.

Euphoric effects of amphetamines and the craving for them during abstinence are considered to result from changes in dopamine activity.

7. Acute and chronic effects of amphetamines

The acute effects of amphetamines in general closely resemble those of cocaine. Heavy methamphetamine abusers, in particular, may experience disturbing hallucinations and engage in compulsive or repetitive behaviors. There are also feelings of paranoia, intense mood swings, and tendencies toward violence.

The extreme behaviors of heavy methamphetamine abuse are referred to collectively as amphetamine psychosis.

8. Present-day patterns of methamphetamine abuse and treatment

Patterns of amphetamine abuse reached a peak in the 1970s, when prescription amphetamines were widely available for weight control and as a way to combat drowsiness.

In the 1990s, as crack cocaine and powder cocaine abuse began to diminish, amphetamines reemerged on the drug scene, in the form of methamphetamine (meth) abuse. Administered by snorting, injecting, or smoking, meth abuse is prevalent in widespread regions of the United States. Home-grown methamphetamine laboratories have proliferated in small towns and rural areas throughout the nation. Common ingredients such as anhydrous ammonia (a farm fertilizer) and pseudoephedrine (sold on an over-the-counter basis as a cold remedy) form the basis for manufacturing this drug. Smokable methamphetamine (crystal meth) has become a major club drug in metropolitan areas.

Since the late 1990s, there has been great concern for the spread of meth abuse in regions of the United States that have been not typically involved in illicit drug use. Domestic production of meth has become homegrown with meth recipes based upon pseudoepinephrine (a common ingredient in cold remedies) and liquid anhydrous ammonia used commonly as a farm fertilizer.

Thousands of domestic meth labs have been raided, typically in non-urban communities. An increased influx of illegal meth from Mexico in recent years may be an indication of a shift from domestic to foreign sources.

Methamphetamine abusers find it extremely difficult to become drug-free and their relapse rate is one of the highest for any category of illicit or licit drug abuse.

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9. Medical uses for amphetamines and similar stimulant drugs

A primary medical application of stimulant drugs is for the treatment of attention deficit/hyperactivity disorder (ADHD). ADHD is the most common psychological disorder among children; about 40 to 60 percent of ADHD children show symptoms of attention deficit disorder (ADD) in adulhood.

Drugs to treat ADD or ADHD include methylphenidate (Ritalin), a sustained-release formulation of methylphenidate (Concerta), a combination of dextroamphetamine and amphetamine (Adderall), and a nonstimulant drug called atomoxetine (Strattera).

Ritalin and Adderall have been recently subject to abuse through their being diverted from their original medicinal purpose to recreational use or to remain awake for long periods of time. This form of drug-taking behavior constitutes a major proportion of nonmedical prescription drug abuse today.

Another medical application is for the treatment of narcolepsy. Modafinil (Provigil) is an example of a drug developed to treat narcoleptic symptoms.

In Section 2 of this course you will cover these topics:

- Narcotics: Opium, Heroin, And Synthetic Opiates
- Lsd And Other Hallucinogens
- Marijuana
- Anabolic Steroids And Drug Abuse In Sports

Topic : Narcotics: Opium, Heroin, And Synthetic Opiates

Topic Objective:

At the end of this topic student would be able to understand:

- Opium and derivatives of opium
- Opium in history
- Opiates and heroin in the twentieth century
- Effects of the mind and the body
- Patterns of heroin abuse
- Treatment for heroin abuse
- Medical Uses of narcotic drugs
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Definition/Overview:

Narcotic: The term **narcotic** *(ναρκωτικός)*is believed to have been coined by the Greek physician Galen to refer to agents that benumb or deaden, causing loss of feeling or paralysis. It is based on the Greek word *ναρκωσις* (narcosis), the term used by Hippocrates for the process of benumbing or the benumbed state. Galen listed mandrake root, altercus (eclata) seeds, and poppy juice (opium) as the chief examples.

Use of the word "narcotic" to refer to any illegal or unlawfully possessed drug including marijuana and cocaine is common worldwide, although these substances are not considered narcotics in a medical context. The central drug policy making body with in the United Nations, for instance, is the Commission on Narcotic Drugs, although the United Nations officially defines a narcotic drug to be "any substance, natural or synthetic, which any of the substances, natural or synthetic, in Schedules I and II of the Single Convention on Narcotic Drugs, 1961, and that Convention as amended by the 1972 Protocol Amending the Single Convention on Narcotic Drugs, 1961."

In U.S. legal context, the term "narcotic" specifically refers to opium, opium derivatives, and their semi-synthetic or fully synthetic substitutes as well as cocaine and coca leaves. Because the term is often used so broadly or pejoratively outside of medical contexts, most medical professionals advocate the use of more precise terms such as "opioid" and "opioid analgesic" to refer to the natural, semi-synthetic, and synthetic substances that behave pharmacologically like morphine and are used primarily for their pain-relieving qualities. The use of the term "narcotic" in various nonclinical contexts is not of educational or of informative value. The decision to term all illegal drugs as narcotics is often used as a shorthand way to politicize and demonize any illegal drug.

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Key Points:

1. Opium and derivatives of opium

Opiates refer to opium and its four derivatives: morphine, heroin, codeine, and thebaine. Drugs that produce opiate-like effects are commonly referred to as synthetic opiates or synthetic opiatelike drugs. Examples of synthetic opiates are methadone, meperidine (Demerol), propoxyphene (Darvon, Darvocet), LAAM (Orlaam), tramadol (Ultram, Ultracet), and buprenorphine (Subutex, Subutone)

2. Opium in history

Opium is harvested from the opium poppy, in a method that dates back thousands of years. Beginning in the seventeenth century, a liquid form of opium called laudanum became popular as a medicinal product and a recreational drug.

The Opium Wars 1839-1860 in China were fought by British and later French and American soldiers and sailors. Their success in warfare against Chinese forces resulted in an opening up of China to international trade.

In Britain and the United States, opium was a mainstay of patent medicines, available to all ages and levels of society. In the U.S., women were attracted to opium drinking, while men were engaging in extensive recreational use of alcohol. Yet, opium smoking was despised as immoral and ruinous, largely due to its association with Chinese immigrants.

The primary active ingredient in opium, morphine, was isolated in 180

The invention of the syringe in the mid-1800s made morphine injections possible. In 1898, a modification of morphine, called heroin, was first synthesized by the Bayer Company in Germany.

Heroin is more fat-soluble and hence more rapidly absorbed into the brain than morphine. Therefore, there is a greater initial response. Once inside the brain, however, heroin effects are chemically identical to that of morphine.

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3. Opiates and heroin in the twentieth century

At the beginning of the twentieth century, there were growing fears that opiate abuse was becoming associated with criminal elements in society. The enactment of the Harrison Act in 1914 began the era of legal restrictions on heroin availability and use.

In the 1960s, heroin abuse found its way to middle America in an era dominated by a youthful counterculture. While in Vietnam, American soldiers were turning to extremely high-grade heroin along with other illicit drugs. Fortunately, heroin dependence was not found to be widespread when American forces returned home in the mid-1970s.

Since the 1970s, the pattern of heroin trafficking has shifted from Turkey (smuggled through France) to Southeast and Southwest Asia to Colombia (smuggled through Mexico and other nearby countries). In a post- September 11 world, heroin traffickers operate less like multinational corporations or shadowy cartels centered in Colombia and more like highly compartmentalized terrorist cells.

In the mid-1990s, increasingly pure forms of heroin became available which could be snorted

or smoked, instead of injected. These forms were attractive to new populations that had previously avoided the drug on the basis of an aversion to hypodermic needles.

4. Effects of the mind and the body

Heroin and other opiates induce a state of tranquil drowsiness. There is often an itching sensation, reddening of the eyes, pupillary constriction, and long-term constipation. At high or unpredictable doses, heroin depresses breathing and can produce death.

Opiates stimulate a family of morphine-sensitive receptors in the brain. Drugs such as naloxone act as opiate antagonists at these receptors. We now know that the brain produces a group of chemicals called endogenous opioid peptides (endorphins) that are associated with morphine-sensitive receptors.

In general, endorphins and opiates stimulate the nucleus accumbens in the brain. This effect appears to underlie heroin craving and heroin-seeking behavior.

Naltrexone (brand name: ReVia) has been found to be a useful medication in the treatment of heroin abuse, principally among patients who are highly motivated to stop their drug-taking behavior.

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5. Patterns of heroin abuse

A primary feature of chronic heroin abuse is the development of tolerance over time and withdrawal symptoms approximately 4 to 6 hours after the previous dose. A major problem is the powerful conditioned-learning effect that makes the social setting of heroin administration critical to the response received from the drug.

While not lethal *per se*, heroin abuse can produce death by virtue of respiratory depression. Heroin has a relative small ratio, between ten and fifteen, of LD (lethal dose) to ED (effective dose). Death by overdose is an ever-present problem. There is also no good way of knowing what other substances are contained in the heroin sold to the abuser. Some forms of synthetic heroin have been known to be adulterated with a toxic impurity that induces symptoms of severe Parkinsons disease.

The controlled use or abuse of heroin, called chipping, was first documented in a 1984 study by Norman Zinberg. Studies conducted since then have indicated that this practice is not without significant risks.

6. Treatment for heroin abuse

Successful treatment for heroin abuse involves both short-term and long-term interventions. Opiate detoxification is a first step in achieving a withdrawal from heroin

Long-term treatment has made use of a procedure called methadone maintenance. Recovering heroin abusers are administered methadone, a legal, inexpensive narcotic drug in an oral dose once each day. The slow action of methadone avoids the rush of a heroin high.

A variation is the administration of LAAM, a synthetic opiate. LAAM has a longer duration than methadone, so clients need to take it only three times a week instead of every day.

Another synthetic opiate for this use, taken on a daily basis, is buprenorphine (brand name: Subutex). Buprenorphine is also available in combination with naloxone (brand name: Suboxone). In the latter case, if tablets were to be crushed and dissolved into an injectable solution, the combined formulation would trigger withdrawal symptoms. The chief advantage of buprenorphine treatment is that it can be prescribed by office-based physicians rather than dispensed through maintenance centers, as is the case with methadone and LAAM.

Some argue that methadone and related opiate maintenance programs merely substitute one form of dependence for another. Others argue that clients in these programs are now able to lead reasonably normal lives that they would not have been able to lead under other circumstances.

Behavioral and social-community programs for heroin abuse (as well as for other forms of drug abuse) include therapeutic communities, where clients live in temporary, drug-free group settings and receive intensive counseling and peer support. Attendance at meetings of Narcotics Anonymous provides a program of peer support, modeled after Alcoholics Anonymous.

Multimodality programs have combined medication, psychotherapy, and vocational rehabilitation under one comprehensive plan of action.

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7. Medical Uses of narcotic drugs

Excluding heroin, narcotic drugs are administered for the relief of pain, the treatment of acute diarrhea, and the suppression of coughing.

Since the late 1990s, there has been a dramatic increase in cases in which prescription narcotic medications, developed for the relief of pain, have been subject to abuse. While a variety of narcotic analgesics such as Vicodin, Percodan, and Demerol have abuse potential, the most striking examples of prescription drug abuse has been the time-release form of oxycodone (brand name: OxyContin).

OxyContin tablets, approved to be taken orally in their intact form, can be crushed and either swallowed, inhaled as powder, or injected after diluting the powder into a solution. The behavioral effect is similar to that of heroin. Limitations on the distribution of OxyContin as a

medication has been discouraged, since it would put into jeopardy hundreds of thousands of patients for whom OxyContin has been extremely beneficial in the treatment of pain.

Topic : Lsd And Other Hallucinogens

Topic Objective:

At the end of this topic student would be able to understand:

- Definitions and classifications
- Lysergic acid diethylamide (LSD)
- Other hallucinogens related to serotonin
- Hallucinogens related to norepinephrine
- Hallucinogens related to acetylcholine
- Miscellaneous hallucinogens

Definition/Overview:

LSD: Lysergic acid diethylamide, LSD, LSD-25, or acid, is a semisynthetic psychedelic drug of the ergoline family. Its unusual psychological effects, which include visuals of colored patterns behind the eyes in the mind, a sense of time distorting, and crawling geometric patterns, have made it one of the most widely known psychedelic drugs. It has been used mainly as a recreational drug, an entheogen, and as a tool to supplement various practices for transcendence, including in meditation, psychonautics, art projects, and illicit (formerly legal) psychedelic therapy. Formally, LSD is classified as a hallucinogen of the psychedelic type.
It is synthesized from lysergic acid derived from ergot, a grain fungus that typically grows on rye, and was first synthesized by Swiss chemist Albert Hofmann. The short form LSD comes from its early code name *LSD-25*, which is an abbreviation for the German "Lysergsure-diethylamid" followed by a sequential number.
LSD is sensitive to oxygen, ultraviolet light, and chlorine, especially in solution, though its potency may last for years if it is stored away from light and moisture at low temperature. In pure form it is colorless, odorless, and mildly bitter.
LSD is typically delivered orally, usually on a substrate such as absorbent blotter paper, a sugar cube, or gelatin. In its liquid form, it can be administered by intramuscular or intravenous injection. The threshold dosage level needed to cause a psychoactive effect on humans is between 20 and 30 g (micrograms).

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Introduced by Sandoz Laboratories as a drug with various psychiatric uses, LSD quickly became a therapeutic agent that appeared to show great promise. However, the extra-medicinal use of the drug in Western society during the mid-twentieth century led to a political firestorm that resulted in the banning of the substance. A number of organizationsincluding the Beckley Foundation, MAPS, Heffter Research Institute and the Albert Hofmann Foundationexist to fund, encourage and coordinate research into its medicinal uses.

The European Monitoring Centre for Drugs and Drug Addiction reports that LSD retail prices range between 5 and 11 per unit in most European countries.

Key Points:

1. Definitions and classifications

Hallucinogens are commonly defined as drugs that distort perception and alter the users sense of reality. Other ways used over the years to describe these drugs include psychedelic (mind-expanding), psychotomimetic (psychosis-resembling), psychodysleptic (mind-disrupting), psycholytic (mind-dissolving), and illusionogenic (illusion-producing).

Most hallucinogens are classified in three categories: (1) those chemically similar to serotonin (LSD, psilocybin, morning glory seeds, DMT, and harmine), (2) those chemically similar to norepinephrine (mescaline, DOM, MDMA, and MDA), and (3) those chemically similar to acetylcholine (atropine, scopolamine, hyoscyamine, and ibotenic acid). A fourth category is reserved for hallucinogens that are chemically unlike any known neurotransmitter (PCP and ketamine).

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2. Lysergic acid diethylamide (LSD)

LSD is synthetically derived from a fungus found in moldy rye and other grains called ergot. Outbreaks of ergotism (the toxic consequence of ingesting ergot) have occurred throughout history.

LSD was first synthesized by Albert Hofmann in 194

Beginning in 1960s, Timothy Leary of Harvard University and others began to study the hallucinatory experience of LSD. Their promotion of LSD as a meaningful, recreational drug initiated the psychedelic era. LSD was officially made a Schedule I controlled substance, and by 1970 became entrenched as a major street drug.

LSD is taken orally and has several characteristic acute effects: sympathetic activation, restlessness, images seen with eyes closed, perception of a multilevel reality, exaggerated

appearances of common objects, feelings of timelessness, a separation of ones mind from ones body and synesthesia (an intermingling of sensory modalities).

LSD stimulates a special subtype of serotonin-sensitive receptors, called S2 receptors. The ability of LSD and other drugs to produce hallucinatory effects is directly proportional to the ability to bind to these receptors.

Interest in LSD waned from the middle 1970s to the early 1990s. During the 1990s, LSD prevalence rates began to increase again. Since 1997, rates are down substantially. In 2005, less than 4 percent of high school seniors reported having used LSD at some time in their lives. The dosage of LSD commonly ingested now is about one-fourth that ingested during the 1960s and 1970s.

LSD is not likely to cause drug dependence. Bad trips on LSD are common, but it is not likely to trigger severe psychiatric breakdown unless the user has already a predisposition. There is little or no evidence that LSD increases creative expression nor does it damage chromosomes. Flashbacks are not uncommon.

While a relationship between LSD and violent/criminal behavior has not been established, LSD reactions are inherently unpredictable.

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3. Other hallucinogens related to serotonin

Psilocybin is a family of mushrooms native to southern Mexico and Central America. Albert Hofmann identified psilocybin as the active ingredient in these mushrooms in 195 Recreational use of psilocybin (srooms) began shortly afterward. Relative to LSD, psilocybin effects are more strongly visual, less emotionally intense and more likely to produce euphoria.

Lysergic acid amide (LAA) is related to LSD but only much less potent and with hallucinogenic effects that are more auditory than visual.

Dimethyltryptamine (DMT) is obtained from the resin of tree bark. When inhaled as a snuff, DMT produces hallucinogenic effects of brief duration, with the total experience ending withiin about one hour.

Harmine is obtained from the bark of a vine. A harmine drink called ayahuasca is sometimes used by shamans who engage in healing practices while in a hallucinogenic trance.

4. Hallucinogens related to norepinephrine

Mescaline is derived from the peyote cactus plant. Psychological and physiological effects of mescaline are roughly similar to that of LSD, with differences reported chiefly only in

degree. Peyote buttons taste extremely bitter and can cause vomiting, headaches, and nausea. DOM, sometimes referred to as STP, is more potent than mescaline but still far weaker than LSD. It produces euphoria and extreme hallucinations, though there is also a substantial incidence of panic attacks and acute psychotic symptoms.

MDMA (Ecstasy) is a synthetic amphetamine-related hallucinogen, first appearing on the scene in the 1980s. Since the early 1990s, MDMA has been available, commonly under the name of Ecstasy), as a club drug. Short-term and long-term toxicity include severe hyperthermia and dehydration, as well as depression, anxiety, and a degeneration of serotonin-using neurons in the brain. In 2005, approximately one out of twenty high school seniors reported having used Ecstasy at some point in their lives, a prevalence rate that is substantially lower than rates reported during the 1990s.

5. Hallucinogens related to acetylcholine

Amanita muscaria mushrooms have been ingested for their euphoric and hallucinogenic effects for thousands of years. The principal psychoactive agent in these mushrooms is ibotenic acid. The hallucinogenic drug, ibogaine, derived from the iboga root of central Africa, is closely related to ibotenic acid. Recently, ibogaine has been studied for a potential role in reducing craving for a range of dependence-producing drugs.

Hexing drugs are so called since they have been historically associated with witchcraft rituals. Examples of hexing drugs are atropine, scopolamine, mandrake, henbane, hyoscyamine, and *Datura stramonium* (commonly called jimsonweed). They are anticholinergic, in that they reduce or block the parasympathetic effects of acetylcholine in the body. Psychological effects include a feeling of delirium, confusion, and a loss of memory for events occurring during the drugged state.

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6. Miscellaneous hallucinogens

Phencyclidine (PCP) is considered a dissociative anesthetic hallucinogen and was once used as a surgical anesthetic drug. Effects of PCP include delirium, disorientation, hallucinations, intense anxiety, and agitation. Hallucinatory experiences are generally not benign as with other hallucinogens. Often there is a change in ones body image and a feeling of depersonalization. The mechanism behind PCP effects appears to be the blocking of a specific subtype of glutamate receptors.

Ketamine is chemically similar to PCP, producing a mixture of stimulant and depressive effects. Users experience hallucinations, a dream-like intoxication, and feelings of

disorientation. Currently in the category of a club drug, ketamine has several risks. It can act as a depressant on respiration. Since it produces amnesia afterward, ketamine has been a factor in cases of date-rape, particularly when women unwittingly ingest it after it has been slipped into an alcoholic beverage.

Topic : Marijuana

Topic Objective:

At the end of this topic student would be able to understand:

- Introduction
- History of marijuana and hashish
- Acute effects of marijuana
- Chronic effects of marijuana
- Patterns of marijuana smoking
- Medical uses for marijuana
- Marijuana decriminalization

Definition/Overview:

Marijuana: Cannabis, also known as marijuana or marihuana, or ganja (from Hindi/Sanskrit: गांजाgānjā, hemp), is a psychoactive drug extracted from the plant Cannabis sativa, or more often, Cannabis sativa subsp. indica. The herbal form of the drug consists of dried mature flowers and subtending leaves of pistillate (female) plants. The resinous form, known as hashish, consists primarily of glandular trichomes collected from the same plant material. The major biologically active chemical compound in cannabis isΔ9-tetrahydrocannabinol (delta-9-tetrahydrocannabinol), commonly referred to as THC.

Humans have been consuming cannabis since prehistory, although in the 20th century there was a rise in its use for recreational, religious or spiritual, and medicinal purposes. It is estimated that about four percent of the world's adult population (162 million) use cannabis annually and 0.6 percent (22.5 million) daily. The possession, use, or sale of psychoactive cannabis products became illegal in most parts of the world in the early 20th century. Since then, some countries have intensified the enforcement of cannabis prohibition while others have reduced the priority of enforcement.

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Key Points:

1. Introduction

The source of marijuana (sometimes spelled marihuana) is *Cannabis sativa*, better known as the hemp plant. From the 1600s to the early 1900s, the growing of cannabis for hemp fiber was a major commercial crop in America, along with tobacco.

In 1964, the major psychoactive ingredient from cannabis resin, called delta-9-tetrahydrocannabinol (THC), was isolated and identified. Other compounds extracted from this resin are referred to as cannabinoids.

Marijuana consists of leaves and occasionally flowers of the cannabis plant that are first dried and then shredded. A more potent form, sinsemilla, is obtained by cultivating only the seedless portion of the plant. Still stronger is the dried cannabis resin itself, which yields hashish, hashish oil, or hashish oil crystals. Marijuana and other cannabis products are regarded in the United States as a Schedule I controlled substance.

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2. History of marijuana and hashish

While references to cannabis as a psychoactive agent date back to China in the third millennium B.C., the popularity of recreational use originated primarily in the Islamic world. Europeans became acquainted with cannabis around 1800, and it was the subject of a popular craze at the time. Marijuana as a recreational drug was popular among musicians in major U.S. cities during the 1920s, where marijuana establishments were largely tolerated by local authorities. During this period, marijuana was not considered a social threat.

Led by inaccurate (and since discredited) information distributed by the U.S. Federal Bureau of Narcotics in the 1930s, marijuana use was portrayed as an extremely harmful and dangerous practice. In 1937, legal restrictions on marijuana use began, with sanctions becoming progressively more and more severe.

During the 1960s, marijuana use became emblematic of the youthful rebellion against authority and the establishment. More recently, attention has focused on the decriminalization of marijuana possession in small amounts and the possibility of marijuana availability for therapeutic use.

3. Acute effects of marijuana

The absorption of inhaled THC through marijuana smoking is extremely rapid, but excretion is very slow. THC metabolites (through biotransformation) remain in the body for several

days even after smoking a single marijuana joint.

Changes in heart rate and sexual reactivity depend either on dosage level, expectations of the user, or a combination of both.

In the 2004 DAWN statistics, marijuana comprised about 11 percent of all drug-related emergency department (ED) visits, ranking second behind cocaine in this respect. In only a small percentage of these cases, however, was marijuana the sole drug present in the patients system at the time. It is not clear whether an increase in ED mentions since the 1990s is related to more people smoking marijuana, a higher THC concentration, or a greater incidence of marijuana being combined with alcohol or some other drug.

A marijuana high is a feeling of euphoria, well-being, and peacefulness. There may be sharpened perception of ones surroundings and an appearance of time elongation. There are deficits in attention and memory. Complex motor tasks are performed more poorly, so driving skills obviously suffer substantially. Marijuana is eliminated very slowly, with regular marijuana smokers like to have a residual amount of THC still in their system prior to ingestion.

Specific receptors in the brain are stimulated by THC. A natural substance called anandamide activated these receptors and appears to produce the same effects as THC in the brain.

Animals will selfadminister marijuana in laboratory studies but their behavior is not as compulsive as that observed with heroin, cocaine, or nicotine.

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4. Chronic effects of marijuana

Tolerance effects among marijuana users do not generally occur. It appears that experienced users learn how to inhale more deeply and ingest more THC than novice users.

Physical withdrawal symptoms, indicative of physical dependence, occur when marijuana dosages are moderate and consumed over a relatively short period of time. Signs of psychological dependence will also be observed in the form of marijuana craving, but these effects may be, in part, a factor of marijuana use in conjunction with other drugs. In any case, levels of obsessive drug seeking and compulsive drug-taking behavior are nowhere near the degree associated with other drugs such as alcohol, opiates, or stimulants.

No conclusive evidence of adverse cardiovascular effects exists. Marijuana smoking, however, presents the risk of inhaling tars and other toxic agents in the smoke. Respiratory problems can result. Evidence of immunological deficits, birth defects, or neurological damage is either nonexistent or inconclusive.

During the 1960s, the concept that marijuana led to the amotivational syndrome,

characterized by a feeling of apathy and indifference to long-term planning, was proposed but has been since discredited.

The concept that marijuana is a gateway drug toward the recreational use of more dangerous drugs of abuse has also come into question. The overall hypothesis has been explored in terms of the sequencing question (whether marijuana use precedes the occurrence of other forms of illicit drug-taking behavior), the association question (whether marijuana use is statistically correlated with later illicit drug-taking behavior), and the causation question (whether there is a causal link between marijuana use and the use other illicit drugs). The consensus on the question of whether marijuana is a gateway drug is that any early exposure to psychoactive substances in general, and illicit drugs such as marijuana in particular, represents a deviance-prone pattern of behavior that will be reflected in a higher incidence of exposure to psychoactive drugs of many types later in life.

5. Patterns of marijuana smoking

According to the 2005 National Survey on Drug Use and Health, about 97 million Americans, about 40 percent of the U.S. population over the age of twelve, have smoked marijuana at least once during their lives. About 15 million (one out of sixteen) have smoked marijuana within the last thirty days.

Domestic marijuana growing represents the number-one cash crop in the United States, with revenues of about $30 billion per year.

The typical potency of cannabis products that are now available is higher than that available in the 1960s. As is always the case with an illicit street drug, there is the risk of adulteration. Marijuana is undoubtedly the dominant illicit drug in U.S. society. Three-fourths of all current illicit drug users smoked marijuana, and for six out of every ten illicit drug users, marijuana is the only illicit drug being used.

6. Medical uses for marijuana

Currently, the potential for marijuana as a therapeutic drug has focused on the treatment of nausea and weight loss resulting from AIDS and chemotherapy during cancer treatment. Since 1985, two legal prescription drugs containing THC have been available: dronabinol (Marinol) and nabilone (Cesamet). However, advocacy for the use of marijuana itself has grown considerably in recent years. U.S. federal authorities have opposed the reclassification of marijuana from a Schedule I (defined as having no medical benefits) to a Schedule II controlled substance.

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Since 2001, Canada has officially approved the medicinal use of marijuana and has made it legal for Canadian patients to grow and smoke marijuana if their symptoms have been certified by a physician as warranting this treatment. Marijuana can be permitted, under these circumstances, free of charge from Canadian governmentoperated cannabis farms.
The issue of legalizing marijuana smoking for medical purposes is currently in flux in the United States. As of 2005, eleven U.S. states (Alaska, California, Colorado, Hawaii, Maine, Maryland, Montana, Nevada, Oregon, Vermont, and Washington) have authorized marijuana smoking for the relief of pain and discomfort or the control of nausea and weight loss, when prescribed by a physician. Nonetheless, the U.S. Supreme Court in 2005 ruled that legalizing medical marijuana at the state level could not supersede federal prohibitions.

7. Marijuana decriminalization

Decriminalization of marijuana possession in small amounts, referring to the consideration that one is committing a civil offense punishable by a small fine rather than imprisonment, in the United States has been a matter settled state by state.
Recent state legislation has been directed more toward the question of the medical application of marijuana than marijuana decriminalization *per se*. The 2005 Supreme Court decision on the question of medical marijuana has been a blow not only to advocates of medical marijuana but to advocates of marijuana decriminalization as well.

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Topic : Anabolic Steroids And Drug Abuse In Sports

Objective:

At the end of this topic student would be able to understand:

- Hazards of anabolic steroids
- Patterns of anabolic steroid abuse
- Nonsteroid hormones and ergogenic drugs
- Drug-testing procedures and policies

Definition/Overview:

Anabolic steroids: Anabolic steroids, or anabolic-androgenic steroids (AAS), are a class of steroid hormones related to the hormone testosterone. They increase protein synthesis within cells, which results in the buildup of cellular tissue (anabolism), especially in muscles.

Anabolic steroids also have androgenic and virilizing properties, including the development and maintenance of masculine characteristics such as the growth of the vocal cords and body hair. The word anabolic comes from the Greek anabolein, "to build up", and the word androgenic from the Greek andros, "man" + genein, "to produce".

Anabolic steroids were first isolated, identified and synthesized in the 1930s, and are now used therapeutically in medicine to stimulate bone growth and appetite, induce male puberty, and treat chronic wasting conditions, such as cancer and AIDS. The American College of Sports Medicine acknowledges that AAS, in the presence of adequate diet, can contribute to increases in body weight, often as lean mass increases, and that the gains in muscular strength achieved through high-intensity exercise and proper diet can be additionally increased by the use of AAS in some individuals.

Serious health risks can be produced by long-term use or excessive doses of anabolic steroids. These effects include harmful changes in cholesterol levels (increased low-density lipoprotein and decreased high-density lipoprotein), acne, high blood pressure, liver damage, and dangerous changes in the structure of the left ventricle of the heart.

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Ergogenic uses for anabolic steroids in sports and bodybuilding is controversial, because of their adverse effects and the potential to gain an advantage conventionally considered "unfair." Their use is considered doping and banned by all major sporting bodies. For many years the AAS have been by far the most detected doping substances in IOC-accredited laboratories. In countries where AAS are controlled substances, there is often a black market in which smuggled or even counterfeit drugs are sold to users. In those countries some have called for less regulation because of those health risk and corresponding civil rights issues.

Key Points:

1. Introduction

Anabolic Steroids Drug-taking behavior in athletic competitions dates back to the original Greek Olympic Games in 300 B.C. A wide range of psychoactive substances can be ergogenic (performance-enhancing).
Anabolic steroid drugs are patterned after the male sex hormone testosterone. They do more than temporarily alter the behavior of the athlete; they actually alter the structure of the

athletes body. They have two general physiological effects: (1) androgenic (enhancing male characteristics) and (2) anabolic (promoting protein development and increased muscle tissue).

Efforts to employ anabolic-androgenic steroid drugs for ergogenic purposes have focused on reducing androgenic effects as much as possible while retaining anabolic effects. While steroids are called simply anabolic steroids, androgenic symptoms inevitably present to some degree.

By 1968, steroid use among athletes in the Olympic Games had become widespread. In the 1980s, the East German government secretly conducted an extensive program of steroid-enhanced training for their athletes. Despite increasingly rigorous drug testing procedures, cases of ergogenic drug use and expulsions of athletes have continued through the most recent Olympic Games as well as other international and national competitions.

In 2003, for the first time, a comprehensive anti-drug code was adopted. All international sport competitions, all athletes sponsored by national federations in their respective countries, and professional leagues in the United States that participate in international competitions (e.g., the National Basketball Association and the National Hockley League) are subject to the code. The World Anti-Doping Agency (WADA) sets the standards for banned drugs, drug tests, and penalties for violators.

Since the late 1990s, public attention has turned to anabolic steroid and other ergogenic drug use in major league baseball. Record-breaking home run performances have fueled speculation that players were using steroids to make these achievements. In 2005, major league baseball established a policy of steroid testing and penalties if players tested positive for steroids. Present regulations stipulate a 50-game suspension following the first positive test, 100-game suspension following the second, and lifetime suspension with right of reinstatement after two years following the third.

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2. Hazards of anabolic steroids

Among men, anabolic steroids increase testosterone levels in the blood and inhibit the production and secretion of testosterone by the testes. Testicles shrink and sperm count goes down. Male breasts enlarge and penile erections are often sustained and painful. There is a development of acne on the shoulders and back as well as accelerated male-pattern baldness.

Among women, increased testosterone produces male-oriented changes in the body, including a lowering of the voice and increased facial hair. Only some of these changes are reversible when steroid use is discontinued.

Health risks include the development of liver tumors and elevated blood pressure. Psychological problems include mood swings and increased aggressiveness in at least some individuals taking anabolic steroids. Among adolescents, steroids suppress the production of human growth hormone (hGH), inhibiting overall body growth despite the increased level of muscularity.

3. Patterns of anabolic steroid abuse

Anabolic steroids are classified as Schedule III controlled substances, on a par with codeine preparations and barbiturates. Violations of its use are handled by the Drug Enforcement Agency (DEA). Patterns of abuse involve illegal sales and distribution networks.

Patterns of steroid abuse include cycling in which steroids are taken for limited intervals of time alternating with an abstinence period, and pyramiding in which steroids are taken in increasing dosage levels during athletic training then tapered off prior to a competition in order to escape detection.

Muscle dysmorphoria is a condition in which body builders continue to see their bodies as weak and small, despite their greatly enhanced physical development. Between 13 and 18 percent of those who have taken steroids show signs of physical and psychological dependence, in that they are unable to control or cut down on them, take more steroids than they intended, develop a tolerance to them, or take them to relieve or avoid undesirable withdrawal symptoms.

The pressure to achieve an idealized body-image among young males in our society is an increasing problem, just as is the case with young females. In the University of Michigan survey, 2 percent of eighth-grade boys, 2 percent of tenth-grade boys, and 2.5 percent of high school seniors had used anabolic steroids at some time in their lives.

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4. Nonsteroid hormones and ergogenic drugs

Drugs other than anabolic steroids continue to be available for performance-enhancing purposes. One example is human growth hormone (hGH). A significant risk of taking hGH is the development of acromegaly, resulting in a misshapen head and enlarged hands and feet. Some dietary supplements are consumed for their presumed ergogenic effects. Since these

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supplements are not classified by the FDA as drugs, they can be marketed and sold without a prescription. Two examples are androstenedione and creatine.

Androstenedione is testosterone-related on the basis of its being a naturally occurring metabolic precursor to testosterone. This supplement rose to prominence in the late 1990s when it became public that baseball player Mark McGwire had been taking it during his record-breaking 1998 hitting season. There is currently no evidence, however, that androstenedione promotes muscle protein synthesis, despite an increase in testosterone. In 2005, the FDA banned the over-the-counter sale of androstendione and other testosterone precursors.

Creatine is a dietary supplement that enhances fat-free mass and physical performance, possibly due to a retention of water by muscle cells which cause them to expand in size. Short-term use of creatine has been found to produce muscle cramping, and its long-term adverse effects have not been fully explored.

5. Drug-testing procedures and policies

Urinanalysis can result in the detection of the metabolites (by-products through biotransformation) of many drugs of abuse. Drug-testing procedures through urine analysis generally take two forms: enzyme immunoassay (EIA) and gas chromatography/mass spectrometry (GC/MS). The first technique is less expensive but less definitive than the second. Only GC/MS is able to detect levels of anabolic steroids.

To be effective, drug-testing procedures must be both sensitive and specific. The sensitivity of a test refers to the minimal level of the banned substance that needs to be in the body fluid for it to be picked up as a positive test. The specificity of a test refers to the possibility that a false-positive results (in which the test comes out positive but the body fluid is in actuality clean). Ideally, a drug detection test should be highly sensitive (few false-negatives) and highly specific (few false-positives).

Attempts have been made to mask or avoid the detection of banned substances, but almost all of these efforts are unsuccessful. However, it is difficult to pinpoint the time of use through test results, since the metabolites of a particular drug often remain in the body for a considerable length of time. Oral-fluid testing (through analysis of saliva) has narrowed the window of detection relative to urinanalysis, but determinations of the exact time of drug ingestion is still imprecise.

In 2003, a screening test for a new designer steroid called THG was developed. The extent of THG use among professional and nonprofessional athletes has yet to be fully revealed.

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Continuing intense pressure to compete and to achieve an ideal body image are two factors in our society that foster abuse of anabolic steroids and other ergogenic substances.

In Section 3 of this course you will cover these topics:

- Alcohol: Social Beverage/Social Drug
- Chronic Alcohol Abuse And Alcoholism
- Nicotine And Tobacco
- Caffeine

Topic : Alcohol: Social Beverage/Social Drug

Topic Objective:

At the end of this topic student would be able to understand:

- What makes an alcoholic beverage?
- Alcohol through history
- Patterns of alcohol consumption
- Pharmacology of alcohol
- Acute physiological effects
- Acute behavioral effects
- Strategies for responsible drinking

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Definition/Overview:

In chemistry, an **alcohol**is any organic compound in which a hydroxyl group (*-OH*) is bound to a carbon atom of an alkyl or substituted alkyl group. The general formula for a simple acyclic alcohol is $C_nH_{2n+1}OH$. In common terms, the word *alcohol* refers to **ethanol**, the type of alcohol found in alcoholic beverages.

The word *alcohol*was introduced into the English language circa 1543 from the Arabic: الغول, "al-ġuḥl".

Ethanol is a colorless, volatile liquid with a mild odor which can be obtained by the fermentation of sugars. (Industrially, it is more commonly obtained by ethylene hydrationthe reaction of ethylene with water in the presence of phosphoric acid.) Ethanol is the most

widely used depressant in the world, and has been for thousands of years. This sense underlies the term alcoholism (addiction to alcohol).

Key Points:

1. What makes an alcoholic beverage?

Ethyl alcohol is produced from organic material with sugar content through a process called fermentation. There is a wide range of fruits and vegetables that can be fermented into some form of alcoholic beverage. Fermentation alone achieves a maximal alcohol content of about 15-16 percent.

Starchy grains are fermented in a process called brewing that produces beer. High levels of alcohol content can be achieved through the process of distillation, up to approximately 95 percent. Products of distillation, called distilled spirits or liquor, are commonly designated by levels of proof, with the proof of an alcoholic beverage being twice the percentage of alcohol content.

2. Alcohol through history

Fermented honey was probably the original alcoholic beverage, dating back to 8000 BC. In the 1700s, widespread consumption of gin (a distilled spirit flavored with juniper berries) became a major social problem, particularly in large cities in England.

Consumption of rum and whiskey in the United States was extensive, several times the level in presentday society. The growing influence of the temperance movement, beginning around 1830, resulted in a slow decline in alcohol consumption. In 1920, nationwide prohibition of alcohol sales and distribution in the U.S. was enacted into law, later to be repealed in 193

3. Patterns of alcohol consumption

Current industry figures report that the average alcohol consumption per day in the U.S. is approximately one drink to one and one-half standard drinks per day. A standard drink is typically estimated to be equivalent to either one 5-ounce glass of wine, one 12-ounce beer or wine cooler, or one 1.5- ounce shot of 80-proof liquor. Each of these drinks contains approximately one-half ounce of pure alcohol.

A relatively small proportion of the U.S. population accounts for most of the alcohol consumed. In fact, 80 percent of the total amount of alcohol consumed in the United States each year is consumed by only 20 percent of the population in general and only 30 percent of Americans who drink.

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Alcohol consumption in the United States has been slowly declining in recent years. Among young adults, and those in college in particular, however, alcohol consumption remains a significant social problem.

Binge drinking is defined for men by the ingestion of five or more alcoholic drinks in a row (typically within two hours) and for women by the ingestion of four or more alcoholic drinks in a row. Prevalence levels of binge drinking have remained relatively steady through the 1990s. Adverse effects of binge drinking have been shown to mpact upon the behavior of drinkers and nondrinkers alike.

4. Pharmacology of alcohol

Alcohol is quickly absorbed into the bloodstream. Its metabolism and eventual excretion is achieved at a constant rate, approximately 100 milligrams of alcohol per hour per kilogram of body weight, through the enzymatic processes in the liver. Biotransformation of alcohol relies upon two enzymes: alcohol dehydrogenase and acetaldehyde dehydrogenase. The metabolic rate of alcohol is influenced by gender, race, and the presence of certain medications in the blood.

Blood alcohol concentration (BAC) is measured by the percentage of grams of alcohol in the blood relative to 100 milliliters of blood. As of 2002, 0.8% BAC is considered the minimal criterion for driving while intoxicated (DWI) in Canada and all U.S. states. 19 6

Alcohol is a CNS depressant. Acute alcoholic poisoning can produce death by a stoppage of breathing. The LD50 BAC level for alcohol is approximately 0.50%.

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5. Acute physiological effects

Alcohol is a peripheral vasodilator, creating a feeling of warmth and redness, but overall the body is losing heat. Hormonal effects on kidney functioning can produce initial dehydration followed by swollen limbs.

Long-term excessive consumption of alcohol increases the risk of heart disease, elevated blood pressure, and stroke, while light to moderate consumption appears to be protective with regard to cardiovascular problems. However, consumption during pregnancy and diabetic patients is not considered safe.

Alcohol can disturb normal patterns of sleep, as well as produce serious complications when combined with other drugs or medications.

Hangovers, usually commencing about four to twelve hours after heavy consumption of alcohol, produce headache, nausea, fatigue, and thirst. While some types of alcohol

consumption have a greater association with hangover symptoms, the mechanism behind the effect remain unclear.

6. Acute behavioral effects

As a CNS depressant drug, alcohol has major adverse effects on the behavior of the drinker. These effects include slurred speech, uncoordinated movement, drowsiness, sensorimotor difficulties. One serious behavior is an alcohol blackout, during which the drinker is unable to remember events occurring during the period of intoxication, even though he or she was conscious at the time.

Driving skills are significantly impaired under alcohol intoxication. Increased risk of a vehicular fatality begins with BAC levels as low as 0.2%. Therefore, it is quite possible for accidents to occur when the driver is substantially below the minimal BAC levels for driving while intoxicated (DWI). The United States presently has one of the most lenient standards for driving while intoxicated among nations of the world.

Undoubtedly, alcohol consumption increases the probability of aggressiveness and violent behavior. The disinhibition theory and the cognitive-expectation theory are two viewpoints that have been advanced to explain this linkage.

The effect of alcohol on sexual desire and sexual performance is complex. The nature of this relationship is partly explained by the pharmacological (physiological) effects of alcohol on the body and partly explained by the expectation of individuals regarding what alcohol *should* do for them. The research in this area is conducted using a balanced placebo design.

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7. Strategies for responsible drinking

Responsible drinking patterns include the avoidance of adverse effects in alcohol consumption and the avoidance of behavioral situations (such as driving) where alcohol consumption produces significant impairments.

Regardless of how it is consumed, alcohol remains a drug with significant potential for dependence. It is not difficult for continual alcohol consumption to result in problems associated with drug dependence.

Topic : Chronic Alcohol Abuse And Alcoholism

Topic Objective:

At the end of this topic student would be able to understand:

- Alcoholism: Stereotypes, definitions, and criteria
- The history of efforts to regulate chronic alcohol abuse
- Chronic effects of alcohol
- Patterns of chronic alcohol abuse
- Approaches to treatment for alcoholism

Definition/Overview:

Alcoholism: Alcoholism is a term with multiple and sometimes conflicting definitions to describe the detrimental effects of alcohol intake.

In common and historic usage, alcoholism refers to any condition that results in the continued consumption of alcoholic beverages despite health problems and negative social consequences. Modern medical definitions describe alcoholism as a disease and addiction which results in a persistent use of alcohol despite negative consequences. In the 19th and early 20th centuries, alcoholism, also referred to as dipsomania described a preoccupation with, or compulsion toward the consumption of, alcohol and/or an impaired ability to recognize the negative effects of excessive alcohol consumption.

Although not all of these definitions specify current and on-going use of alcohol as a qualifier for alcoholism, some do, as well as remarking on the long-term effects of consistent, heavy alcohol use, including dependence and symptoms of withdrawal.

While the ingestion of alcohol is, by definition, necessary to develop alcoholism, the use of alcohol does not predict the development of alcoholism. It is estimated that 9% of the general population is pre disposed to alcoholism based on genetic factors. The quantity, frequency and regularity of alcohol consumption required to develop alcoholism varies greatly from person to person. In addition, although the biological mechanisms underpinning alcoholism are uncertain, some risk factors, including social environment, stress, emotional health and genetic predisposition, have been identified.

Key Points:

1. Alcoholism: Stereotypes, definitions, and criteria

The public image of an alcoholic is often quite different from the reality. Criteria for alcoholism include four life problems: problems associated with a preoccupation with drinking, emotional problems, vocational and family problems, and problems associated with physical health.

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A sign of alcoholism can be symptomatic drinking (alcohol consumption aimed at reducing stress and anxiety) as well as a loss of control over drinking itself. Psychological depression can be an emotional effect of alcoholism as well. Chronic alcohol consumption results in shrinkage of brain tissue, particularly in the cerebral cortex, cerebellum, and regions concerned with memory and cognition.

Major life problems are often not recognized by alcoholics because of the processes of denial on the part of the alcoholic and enabling on the part of the alcoholics family and friends.

From the perspective of the mental health professional, alcohol abuse involves the continued use of alcohol despite the drinkers knowledge of having a persistent physical problem or some social or occupational difficulty. Alcohol dependence involves a greater variety of significant physical, psychological, social, and behavioral problems, including the possibility of alcohol tolerance and withdrawal.

2. The history of efforts to regulate chronic alcohol abuse

Beginning in the late 1700s, a temperance movement gained increasing prominence as an advocate for the reduction of liquor consumption. Gradually, this influence widened to include the prohibition of alcohol consumption in any form. 22 2

Until about 1830, alcohol consumption in the United States was enormous, with a per capita consumption level of roughly 7 gallons per year. The influence of temperance groups succeeded in reducing the per capita consumption level to about 2 gallons per year in 1850, roughly the same as the consumption level today.

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3. Chronic effects of alcohol

As with other CNS depressants, alcohol consumption over a period of time will result in a tolerance effect. The tolerance effect results from changes in metabolic processes and neuronal responses.

Abrupt withdrawal from alcohol can result in a range of serious physical symptoms. In the most common form, called the alcohol withdrawal syndrome, includes the experience of insomnia, tremors, anxiety, nausea, vomiting, and in some cases seizures. A less common form, called delirium tremens (DTs), includes extreme disorientation, profuse sweating, fever, and frightening visual hallucinations.

Chronic alcohol abuse produces three, increasingly dangerous, forms of liver disease: fatty liver, alcoholic hepatitis, and alcoholic cirrhosis. Abstinence can produce a reversal of fatty liver, as well as alcoholic hepatitis (though in the latter case, some residual scarring may

remain). However, alcoholic cirrhosis is not reversible by abstinence. Liver transplantation surgery is the only option for complete recovery.

Alcoholism-related cardiovascular problems include inflammation and enlargement of the heart, irregular heart contractions, fatty accumulations in the heart and arteries, high blood pressure, and brain hemorrhage.

Chronic alcohol abuse increases the risk of several types of cancer, including cancer of the liver, esophagus, pharynx, and larynx.

Long-lasting deficits associated with problem-solving, memory, and related cognitive skills are referred to as alcoholic dementia. A more severe form of cognitive impairment is the two-stage disease referred to as Wernicke-Korsakoff syndrome. The first stage is called Wernickes encephalopathy, arising from a deficiency in thiamine. The second stage is called Korsakoffs psychosis. A common feature of Korsakoffs psychosis is the creation of false memories (confabulation).

When pregnant women engage in alcohol abuse during pregnancy, significant birth-defects result in the newborn. The most serious postnatal effect is fetal alcohol syndrome (FAS), characterized by growth retardation in the child, CNS abnormalities associated with mental retardation, and a distinctive facial appearance. If only some of these features are present, the diagnosis is referred to as fetal alcohol effect (FAE). In some populations, FAS and FAE prevalence is very high, though nationwide the incidence rate is about two cases per thousand live births.

Short questionnaires, such as the TWEAK questionnaire, are available for identifying problem drinking among pregnant women.

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4. Patterns of chronic alcohol abuse

Alcoholics can be found in every age, gender, racial, ethnic, religious, socioeconomic and geographic category. However, male alcoholics outnumber female alcoholics by about 6 to There is a growing recognition of alcohol problems among the elderly. 22 3

A systems approach encourages an examination of how the alcoholic and other members of the immediate family interact with one another. Codependency refers to the dysfunctional way in which family members or friends interact with the alcohol and end up suffering themselves a range of psychological problems.

Children of alcoholics (COAs) have a higher statistical risk of becoming an alcoholic than do children of nonalcoholics. Two primary risk factors, a family history and a low response to alcohol, contribute to the possible development of alcoholism later in life.

Two distinctive subgroups among alcoholics have been identified. In Type 1 alcoholics, problem drinking occurred later in life and environmental factors played a major role in the development of alcohol abuse. In Type 2 alcoholics, problem drinking began earlier in life and genetic factors played a major role in the development of alcohol abuse. As exploration of the human genome continues, it is likely that several different genes will be identified with alcoholism. These genes will be found to interact with environmental factors, placing some individuals at a significantly higher risk for alcohol dependence.

While most health professionals and organizations, including the American Medical Association, view alcoholism as a disease, physicians are often ill-trained to diagnose and recommend appropriate treatment. Only one in five physicians, in a recent poll, considered themselves very prepared to diagnose alcoholism in their patients.

5. Approaches to treatment for alcoholism

Biologically based treatments include the use of Antabuse (a medication that produces strong adverse physical effects when alcohol has been consumed), the use of naltrexone (ReVia) and natfemene (Revex) that inhibit opiate receptors in the brain, and acamprosate (Campral) . Recently, medications such as ondansetron (Zofran) have been designed to reduce serotonin levels, a factor in early-onset Type 2 alcoholism.

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Group therapy and peer support can be provided by programs such as Alcoholics Anonymous (AA), SMART Recovery, Men for Sobriety (MOS), Women for Sobriety (WOS), Moderation Management (MM), and Secular Organization for Sobriety (SOS). By far, the most common of these approaches has been Alcoholics Anonymous.

Alcoholics Anonymous is a loosely organized fellowship of alcoholics who wish to rid themselves of problem drinking by helping one another maintain sobriety. It functions as a type of group therapy with outside one-on-one support from alcoholics who have maintained sobriety for a long period of time.

An intensely debated question in the field of alcoholism treatment is whether it possible for alcoholics to achieve a level of controlled drinking without falling back into a state of alcoholic dependence.

Increasing emphasis has been made on programs oriented to alcoholism and worker productivity. Collectively, these efforts are referred to as employee assistance programs (EAPs). More than 40 percent of the U.S. work force is covered by EAPs at ones place of employment.

Topic : Nicotine And Tobacco

Topic Objective:

At the end of this topic student would be able to understand:

- Tobacco Through History
- Tobacco today
- Whats in tobacco?
- The dependence potential of nicotine
- Health consequences
- Patterns of smoking behavior and use of smokeless tobacco
- Quitting smokin

Definition/Overview:

Nicotine is an alkaloid found in the nightshade family of plants (*Solanaceae*) which constitutes approximately 0.63.0% of dry weight of tobacco, with biosynthesis taking place in the roots, and accumulating in the leaves. It functions as an antiherbivore chemical with particular specificity to insects; therefore nicotine was widely used as an insecticide in the past, and currently nicotine analogs such as imidacloprid continue to be widely used.
In low concentrations (an average cigarette yields about 1 mg of absorbed nicotine), the substance acts as a stimulant in mammals and is one of the main factors responsible for the dependence-forming properties of tobacco smoking. According to the American Heart Association, "Nicotine addiction has historically been one of the hardest addictions to break." The pharmacological and behavioral characteristics that determine tobacco addiction are similar to those that determine addiction to drugs such as heroin and cocaine.

Key Points:

1. Tobacco Through History
Europeans first learned about tobacco from natives living on the islands first visited by Columbus in 149
Within 200 years, tobacco had established itself as a popular commodity as well as a powerful economic force throughout Europe.
Tobacco use has taken many forms: snuffing (sniffing powdered tobacco), pipe smoking,

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cigars, tobacco chewing, and more recently cigarettes. By the 1920s, cigarettes had achieved dominance as the leading form of tobacco use in the United States.

Per capita consumption of cigarettes reached its peak in 1960. Since then, consumption levels have steadily declined. The turn-around coincided with the first Surgeon Generals report on smoking and health. One major effect of the report was a change in the type of cigarette smoked by the average smoker, from unfiltered to filtered varieties. A second effect was the introduction of cigarettes low in tar and nicotine.

2. Tobacco today

The early 1990s produced the beginning of a continual series of challenges to the tobacco industry. In 1993, U.S. federal agencies concluded that environmental tobacco smoker caused lung cancer. Since then, increasing restrictions have been enacted on smoking behavior.

In 1998, major American tobacco corporations entered into an agreement with all 50 U.S. states to resolve claims that the states should be compensated for the costs of treating people with smoking-related illnesses. There has been a substantial decline between 1998 and 2003 in smoking levels among secondary school students, particularly eighth-graders, it is not clear whether the 1998 settlement has been responsible in this regard. By and large, compensation funds awarded to the states have been used to keep taxes down or pay off debt, rather than support tobacco prevention programs.

An effort in 1996 by the FDA to regulate tobacco products, based on the assertion that nicotine was a drug, was overturned by the U.S. Supreme Court in 200

Sales of cigarettes by American tobacco corporations overseas have compensated for declining domestic sales. The U.S. trade deficit would be considerably worse than it is today, were it not for the export of tobacco products to other nations.

3. Whats in tobacco?

Tobacco smoke has two components: a particulate phase (containing nicotine and tar) and a gaseous phase (containing various compounds including carbon monoxide).

Carbon monoxide is an odorless, colorless, tasteless but extraordinarily toxic gas. It is the primary factor in producing cardiovascular disease among smokers, as well as causing deficiencies in bodily functioning and behavior.

Tar is a sticky substance that adheres to cells in the lungs and the airways leading to them. The alteration of cells along the pulmonary system, in the presence of tar, permits carcinogenic (cancer-producing) compounds to settle on this tissue.

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Nicotine is a toxic, dependence-producing psychoactive drug found exclusively in tobacco. It is absorbed extremely rapidly and easily passes through the blood-brain barrier as well as through the blood-placental barrier in pregnant women, in a few seconds. Its elimination half-life is approximately two to three hours.

The primary effect of nicotine is to stimulate CNS receptors that are sensitive to acetylcholine. These receptors are called nicotinic receptors because they are excited by nicotine.

4. The dependence potential of nicotine

Nicotine stimulates the release of dopamine in the nucleus accumbens in the brain. The titration hypothesis holds that smokers adjust their smoking behavior to obtain a stable dose of nicotine from whatever cigarettes they are smoking.

Cessation of smoking behavior among experienced smokers produces strong withdrawal symptoms and craving for the nicotine found in tobacco. Ex-smokers can attest to cravings that slowly diminish but sometimes linger for months or years.

5. Health consequences

An estimated 430,000 deaths in the United States each year are attributed to smoking-related illnesses. These illnesses include cardiovascular disease (heart attack, arteriosclerosis, and atherosclerosis), respiratory diseases (chronic bronchitis and emphysema), lung cancer, and cancers of a number of other organs.

Smoking is responsible for approximately 30 percent of all cardiovascular diseases (CHD) deaths. The major villains are nicotine and carbon monoxide. Nicotine causes constriction of blood vessels leading to a rise in blood pressure and the formation of blood clots. Carbon monoxide places a further burden on the cardiovascular system by restricting the amount of oxygen reaching the heart.

Between 80 and 90 percent of all cases of chronic obstructive pulmonary disease (COPD) are due to cigarette smoking.

Lung cancer is an enormous problem among female as well as male smokers. Smoking also raises the risk of cancer of the larynx, mouth, lip, bladder, pancreas, kidney, and (in women) uterus.

Environmental smoke presents significant hazards to non-smokers. Appoximately 85 percent of the smoke in an average room where people are smoking cigarettes is generated by sidestream smoke.

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6. Patterns of smoking behavior and use of smokeless tobacco

Rates of smoking among adults leveled off around 1991, after a steady decline since the mid-1960s. Smoking among college students, however, rose through 1999 but has slowly declined since then. In 2004, about 24 percent of college students smoked cigarettes within the previous month, about the same as the national average.

Young smokers begin smoking cigarettes in early adolescence. Virtually alladult smokers have begun by the age of 20, and 80-90 percent of them have begun by the age of 1

In recent years, the attitudes among adolescents toward the social aspects of smoking have become more and more negative.

Smokeless tobacco is ingested by absorption through the membranes of the mouth rather than by inhalation of smoke into the lungs. Smokeless tobacco has increased in popularity among young males since the 1970s, particularly in rural communities of the South and North Central regions of the United States. Regular use of smokeless tobacco increases the risk of gum disease, loss of teeth, and oral cancer.

In the 1990s, there was a brief resurgence in the popularity of cigar smoking. More recently, flavored cigarettes (called bidis and kreteks) have been discovered by young smokers.

Cigarette smoking prevalence rates are much higher in many foreign nations than in the United States. In addition, there are far fewer restrictions on smoking behavior in these countries. Tobacco use is now a global public health concern. According to the World Health Organization, 47 percent of men and 12 percent of women worldwide are smokers.

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7. Quitting smoking

Given the dependence-producing effects of nicotine, the process of quitting smoking is extremely difficult. There are significant health benefits that can undo some of the damage, once tobacco use has ended.

Options available to smokers who want to quit include social support groups (Smokers Anonymous and similar programs), counseling, hypnosis, acupuncture, and a number of prescription medications.

Nicotine gums, patches, sprays, and inhalers are useful in gradually withdrawing from nicotine. They are alternatives that avoid inhaling carbon monoxide and tar into the lungs.

In 2006, a twice-daily tablet called Chantix became available in the United States as a nicotine-free stopsmoking medication.

Topic : Caffeine

Topic Objective:

At the end of this topic student would be able to understand:

- Coffee
- Tea
- Chocolate
- Soft drinks and medications
- Caffeine as a drug
- Health risks and benefits
- Dependence: Tolerance and withdrawal
- Kids and caffeine

Definition/Overview:

Caffeine: Caffeine is a bitter, white crystalline xanthine alkaloid that acts as a psychoactive stimulant drug and a mild diuretic. Caffeine was discovered by a German chemist, Friedrich Ferdinand Runge, in 1819. He coined the term "kaffein", a chemical compound in coffee, which in English became caffeine. Caffeine is also part of the chemical mixtures and insoluble complexes **guaranine** found in guarana, **mateine** found in mate, and **theine**found in tea; all of which contain additional alkaloids such as the cardiac stimulants theophylline and theobromine, and often other chemicals such as polyphenols which can form insoluble complexes with caffeine.

Caffeine is found in varying quantities in the beans, leaves, and fruit of some plants, where it acts as a natural pesticide that paralyzes and kills certain insects feeding on the plants. It is most commonly consumed by humans in infusions extracted from the cherries of the coffee plant and the leaves of the tea bush, as well as from various foods and drinks containing products derived from the kola nut. Other sources include yerba mate, guarana berries, and the Yaupon Holly.

In humans, caffeine is a central nervous system (CNS) stimulant, having the effect of temporarily warding off drowsiness and restoring alertness. Beverages containing caffeine, such as coffee, tea, soft drinks and energy drinks enjoy great popularity. Caffeine is the world's most widely consumed psychoactive substance, but unlike many other psychoactive

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substances it is legal and unregulated in nearly all jurisdictions. In North America, 90% of adults consume caffeine daily. The U.S. Food and Drug Administration lists caffeine as a "Multiple Purpose Generally Recognized as Safe Food Substance".

Key Points:

1. Introduction

Caffeine belongs to a family of CNS stimulant compounds called xanthines and is contained in coffee, tea, and chocolate, as well as certain soft-drink products and OTC medications. Two other examples of xanthines are theobromine (found in chocolate) and theophylline (found in small amounts in tea).

The principal xanthine discussed in this topic is caffeine.

2. Coffee

Coffee beans are generally harvested from the *Coffea arabica* and *Coffea robusta* plants. Coffee consumption dates back to between the 11th and 15th centuries in Ethiopia.

In the seventeenth century, coffee drinking was popular in England, and coffee houses were places where intellectuals met and discussed political and social issues of the day. Coffee was a popular drink in America as well. The United States is the worlds top importer of coffee, with one-half originating in Brazil and Colombia.

Green coffee beans are dried then roasted, prior to being ground and brewed. A standard 5-ounce cup of coffee, roughly speaking, contains about 100 mg of caffeine, though the exact content varies according to the method of brewing.

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3.Tea

Tea is a brew of leaves from the *Camellia senensis* (tea plant), a large evergreen tree. Dutch traders brought tea from Asia to Western Europe in the early 1600s. In Britain, tea became the national drink. Taxation issues regarding the sale of tea in the British colonies in America led to the famous Boston tea party in 177

A standard 5-ounce cup of tea, roughly speaking, contains about 60 mg of caffeine and a small amount of theophylline. Polyphenols, with beneficial effects in the prevention of heart disease, inflammatory disorders, and some forms of cancer, are contained in some forms of tea (primarily green tea).

4. Chocolate

Chocolate is harvested from cocoa bean pods that grow on cacao trees. Spanish explorer Corts brought cocoa beans to Spain where, with the addition of sugar, became a popular beverage called molinet. Milk chocolate, however, was not developed until the 1800s. Chocolate is a product of a complicated process of heating cocoa beans until the natural fat (cocoa butter) melts. The result is a paste called chocolate liquor. When chocolate liquor cools and hardens, the result is baking chocolate.

Later, the cocoa butter can be squeezed out of the chocolate liquor. The remainder can be crushed into a powder and mixed with hot milk or water into cocoa. Milk chocolate is a mixture of cocoa liquor, cocoa butter, milk, sugar, and vanilla. The various combinations make up the various recipes of milk chocolate.

The chocolate industry today is dominated by Hershey Chocolate USA and M&M/Mars, together holding about 80 percent of the market.

A typical 1-ounce piece of milk chocolate contains caffeine and theobromine, having a total stimulant effect equivalent to about 10 mg of caffeine alone.

5. Soft drinks and medications

Most caffeinated soft drinks are colas but it is possible for a noncola (e.g., Mountain Dew) to be caffeinated. All caffeinated soft drinks have the caffeine added during production. Stimulant OTC drugs containing caffeine include NoDoz and Vivarin. Caffeine can also be found in some pain relievers, cold remedies, diuretics, and weight-control aids.

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6. Caffeine as a drug

Oral ingestion of caffeine is absorbed in about 30 to 60 minutes; CNS effects peak in about 2 hours. Smokers eliminate caffeine 100 percent faster than nonsmokers.

Caffeine and xanthines in general block the effects of the inhibitory neurotransmitter adenosine. The bronchodilating effect in the respiratory passageways is the basis for the use of xanthines such as theophylline in anti-asthma medications.

Caffeine increases vigilance and attentiveness in tasks at which subject become easily bored and decreases response time to simple visual and auditory signals.

7. Health risks and benefits

Caffeine stimulates cardiac muscle, but there is no evidence of an increased risk of heart attack. There is, however, an adverse effect on bone tissue, particularly among the elderly. There is no evidence of a linkage to cancer or with infertility, but heavy caffeine use during

pregnancy is related to a greater incidence of low birth weight in the newborn and possible miscarriage.

Any person with a history of panic attacks should be careful to avoid caffeine.

There is preliminary evidence of a link between caffeine consumption and a lower risk of developing Parkinsons disease among men and a lower risk of liver cirrhosis in both sexes.

8. Dependence: Tolerance and withdrawal

Cardiovascular and behavioral effects of caffeine show pronounced tolerance effects.

Cessation of caffeine intake produces physical withdrawal symptoms, including headache, impaired concentration, muscle aches, and irritability. There are clear cases of caffeine craving as well.

Toxic levels of caffeine (approximately 1,000 mg of caffeine equivalent to about 10 cups of caffeinated coffee) result in extreme nervousness and agitation, a condition called caffeinism. Caffeinism is referred to in the health professional community as acute caffeine intoxication. The lethal dose is from 5 to 10 times the level for acute caffeine intoxication.

9. Kids and caffeine

Consumption of caffeinated beverages (principally coffee and soft drinks) by children and adolescents is an increasing health problem. A reduction in milk consumption can result in deficient levels of calcium and phosphorus. Insomnia and increased anxiety are other concerns.

Unfortunately, very few studies exist that have specifically investigated short-term or long-term effects of caffeine on children and teenagers.

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In Section 4 of this course you will cover these topics:

- Glues, Solvents, And Other Inhalants
- Prescription Drugs, Over-The-Counter Drugs, And Dietary Supplements
- Sedative Hypnotics And Antianxiety Drugs

Topic : Glues, Solvents, And Other Inhalants

Topic Objective:

At the end of this topic student would be able to understand:

- Inhalants through history

- Glue, solvent, and aerosol inhalation
- Patterns of inhalant abuse
- Amyl nitrite and butyl nitrite inhalation

Definition/Overview:

Inhalants: Inhalants are a broad range of drugs in the forms of gases, aerosols, or solvents which are breathed in and absorbed through the lungs. While some inhalant drugs are used for medical purposes, as in the case of nitrous oxide (a dental anaesthetic), this article focuses on the non-medical use of inhalants, as recreational drugs which are used for their intoxicating effect. Most inhalant drugs which are used non-medically are ingredients in household or industrial chemical products which are not intended to be concentrated and inhaled, including organic solvents (found in cleaning products, fast-drying glues, and nail polish removers), fuels (gasoline (petrol) and kerosene) and propellant gases such as freon and compressed hydrofluorocarbons which are used in aerosol cans such as hairspray and non-stick cooking spray. A small number of recreational inhalant drugs are pharmaceutical products which are used illicitly, such as anaesthetics (ether and nitrous oxide) and volatile anti-angina drugs (alkyl nitrites).

Inhalant users tend to be people who do not have access to other drugs or alcohol, such as children, teenagers, incarcerated or institutionalized people, and marginalized individuals. The most serious inhalant abuse occurs among children and teens who "...live on the streets completely without family ties." Inhalant users inhale vapor or aerosol propellant gases using plastic bags held over the mouth or by breathing from a solvent-soaked rag or an open container. The effects of inhalants range from an alcohol-like intoxication and intense euphoria to vivid hallucinations, depending on the substance and the dosage. Some inhalant users are injured due to the harmful effects of the solvents or gases, or due to other chemicals used in the products that they are inhaling. As well, as with any recreational drug, users can be injured due to dangerous behavior while they are intoxicated, such as driving under the influence. In some cases, users have died from hypoxia (lack of oxygen), pneumonia, cardiac failure or arrest, or aspiration of vomit.

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Key Points:

1. Inhalants through history

Mind-altering effects of substances inhaled into the lungs have been known since the beginnings of recorded history.

Two early examples of inhalants are nitrous oxide and ether. Over the years, they have been subject to instrumental use (as anesthetics) and recreational use.

2. Glue, solvent, and aerosol inhalation

Abuse of glue and solvent chemicals dates back only to the late 1950s. Some of the common products subject to inhalant abuse include glues, paint thinners, lighter fluid, and stain removers.

The abuse potential of inhalants stems from their rapid inhalation into the lungs, the feelings of euphoria, and the easy availability.

Fumes from inhalant products fall under the general category of CNS depressants. The most immediate effects are giddiness, dizziness, slurred speech, followed by drowsiness.

The dangers of inhalant abuse include the toxic effects of the inhaled compounds themselves on the brain and the potential loss of consciousness when inhalants are administered.

Dangerous procedures associated with inhalant use include huffing and bagging. Inhalation of Freon, a refrigerant gas, risks damage to the larynx that can be frozen by the extremely cold vapor.

In addition, there are specific hazards in the inhalation of acetone, benzene, hexane, toluene, and gasoline. Acetone inhalation causes damage to the mucous membranes of the respiratory tract. Benzene exposure has been linked to leukemia and anemia. Hexane inhalation is associated with peripheral nerve damage, leading to muscle weakness and atrophy. Toluene inhalation is associated with short-term memory loss, anemia, hearing loss, and movement difficulties. Gasoline inhalation is associated with spastic muscle disorders and liver disease.

3. Patterns of inhalant abuse

Among all the psychoactive drugs, inhalants are associated most closely with the young and often the very young. In Central and South America, inhalant abuse is prevalent among children as young as eight or nine years old. Whatever the ethnic identity or socio-economic status of the chronic inhalant abuser, a critical factor in the beginning or continuance of inhalant abuse is peer influence.

Long-term effects of inhalant abuse are not well-documented, and the gateway drug feature

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of inhalants has been much debated. 30 0

Societys response to inhalant abuse has been to modify household products so as to minimize abuse and to institute prevention programs. Oil of mustard has been added to plastic cement products (used for models), since it produces severe nasal irritation if the cement product is inhaled. A National Inhalant and Poisons Awareness Week is held each year in March to promote awareness of the problem of inhalant abuse and related patterns of drug-taking behavior.

4. Amyl nitrite and butyl nitrite inhalation

When inhaled, amyl and butyl nitrites produce intense vasodilation, a relaxation of smooth muscle, a fall in blood pressure, and a reflexive increase in heart rate. Amyl nitrite has been used in the treatment of angina pain in heart patients.

The recreational use of nitrite inhalation began in the 1960s and reached a peak in the 1970s, particularly among gay men. Today, cases of nitrite inhalation have been found among both heterosexual and gay adolescents, for whom the primary attraction is a feeling of general euphoria. In 2005, the lifetime prevalence rate among high seniors is approximately 1 percent, down substantially from 1979 when the prevalence rate was approximately 11 percent.

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Topic : Prescription Drugs, Over-The-Counter Drugs, And Dietary Supplements

Topic Objective:

At the end of this topic student would be able to understand:

- Categories Of Medicinal Products
- The History Of Prescription And Otc Drug Regulation
- Procedures For Approving Prescription And Otc Drugs
- Major Otc Analgesic Drugs
- Other Major Classes Of Otc Drugs
- The Pharmaceutical Industry Today
- Dietary Supplements

Definition/Overview:

Over-the-counter (OTC) drugs : Over-the-counter (OTC) drugs are medicines that may be sold to a customer without a prescription. The term "over-the-counter" is somewhat counter-intuitive, since these items can often be found on the shelves of stores and bought like any other packaged product in some countries in contrast to prescription drugs which are more likely to literally be passed over a counter from the pharmacist to the customer. Some medicines considered safe in general terms may be available in general stores, supermarkets, gas stations etc. The rules vary considerably from country to country.

Key Points:

1. Categories Of Medicinal Products

There are three major categories of products available to the public for purchase as medicines. They are prescription drugs, over-the-counter (OTC) drugs, and dietary supplements.

The FDA is responsible for making sure that a prescription drugs and OTC drugs are safe and effective. In contrast, dietary supplements are not regulated by the FDA as drugs. Dietary supplement labels must, by law, specify that the product has not been evaluated by the FDA. No claims of benefit with respect to the diagnosis, treatment, cure, or prevention of disease are permitted.

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2. The History Of Prescription And Otc Drug Regulation

The Pure Food and Drug Act in 1906 stipulated that all active ingredients in drugs had to be clearly and accurately identified. It did not guarantee protection against a drug being dangerous or ineffective.

The Food, Drug, and Cosmetic Act of 1938 was the first step in providing protection against unsafe drugs. A 1962 amendment required that new drugs be effective as well as safe for use as directed.

3. Procedures For Approving Prescription And Otc Drugs

After preliminary studies are completed and a new drug has been deemed safe with animals, a Notice of Claimed Investigational Exemption for a New Drug (IND) is submitted to the FDA. At this point, further drug testing goes through four phases. 31 3

In Phase 1 trials, the characteristics of a new drug on healthy human volunteers are

established. In Phase 2 trials, about 100 to 500 human patients are treated with the drug or a placebo control, in a double-blind procedure. In Phase 3 trials, the new drug is tested for safety, effectiveness, and proper dosage levels in a larger population of patients. A close examination of possible side effects is made.

After all three stages of clinical trials have been successfully completed, the drug company files a New Drug Application (NDA) for approval by the FDA. If approved, the drug is released for commercial use. Afterward, Phase 4 trials keep track of unforeseen side effects or toxic effects through a federal program called MedWatch.

A drug patent has a fixed duration of twenty years, during which time the drug company has the exclusive right to manufacture and sell the new drug under its own brand name. After this period has passed, other drug companies now can market the drug under its generic name, as long as there is bioequivalence with the original product.

Since 1987, the FDA has taken steps to speed up the testing process to allow for quicker availability of drugs for special medical disorders or conditions.

OTC drugs are required to be generally regarded as safe (GRAS), generally regarded as effective (GRAE), and generally regarded as honestly labeled (GRAHL). Over the years, many OTC drugs have been approved that had been formerly available only on a prescription basis. Examples include naproxen (Aleve), loratadine (Claritin), ibuprofen (Advil), and eimetidine (Tagamet HB).

While prescription and OTC drugs are considered relatively safe when used as directed, problems still arise. The DAWN reports show drug-related emergency department (ED) visits that are associated with taking these drugs.

Three issues should be kept in mind with regard to prescription drug misuse. One, drug-related ED visits in this category are far less frequent than ED visits involving illicit drugs. Two, prescription drugs are frequently the agents of choice in suicide attempts. Three, most instances involve the combination of multiple drugs, particularly alcohol.

There is also a growing concern about unintentional drug misuse through prescription errors that are made by health care professionals.

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4. Major Otc Analgesic Drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are OTC analgesic products that include aspirin, ibuprofen, and naproxen.

Aspirin has anti-inflammatory, antipyretic (fever-reducing), and analgesic properties, working on a peripheral level by blocking the synthesis of prostaglandins. Major side effects,

however, include gastric bleeding, longer clotting time, complications in labor and delivery among pregnant women, and increased risk of developing Reye syndrome among children.
Acetaminophen (a non-NSAID) has analgesic and antipyretic effects but does not reduce inflammation. Major side effects include liver damage, kidney damage, and the enhancement of anti-clotting medications.
Ibuprofen, a former prescription drug, is similar in effect to aspirin, though there is generally less gastric irritation. It shares the anticlotting effect of aspirin and recently has been suggested to be a preventative measure for the development of Alzheimers disease.
Naproxen, another former prescription drug, has a duration that is substantially longer than that of other OTC analgesic drugs, but there are major problems with gastrointestinal irritation.

5. Other Major Classes Of Otc Drugs

OTC sleep aids, containing either diphenhydramine or doxylamine succinate, are essentially antihistamine products that induce drowsiness.
Cough-and-cold remedies include some combination of an antitussive agent for coughing, an expectorant to reduce mucus, an antihistamine to relieve itching and sneezing, and an analgesic and antipyretic agent to relieve pain or fever. Problems arise because antihistamines are CNS depressants, causing drowsiness and inattention.

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6. The Pharmaceutical Industry Today

Pharmaceutical companies are clearly profitable but extremely competitive enterprises. These companies face increasing strains and pressures not only within their own industry but from governmental agencies and the public at large, who are alarmed by the expense of drugs in general. The high costs of medications have encouraged a large number of mail-order businesses that sell medications to patients in the United States from Mexican and Canadian sources.

7. Dietary Supplements

Well over 100 dietary supplements are currently available to the public, with approximately seventy of these being herbal preparations. Two supplements, gingko biloba and ginseng, are discussed in this topic.
Ginkgo biloba is extracted from the Gingko tree and dates back to about 3000 B.C. in China. The most frequent application has been to improve memory or cognitive functioning. It is relatively safe when taken in standard dosages, though it has an anti-clotting feature that

might be dangerous for some individuals.

Ginseng is extracted from the Ginseng root. The active ingredients in ginseng, called ginsenosides, function as anti-oxidants and are promoted as ways to improve mental alertness and concentration. There have been reports, however, of problems related to uterine bleeding in post-menopausal women, elevations in blood pressure, nervousness, and insomnia.

Topic : Sedative Hypnotics And Antianxiety Drugs

Topic Objective:

At the end of this topic student would be able to understand:

- Barbiturates and non-barbiturate sedative-hypnotics
- The nature of anxiety
- Antianxiety drugs
- Non-benzodiazepine sedative-hypnotics and antianxiety drugs
- Risks of gamma hydroxybutyrate (GHB)

Definition/Overview:

Sedative-Hypnotic : Sedative-hypnotic drugs depress behavior, moderate excitement, and induce calmness. These drugs depress the central nervous system, however, they usually produce therapeutic benefits at far lower doses than those causing substantial generalized depression of behavior.

Barbiturates have a wider and more powerful effect on the central nervous system than the other sedatives. The barbiturates can produce varying degrees of depression of the CNS, ranging from mild sedation to general anesthesia. In low doses barbiturates have a calming effect, and some of the barbiturates (e.g., phenobarbital) have demonstrated selective anticonvulsant properties. In moderate doses they produce a drunken euphoric state, similar to alcohol. Sedation and sleep result from increased doses, and even higher doses produce surgical anesthesia. Because of their ability to produce sedation and decrease sleep latency, barbiturates were popular in the treatment of insomnia prior to the advent of benzodiazepines. However, because of the high incidence of tolerance and physical dependence following chronic use and the relatively high danger of overdose, these drugs are rarely used today for the treatment of anxiety or sleep disturbances.

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Benzodiazepines share the sedative-hypnotic properties, but produce fewer side effects than barbiturates. Like barbiturates, benzodiazepines have also been reported to produce anticonvulsant effects. In addition, these drugs are used clinically as muscle relaxants, antiepilieptic agents, and to produce sedation before operative procedures. The antianxiety effects of benzodiazepines are more selective than those of other sedative-hypnotics -- they relieve anxiety at lower doses and thus produce minimal sedation and motor impairment. The benzodiazepines are currently the most important class of drugs for treatment of anxiety and sleep disorders.

Key Points:

1. Barbiturates and non-barbiturate sedative-hypnotics

Barbiturates represent the first marketed sedative-hypnotic drug. They were developed in 190 Over the next thirty years, barbiturates such as phenobarbital, amobarbital (Amytal), pentobarbital (Nembutal), and secobarbital (Seconal) were introduced.

In general, barbiturates are classified as long-acting, intermediate-acting, short-acting, and ultra-shortacting varieties. The ultra-short-acting barbituates, such as thiopental (brand name: Pentothal), are used in surgical anesthesia.

Since they are CNS depressants, barbiturates have been used in the treatment of insomnia and epilepsy. However, barbiturates induce a suppression of REM (rapid eye movement) sleep, and a REM-sleep rebound effect, when barbiturates are withdrawn, produces upsetting nightmares and grogginess the next day. There is the possibility of a lethal dose of barbiturates, particularly in combination with alcohol.

Strong physical dependence can develop with barbiturate use. Today, while still used for epilepsy treatment, they are seldom used for insomnia. While not as widely available now as in the past, barbiturates are still problematic drugs of abuse. A serious risk involves the possibility of a lethal overdose either from taking too high a dose level or from taking the drug in combination with alcohol.

Chloral hydrate and methaqualone (Quaalude), at one time, were available as sleeping pills. They are presently available only as illicit drugs.

2. The nature of anxiety

Some level of anxiety is necessary to survive as a species. When anxiety interferes with our daily lives or when it causes us great personal distress, then an adaptive emotion has become maladaptive. These conditions are referred to as anxiety disorders. Approximately 19 million

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Americans suffer from an anxiety disorder each year and as many as 40 million people have been affected at some time in their lives.

Anxiety disorders are generally classified in six basic types: Panic disorder, obsessive-compulsive disorder, post-traumatic stress disorder, social anxiety disorder, specific phobias, and generalized anxiety disorder.

Panic disorder involves feelings of terror that strike suddenly and repeatedly with no warning. Obsessive-compulsive disorder involves of persistent and unwelcome thoughts or an urgent need to engage in a specific ritualistic behavior. Post-traumatic stress disorder involves frightening thoughts and memories of a previously experienced terrifying event. Social anxiety disorder involves an excessive level of anxiety and selfconsciousness in everyday social situations. Specific phobias involve an intense fear of something that poses little or no actual danger. Generalized anxiety disorder involves excessive anxiety, worry, or tension, when little or nothing is occurring to provoke it.

3. Antianxiety drugs

Meprobamate (Miltown) had been a prominent antianxiety drug. It was first introduced in 195

The fact that physical and psychological dependence can occur has made meprobamate unpopular as a prescription medication. Its use as an antianxiety drug has since been eclipsed by the use of benzodiazepines.

Benzodiazepines have a selective effect on anxiety rather than reducing the bodys overall level of functioning. They remain the primary, though no longer exclusive, means for the pharmacological treatment of anxiety disorders.

Benzodiazepines include long-acting varieties (Valium, Librium, Centrax, Doral, and Azene), intermediate-acting varieties (Ativan, Klonopin, and Restoril), and short-acting varieties (Halcion, Xanax, and Serax).

Benzodiazepines have an advantage over barbiturates in terms of safety. However, taking benzodiazepines with alcohol can be quite dangerous. Long-acting benzodiazepines can accumulate in the blood, particularly among the elderly, and cause confusion and loss of memory.

Benzodiazepines show tolerance effects with respect to their sedative action, but not with respect to their anxiety-producing action. Withdrawal symptoms are present but less severe than with barbiturates. The principal social problems surrounding benzodiazepine use have arisen more from their misuse than their abuse.

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Benzodiazepines show cross-tolerance with alcohol and barbiturates, as well as cross-dependence. In cross-dependence, one drug can substitute for whatever physiological effects have been produced by a second drug that has been discontinued. The basis for cross-tolerance and cross-dependence is the sharing of a common neurochemical basis for action. Benzodiazepines inhibit the neurotransmitter, GABA. GABA receptor sites in the brain contain three binding sites, one for sedative-hypnotics (including barbiturates), one for benzodiazepines and alcohol, and one for GABA itself.

Rohypnol (a benzodiazepine not available in the United States) is an illicit drug that induces a disinhibition of behavior and subsequent memory lapse similar to an alcohol-induced blackout. Concerns have been raised that Rohypnol, one of the present-day club drugs, has the dangerous potential for abuse as a date-rape drug.

4. Non-benzodiazepine sedative-hypnotics and antianxiety drugs

Zolpidem (Ambien) and eszopiclone (Lunesta) are non-benzodiazepine drugs. In the case of Ambien there is the ability to bind to a specific subtype of GABA receptors. Ambien has strong but transient effects, with a half-life of about 2 hours, so it is more useful as a sedative-hypnotic rather than an antianxiety drug. Lunesta has a half-life of about 6 hours, so that it is helpful for people who have difficulty in staying asleep during the night as well as difficulty in falling asleep. Lunesta has also been approved for a longer interval of treatment than the recommended treatment with Ambien.

Buspirone (BuSpar) relieves anxiety without accompanying signs of sedation. Unfortunately, it has a much longer latency for action than benzodiazepines. On the other hand, BuSpar shows no tolerance effects, cross-tolerance, cross-dependence, or physical symptoms of withdrawal.

Beta-blockers, commonly used for treating coronary heart disease and blood pressure, are useful antianxiety drugs for individuals facing an anxiety-producing social event, such as performing on the stage or giving a speech.

Antidepressant medications, particularly selective serotonin reuptake inhibitors (SSRIs) such as Zoloft and Paxil, have been found to be useful in the treatment of panic disorder, post-traumatic stress disorder, and social anxiety disorder.

5. Risks of gamma hydroxybutyrate (GHB)

GHB was first synthesized in the 1960s and was once available in health-food stores, though the FDA has since removed it from the legitimate market. Present-day GHB, as an illicit drug

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of abuse, produces euphoria and an accompanying lowering of inhibitions. In the latter respect, it is similar to Rohypnol. Like Rohypnol, GHB can be easily slipped into alcoholic beverages without the knowledge of the drinker, and its .

In Section 5 of this course you will cover these topics:

- Drugs For Treating Schizophrenia And Mood Disorders
- Intervention And Treatment: Strategies For Change
- Prevention And Education: Schools, Community, And Family

Topic : Drugs For Treating Schizophrenia And Mood Disorders

Topic Objective:

At the end of this topic student would be able to understand:

- Psychiatric drugs and the biomedical model
- Antipsychotic drugs and schizophrenia
- Drugs used to treat mood disorders
- Drugs for other types of mental illness
- St. Johns wort: An herbal alternative for treating depression
- Psychiatric drugs, social policy, and deinstitutionalization

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Definition/Overview:

Schizophrenia: Schizophrenia (pronounced /ˌskɪtsəˈfrɛniə/ or /ˌskɪtsəˈfriːniə/),from the Greek roots *schizein*(σχίζειν, "to split") and *phrēn,phren-* (φρήν, φρεν-, "mind") is a psychiatric diagnosis that describes a mental disorder characterized by abnormalities in the perception or expression of reality. It most commonly manifests as auditory hallucinations, paranoid or bizarre delusions, or disorganized speech and thinking with significant social or occupational dysfunction. Onset of symptoms typically occurs in young adulthood, with approximately 0.40.6% of the population affected. Diagnosis is based on the patient's self-reported experiences and observed behavior. No laboratory test for schizophrenia currently exists.

Studies suggest that genetics, early environment, neurobiology, psychological and social processes are important contributory factors; some recreational and prescription drugs appear

to cause or worsen symptoms. Current psychiatric research is focused on the role of neurobiology, but no single organic cause has been found. Due to the many possible combinations of symptoms, there is debate about whether the diagnosis represents a single disorder or a number of discrete syndromes. For this reason, Eugen Bleuler termed the disease *the schizophrenias* (plural) when he coined the name. Despite its etymology, schizophrenia is not the same as dissociative identity disorder, previously known as multiple personality disorder or split personality; in popular culture the two are often confused. Increased dopamine activity in the mesolimbic pathway of the brain is consistently found in schizophrenic individuals. The mainstay of treatment is antipsychotic medication; this type of drug primarily works by suppressing dopamine activity. Dosages of antipsychotics are generally lower than in the early decades of their use. Psychotherapy, vocational and social rehabilitation are also important. In more serious caseswhere there is risk to self and othersinvoluntary hospitalization may be necessary, although hospital stays are less frequent and for shorter periods than they were in previous years.

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Key Points:

1. Psychiatric drugs and the biomedical model

Drugs used in treating mental illness are referred to as psychiatric drugs, or alternatively psychotropic medication. Illnesses treated in this way include schizophrenia and mood disorders (depression, mania, or a combination of both).

The biomedical model holds that abnormal thoughts and behaviors are results of biochemical processes in the brain. Psychiatric drug treatment assumes the biomedical model.

2. Antipsychotic drugs and schizophrenia

Antipsychotic drugs refer to those drugs used in the treatment of schizophrenia. Schizophrenic symptoms include delusional thinking, auditory hallucinations, emotional flatness, social withdrawal, and inappropriate postures (catatonia). Approximately one percent of the U.S. adult population have schizophrenic symptoms.

Early treatment of schizophrenia involved heavy administration of barbiturates and surgical interventions. The earliest varieties of antipsychotic drugs are referred to as typical antipsychotic drugs because they produce side effects that resemble Parkinsons disease. These medications, called firstgeneration antipsychotic drugs, include Thorazine and Haldol. More recently developed (second-generation and third-generation) medications are referred to as atypical antipsychotic drugs because they do not produce Parkinsons-like side effects.

They include Clozaril, Risperdal, Zyprexa, Seroquel, Geodon, and Abilify. Among these drugs, only Clozaril has the problem of producing agranulocytosis (a potentially lethal blood disorder) in about 1-2 percent of patients. The other types of antipsychotic medication do not have this side effect feature. An interesting new antipsychotic drug, called Abilify, acts to modulate and stabilize rather than simply reduce levels of dopamine activity in the brain. There is considerable evidence for some dopamine involvement in the effectiveness of antipsychotic drugs and, hence, in the development of schizophrenic symptoms. The particular combination of dopamine receptor subtypes (and possibly serotonin receptors subtypes) appears to differentiate the various antipsychotic drugs available today.

3. Drugs used to treat mood disorders

Psychiatric drugs used to treat major depression are referred to as antidepressants. They fall into three categories: MAO inhibitors and tricyclic drugs (first-generation antidepressants), selective serotonin reuptake inhibitors or SSRIs (second-generation antidepressants) and the recently introduced thirdgeneration antidepressants that act upon serotonin in the brain but not exclusively so.

MAO inhibitors are antidepressants that reduce the activity of monoamine oxidase (MAO), an enzyme that normally inactivates norepinephrine, dopamine, and serotonin at the synapse. Examples are Nardil and Parnate.

Tricyclic antidepressants block the reuptake of norepinephrine and serotonin at the synapse. Examples are Tofranil, Elavil, and Norpramin.

As the name suggests, selective serotonin reuptake inhibitors (SSRIs) are designed to selectively block the reuptake of serotonin at the synapse. Examples include Prozac, Paxil, Zoloft, Lexapro, and Celexa. There has been concern by health officials that SSRIs have been overprescribed.and may incur an elevated risk of suicide among children and adolescents.

Third-generation antidepressants slow down the reuptake of both norepinephrine and serotonin in a similar way as do tricyclic drugs. However, third-generation antidepressants are different in their chemical structure. Examples of drugs in this category are Effexor, Remeron, and Cymbalta.

4. Drugs for other types of mental illness

Symptoms of mania, as well as extreme swings between depression and mania (bipolar disorder), are treated with lithium carbonate, Depakote, and two second-generation antipsychotic medications (Risperdal and Geodon). Recently, Abilify has been FDA-

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approved for the treatment of bipolar disorder as well as schizophrenia.

Risperdal has been found to be useful in treating autism, a complex developmental disability that involves a severe impairment in the social connectedness that a person typically shares with others..

Off-label usage refers to the practice of prescribing psychiatric drugs for purposes other that those specified by the FDA when they were first approved. Some antidepressants are useful in the treatment of anxiety, and vice versa. This kind of cross-over pharmacotherapy is legally sanctioned for physicians and an increasingly common practice.

5. St. Johns wort: An herbal alternative for treating depression

In controlled studies, St. Johns wort is three times more effective than a placebo for reducing mild to moderately severe depressive symptoms. Full clinical trials by the FDA are forthcoming.

Available commercially in the United States, without restriction, as a dietary supplement, St. Johns wort appears to have relatively mild side effects, chiefly mild gastrointestinal symptoms, fatigue, and sensitivity to light.

6. Psychiatric drugs, social policy, and deinstitutionalization

Since the 1960s, the mode of treatment of mentally ill individuals has shifted from large facilities to smaller, decentralized facilities in the community. This policy is referred to as deinstitutionalization.

While social problems has arisen, most mental health professionals and patients themselves have argued that mentally ill patients lead better lives now than their counterparts in the days of large-scale institutionalized care.

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Topic : Intervention And Treatment: Strategies For Change

Topic Objective:

At the end of this topic student would be able to understand:

- Ways To Approach Drug-Abuse Prevention
- Incarceration and other punitive measures in the United States
- Prison-alternative and prison-based treatment programs
- The personal journey to treatment and recovery

- The Importance Of Family Systems In Prevention And Treatment
- Finding the best drug-abuse treatment and prevention program

Key Points:

1. Ways To Approach Drug-Abuse Prevention

Efforts to prevent drug abuse are divided into three categories. Primary prevention efforts are directed to those who have not had any or minimal experience with drugs. Secondary prevention efforts are directed to those who already have had some experience with drugs. Tertiary prevention efforts are directed to those who seek treatment for drug abuse problems and the objective is for these individuals to stay drugfree and avoid relapse.

Only ten percent of individuals in the United States who need treatment for an alcohol or illicit drug problem actually received that treatment. Alcohol is by far the most frequently treated substance-abuse problem, accounting for more than 40 percent of treatment cases in facilities licensed or certified to provide treatment programs.

A biopsychosocial strategy for treatment is an integrated approach that respects the role of biological, psychological, and social factors in drug abuse. A multidimensional conceptualization of the problem increases the likelihood that treatment will be successful. A multidimensional approach is necessary since drug abusers are frequently abusers of a range of drugs simultaneously. It is uncommon for an individual to be abusing a single drug. An additional reason for a multidimensional approach is that many clients who are contending with drug abuse are also suffering from depression, anxiety, and other types of serious psychological disorders. These individuals are often referred to as dual-diagnosis patients or clients. Roughly one out of five abusers of alcohol or other drugs have serious mental disorders as well.

2. Incarceration and other punitive measures in the United States

Incarceration (containment in jail or prison) has two objectives: rehabilitation and deterrence. Rehabilitation refers to the effort to reduce the likelihood that the individual will behave in a similar way in the future. Deterrence refers to the effort to prevent future behavior by conveying the message that a punishment given to others for similar behavior would apply to them as well.

Drug trafficking laws are established to control the unauthorized manufacture, distribution by sale or gift, and possession with intent to distribute any controlled substance. Controlled substances are defined by federal regulations established in 1970 and revised in 1986 and

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1988 in terms of five categories or schedules. Schedule I violations are the most severely punished; schedule V violations are the least severely punished.

Special circumstances are considered in arriving at the penalty imposed for a given drug trafficking violation. In some cases, penalties can be doubled. As examples, penalties are doubled for firstoffense trafficking of Schedule I or II controlled substances if death or bodily injury results from the use of such substances, if a sale if made by a person over the age of 21 to a person under the age of 18, or if drug sales are made within 1,000 feet of an elementary or secondary school.

Simple possession is defined as having on ones person any illegal or nonprescribed controlled substance in any of the five schedules for ones personal use. Most drug possession cases are prosecuted at the state level.

States and local municipalities also have taken on regulatory authority with regard to the sale of drug paraphernalia to minors, unless they are accompanies by a parent or legal guardian, as well as the importation, exportation and advertising of such items.

In general, for every four drug offenders presently incarcerated in the United States, three of them are in a state prison and one is in a federal prison.

3. Prison-alternative and prison-based treatment programs

About one-half of all individuals entering a publicly funded drug treatment program have done so because of legal pressure to avoid incarceration. A growing presence in the criminal justice system has been the establishment of specific judicial proceedings called drug courts in which adult, nonviolent drug offenders are provided intensively supervised treatment instead of a standard drug-offense sentence. An individual entering a treatment program as a result of legal pressure is as likely and sometimes more likely to succeed than an individual entering on a volunteer basis.

The Stayn Out program is modeled after therapeutic communities but exists as a separate unit within a prison. Unfortunately, less than 20 percent of prisoners with drug abuse problems in the United States receive any kind of treatment program while incarcerated. C. Prevention and treatment in the workplace

Since 1988, all companies and businesses receiving any U.S. federal contracts or grants are required to provide a drug-free workplace. They are encouraged to establish employee assistance programs (EAPs) to handle problems associated with drug and alcohol abuse or dependence.

Preemployment drug screening is required for all federal employees, as well as a periodic

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random schedules of drug testing afterward. Despite its obvious infringement on individual privacy, drug testing has become a fact of life in corporate America.

The possibility of a false-positive result and its impact on an individuals job are significant problems associated with widespread drug screening. Even if the false-positive rate is low, it is likely that a substantial proportion of those who fail a drug test are innocent. More sensitive retesting procedures after an initially positive result are frequently unavailable to an individual who has tested positive in a drug test.

Estimates of the adverse impact of alcohol and other drug abuse in the workplace in terms of a loss in productivity range from $60 to 100 billion each year. Losses of productivity included increased workers compensation claims, absenteeism, accidents on the job, sick leave, as well as more numerous instances of workers arriving late or requesting early dismissal from work.

4. The personal journey to treatment and recovery

Drug-abuse rehabilitation has three major goals. First, the decline in physical and psychological functioning must be reversed. Second, the use of all psychoactive substances must stop on a permanent basis. Third, a life-style free of alcohol and other drugs must be rebuilt and maintained.

Stages of change during drug-abuse recovery are (1) precontemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance. Maintenance is ultimately open-ended, in that it continues for the rest of the ex-users life.

Stages of change apply not only to drug-abuse recovery but to any life change that needs to be made. Examples are losing weight, getting more exercise, stopping smoking, ending an unhappy relationship, or seeking out a physician for a medical condition.

5. The Importance Of Family Systems In Prevention And Treatment

Learning how the family has coped with having a drug abuser as a family member is crucial not only in understanding the origins of the abuse but also in maximizing the chances of successful treatment.

Family reactions to the conditions of drug abuse resemble the stages people go through when grieving the loss of a loved one: denial, anger, bargaining, feeling, and acceptance.

Enabling behavior on the part of family and friends of the drug abuser can be a significant obstacle to effective treatment. Enabling behaviors include avoiding and shielding, attempting to control, taking over responsibilities, rationalizing and accepting, as well as

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cooperation and collaborating.

Coping mechanisms of individuals within a dysfunctional family system can lead to the taking on of specific survival roles. These include the Chief Enabler, Family Hero, Family Scapegoat, the Lost Child, and Family Mascot. A drug-free family is more than a family without drugs in their lives; it is a family that is completely different from what it has been before.

6. Finding the best drug-abuse treatment and prevention program

Certain general guidelines have been offered in deciding a mode of treatment. Outpatient treatment should be given preference over inpatient treatment. A pharmacological approach should be combined with psychotherapy or behavioral counseling whenever possible. Self-help groups such as Alcoholics Anonymous (AA) or similar organizations should be considered.

Finding the most suitable treatment facility should be guided by several considerations. They include the extent of experience the facility has had for the specific type of problem, whether medical professionals are accessible in case medical treatment is needed, whether the facility encourages family therapy for clients who have intact families, whether it provides both group and individual counseling, and whether it is accredited by national and state credentialing organizations.

Information about drug-abuse treatment programs can be found in newspapers and classified sections (yellow pages) of telephone directories, under Alcoholism or Drug Abuse and Addiction Treatment. Web sites on the Internet are also very helpful. Probably the most comprehensive sources are the National Clearinghouse for Alcohol and Drug Information (NCADI) and a directory database sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA).

There is a critical need in the United States to reduce the ethnic disparities that presently exist in the availability of treatment programs for alcoholism, illicit drug abuse, drug misuse, as well as mental health care.

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Topic : Prevention And Education: Schools, Community, And Family

Topic Objective:

At the end of this topic student would be able to understand:

- ATOD prevention: Strategies, goals, and objectives
- Lessons from the past: Prevention approaches that have failed
- Hope and promise: Components of effective school-based prevention programs
- Community-based prevention programs
- Family systems in primary and secondary prevention
- Multicultural issues in primary and secondary prevention
- ATOD prevention and the college student

Definition/Overview:

Prevention: Prevention research in the 1990s has helped educators understand that decisions about ATOD use are multifaceted and include many dimensions of a young person's skills, capacities, and beliefs. In the past, researchers and practitioners categorized ATOD prevention in relatively narrow terms: Simply inform young people about ATOD use, properties, and consequences, and expect young people to abstain from use. As research and evaluation studies provided greater insight into what worked and why, prevention models based on psychosocial domains predominated. From these evolved models focusing on risk factors and protective factors. Most recently, research on the topic of resiliency has shifted prevention's focus from children's perceived social and individual deficits (e.g., friends who use drugs or lack of self-esteem) to their strengths, leading to a more holistic concept of youth development.

Key Points:

1. ATOD prevention: Strategies, goals, and objectives

The range of primary and secondary prevention efforts today is exemplified by the phrase, ATOD (alcohol, tobacco, and other drugs) prevention. In primary prevention, it is assumed that the target population may have been exposed to drug-taking behavior in other people but have not had drug experiences of their own. In secondary prevention, the focus is on the life-style of individuals with the goal of minimizing the problems associated with drug-taking

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behavior, assuming that some level of that behavior has already taken place.
The two major components of prevention is the minimizing the impact of risk factors in an individuals life and maximizing the impact of protective factors that provide a basis for resilience toward ATOD use. The goal of primary prevention is to enhance resilience and, in doing so, reduce the effects of risk factors through the action of protective factors.
Three priorities set by the White House Office of National Drug Control Policy (ONDCP) are (1) stopping drug use before it starts (through primary prevention programs), (2) healing Americas drug users (through effective treatment programs), and (3) disrupting the market (through reducing the supply and distribution of illicit drugs).
The Public Health Model of drug abuse points to the reduction in the negative consequences of drugtaking behavior as a desirable goal for the enhancement of the overall health of society. The present Healthy People 2010 program has been established by the federal government as a set of target goals.

2. Lessons from the past: Prevention approaches that have failed
Reducing the supply of drugs from around the world, as well as within the U.S., has proved an intractable problem. Only a tiny fraction of illicit drugs are interdicted at U.S. borders. Arrest, prosecution, conviction, and incarceration of drug-law offenders have been largely unsuccessful as deterrent factors with respect to illicit drug abuse.
Scare tactics, negative education, objective information approaches, promotional campaigns, and selfesteem enhancement approaches have had little or no impact on reducing drug-taking behavior.

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3. Hope and promise: Components of effective school-based prevention programs
The criterion for a successful ATOD prevention program must be on the reduction or delay in the onset of ATOD-taking behavior itself. It should not in the perceptions of participants exiting the program, their feelings about the program, or their intention to engage in ATOD use in the future as a result of the program.
Successful school-based ATOD prevention programs have generally incorporated five components. First, a cognitive component provides information about the short-term consequences of alcohol, tobacco, and other drugs, as well as counters the myth that ATOD use is the norm in their age group. Second, a decisionmaking component facilitates critical thinking and independent decision making. Third, a stress-reduction component helps students to develop ways to lessen anxiety in their lives. Fourth, a social-skills component

teaches social assertiveness and specific techniques to say no. Fifth, a self-directed behavior-change component fosters self-improvement and encourages a sense of personal control and self-esteem.

Life Skills Training incorporates the above components. Research concerning the effectiveness of LST has now spanned a period of as long as six years following exposure to the program, with outcomes being compared favorably to controls.

The widely available DARE (Drugs Abuse Resistance Education) program has been found to be largely ineffective as an ATOD prevention approach. In 2001, in response to criticisms leveled against it, the DARE program was modified to be enhanced DARE. The current program has become more interactive in character and has incorporated elements of other school-based prevention programs that have been shown to be successful.

Fostering resilience in the face of risk-factors in an individuals life appears to be a promising long-term approach in ATOD prevention.

4. Community-based prevention programs

Community-based prevention programs allow the involvement of parents and other family members, religious institutions, and the media as collaborative agents for change. They draw upon multiple social institutions: family, religious groups, and community organizations..

Effective community-based programs share several of the approaches used in school-based programs. In addition, they extend to the wider community, enlist the help of positive role models (impactors), and promote a range of anti-drug messages in the press and television.

Alternative-behavior programming provides the means to steer people away from high-risk situations that are associated with ATOD use.

The mass media, particularly the efforts of the Partnership for a Drug-Free America, have had a major positive impact upon ATOD prevention. Unfortunately, pro-drug web sites on the Internet have greatly proliferated since the advent of online services.

Comprehensive community-based ATOD prevention programs have three major components. First, a school-based component stresses drug-resistance skills. Second, a parent program component educates parents to work on family communication skills. Thirds, a health policy change component directs efforts toward establishing drug-free community sites and activities as well as promoting mass media coverage of anti-drug efforts.

CASASTART is an example of a successful community-based ATOD prevention program..

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5. Family systems in primary and secondary prevention

Parents are role models, educators or resources for information, family policy makers and rule setters, stimulators of positive family activities, and consultants against peer pressure. Family communication is a key factor in avoiding dysfunctional relationships that include enabling behavior and mistrust.

Three major risk factors in the life of a teenager, with regard to ATOD abuse, are (1) the degree of stress they feel they are under, (2) the frequency with which they are bored, and (3) the amount of money they have to spend in a typical week. These factors represent a triple threat. Combining two or three of these factors makes the risk of ATOD abuse three times higher than when none are present.

6. Multicultural issues in primary and secondary prevention

In the case of ATOD prevention efforts, information intended to reach individuals within a specific culture must pass through a series of sociocultural filters. Understanding this filtering process is essential to maximize the impact of ATOD prevention programs.

Communication of ATOD prevention information to Latinos is maximized by respecting the importance of family and religious institutions in this culture, the special role of Latino fathers, and the image of the Latina woman.

Communication of ATOD prevention information to African Americans is maximized by respecting the relationship between drug-taking behavior and delinquency, as well as the relationship between drug use and social problems such as poverty and poor health care.

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7. ATOD prevention and the college student

U.S. college students represent a heterogeneous population, comprising diverse racial, ethnic, socioeconomic, and geographic groups, as well as both genders and an increasingly wide age range.

Major emphasis should be made in the area of secondary ATOD prevention among college students, particularly with respect to alcohol use. Alternative-behavior programming can play a significant role in reducing problems associated with alcohol use as well as the use of other drugs.

Recently, special courses have been established on college campuses that focus upon responsible drinking behavior rather than abstinence. One such course, AlcoholEdu, is a three-hour web-based online course. More than 450 colleges and universities are currently using this course as part of an overall alcohol abuse prevention program.

8. Where you can go for help

As decision makers with regard to drug-taking behavior, it is clear that we need all the help we can get.

The most comprehensive source of information and guidance is the National Clearinghouse for Alcohol and Drug Information (NCADI). Materials can be obtained by calling 800-729-6686 or accessing the NCADI web site at www.health.org.

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