



Effects of Ethanol on Body Structures

Psychology 470

Introduction to Chemical Addictions

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Mouth

- Trace amounts absorbed here
- Causes
 - Irritation
 - lesions
 - ulcers
 - oral cancer

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Esophagus

- Is a tube surrounded by muscles and blood vessels
- Has a mucosal lining
- Causes
 - Damage to mucosal lining
 - Esophageal ulcers
 - Esophageal Cancer
 - Esophageal Varices

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Stomach

- 15-20% absorbed here
- Stimulates production of HCL
- Irritates and damages mucosal lining
- Changes the electrical properties of the stomach lining
- Gastritis
- Ulcers
- Achlorhydria

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Pyloric Valve

- Spasms in the presence of large amounts of ethanol

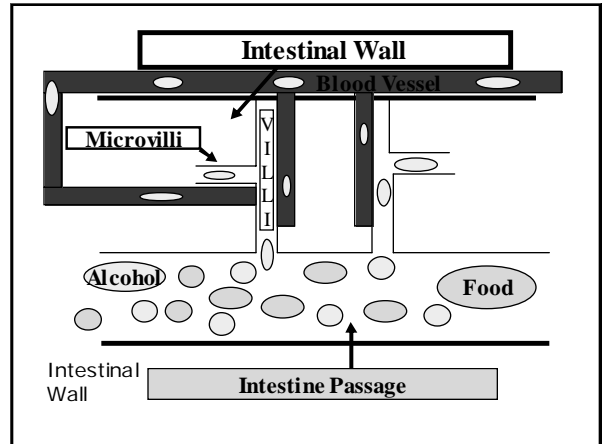
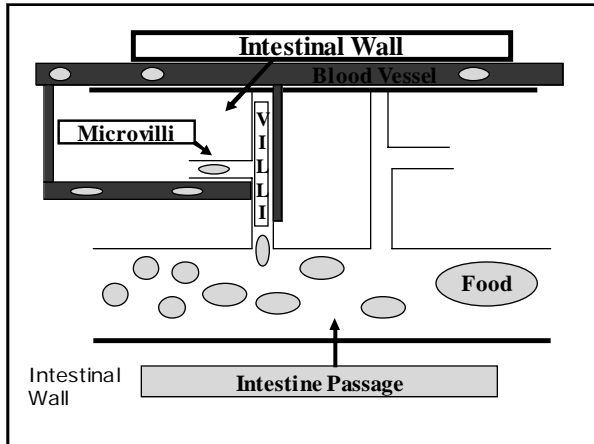
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Small Intestine

- Majority of Ethanol absorbed here
- Damages Mucosal Cells, Villi, and Microvilli
- Decreases absorption of nutrients and vitamins
- Increases Triglyceral and Cholesterol production

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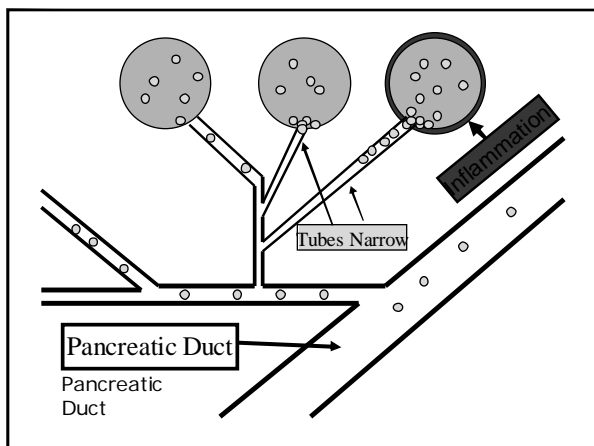
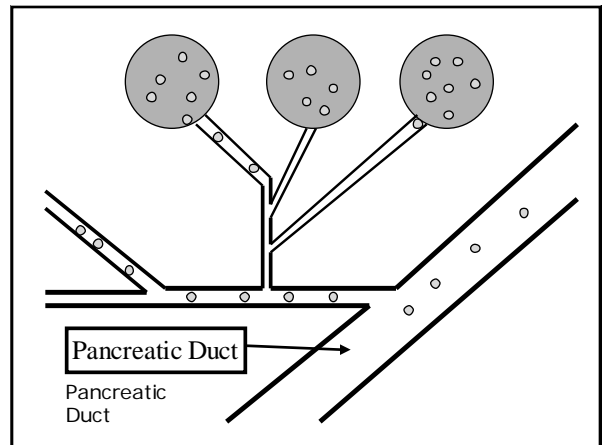


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Pancreas

- Increased concentration of Pancreatic enzymes
- Decreased volume of enzyme secretion
- Pancreatitis
- Decreased insulin production
 - Secondary Diabetes

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Gall Bladder

- Decreased amounts of Bile

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Large Intestine

- Decreased water and vitamin absorption
- Diarrhea

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Effects on Blood Cells

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RBC

- Decreased Production
- Anemia

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WBC

- Decreased production
- Decreased response time
- Get more infections
- Increased risk for STD's/HIV

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Platelets

- Decreased production
- Decreased clotting time
 - More bumps and bruises

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Nervous System

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Neurons

- Alters neuronal membrane (lipid bilayer)
- Decreases amounts of Na that enters the axon
- Decreased height of the action potential
- Alters Ca influx - Decreases the amount of NT that is released
- Decreases transmission speed
- Increases tolerance
- Demyelination

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More

- Inhibits the function of NMDA – subtype of Glutamate Receptor
 - Decreases the responsiveness of NMDA receptors to glutamate
- Binds on BZ subunit of GABA receptor
 - Inhibits other neurons by increasing Cl into post synaptic element
- May impact Serotonin receptors (5HT2, 5HT3) located in Dopamine Post Synaptic Elements in Nucleus Accumbens

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Brain Structures

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Brain Structures

- Alters newer evolutionary structures first, then older structures
- Damages Frontal, Temporal lobes, hippocampus, etc
- Decreases the numbers of dendrites and axons
- Increases Ventricle Size
- Decreases blood flow

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Related Brain Damage

- Blackouts
- Sleep Changes
- Wernicke-Korsakoff's Syndrome
- Other Psychological and Psychiatric problems

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Wernicke-Korsakoffs Syndrome

- Due to a lack of B vitamins
- Results from damage to cortex peripheral nerve cells
- Key symptom is confabulation
 - Get holes in memory so you fill them in.
- Usually STM is the most affected
- Poor Prognosis

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Visual System

- Decreased accommodation time
- Decreases tracking ability
- Double vision
- Decreased recovery time

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Endocrine Effects

- Inhibits Vasopressin release
- Decreases thyroid hormones, progesterone, testosterone, Luteinizing hormone, and others

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Males

- Damages or kills Leydig Cells
- Increases feminine characteristics
- Decreased sexual drive, reproductive failure, impotence

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Females

- Early Menopause
- Premenstrual discomfort
- Increased menstrual Flows
- Infertility

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Muscle Tissue

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Skeletal Muscle

- Disrupts internal structure of the muscle
- Cramps, pain, weakness = Alcoholic Myopathy

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Cardiac

- Increased Weight of the heart
- Dilation of heart chambers
- Scar tissue
- Cardiomyopathy

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Removal of Ethanol

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Methods

- Trace amounts through respiration and sweat.
- Some through fecal material
- Most is metabolized by the liver via two systems

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Alcohol Dehydrogenase System (ADH)

- | • Substance | Degrading Enzyme |
|--------------------------------------|------------------------|
| • Ethanol | Alcohol Dehydrogenase |
| • Acetaldehyde | Aldehyde Dehydrogenase |
| • Acetic Acid | |
| • CO ₂ + H ₂ O | |
| • Respiration | |
| • Urination | |

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Microsomal Ethanol Oxidase System (MEOS)

- | • Substance | Degrading Enzyme |
|--------------------------------------|------------------------|
| • Ethanol | MEOS |
| • Acetaldehyde | Aldehyde Dehydrogenase |
| • Acetic Acid | |
| • CO ₂ + H ₂ O | |
| • Respiration | |
| • Urination | |

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Ethanol Effects on the Liver

- Fatty Liver
- Cirrhosis
- Portal Hypertension
- Decreased vitamin production
- Decreased hormones and other products important for body functioning

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Other Issues

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Genetic Differences

- Decreased ADH metabolic rates for Europeans
- Increased ALDH metabolic rate for Europeans

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Biological Effects on Children

- Increased numbers of spontaneous abortions
- Fetal Alcohol Syndrome (FAS)
- Endocrine Changes
- BAC

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Drugs

- Additive effects
- Benzodiazepines
- Synergistic effects
- Barbiturates
- Decreased effectiveness
- Antibiotics

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Conclusions

- Most damaging drug there is
- Influences every system
- Causes major social/economic problems
- Highly correlated with aggression

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