



How Drugs Work

Where do drugs come from?

In 2008, an archeological research team from NC State University discovered evidence of ancient drug use among humans during the Stone Age. The team found “ceramic bowls, as well as tubes for inhaling fumes or powders, which appear to have originated in South America” around 2200 years ago. The archeologists also found evidence of plant-based hallucinogenic substances that support theories of human drug use as far back as 5000 years ago. The substances were likely used to produce “trance-like states” for spiritual and religious purposes (Wynn-Jones 2008).

Historians believe that humans have been utilizing natural substances, especially plants, for healing and psycho-spiritual purposes for more than 3000 years. Today we call these “drugs,” and often they come with a negative reputation. But drug use, for religious, cultural, social, or medical purposes, has been documented in every ancient society, all across the earth: the Pharaohs of Ancient Egypt drank wine to commemorate deaths; the Oracles of Ancient Greece were thought to predict the future through hallucinations caused by breathing natural gases escaping from the ground; opium use was widespread

throughout the medieval kingdoms of China and Southeast Asia; plants with hallucinogenic properties were used around the world, including hashish in the Middle East and Western Africa, cacao throughout South America, and peyote in the deserts of North America.

Before the developments of modern medicine, these “drugs” served as a connection between human cultures and their natural surroundings. **Whether used for religious and cultural rituals, treating diseases and pain, or healing wounds, many of today’s illegal “drugs” were originally used as the first medicines.**

Around the same time the artifacts from NC State’s research team were actually being used, the Ancient Greeks were using tree bark to make “teas” for healing fevers and headaches. Today, the active ingredient from those teas is the world’s most widely used drug: **Aspirin** (Stanitski, et al. 1994). **Drug use has always played a role in world cultures, whether positive or negative. “These insights into the healing properties of natural substances, often based on knowledge of the local environment, have typically been passed on from generation to generation within communities”** (Brown & Ford 2008). Eventually, however, humans realized that they could manipulate those natural substances and use them for even more purposes. From the recognition of bacteria and germs in the mid-1800s to the decoding of DNA in the mid-1900s, humans have used modern science to turn natural “drugs” into health miracles:

The 20th century, however, saw a major new development in health care – that of the production of synthetic molecules specifically for the treatment of illnesses. Without question this has been one of the most significant achievements of the last 100 years. Development of targeted drugs and vaccines has meant that diseases such as smallpox have been eradicated, countless millions have survived infections such as malaria and



tuberculosis, and other diseases like polio are on their way to extinction. Untold numbers of people today owe their lives to the action of medicines (Brown & Ford 2008).

This was the beginning of modern medicine; it was also the beginning of modern drug abuse.

What is a drug?

Today, the distinction between “drugs” and “medicines” might be difficult to make. According to the World Health Organization (WHO), **a drug is any substance that changes the body’s normal functions.** Pharmacology is the study of these substances for the purpose of treating diseases and improving human health; **pharmacology is the study of medicinal drugs.** When these substances are used for nonmedical or recreational purposes, they become what most people refer to as “drugs.” In this sense, **drugs are substances that are purposely used to change the way someone feels, acts, thinks, or experiences their own senses and their environment.** This is what is commonly referred to as a “high.” Drug use often leads to a feeling of



happiness or excitement, a loss of inhibitions, and an excess of energy. The truth is, however, that “highs” can also include “lows.” Other drugs cause the



body’s ability to process information to drastically slow down, leading a person to feel that they have lost control of their senses or of their own body. **Drug use almost always changes a person’s understanding of their surroundings.**

Recognizing that **many of these drugs have serious short-term and long-term impacts on the human body**, many governments around the world choose to regulate them or even make them illegal. An illegal drug is called an “**illicit drug.**” Other drugs remain legal, but with specific restrictions such as legal age limits or maximum amounts for possession. Any substance that is limited by laws in any way is called a “**controlled substance;**” this includes illegal drugs, legal drugs (such as **alcohol** and **cigarettes**), food additives (such as **caffeine** or **high fructose corn syrup**), prescription medications, or even some “over-the-counter” medications.

Who uses illegal drugs?

According to the National Criminal Justice Reference Service, the United States is home to almost 13 million drug abusers. More than one third of all young Americans have used an illegal drug at least once, and the use of illegal drugs among 8th graders has increased 150% in the last 10 years. Early drug use is the greatest indicator of adult drug addiction and illegal drug use costs the United States about \$70 billion each year. (That’s \$1000 per American, including children.) According to the 2011 United Nations World Drug Report, **North America is the world’s largest drug market and accounts for the world’s highest rate of teen drug use** (UNODC 2011; NCJRS 1997).

“Drug use is a worldwide phenomenon, and drug use occurs in almost every country. The specific drug or drugs used varies from country to country, and from region to region” (Gale 2011). Around the world, cannabis (or marijuana) is by far the most widely used illicit drug. The illegal use of methamphetamines, opioids (including prescription “pain killers”), and

cocaine are also incredibly prevalent on every continent. China and India – the world’s largest nations, by population – do not track the use of illegal or dangerous drugs; this is also true of a majority of African nations.

Synthetic drugs, such as nonmedical uses of prescription drugs and legal drug “copy-cat” substances called “bath salts” or “designer drugs,” will be the focus of the next major international drug crisis, according to the UN. These man-made drug molecules are designed to evade laws and medical health systems. The danger of these drugs is that they are completely unregulated, and have an incredibly high rate of undetectable hazardous contamination. These drugs target teens and other less frequent drug users (UNODC 2011).

How do drugs affect the human body?

Depending on how the drug gets into the body, and depending on how fast it can travel throughout the body through the blood stream, all drug molecules take effect in the brain. By interfering with the brain’s normal communication methods – in the central nervous system – the drug molecule can hijack the human body, in one or several areas of the brain.

The human brain’s communication system is based on “chemical messages” called neurotransmitters. These neurotransmitters jump from neuron (one segment of a nerve) to neuron. Since the brain can produce many different neurotransmitters, it can send many different messages: each neurotransmitter communicates a unique and specific message. If a drug molecule can prevent the neurotransmitters from sending their messages, the drug can change the brain’s chemistry.

The drug takes over control of the neurotransmitters by blocking

their “receptors” in the neurons. **Each receptor has a special shape that allows it to bind with a special neurotransmitter (this is where the unique and specific messages come from). If the drug molecule has the right shape, it can block the receptor and prevent the neurotransmitter from ever sending its message.** Or a drug molecule might cause the neurotransmitter to send its message too many times. In either case, **it’s all about the shape: It is the shape of the drug molecule that determines which kind of receptor it can interfere with, which also determines which neurotransmitter it can interfere with, which also determines which chemical message it can interfere with. This is what determines the effects of any specific drug.**

Drug molecules that have several effects are able to interfere with communication in several parts of the brain at once. If the drug interacts with receptors and neurotransmitters in a part of the brain that controls hunger, one of the drug’s effects will change the person’s appetite; if the drug interacts with receptors and neurotransmitters in a part of the brain that controls mood, one of the drug’s effects will change the way the person feels.

A drug’s effects on the human body have everything to do with its chemistry – the way its molecules are shaped and bonded together so that they can interact with specific parts of the brain.

When a drug user chooses his drug substance, he is choosing his symptoms, and choosing which part of his brain’s chemistry he wants to alter. This is also how a medical doctor prescribes medications to her patients.

When the doctor recognizes your symptoms, she prescribes a medical drug substance that has been designed or determined to interact with a special part of your brain. The trouble with drugs comes when someone chooses to go outside of the doctor’s orders.

