Alcohol: The good, the bad and the ...

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Overview

- Alcohol statistics... the good and the bad
- What constitutes a drink and how much is too much?
- Alcohol effects on the body
- What does alcohol really do to the brain?
- Special populations
Who drinks?

- National Survey on Drug Use and Health (≥ 18 years old):
  - 87.6% drank during their lifetime
  - 71% drank in the past year
  - 56.3% drank in the past month
    - 51.4% of women
    - 61.5% of men
Alcohol (the good)

• Moderate consumption
  – Antiatherogenic (prevents formation of fatty plaques in the arteries)
  – Anti-inflammatory
  – Improved cholesterol profile
  – Improved clotting
  – Improved insulin sensitivity
  – Lower stroke risk
  – Lower overall mortality
Alcohol (the bad)

• 24.6% of adults engaged in binge drinking in the past month
  – Binge: ≥ 5 drinks on a single occasion

• 7.1% of adults engaged in heavy drinking in the past month
  – Heavy drinking: 5 or more occasions of binge drinking in the past 30 days

Alcohol (the bad)

• Binge drinking ranks 3rd among preventable causes of death in the USA (behind tobacco and sedentary lifestyle)
  – Attributed to 85,000 deaths annually
  – Cost estimated at $220 billion
Alcohol (the bad)

• Alcohol abuse (alcoholism): recurring use of alcoholic beverages despite its negative consequences
  – Increased rates of injury
  – Cardiovascular disease
  – Cancer
  – Digestive disease
  – Respiratory disease
  – Endocrine diseases
  – Mental disorders
  – General increase in mortality and morbidity
How much is a Drink?

12 fl oz of regular beer = 8–9 fl oz of malt liquor (shown in a 12 oz glass) = 5 fl oz of table wine = 1.5 fl oz shot of 80-proof spirits ("hard liquor"—whiskey, gin, rum, vodka, tequila, etc.)

- about 5% alcohol
- about 7% alcohol
- about 12% alcohol
- about 40% alcohol

The percent of "pure" alcohol, expressed here as alcohol by volume (alc/vol), varies by beverage.

= approximately 14 g of pure alcohol
How Much is Too Much?

• Moderate or “low-risk” drinking
  – For men:
    • No more than 4 drinks on any single day AND no more than 14 drinks per week
  – For women
    • No more than 3 drinks on any single day AND no more than 7 drinks per week
How Much is Too Much?

• Avoid alcohol altogether if you:
  – Plan to drive a vehicle or participate in activities requiring skill, coordination, and alertness
  – Take medications that interact with alcohol
  – Have a medical condition that alcohol can aggravate
  – Are pregnant or trying to become pregnant
  – Younger than age 21
What is Alcoholism?

• Symptoms of alcoholism:
  – Craving—A strong need, or urge, to drink
  – Loss of control—Not being able to stop drinking once drinking has begun
  – Dependence—Withdrawal symptoms: nausea, sweating, shakiness, negative emotional states e.g. anxiety after stopping drinking
  – Tolerance—The need to drink greater amounts of alcohol to feel the same effect
Is Alcoholism Genetic?

• Alcoholism has a genetic component (estimated at 50% of risk)
• Multiple genes contribute
  – Positive
  – Negative
• Treatment?
Risks to Long-Term Health

- Alcohol metabolism
Risks to Long-Term Health

- Alcohol metabolism
  - Mostly liver
  - Pancreas
  - Gastrointestinal tract
  - Brain
Risks to Long-Term Health

• Liver
  – Steatosis (fatty liver)
  – Alcoholic hepatitis
  – Fibrosis
  – Cirrhosis
Risks to Long-Term Health

• Pancreas
  – Pancreatitits
  – Metabolism of alcohol to aldehydes (toxins)
Risks to Long-Term Health

• Heart
  – Cardiomyopathy—stretching and drooping of the heart muscle
  – Arrhythmias—irregular heart beat
  – Stroke
  – High blood pressure
Risks to Long-Term Health

- Cancer (increased risk)
  - Mouth (alcohol and tobacco responsible for 65 – 80%)
  - Esophagus
  - Throat
  - Liver (responsible for 25 – 30%)
  - Breast (responsible for 11%)
  - Colon

- Even 1 drink per day raises cancer risk in women
Risks to Long-Term Health

• Immune system
  – Impairs normal immune function
  – Increases infection risk and severity
    • Pneumonia
  – A single binge can reduce body’s defenses for 24 hrs
Acute Effects of Alcohol on the Brain

• Difficultly walking
• Blurred vision
• Slurred speech
• Slowed reaction times
• Impaired memory
• Reduced inhibitions—risk taking

http://pubs.niaaa.nih.gov/publications/aa63/aa63.htm
Chronic Effects of Alcohol on the Brain

**Figure 3** Functions and associated brain regions targeted by alcohol abuse and alcoholism. Figure courtesy of A. Pfefferbaum, SRI International, CA, USA and E. V. Sullivan, Stanford University, CA, USA.
Chronic Effects of Alcohol on the Brain

Chronic Effects of Alcohol on the Brain

Fractional Anisotropy (white matter)

Are the Effects Reversible?
Chronic Alcohol and Cognitive Impairment

• Most alcoholics exhibit mild-to-moderate cognitive impairment
  – Visuospatial ability—perception and recall of locations
  – Higher order cognition—abstract thinking required to organize and execute a plan and adapt to changing circumstances
Chronic Alcohol and Dementia

• Alcohol dementia
  – Progressive
  – Impaired planning, apathy, memory loss
• Alcohol dementia shares similarities with Alzheimer’s disease
• Unclear if alcohol use impacts development of Alzheimer’s disease
• Common mechanism may underlie Alzheimer’s and alcohol effects on brain
Alcohol and Alzheimer’s

A. The brain of a normal elderly person

B. The brain of a person with Alzheimer’s disease

C. The brain of a person with alcoholism
Wernicke-Korsakoff Syndrome

• Chronic excessive alcohol consumption commonly leads to poor nutrition
  – Thiamine deficiency (vitamin B1)

• Up to 80% of alcoholics have thiamine deficiency
Wernicke-Korsakoff Syndrome

- Persistent thiamine deficiency can lead to:
  - Wernicke’s encephalopathy (transient, but severe)
    - Mental confusion
    - Oculomotor disturbances
    - Muscle incoordination
Wernicke-Korsakoff Syndrome

• Korsakoff’s psychosis (chronic condition)
  – Persistent learning and memory problems
Chronic Effects of Alcohol on the Brain

Control

Alcoholic

Wernicke-Korsakoff


How does the brain adapt to chronic alcohol?

A. Under normal conditions, a balance exists between excitatory and inhibitory neurotransmission in the brain.

B. Short-term alcohol exposure tilts the balance toward inhibition by both enhancing the function of inhibitory neurotransmitters and neuromodulators (i.e., GABA, glycine, and adenosine) and decreasing the function of excitatory neurotransmitters (i.e., glutamate and aspartate).

C. Research suggests that after long-term alcohol exposure, the brain attempts to restore equilibrium by compensating for the depressant effects of alcohol; thus, the brain decreases inhibitory neurotransmission and enhances excitatory neurotransmission.

D. During alcohol withdrawal, these compensatory changes are no longer opposed by the presence of alcohol and the balance shifts toward a state of excessive excitation. This state of hyperexcitation is characterized by seizures, delirium, and anxiety.
Alcohol Withdrawal Syndrome

- Occurs when alcohol consumption is abruptly reduced or discontinued
  - Seizures
  - Tremor
  - Hallucinations
  - Insomnia
  - Agitation
  - Confusion
  - Death
Special Populations

• Underage drinkers
  – 2009 about 10.4 million 12 – 20 year olds drank
  – On average young people (< 21) drink 5 drinks on a single occasion
  – Approx 5000 young people die annually due to alcohol-related events
  – 190,000 young people seriously injured due to alcohol-related injuries
Special Populations

• Underage drinkers
  – Impaired judgement
  – Increased risk of assault
  – Critical brain development period
Special Populations

• College drinkers (18 – 24)
  – 80% of college students drink
  – 50% of those who drink binge
  – 1825 deaths annually
  – 690,000 assaults
  – Nearly 600,000 injuries
Special Populations

• Women
  – Develop alcohol-related problems at lower drinking levels than men
  – More vulnerable to:
    • Liver damage
    • Heart disease
    • Breast cancer (with as little as one drink per day)
Special Populations

• Adults over 65 years of age
  – May have impaired tolerance/metabolism
  – More likely to have health problems worsened by alcohol
    • Diabetes
    • High blood pressure
    • Congestive heart failure
    • Liver problems
    • Osteoporosis
    • Memory problems
    • Mood disorders
Special Populations

• Adults over 65 years of age
  – Drug interactions
    • Aspirin
    • Acetaminophen
    • Cold and allergy medicine
    • Cough syrup
    • Sleeping pills
    • Pain medicine
    • Anxiety or depression medicine
Special Populations

• Adults over 65 years of age who are healthy and do not take medications should not have more than:
  – 3 drinks on a given day
  – 7 drinks in a week
Support & Treatment

• National Drug and Alcohol Treatment Referral Routing Service
  – U.S. Department of Health & Human Services Substance Abuse and Mental Health Services
  – 1-800-662-4357
  • 2 options
    – 1-speak to a representative concerning substance abuse treatment or request printed material on alcohol or drugs
    – 2-local substance abuse treatment referral information
Conclusions: Alcohol the good

- Moderate alcohol consumption is associated with several benefits
  - Heart and circulatory benefits
  - Anti-inflammatory
  - Improved insulin sensitivity
  - Lower overall mortality
Conclusions: Alcohol the bad

• Special populations particularly sensitive to alcohol-induced damage
  – Women
  – Underage and college drinkers
  – Adults over 65
  – Anyone with a family history of alcohol abuse
Conclusions: Alcohol the bad

- Excessive consumption associated with many health hazards
  - Heart
  - Liver
  - Immune dysfunction
  - Cancer
  - Brain, psychiatric disorders
  - Addiction
  - Nutritional problems
  - Mortality
Opportunities to participate in research

Methamphetamine Abuse Research Center (MARC) Clinical and Laboratory Study (eIRB#8702)

Participants: The MARC Clinical and Lab Study plans to recruit 700 subjects into seven groups (100 per group): 1) adults actively using methamphetamine, 2) adults in early remission from methamphetamine dependence, 3) adults with active alcohol dependence, 4) adults in early remission from alcohol dependence, 5) adults with active polysubstance dependence (i.e., dependence on MA and at least one other substance), 6) adults in early remission from polysubstance dependence, and 7) non-dependent adults.

Study Visit Procedures: This study entails a 6-7 hour neuropsychiatric study visit including: 1) a clinical interview to collect biopsychosocial history, 2) a structured clinical interview to verify psychiatric and substance use disorders, 3) psychiatric symptom questionnaires, 4) neuropsychological tests covering a full range of cognitive domains, 5) human immunodeficiency virus (HIV) and hepatitis C virus (HCV) antibody screening, including pre- and post-test education and counseling, 6) blood, urine, and oral fluid collection for medical laboratory tests, and 7) saliva and blood collection for storage in the MARC Biorepository and use in future experiments.
Objectives: The purpose of this research study is to identify the biological mechanisms by which the hepatitis C virus (HCV) and alcohol cause abnormalities in immune cells and contribute to problems with thinking and mood. This project will determine the effects of alcohol use on viral load, T cell response, inflammatory factors, and neuropsychiatric function in adults with HCV in order to guide the development of treatments for alcohol dependence.

Participants: We are seeking adult research participants with HCV and without alcohol dependence, as a comparison to hepatitis C positive participants who have an alcohol use disorder.

Study Visit Procedures: During this study, research participants will be asked to attend a total of 10 visits to the Portland VA Medical Center. At the first visit (approx. 3 hours), participants will be asked to provide a detailed health questionnaire, breathalyzer, blood and urine samples. During subsequent 30-minute visits, similar data will be gathered.
Marchiafava-Bignami disease

- Rare
- Progressive neurological condition
- Corpus callosum atrophy
- Most commonly observed in alcoholics
NEUROLOGICAL
- Damage to brain cells
- Sleep disturbances
- Dulled senses
- Impaired Coordination
- Hallucinations
- Double vision
- Slurred speech
- Convulsions

MUSCULAR
- Tremors
- Muscle clamps
- Shakes
- Chills

BODY TEMPERATURE
- Cold, clammy skin
- Sweating
- Hypothermia
- Flushed skin

CARDIOVASCULAR
- High blood pressure
- Abnormal heart rhythms
- Weak or rapid pulse
- Heart muscle damage
- Heart attack or stroke
- Edema

GASTROINTESTINAL
- Nausea
- Vomiting
- Diarrhea
- Damage to stomach lining
- Stomach ulcers
- Increased urination
- Irritable colon
- Bleeding in the stomach

http://www.mychoice-myvoice.com/facts/alcohol-side-effects/