

**ALCOHOL AND**

**HEALTH**

**AMERICAN COUNCIL ON ALCOHOL PROBLEMS**

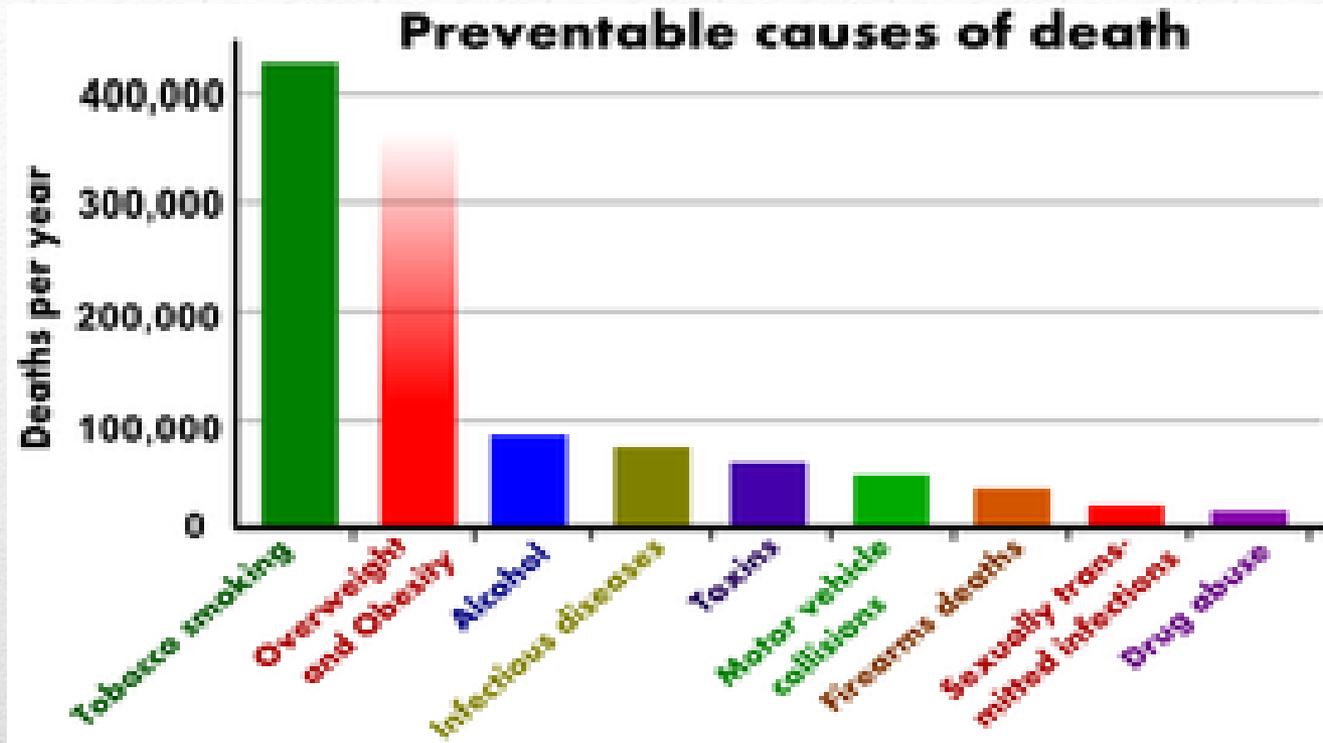
James B. Angel PhD  
Dept. of Kinesiology  
Samford University

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- APPROX. **85,000 DEATHS/YEAR** IN U.S.
- MAKES ALCOHOL **3<sup>rd</sup>** LEADING LIFESTYLE-RELATED CAUSE OF DEATH
- RESPONSIBLE FOR **2.3 MILLION** YEARS OF POTENTIAL LIFE LOST ANNUALLY
  - CDC, 2013

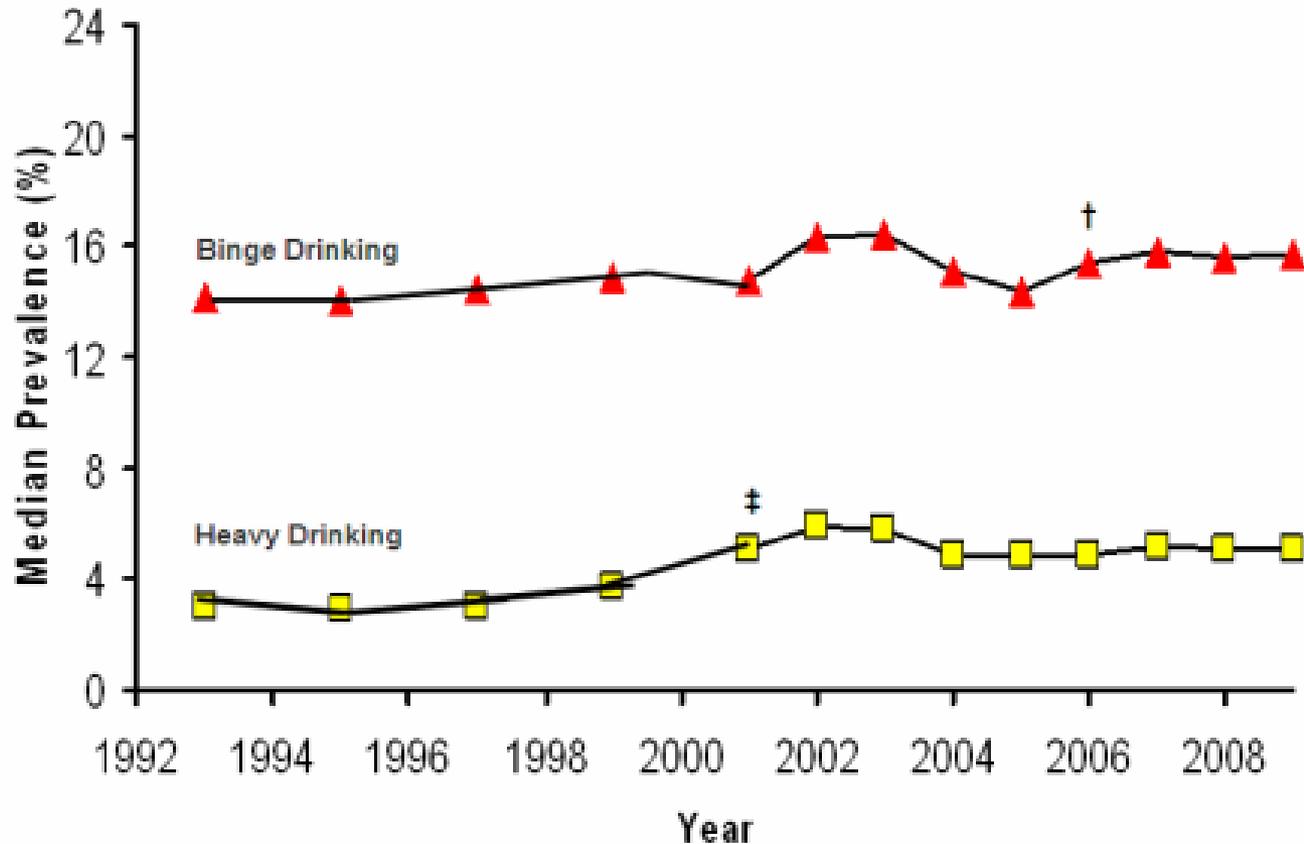
# **EXCESSIVE ALCOHOL USE**

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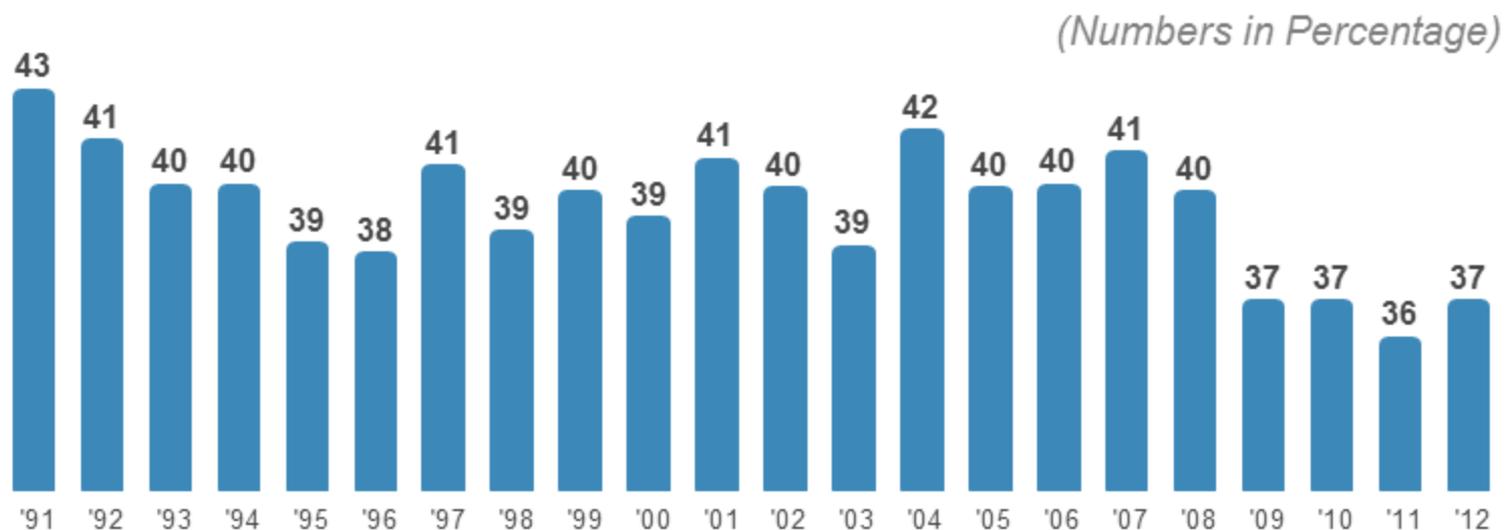
# PREVENTABLE CAUSES OF DEATH

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# PREVALENCE 1993-2009

## College Students Who Reported Binge Drinking\* Decreased 13% Proportionally from 1991 to 2012.



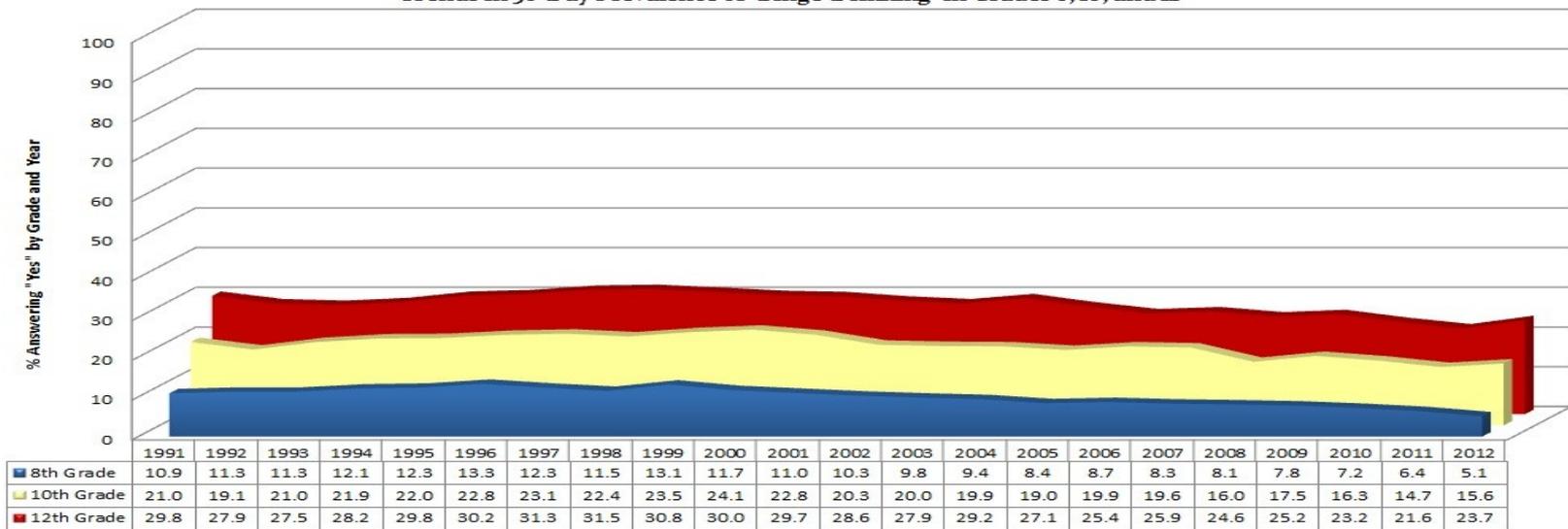
Source: NIDA, *National Survey Results on Drug Use from the Monitoring The Future Study*, Vol. II Johnston L., et al, U. of Michigan, 2013

Note: Author state language on the 93/94 survey changed slightly.

\*Five or more drinks in a row in previous two weeks.

**Over the past two weeks, have you had 5 or more alcoholic beverages in a row?**

**Trends in 30-Day Prevalence of "Binge-Drinking" in Grades 8, 10, and 12**



Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (December 19, 2012). "The rise in teen marijuana use stalls, synthetic marijuana use levels, and use of 'bath salts' is very low." University of Michigan News Service: Ann Arbor, MI. Retrieved December 19, 2012 from <http://www.monitoringthefuture.org>

# HIGH SCHOOL BINGEING

- **ANNUALIZED ALCOHOLISM DEATH RATES – 4.6X HIGHER FOR FEMALES AND 1.9X HIGHER FOR MALES vs GENERAL POPULATION**
- **MEAN AGE AT DEATH – 60 FOR FEMALES AND 58 FOR MALES, ABOUT 20 YEARS LOWER THAN THE MEAN AGE AT DEATH AMONG GENERAL POPULATION**
  - John, U., UNC, 2012
- **DIE SOONER OR LIVE UNHEATHIER**

# **ALCOHOL AND DEATH!!**

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- 5 OZS. WINE (12%)
- 12 OZS. BEER (4.5%)
- 1 1/2 OZS. 80 PROOF LIQUOR (40%)
- 10 OZS. WINE COOLER (6%)
  
- ALL CONTAIN 0.5 OZS. ETHYL ALCOHOL (ETHANOL)

# **ONE STANDARD DRINK**

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- **20% ABSORBED DIRECTLY FROM STOMACH TO BLOODSTREAM**
- **80% ABSORBED THROUGH SMALL INTESTINE TO BLOODSTREAM**

# **ALCOHOL METABOLISM**

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- ALCOHOL DILUTED IN WATER VOLUME OF BODY-REDUCES EFFECT SOMEWHAT
- MUSCLE CONTAINS MORE WATER THAN DOES FAT- MEN HAVE MORE MUSCLE = ABOUT 10% MORE BODY WATER
- ALCOHOL LESS DILUTED IN WOMEN

# **ALCOHOL AND WOMEN**

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- DIFFERENCE IN DIGESTIVE ENZYME ADH (ALCOHOL DEHYDROGENASE) – LESS ACTIVE IN WOMEN vs MEN, THEREFORE BAC HIGHER IN WOMEN
- RISK OF ADDICTION IN WOMEN 2X HIGHER THAN MEN



# ALCOHOL AND WOMEN

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- **WOMEN MORE VULNERABLE THAN MEN TO MANY MEDICAL CONSEQUENCES OF ALCOHOL USE**
  - **DEVELOP CARDIOMYOPATHY & PERIPHERAL NEUROPATHY AFTER FEWER YEARS OF HEAVY DRINKING vs ALCOHOLIC MEN**
    - **Alcohol and Alcoholism, 2000**
  - **MEN AND WOMEN HAVE SIMILAR LEARNING AND MEMORY PROBLEMS DUE TO HEAVY DRINKING, BUT WOMEN WERE DRINKING EXCESSIVELY FOR ABOUT ½ AS LONG AS THE MEN IN THE STUDY**
    - **Alcohol Research and Health, 2003**

# **WOMEN vs MEN**

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- LIVER – 90%



- BREATH – 5%
- URINE – 5%
- SWEAT – SMALL AMOUNT



- RULE OF THUMB – ONE HOUR TO ELIMINATE 0.5 OZS. OF ETHYL ALCOHOL
- HOT COFFEE, COLD SHOWERS, EXERCISE???

# ALCOHOL ELIMINATION

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- **CEREBELLUM – COORDINATES MOVEMENT OF MUSCLES**
  - FINE MUSCLE MOVEMENT – FINGER TO NOSE
  - FINE MUSCLE MOVEMENT - MAINTAINING BALANCE



# ALCOHOL AND THE BRAIN

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- **MEDULLA ( BRAIN STEM) –**  
CONTROLS/INFLUENCES ALL BODY FUNCTIONS  
WE DO NOT THINK ABOUT, i.e. **BREATHING,**  
HEART BEAT, TEMPERATURE, etc.
- **EXCESSIVE ALCHOL CAUSES SLEEPINESS AND**  
CAN CAUSE UNCONSCIOUSNESS EVEN **DEATH**  
AS BAC INCREASES AND AFFECTS  
**RESPIRATORY CENTER OF THE BRAIN**

# **ALCOHOL AND THE BRAIN**

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- 5 OR MORE DRINKS ON ONE OCCASION FOR **MEN** OR 4 OR MORE DRINKS FOR **WOMEN** IN A ROW OR IN ABOUT 2 HOURS – 5/4 DEFINITION
- LESS COMMON DEFINITION - LEADING TO BAC OF 0.08

# **BINGE DRINKING**

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- **“90% OF ALL ALCOHOL CONSUMED BY TEENS IS DONE WHILE BINGE DRINKING”.**
  - CDC, 2011
- **NEW ALARM – TEENS PREFERENCE IN ALCOHOL IS NOW HARD LIQUOR vs BEER**
  - Michael Siegel PhD, Boston Univ., 2011
- **ER PHYSICIANS – KIDS ARE PRESENTING WITH BAC OF .3 - .4 (4X LEGAL LIMIT FOR DRIVING). AT THAT LEVEL 50% DIE**
  - Mary C. O’Brien MD, 2011

# **BINGE DRINKING**

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- **JUNGLE JUICE – MIXTURE – HARD LIQUORS + FRUIT JUICES. EVERCLEAR, ALCOHOL CONTENT AS HIGH AS 190 PROOF**
- **GOAL OF MANY TEENAGERS – GET AS DRUNK AS POSSIBLE, AS QUICKLY AND CHEAPLY AS POSSIBLE TO REDUCE SOCIAL ANXIETY**
- **ONE 23.5 OZ. CAN of FOUR LOKO = SAME AMOUNT OF AS 4.7 – 12 OZ. BEERS, SWEET AND CHEAP**
  - E. Listfield, Parade Magazine, 2011

# **BINGE DRINKING**

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- EVERY YEAR, ALMOST **700,000** COLLEGE STUDENTS ASSAULTED BY STUDENTS WHO HAVE BEEN DRINKING
- ABOUT **100,000** ARE VICTIMS OF ALCOHOL – RELATED SEXUAL ASSAULT OR DATE RAPE
  - National Institute on Alcohol Abuse, 2007

# **SUBSTANCE ABUSE ON COLLEGES CAMPUSES**

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- ILLEGAL IF UNDER 21 TO DRIVE WITH WHAT BAC LEVEL? **VARIABLES BY STATE - 0.0-0.02**
- ALL **50** STATES
- LICENSE SUSPENSION, REVOCATION, FINES & COMMUNITY SERVICE

# **ZERO TOLERANCE**

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- **FIRST CONVICTION – 30 Day License Suspension + Drunk Driving Program**
- **SECOND CONVICTION – License Revocation ONE YEAR**
- **THIRD CONVICTION – License Revocation THREE YEARS**
- **FOURTH OR SUBSEQUENT CONVICTIONS – 5 YEAR License Revocation**

**ZERO TOLERANCE ALABAMA**

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<http://www.thelaw.com/guide/criminal-law/dui-dwi-zero-tolerance-laws-by-state/>

# STATE ZERO TOLERANCE

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- ALCOHOL CONSUMPTION LINKED TO MORE THAN **60 DISEASES**
- **12 HEALTH RISKS OF CHRONIC HEAVY DRINKING**



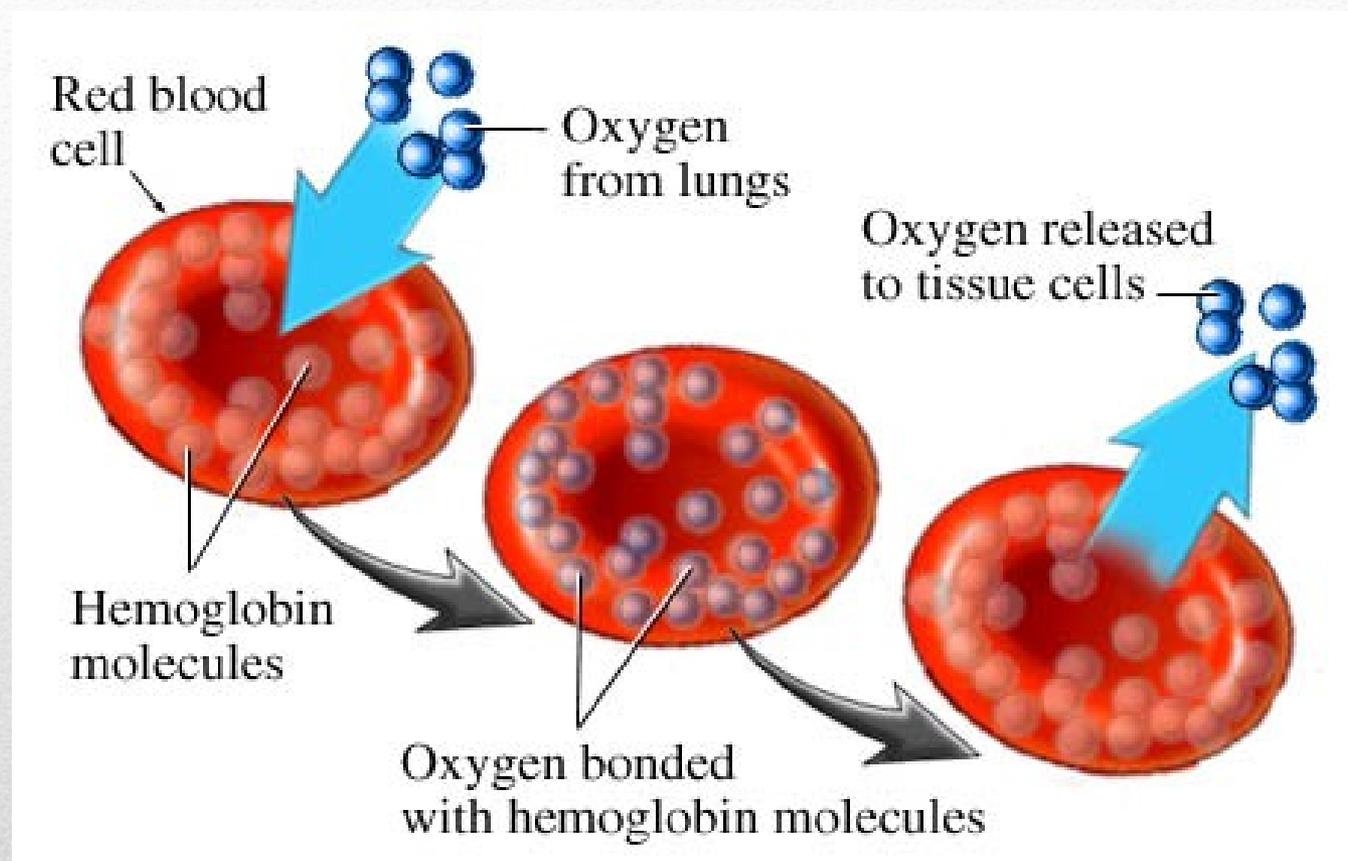
**IT'S NOT JUST THE LIVER**

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## 12 Health Risks of Chronic Heavy Drinking

1. Anemia
2. Cancer
3. Cardiovascular Disease
4. Cirrhosis
5. Dementia
6. Depression
7. Seizures
8. Gout
9. High Blood Pressure
10. Infectious Disease
11. Nerve Damage
12. Pancreatitis



# RBC, Hb & OXYGEN

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- **HEAVY DRINKING REDUCES NUMBER OF OXYGEN CARRYING RBC TO ABNORMALLY LOW LEVEL**
- **ALCOHOL STARVES RBC OF OXYGEN, THICKENS THE BLOOD (BLOOD SLUDGE) AND KILLS THE CELLS**
  - **FATIGUE, SHORTNESS OF BREATH & LIGHTHEADEDNESS**



# **RED BLOOD CELLS (RBC)**

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- **INCREASED RISK COMES FROM CONVERSION OF ALCOHOL TO ACETALDEHYDE – A POTENT CARCINOGEN**
  - Rehm, J. PhD, Univ. of Toronto, 2012
- **SITES INCLUDE - MOUTH, PHARYNX, LARYNX, ESOPHAGUS, BREAST & COLORECTAL**
- **RISK RISES EVEN HIGHER WITH TOBACCO USE**

# **CANCER**

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- “WE CAN CONFIDENTLY SAY THAT EVEN MODERATE ALCOHOL CONSUMPTION IS ASSOCIATED WITH A MODESTLY HIGHER RISK FOR BREAST AND COLORECTAL CANCER”. Susan Gapstur, PhD, MPH, American Cancer Society, 2011

# CANCER

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- HEAVY DRINKING (**BINGEING**) CAUSES PLATELETS TO CLUMP INTO BLOOD CLOTS – LEADS TO **HEART ATTACK OR STROKE**
- BINGE DRINKING **DOUBLED** RISK OF DEATH IN THOSE INITIALLY SURVIVING A HEART ATTACK  
Harvard Univ., 2005



# CARDIOVASCULAR DISEASE

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- HEAVY DRINKING CAN CAUSE **CARDIOMYOPATHY**– DEADLY CONDITION IN WHICH HEART MUSCLE WEAKENS AND CANNOT PUMP EFFICIENTLY AND THEN CAN FAIL
- HEART RHYTHM ABNORMALITIES – **ATRIAL OR VENTRICULAR FIBRILLATION** LEADING TO RAPID LOSS OF CONSCIOUSNESS AND DEATH WITHOUT IMMEDIATE TREATMENT

# **CARDIOVASCULAR DISEASE**

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- NORMALLY, LIVER BREAKS DOWN ALCOHOL IN BLOODSTREAM – **HARMFUL TO HARMLESS**
- ALCOHOL ABUSE - LIVER UNABLE TO FILTER **TOXINS QUICKLY ENOUGH**
- **CIRRHOSIS** – LIVER HEAVILY SCARRED AND UNABLE TO FUNCTION
- **HARD TO PREDICT - WOMEN SEEM TO BE ESP. VULNERABLE**

# **CIRRHOSIS**

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- **BRAIN IMAGING - SPECIFIC BRAIN REGIONS IN PATIENTS WITH ALD TO DETERMINE HOW BRAIN DISORDER - HEPATIC ENCEPHALOPATHY (HE) DEVELOPS**
- **CONFIRMED AT LEAST TWO TOXIC SUBSTANCES – AMMONIA & MANGANESE THAT HAVE ROLE IN DEVELOPMENT OF HE**
- **ALCOHOL-DAMAGED LIVER CELLS ALLOW EXCESS AMOUNTS OF THESE HARMFUL BYPRODUCTS TO ENTER THE BRAIN AND DAMAGE IT**
  - **NIAAA, 2004**

# **ALCOHOLIC LIVER DISEASE (ALD)**

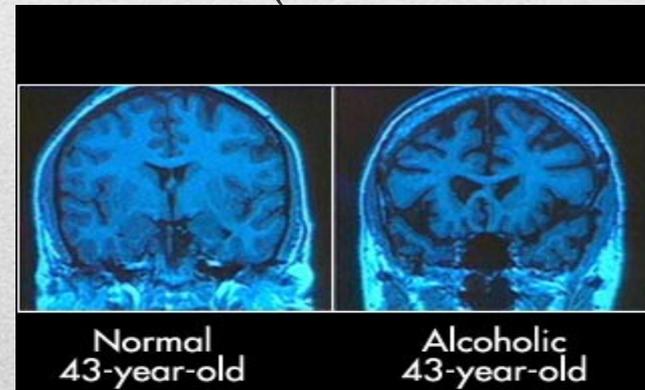
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- WITH AGING, BRAIN **SHRINKS** AT RATE OF **1.9% PER DECADE** (CONSIDERED NORMAL)
- HEAVY DRINKERS **SPEED** SHRINKAGE OF KEY BRAIN REGIONS RESULTING IN **MEMORY LOSS** + OTHER DEMENTIA SYMPTOMS
- **WERNICKE- KORSAKOFF SYNDROME – THIAMINE DEFICIENCY (80%)**
- HEAVY DRINKING - DEFICITS IN ABILITY TO **PLAN, MAKE JUDGEMENTS, SOLVE PROBLEMS & OTHER HIGHER ORDER ABILITIES** James C. Garbutl MD

# **ALCOHOL DEMENTIA**

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- **MRI REVEALS CONSISTENT ASSOCIATION BETWEEN HEAVY DRINKING AND PHYSICAL BRAIN DAMAGE**
- **IMAGING SHOWS MORE EXTENSIVE SHRINKAGE IN THE CORTEX OF THE FRONTAL LOBE (SEAT OF INTELLECTUAL FUNCTIONS)**



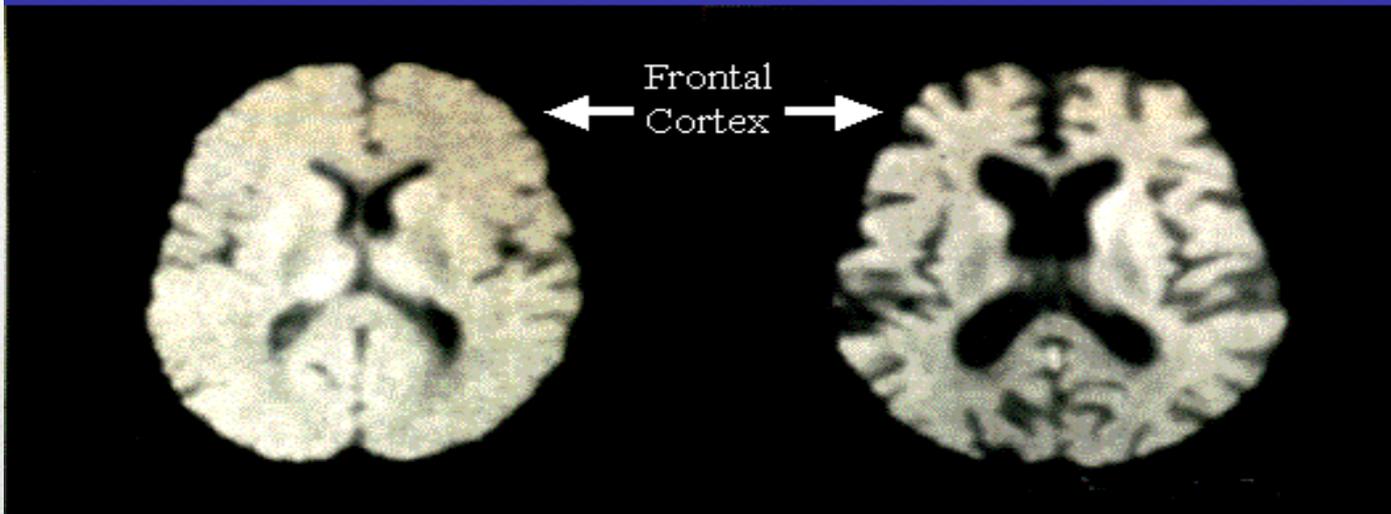
# ALCOHOL AND THE BRAIN

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## HUMAN BRAIN IMAGES

Moderate Drinker

Alcoholic



Axial magnetic resonance images from a healthy 57-year-old man (left) and a 57-year-old man with a history of alcoholism (right). D. Pfefferbaum



# BRAIN SHRINKAGE

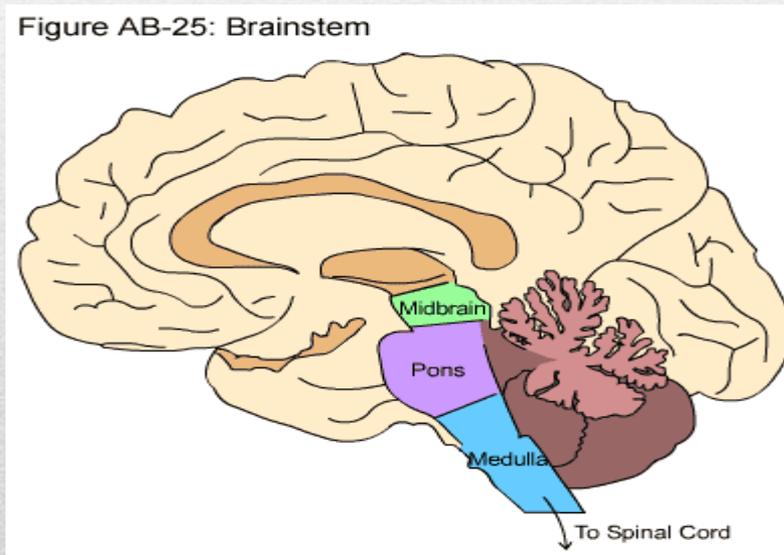
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- **MRI BRAIN SCANS OF 1,839 SUBJECTS AGED 34-88 SHOWED THAT THE MORE A PERSON CHRONICALLY DRINKS, THE MORE THE BRAIN VOLUME DECREASES, EVEN FOR MODERATE DRINKERS**
- **NO BENEFICIAL EFFECT OF EVEN SMALL AMOUNTS OF ALCOHOL ON BRAIN VOLUME**
  - Carol Paul, PhD, Wellesley College, 2007.

# **ALCOHOL AND THE BRAIN**

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- SHRINKAGE ALSO OCCURS IN **DEEPER** BRAIN REGIONS, INCLUDING THOSE ASSOCIATED WITH **MEMORY** + THE **CEREBELLUM** WHERE COORDINATION AND BALANCE ARE CENTERED



# ALCOHOL AND THE BRAIN

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- HEAVY DRINKING GOES HAND IN HAND WITH DEPRESSION – DEBATE WHICH COMES FIRST?
- NEARLY 1/3 OF PEOPLE WITH MAJOR DEPRESSION HAVE ALCOHOL PROBLEMS
  - National Institute on Alcohol Abuse and Alcoholism
- RECENT STUDY INDICATES THAT HEAVY DRINKING LEADS TO DEPRESSION
  - New Zealand Univ., 2010

# DEPRESSION

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- HEAVY DRINKING CAN BE A CAUSE OF EPILEPSY AND TRIGGER SEIZURES EVEN IN THOSE WITHOUT EPILEPSY
- CNS DEPRESSANT – TOO MUCH OR SUDDENLY STOPS = SEIZURE
- CAN ALSO INTERFERE WITH THE ACTION OF MEDICATIONS USED TO TREAT THE DISORDER

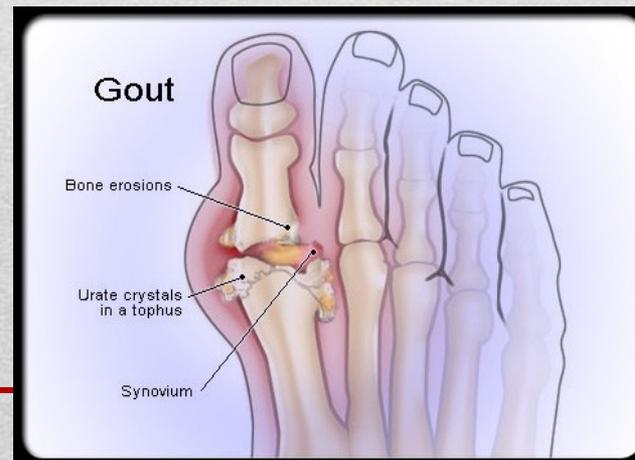
# SEIZURES

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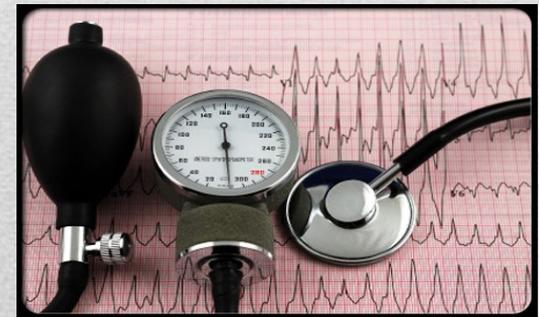
- **CAUSED BY FORMATION OF URIC ACID CRYSTALS IN THE JOINTS – PROVOKES INFLAMMATORY RESPONSE - USUALLY BIG TOE**
- **SOME CASES HEREDITARY, ALCOHOL CAN PLAY A ROLE**
- **ALCOHOL IMPEDES REMOVAL of URIC ACID & AGGRAVATES EXISTING CASES**
- **12 YEAR STUDY – 47,000 MEN; 2-4 BEERS/WK. INCREASED RISK BY 25%; 2/DAY INCREASED RISK 200%**
  - **Lancet, 2004**

# GOUT



- ALCOHOL CAN DISRUPT **SYMPATHETIC NERVOUS SYSTEM** WHICH CONTROLS:
  - **CONSTRICTION (BRAIN) AND DILATION (PERIPHERY)** OF BLOOD VESSELS IN RESPONSE TO STRESS, TEMPERATURE AND EXERTION
- **BINGEING CAN CAUSE BLOOD PRESSURE TO RISE – OVER TIME CAN BECOME CHRONIC**
- **HBP CAN LEAD TO KIDNEY AND HEART DISEASE + STROKE**

# **HIGH BLOOD PRESSURE (HBP)**



- **HEAVY DRINKING SUPPRESSES IMMUNE SYSTEM (EVEN 24 HRS. AFTER GETTING DRUNK)**
  - **TOEHOLD FOR INFECTIONS INCLUDING:**
    - TB, PNEUMONIA, HIV/AIDS & OTHER STIs
- **MORE LIKELY TO ENGAGE IN RISKY SEX**
- **3-FOLD INCREASE IN CONTRACTING STI**
  - Rehm, J. Univ. of Toronto, 2012



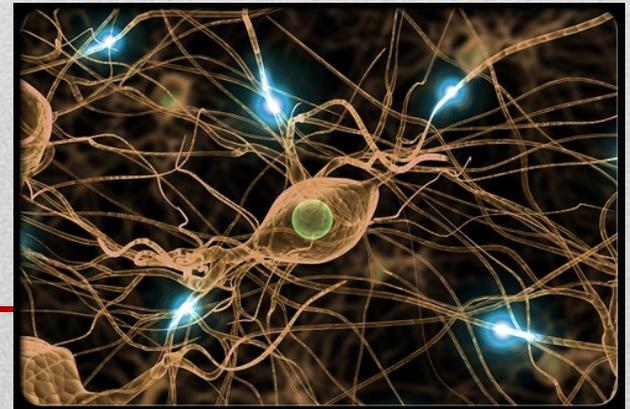
# **INFECTIOUS DISEASE**

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- **HEAVY DRINKING CAUSES:**
  - **ALCOHOLIC NEUROPATHY(PINS & NEEDLES FEELING IN EXTREMITIES)**
  - **MUSCLE WEAKNESS**
  - **INCONTINENCE**
  - **CONSTIPATION**
  - **ERECTILE DYSFUNCTION**
- **ALCOHOL NEUROPATHY MAY ARISE SINCE ALCOHOL IS TOXIC TO NERVE CELLS & DUE TO NUTRITIONAL DEFICIENCIES**

# **NERVE DAMAGE**

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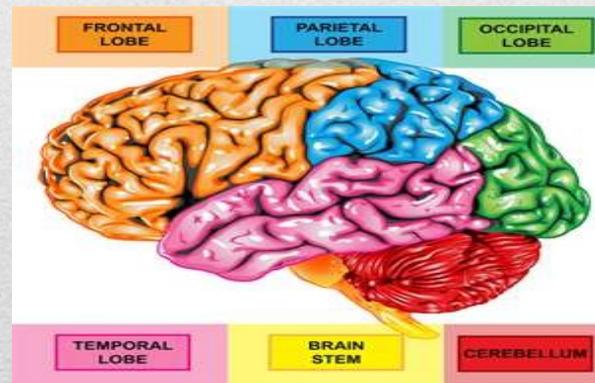
- **ALCOHOL CONSUMPTION CAUSES INFLAMMATION OF PANCREAS**
- **CHRONIC PANCREATITIS INTERFERES WITH DIGESTIVE PROCESS – CAUSES ABDOMINAL PAIN and PERSISTENT DIARRHEA**
- **SOME PANCREATITIS TRIGGERED BY GALLSTONES BUT ~ 60 -90% (CHRONIC) & 1/3 (ACUTE) FROM ALCOHOL CONSUMPTION**
- **PROPORTIONAL TO DOSE & DURATION OF CONSUMPTION**

# **PANCREATITIS**

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- “BINGE PATTERN EXPOSURE TO ETHANOL DURING ADOLESCENCE INDUCES BRAIN DAMAGE BY INFLAMMATORY PROCESSES AND CAUSES LONG-LASTING NEUROBEHAVIOURAL CONSEQUENCES”. European Journal of Neuroscience, 2007.



# ALCOHOL AND THE BRAIN

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- **YOUNGER SUBJECTS INGESTING ALCOHOL HAD A HARDER TIME RECOGNIZING WORDS FROM A LIST READ 20 MINS. EARLIER vs OLDER SUBJECTS WITH SAME DOSE**
- **THOSE UNDER 25 PERFORMED MARKEDLY WORSE THAN THOSE OVER AGE 30**
- **IF EFFECTS OF ALCOHOL VARIED THAT MUCH IN SUCH A NARROW AGE RANGE – THERE’S A COMPELLING REASON TO BELIEVE ITS EFFECTS ARE EVEN STRONGER IN ADOLESCENTS AND CHILDREN**
  - **Scott Swartzwelder PhD, Duke University, 2004**

# **ALCOHOL AND THE YOUNG BRAIN**

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- THE YOUNGER THE AGE, THE WORSE THE PERFORMANCE ON THE MEMORY TESTS WITH THE EQUIVALENT OF **2 DRINKS**
- BINGE DRINKING AFFECTS ADOLESCENT (12-24 YEARS) BRAINS MORE SEVERELY vs ADULT BRAINS

# **ALCOHOL AND THE YOUNG BRAIN**

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- “THERE IS NO OTHER TIME IN A PERSON’S LIFE WHEN THEY WILL BE CALLED UPON TO **LEARN** AND **ACQUIRE** INFORMATION MORE **RAPIDLY** THAN DURING THE **ADOLESCENTS** AND **EARLY ADULT YEARS** AND ONE OF THE MOST POWERFUL EFFECTS OF **ALCOHOL** IS ON THE **MEMORY**”.
- Scott Swartzwelder PhD, Duke University, 2004

# **ALCOHOL AND THE YOUNG BRAIN**

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- **ALCOHOL HAS LESS OF A SEDATIVE EFFECT IN ADOLESCENCE THAN IN ADULTS.**
- **TEENS AND YOUNG ADULTS INVOLVED MORE IN ACCIDENTS, FIGHTS, ACCIDENTS OF ALL KINDS AND UNWANTED AND UNPROTECTED SEX**
- **TEEN DRINKERS TYPICALLY SUFFER FROM GREATER IMPAIRMENT BEFORE PASSING OUT**

# **ALCOHOL AND BEHAVIOR**

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- **AHA RECOMMENDATION FOR ACCEPTABLE INTAKE - TO INGEST NO MORE THAN 2 DRINKS FOR MALES AND 1 FOR FEMALES DAILY**
- **MAY REDUCE RISK OF HEART DISEASE**
- **HOWEVER, 2/3 OF WOMEN AND 1/2 OF MEN EXCEED THAT AMOUNT**
- **THAT IS ASSOCIATED WITH A 70% INCREASED RISK OF HBP, HIGH TRIGLYCERIDES AND ABDOMINAL FAT**
  - CDC, 2008

**IS ALCOHOL GOOD FOR  
YOUR HEALTH???**

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- “Who Has Woe? Who Has Sorrow? Who Has Strife? Who Has Complaints? Who Has Needless Bruises? Who Has Bloodshot Eyes? Those Who Linger Over Wine, Who Go To Sample Bowls Of Mixed Wine.
- In The End It Bites Like A Snake and Poisons Like A Viper” Proverbs 23:29-30,32

# SOLOMON'S WISDOM

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**QUESTIONS??**

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