Alcohol and Health

Alcohol and the Human Body: Short-term Effects
Introduction

According to the Canadian Tobacco, Alcohol and Drugs Survey of 2013, about three quarters of Albertans (aged 15 and over) drank alcohol in the past year, and most did so moderately. When it comes to making choices about drinking, individual differences should be taken into account. However, the path that alcohol travels through the body is the same for everyone and, for all of us, excessive drinking can be harmful.

Regardless of the drinking choices we make, everyone can benefit from understanding that alcohol is not like any other drink: it’s absorbed differently, it’s eliminated differently, and it affects us differently.

This resource will highlight what happens to our bodies—and to the alcohol—when we drink.
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Alcohol Absorption

The Process of Absorption

When we drink alcohol, a small amount is broken down by enzymes in the stomach, some is absorbed through the walls of the stomach, and the rest (the greatest amount) is absorbed by the small intestine.

Alcohol dissolves easily in water. Thus, it is absorbed very quickly by the bloodstream and transported to all the organs of the body. Transportation moves fastest to organs with many blood vessels, such as the brain, the lungs and the liver. This is the reason that we may feel a “rush” to the brain soon after drinking.

These are some of the main factors that influence the rate at which alcohol is absorbed in the body:

- alcohol concentration
- food
- genetic factors
- body size and composition

Stomach Fullness and Absorption

During digestion, the stomach’s contents are passed into the small intestine (a process known as gastric emptying). When there is no food present, alcohol empties quickly into the small intestine. If food is present, the process is slower. The stomach closes the pyloric valve (the valve that leads to the small intestine) in order to digest food and this prevents alcohol from entering the small intestine. The alcohol will be absorbed in the stomach instead, which is a slower process. The higher the fat content of the food in the stomach, the more time is required for gastric emptying, and the slower the process of alcohol absorption.

Alcohol Strength and Absorption

Drinks with a high alcohol concentration irritate the lining of the stomach. This slows the opening of the pyloric valve. Drinking several shots of spirits one after the other in the hope of getting drunk quickly may actually produce a delayed reaction.
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Alcohol Elimination

A small amount of alcohol is eliminated through urine or perspiration. Since the bloodstream carries alcohol to the lungs, it can also be eliminated through the breath. This is why a breathalyzer (breath alcohol testing device) can measure a person’s blood alcohol concentration.

Most alcohol (about 90%) is eliminated by the body’s metabolism. While the stomach plays a small role in this process, the liver is the organ primarily responsible for transforming the alcohol absorbed by the blood.

In the first stage of metabolism in the liver, an enzyme called alcohol dehydrogenase transforms the alcohol into acetaldehyde, a highly toxic substance that affects the entire body. This activates another enzyme called acetaldehyde dehydrogenase, which transforms the toxic acetaldehyde into molecules of acetate or acetic acid.

Factors Affecting Alcohol Elimination

Regardless of how much a person drinks, the liver can only metabolize so much alcohol every hour. The speed of metabolism depends on the number of metabolic enzymes in the liver, which varies from one individual to the next and is thought to be genetically determined. Other factors also influence the process, including sex, age, the presence of food, and the presence of other drugs, including medication.

Sex

If a woman and a man drink the same amount, the woman will have a higher blood alcohol concentration than the man. This is because women, on average, weigh less than men and their bodies contain a higher percentage of fat. Their bodies also have lower water content, thus the alcohol is dissolved in a smaller amount of water, resulting in a higher alcohol concentration.

Age

Older people also generally have a reduced tolerance to alcohol because of the lower water content of their bodies. Consequently, as with women, there is a higher concentration of alcohol for the body to absorb and metabolize.

Medications

Some medications can interfere with the elimination of alcohol, and can heighten or mask the effects of alcohol. Conversely, alcohol can reduce the effectiveness of some medications or affect their elimination.
Effects on the Body

The Brain

The most immediate effects of drinking can be seen in the brain.

Alcohol restricts a number of brain functions by depressing the central nervous system. At first, the effects may be pleasurable. There could be a reduction in stress and inhibitions, and a sensation of either calm or excitement. As drinking continues, other observable effects on the brain include slowed reaction times, impaired memory, and trouble with movement or co-ordination.

As the blood alcohol concentration rises, the brain’s motor and sensory centres are affected, contributing to difficulty with co-ordination and fine motor functions. A person’s reaction time also slows down.

Alcohol intoxication affects speech and thought processes. Cognitive and verbal skills are diminished, as well as the ability to resolve conflicts. This can contribute to a greater likelihood of aggressive behaviour.

The immediate and short-term effects on the brain are usually less pronounced in regular drinkers because of an increased tolerance for alcohol. This tolerance is both metabolic (the liver processes the alcohol more quickly and efficiently) and functional (the person learns to compensate for the deficits caused by alcohol). Nevertheless, the long-term effects of alcohol are harmful and people with a higher alcohol tolerance often drink excessively.
The Young Brain

Researchers have found that the brain continues to develop during adolescence and into one’s twenties and that drinking affects the area of the brain responsible for learning and memory. This makes the brains of adolescents more vulnerable to alcohol-related damage than adult brains. Furthermore, there are several factors that increase the risk of developing an alcohol use disorder later in life, including drinking at a younger age and binge drinking.

For more information about alcohol and young people, please refer to the resource in this series titled Alcohol and Adolescents.

The Endocrine System

As alcohol levels rise, the pituitary gland reduces secretions of the hormone that maintains the body’s proper hydration level. When the kidneys are no longer able to reabsorb sufficient water from the urine, the body ends up eliminating more water than it absorbs, which causes dehydration. The symptoms of dehydration are fatigue, back and neck pain, and headaches.

The Heart and Cardiovascular System

Just one or two standard drinks can affect heart rate, blood pressure, circulation and contractions of the heart muscle, including the heart’s ability to pump blood through the body. While these reactions are generally not clinically significant, they may be serious if an individual has pre-existing cardiovascular problems.

Alcohol causes the small blood vessels beneath the skin to dilate, which increases blood circulation. Some heavy drinkers have a ruddy complexion because of dilated blood vessels. The dilation of blood vessels also causes heat loss, and a drop in body temperature. Contrary to popular belief, it is dangerous to drink alcohol to “warm up” when exposed to the cold.

The Intestines

As soon as alcohol is ingested, the intestines begin to secrete acid. As the blood alcohol concentration rises, secretions of pepsin, a digestive hormone, are reduced, leading to an irritation of the intestinal walls. This irritation can cause diarrhea.
Other Effects

Alcohol and Stress
Alcohol often goes hand-in-hand with, and even promotes, sociability, conversation, pleasure, and a sense of well-being. People may also experience a temporary reduction in stress.

Although a small amount of alcohol may relieve stress in the short-term, it doesn’t treat the source of the stress. Studies have found that prolonged drinking increases anxiety and that, if stress levels remain high, alcohol dependency may result.

For more information on alcohol and mental illness, please refer to the resource in this series titled Alcohol and Mental Illness.

Alcohol and Sleep
Alcohol is often thought of as a sleep aid. While it may help one fall asleep, alcohol interrupts normal sleep cycles, which can cause frequent sleep interruptions, and may intensify existing sleep problems.

For more information on alcohol and sleep, please refer to the resource in this series titled Alcohol and Sleep.

Alcohol and Sex
Alcohol can cause or aggravate sexual problems. Drinking to excess can make it difficult for men to achieve an erection and for women to achieve orgasm.
Alcohol and Breastfeeding

The level of alcohol in breast milk is the same as the level in the blood and alcohol intake can decrease milk production. The safest choice a woman can make is to avoid drinking alcohol while breastfeeding. Women who choose to drink alcohol while breastfeeding can consult a health-care provider to find out how they can reduce their infant’s exposure to alcohol through breast milk.

For more information, contact Health Link Alberta toll-free at 811.

Conclusion

Alcohol’s effects on the human body are complex. There are many individual factors that influence both its absorption and elimination in the body. After drinking alcohol, the impact on the brain is immediate and as drinking continues, the kidneys, heart, and intestines are also affected. It is important to be aware of the interaction between our bodies and alcohol to help make informed choices about alcohol use.

Alberta Health Services offers a wide range of services for individuals looking for help for someone they care about, or for themselves. For more information, and to find an addictions services office near you, call the Addiction Helpline at 1-866-332-2322. It’s free, confidential and available 24 hours a day.
More information means informed decisions

Well-informed people will be more conscious of the harmful effects of excessive drinking, and will be aware that if they choose to drink alcohol, drinking in moderation is a healthier choice.

For copies:
AHS staff and allied health professionals can download digital copies from under the “Resources” tab at: www.albertahealthservices.ca/amhresources. Allied health professionals should contact their local Addiction and Mental Health office to access hard copies.

Thank you

AHS would like to thank our allied health professionals at Éduc’alcool for their contribution to this series.
Alberta Health Services offers a wide range of addiction and mental health services.

For individuals looking for help for someone they care about, or for themselves the Addiction Helpline and the Mental Health Helpline are available.

Addiction Helpline
1-866-332-2322

Mental Health Helpline
1-877-303-2642

Both helplines are free, confidential and available 24 hours a day.