Chapter 9

Alcohol

PowerPoint® Lecture Slide Presentation
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What Is Alcohol and How Is It Made?

- Alcohol is *not* an essential nutrient.
- Ethanol is the type of alcohol consumed in alcoholic beverages.
  - Methanol (in antifreeze) and isopropanol (rubbing alcohol) are both poisonous to humans.
  - Ethanol is safe for consumption, but excessive amounts are toxic and too much can be fatal.
- Made by fermentation of yeast and natural sugars in grains (beer) and fruits (wine)
  - Liquor is the concentrated alcohol collected through distillation.
Why Do People Drink Alcohol?

• People drink to relax, celebrate and socialize.

• Moderate alcohol consumption may have health benefits: may reduce risk of heart disease and death
  
  • Moderate alcohol consumption: no more than one drink daily for adult women, two for men

  • Alcohol can increase HDL cholesterol and may make blood platelets less “sticky”: less likely to form unwanted blood clots

  • Health benefits only shown in women ≥55 years of age and men ≥45 years old, not in younger people
What Happens to Alcohol in the Body?

- Alcohol is a toxin and the body works quickly to metabolize and eliminate it.
- You absorb alcohol in your stomach (and it can go directly into your blood) and small intestine (80%).
  - Some alcohol is metabolized by alcohol dehydrogenase enzyme in your stomach (20%) before it’s absorbed.
  - Women more susceptible to effects of alcohol than men (less enzyme and body water to distribute it)
    - Have 20-30% less of alcohol dehydrogenase than men, absorb more alcohol in stomach
  - Food (fats) in stomach slows alcohol absorption.
What Happens to Alcohol in the Body?

- You metabolize alcohol primarily in your liver: one standard drink is metabolized in 1½ - 2 hours.
- Two enzymes will metabolize the alcohol
- If liver cannot handle the amount, some alcohol will enter the blood and distribute to watery tissues
- Alcohol circulates in your blood until metabolized
- Blood alcohol concentration (BAC) correlates with amount of alcohol in your breath, thus the Breathalyzer
The Metabolism of Alcohol

- **a** Some alcohol is metabolized in the stomach by the enzyme alcohol dehydrogenase.
- **b** Some alcohol is absorbed through the stomach. Food in the stomach slows the absorption of alcohol.
- **c** Most alcohol is absorbed in the small intestine.
- **d** Most alcohol is metabolized in the liver.
- **e** Alcohol that is not metabolized will return to the blood and circulate throughout the body, including the brain.
What Happens to Alcohol in the Body?

The effects of alcohol on your **brain**

- Depressant of central nervous system
- Slows down transmission of nerve impulses and reaction time to stimuli
- Impairs thoughts, actions, behavior
- The more consumed, the more areas of brain affected
- If enough consumed, activities of brain stem are suppressed (breathing, heart rate), resulting in death
## Progressive Effects of Alcohol

<table>
<thead>
<tr>
<th>Blood Alcohol Concentration</th>
<th>Changes in Feelings and Personality</th>
<th>Brain Regions Affected</th>
<th>Impaired Functions (continuum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01–0.05</td>
<td>Relaxation, sense of well-being, loss of inhibition</td>
<td>Cerebral cortex</td>
<td>Alertness; judgment</td>
</tr>
<tr>
<td>0.06–0.10</td>
<td>Pleasure, numbing of feelings, nausea, sleepiness, emotional arousal</td>
<td>Cerebral cortex and forebrain</td>
<td>Coordination (especially fine motor skills); visual tracking</td>
</tr>
<tr>
<td>0.11–0.20</td>
<td>Mood swings, anger, sadness, mania</td>
<td>Cerebral cortex, forebrain, and cerebellum</td>
<td>Reasoning and depth perception; appropriate social behavior</td>
</tr>
<tr>
<td>0.21–0.30</td>
<td>Aggression, reduced sensations, depression, stupor</td>
<td>Cerebral cortex, forebrain, cerebellum, and brain stem</td>
<td>Speech; balance; temperature regulation</td>
</tr>
<tr>
<td>0.31–0.40</td>
<td>Unconsciousness, coma, death possible</td>
<td>Entire brain</td>
<td>Bladder control; breathing</td>
</tr>
<tr>
<td>0.41 and greater</td>
<td>Death</td>
<td></td>
<td>Heart rate</td>
</tr>
</tbody>
</table>

How Can Alcohol Be Harmful?

Alcohol can disrupt sleep and cause hangovers.

• Even a moderate amount in late afternoon/evening can disrupt sleep cycle

Alcoholic beverages may contain congeners which contribute to hangover symptoms.

• Hangover symptoms: headache, fatigue, nausea, increased thirst, rapid heart beat, tremors, sweating, dizziness, depression, anxiety and irritability

• Taking acetaminophen before/after alcohol consumption has been shown to cause liver damage.

Alcohol is a diuretic, can cause dehydration and electrolyte imbalances
How Can Alcohol Be Harmful?

Alcohol can interact with hormones:

• Interferes with insulin and glucagon that regulate blood glucose level

• Negatively affects parathyroid hormone and other bone-strengthening hormones, can increase risk of osteoporosis

• Can increase estrogen levels in women, may increase risk of breast cancer

• Affects reproductive hormones and is associated with both male and female sexual dysfunction
How Can Alcohol Be Harmful?

Alcohol may lead to overnutrition and malnutrition:

- Provides 7 kcal/g, contributing to weight gain
- Increases fat and weight around stomach
- Alcohol calories can displace nutritious foods.
- Excessive alcohol can interfere with absorption and/or use of protein, zinc, magnesium, thiamin, folate, and vitamins B\textsubscript{12}, A, D, E, K.
- Thiamin deficiency affects brain function and increases risk of Wernicke-Korsakoff syndrome
Calories in Selected Alcoholic Drinks

**Beer**
Serving size: 12 oz
Alcohol serving: 1
Calories per drink: 150

**Light beer**
Serving size: 12 oz
Alcohol serving: 1
Calories per drink: 110

**Distilled spirits (whiskey, vodka, gin, rum)**
Serving size: 1.5 oz
Alcohol serving: 1
Calories per drink: 100

**Red or white wine**
Serving size: 5 oz
Alcohol serving: 1
Calories per drink: 100–105

**Cosmopolitan**
Serving size: 2.5 oz
Alcohol servings: 1.7
Calories per drink: 131

**Mudslide**
Serving size: 12 oz
Alcohol servings: 4
Calories per drink: 820

**Bloody Mary**
Serving size: 5.5 oz
Alcohol serving: 1
Calories per drink: 97

**Margarita**
Serving size: 6.3 oz
Alcohol servings: 3
Calories per drink: 327

**Rum and Coke**
Serving size: 12 oz
Alcohol servings: 2.7
Calories per drink: 361

*Note: Alcohol servings are per beverage.*

Too Much Alcohol Costs You Good Nutrition

**Dinner 1**

- 4 oz grilled chicken breast
- 3/4 cup mashed potatoes
- 1 1/2 cup steamed carrots
- 2 oz whole wheat dinner roll
- 4 tsp soft margarine
- 1 cup fat-free milk

**Calories**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Calories</td>
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<tr>
<td>Total fat (g)</td>
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</tr>
<tr>
<td>Saturated fat (g)</td>
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</tr>
<tr>
<td>Cholesterol (mg)</td>
<td>89</td>
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<tr>
<td>Fiber (g)</td>
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</tr>
<tr>
<td>Sodium (mg)</td>
<td>1,764</td>
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<tr>
<td>Vitamin A RE (mcg)</td>
<td>1,264</td>
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<tr>
<td>Vitamin C (mg)</td>
<td>13</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>456</td>
</tr>
</tbody>
</table>

**Dinner 2**

- 5 12-oz beers
- 1 large serving nachos with cheese
- 8 BBQ chicken wings
- 1 handful goldfish crackers

**Calories**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>1,719</td>
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<tr>
<td>Total fat (g)</td>
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<tr>
<td>Saturated fat (g)</td>
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<tr>
<td>Cholesterol (mg)</td>
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<tr>
<td>Fiber (g)</td>
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<tr>
<td>Sodium (mg)</td>
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<tr>
<td>Vitamin A RE (mcg)</td>
<td>92</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>1</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>376</td>
</tr>
</tbody>
</table>
How Can Alcohol Be Harmful?

Alcohol can harm your digestive organs, heart, and liver

- Excessive amounts of alcohol can increase risk of
  - Inflammation of esophagus
  - Cancers of the esophagus, mouth, and throat
  - Gastritis and stomach ulcers
  - Hypertension and damage of heart tissue
  - Alcohol liver disease, which has three stages:
    - Fatty liver, alcoholic hepatitis, cirrhosis (liver cells die)
The Stages of Alcoholic Liver Disease

Normal liver

Fatty liver
A fatty liver can occur after just a few days of overconsumption.

Cirrhosis
By the cirrhosis stage, permanent damage is done and scar tissue has developed.

Figure 9.5
Reversing a fatty liver

- Stop consuming alcohol... otherwise you will enter the second stage of liver disease, alcoholic hepatitis.
Effects of Alcohol on the Body

- Hangovers
- Blurred vision
- Slurred speech
- Breathing may stop
- Malnutrition, overnutrition
- Brain damage, addiction, and stroke
- Heart disease, irregular heart beat
- Liver disease, liver failure
- Infertility (in women), impotence (in men)
- Osteoporosis
How Can Alcohol Be Harmful?

Alcohol can put a healthy pregnancy at risk:

- Exposure to alcohol prenatally can cause fetal alcohol spectrum disorders (FASDs).

  Most severe form is fetal alcohol syndrome (FAS) which is the leading cause of mental retardation and birth defects in the US.

- Seriously damages the nervous system in fetus
  - Causes physical, mental, and behavioral abnormalities

- Effects of FASDs are permanent.

- The only proven, safe amount of alcohol a pregnant woman can consume is **none**.
Fetal Alcohol Syndrome

Figure 9.7

- Skin folds over the eyes
- Low nasal bridge
- Short turned up nose
- Indistinct philtrum (groove between nose and upper lip)
- Small head circumference
- Small eye opening
- Small midface
- Flattened face
- Thin upper lip
What Are Alcohol Abuse and Alcoholism?

Binge drinking, drinking and driving, and underage drinking are forms of alcohol abuse.

• Occurs when a male consumes $\geq 5$ drinks, a woman $\geq 4$ drinks in a short time

• Increased likelihood of injuries, car accidents, drowning, unplanned sexual activity, and death

• Associated with sexual aggression and assaults and health problems: sexually transmitted disease, suicide, homicide, child abuse, hypertension, heart attacks
What Are Alcohol Abuse and Alcoholism?

- Binge drinking can cause blackouts and lead to alcohol poisoning.
- Chronic drinking can lead to alcohol tolerance.
  - Brain becomes less sensitive to alcohol, more needed to get same intoxicating effect
  - CAGE: screening tool to assess if patients have problem controlling alcohol consumption
- Drinking and driving: illegal to drive with BAC >0.08
- One drink impairs alertness, judgment, coordination
Consequences of College Binge Drinking

Number of college students, 18–24, per year

Deaths: 1,700
Sexual assaults: 97,000
Injuries: 599,000
Assaults: 696,000
Don’t Drink and Drive!
The CAGE Screening Tool

Table 9.3

| C | Have you ever felt that you should cut down on your drinking? |
| A | Have people annoyed you by criticizing your drinking? |
| G | Have you ever felt guilty about your drinking? |
| E | Have you ever had a drink first thing in the morning (eye opener) to steady your nerves or get rid of a hangover? |

What Are Alcohol Abuse and Alcoholism?

Underage drinking

- Increases risk of violence, injuries and health risks
- Can also interfere with brain development and lead to permanent cognitive and memory damage in teenagers
- Underage drinking and driving is twice as deadly.
- The earlier in life a person starts drinking, the higher the risk for alcoholism.
What Are Alcohol Abuse and Alcoholism?

Alcoholism is a disease: craving, loss of control, physical dependency, inability to limit intake, withdrawal symptoms

- About 50% of risk of alcoholism is genetic
- Risk also determined by environment
- No cure, but can be treated with:
  - Medication to reduce cravings
  - Psychological help and support
  - Complete elimination of alcohol required
  - Alcoholics Anonymous: 12-steps for recovery and supportive group meetings
Who Should Avoid Alcohol and What Is Moderate Drinking?

*Dietary Guidelines for Americans* states that the following should abstain from alcohol:

- Women of childbearing age who may become pregnant
- Pregnant and lactating women
- Children and adolescents
- Those with specific medical conditions, taking certain medications, or operating machinery or driving
- Those who cannot restrict their intake
Who Should Avoid Alcohol and What Is Moderate Drinking?

To be a moderate drinker, watch out for:

- Size of your drinks
  - Standard drink contains ½ oz. of alcohol
  - Drinks served may often contain more

- Frequency of your drinking
  - Abstaining from alcohol for several days and then overdrinking one day is *not* moderate drinking.

- Defined as binge drinking
When a Drink Is More Than a Drink…

Figure 9.10
Health Benefits???

- There isn’t enough evidence to support the theory that wine has any health superiority over beer and distilled spirits.

- Some studies have shown that there are potential benefits from moderate alcohol consumption. These include: fewer gallstones, fewer kidney stones, reduced risk of atherosclerosis and improved cognitive function in the elderly.