

Alcohol and Health

Prof. David W. Craig

Dept. of Chemistry

Hobart and William Smith Colleges

Ref: Braun pp61-87, Grant Ch4, Manzardo Ch5

Alcohol and Sex

■ Physiological responses

- ◆ Erections slower to rise and quicker to fall
- ◆ Reduction in vaginal lubrication

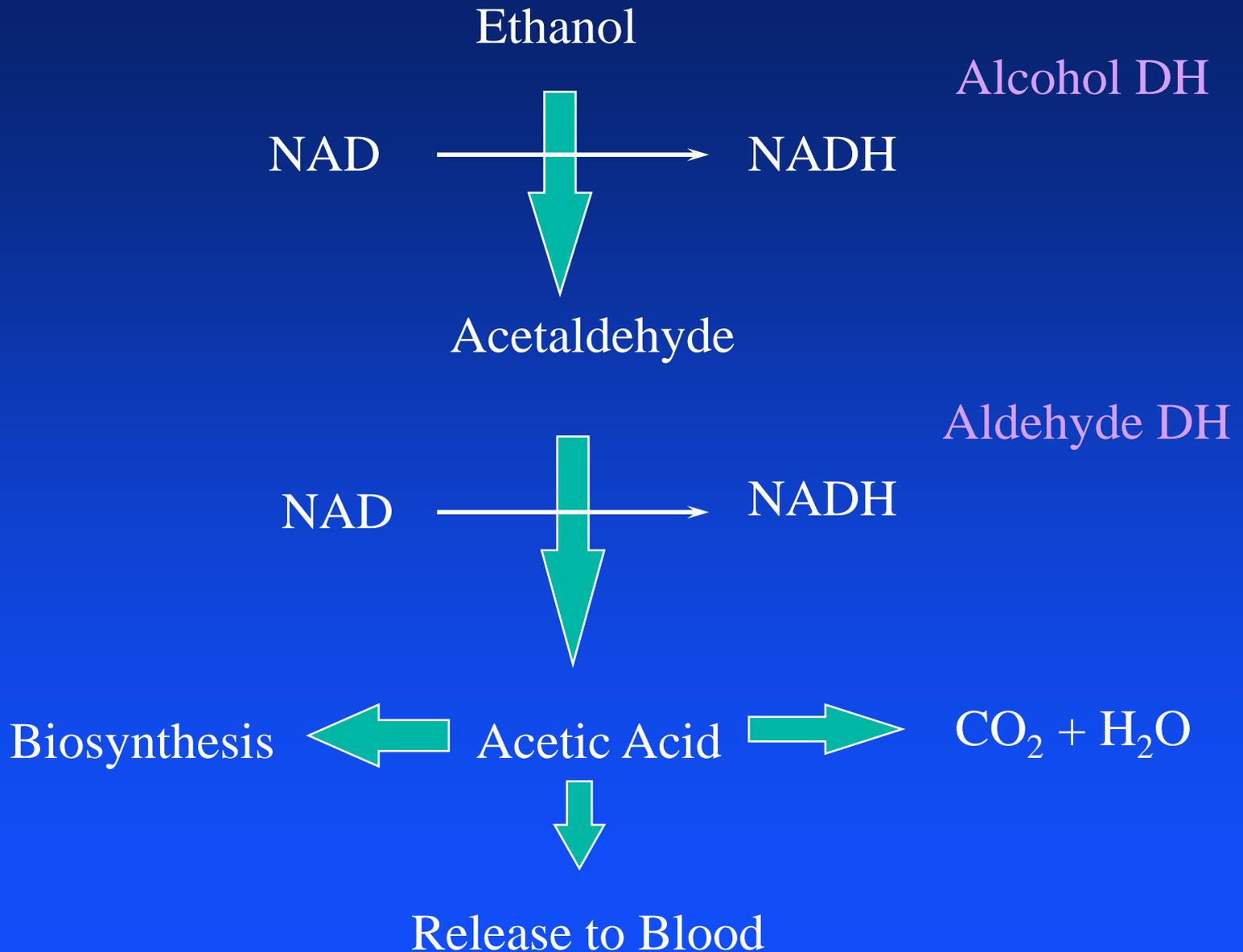
■ Psychological Perceptions

- ◆ 45% of men and 68% of women say alcohol enhances sexual enjoyment

■ Rutgers study (2-3 drinks) of college males

- ◆ Subjects who thought they drank alcohol were most highly aroused (those that did not actually get alcohol were slightly less aroused)
- ◆ Subjects who expected tonic but actually got alcohol were less aroused than those that expected alcohol but did not.

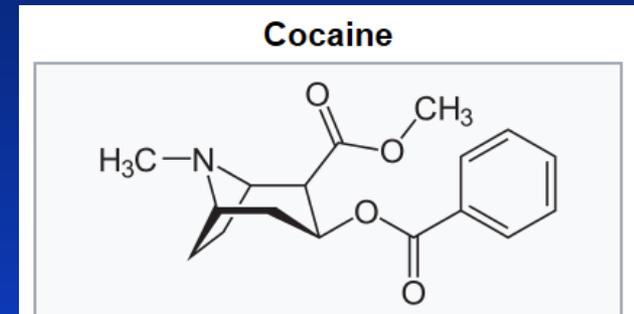
Major Pathway for Alcohol Metabolism



Interaction with other Drugs

■ Ethyl ester of Cocaine

- ◆ potentiates cocaine “high”
- ◆ Acts by inhibiting reuptake of serotonin, norepinephrine, and dopamine



■ Aspirin and Cimetidine Inhibits Gastric ADH

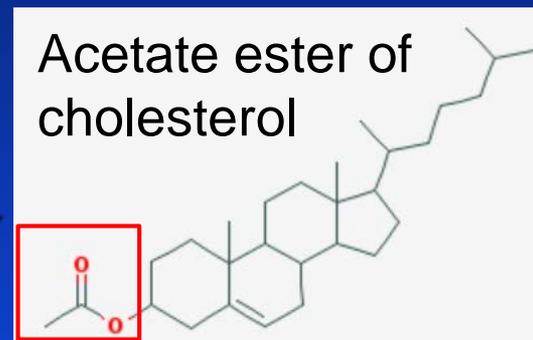
■ Liver Drug Detoxification Impaired

- ◆ Depleted NAD impairs liver's ability to clear other drugs

Metabolic Fates of Excess Ethanol and Acetaldehyde

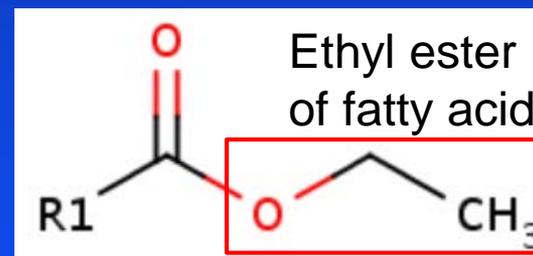
■ Ethyl esters of Fatty Acids and acetate esters of Cholesterol

- ◆ may cause heart damage, impair energy metabolism, disrupt cell membranes



■ Protein Modification by Acetaldehyde

- ◆ enzymes inactivated by imine adducts



■ Ethanol can also be oxidized by MEOS/Cytochrome P450

- ◆ MEOS oxidation produces harmful free radicals

Other Metabolic Processes Affected by Alcohol Metabolism

- High NADH/NAD ratio:
 - ◆ Impaired Energy Metabolism and increased production of lactic acid
 - ◆ Inhibits Lipid Degredation in Liver
 - ◆ Stimulation of fat synthesis and increases in LDL and HDL levels
 - ◆ Inhibition of oxidative steps in testosterone synthesis

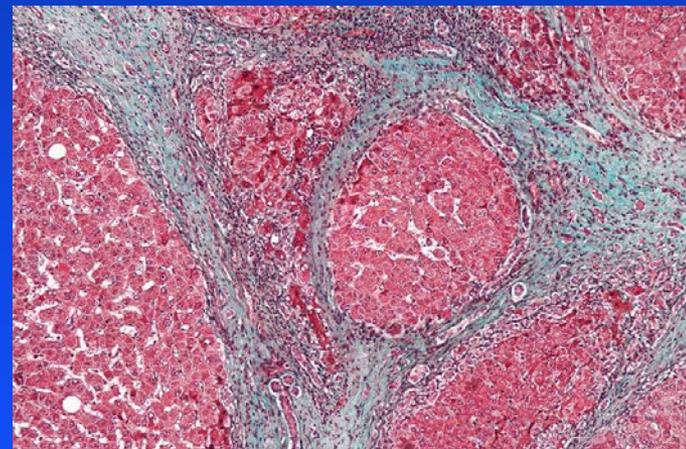
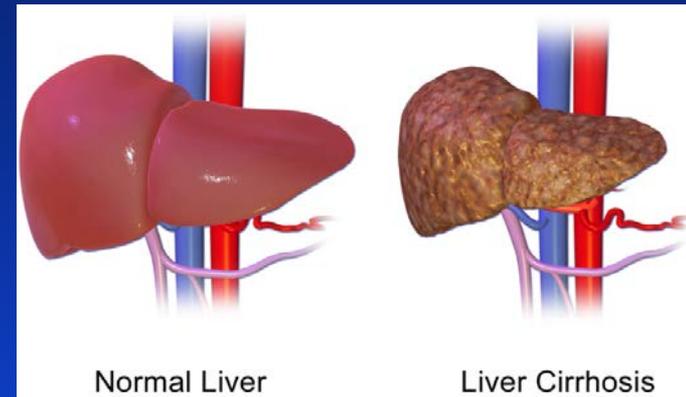
Other Metabolic Processes Affected by Alcohol Metabolism

■ Acetaldehyde Adducts

- ◆ tubulin-mediated protein exocytosis and endocytosis inhibited...insulin, etc
- ◆ Impaired Protein Synthesis Type II (fast twitch) Muscle Fibers
- ◆ In alcoholics, acetaldehyde reacts with dopamine to become tetrahydroisoquinoline (THIQ) in the brain. It is thought that accumulation of THIQ is related to addiction.

Alcohol-Induced Liver Damage

- Risk becomes significant when alcohol consumption exceeds
 - ◆ 6.2oz/day for men
 - ◆ 1.55oz/day for women
- Caused by
 - ◆ Free radical rx in fatty liver
 - ◆ Cytokine stimulated differentiation of Ito cells into collagen myofibroblasts
 - ◆ Increased levels of Acetaldehyde due to lower levels of Aldehyde dehydrogenase



Alcohol-Induced Immune System Impairment

- Suppresses proliferation of lymphocytes in blood, spleen, and thymus
- Reduced B cell antibody production
- Natural Killer (NK) cells have reduced activity

Alcohol-Induced Changes in the Cardiovascular System

- Reduced risk of CAD with ≤ 2 drinks/day
 - ◆ increased HDL, inhibition of platelet activity
- Reduction in Cerebral Vascular Disease (Stroke)
 - ◆ reduced platelet activity
- 50% greater risk of hypertension with 3-4 drinks/day
- Cardiomyopathy (weakened heart muscle)
 - ◆ impaired protein metabolism, free radicals
- Arrhythmias caused by alcohol effect on sinoatrial node