Joint Meeting of the National Advisory Council on Alcohol Abuse and Alcoholism, National Cancer Advisory Board, and National Advisory Council on Drug Abuse

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Cost and Scope of Alcohol-Related Problems

- 14% of people age 18+ met DSM-5 AUD criteria in past year
- ~ 88,000 people die annually from alcohol-related causes in the U.S.
- ~ 50% of all liver disease in the U.S. attributable to alcohol misuse
- Increase in the intensity of underage binge drinking and hospitalizations in last 10 years
- <10% of people with AUD get any treatment

Prevalence of disorder/disease

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Prevalence (Millions in the US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>15.7</td>
</tr>
<tr>
<td>Illicit drugs</td>
<td>7</td>
</tr>
<tr>
<td>Tobacco</td>
<td>31</td>
</tr>
<tr>
<td>Cancer</td>
<td>14.5</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Cost to society

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Cost (Billions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>249</td>
</tr>
<tr>
<td>Illicit drugs</td>
<td>193</td>
</tr>
<tr>
<td>Tobacco</td>
<td>295</td>
</tr>
<tr>
<td>Cancer</td>
<td>216.6</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>36</td>
</tr>
</tbody>
</table>

Alcohol Effects Across the Lifespan

NIAAA supports research to study how alcohol can affect health and well-being at various stages of life.

Lifespan Transcending Themes:
- Neurobiology
- Metabolism
- Genetics
- Epigenetics
- Epidemiology
- Health Services Research

Alcohol

- Prenatal Alcohol Exposure
- Underage / Binge Drinking
- Alcohol Use Disorder
- Organ Damage
- Medication Interactions

Environment

Genes
NIAAA Strategic Plan: 2017-2021
Strategic Priorities

• Identify **Mechanisms** of Alcohol Action, Alcohol-Related Pathology, and Recovery

• Improve **Diagnosis** and Tracking of Alcohol Misuse, Alcohol Use Disorder, and Alcohol-Related Consequences

• Develop and Improve Strategies to **Prevent** Alcohol Misuse, Alcohol Use Disorder, and Alcohol-Related Consequences

• Develop and Improve **Treatments** for Alcohol Misuse, Alcohol Use Disorder, Co-occurring Conditions, and Alcohol-Related Consequences

• Enhance the **Public Health Impact** of NIAAA-Supported Research
Key NIAAA Initiatives and Programs

1. Fetal Alcohol Spectrum Disorders – Prevention & Early Diagnosis
2. Underage and Binge Drinking – NCANDA, ABCD, CollegeAIM
3. Neurobiology of Alcohol Misuse and AUD
4. Genetics of Alcohol Misuse and AUD
5. Treatment and Recovery Research
6. Medications Development
7. Alcoholic Liver Disease
8. Alcohol and HIV/AIDS
9. Alcohol Biosensors
Surgeon General’s Report on Alcohol, Drugs, and Health

- First ever SGR addressing alcohol and other substance misuse, and SUDs

- NIAAA and NIDA played key roles in report development

- Presents state-of-the-science, with focus on:
  - Neurobiology
  - Prevention
  - Treatment
  - Recovery
  - Delivery of care

- Outlines future directions and recommendations for action
HBO Documentary on Risky Drinking

- Produced in conjunction with NIAAA and featuring NIAAA experts
- Described as a no-holds-barred look at AUD through the intimate stories of four people whose drinking dramatically affects their relationships
- Aims to provoke conversation about how to identify risky drinking and to suggest alternatives to a one-size-fits-all approach for treating it

Premiered December 19, 2016
Wearable Alcohol Biosensor Challenge

- Winning prototype submitted by BACtrack, a company known for designing and selling portable breath alcohol testers for consumer use

- Their entry, the BACtrack Skyn:
  - Worn on the wrist
  - Detects alcohol in sweat
  - Offers continuous, non-invasive BAC monitoring
  - Stores data to a smartphone via Bluetooth

- A Second Challenge is open (12/10/16 - 5/15/17)
  - To design a wearable sensor using technologies that detect alcohol non-invasively in blood or interstitial fluid
Eveningness and later sleep timing are associated with greater risk for alcohol and marijuana use in adolescence.
Initial Findings from NCANDA

Weaker functional amygdala-precuneus connectivity in youth who had exceeded NCANDA study entry criteria for drinking than youth who were no-to-low drinkers at entry.

117 youth in the exceeds drinking group had attenuated connectivity between the emotion network seed of the amygdala and default-mode network regions of the posterior cingulate cortex/precuneus relative to a subgroup of 117 no/low drinking youth matched to the drinkers in age, sex, education, ethnicity, and ratio of scanner manufacturer.

Müller-Oehring et al. Cerebral Cortex 2017; SRI-Stanford NCANDA Data Analysis Resource
College Binge Drinking and Blackout

- Past month binge drinking among college students:
  - Overall: 37.9%
  - Male: 39.4%
  - Female: 36.5%

- Blackouts are common:
  A 2012 survey of 26,000+ college students found that 32% experience a blackout each year (34% male, 31% female)

- Blackout frequency predicts other alcohol-related consequences

Source: Hingson et al., 2016, ACER

Table 3. Experienced Other Alcohol Problems According to Frequency of Blackouts in Past 6 Months: NEXT Generation Health Study, Wave 4 (N = 1,463, Drinkers)

<table>
<thead>
<tr>
<th>Blackout Frequency</th>
<th>None (N = 1,189)</th>
<th>1 to 2 (N = 218)</th>
<th>3 or More (N = 56)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Had a hangover</td>
<td>26%</td>
<td>78%</td>
<td>94%</td>
</tr>
<tr>
<td>Missed work/class</td>
<td>4</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>Got behind school/work</td>
<td>3</td>
<td>37</td>
<td>61</td>
</tr>
<tr>
<td>Did something they later regretted</td>
<td>11</td>
<td>58</td>
<td>76</td>
</tr>
<tr>
<td>Argued with friends</td>
<td>10</td>
<td>49</td>
<td>60</td>
</tr>
<tr>
<td>Damaged property</td>
<td>2</td>
<td>14</td>
<td>48</td>
</tr>
<tr>
<td>Trouble with police</td>
<td>1</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>Injured</td>
<td>4</td>
<td>16</td>
<td>55</td>
</tr>
<tr>
<td>Alcohol overdose</td>
<td>&lt;1</td>
<td>16</td>
<td>55</td>
</tr>
</tbody>
</table>

\*All relations p < 0.01.

\(^1\text{National Survey of Drug Use and Health, SAMHSA, 2016; } ^2\text{American College Health Association, 2012}\)
• **College Alcohol Intervention Matrix**: evidence-based decision guide and interactive website to help schools address harmful and underage student drinking

• **Rates nearly 60 individual- and environmental-level interventions** based on factors such as cost, effectiveness, and ease of implementation

• **NIAAA working with its College President’s Working Group to hold regional workshops to introduce CollegeAIM to institutional officials and show them how to use it**
Stages of the Addiction Cycle: Associations with Neurocircuits & Addictions Neuroclinical Assessment


Adapted from: Kwako LE et al. *Biological Psychiatry*, 80 (2016) 179-189
NIAAA Medications Development Program

• Division of Medications Development established to coordinate efforts to identify, screen, and evaluate compounds for treating AUD
  • Human laboratory screening studies to bridge the gap between preclinical and clinical trials
  • SBIR/STTR program to bridge the “valley of death” between basic and clinical research by facilitating studies leading to the development of an IND application to the FDA
  • NIAAA Clinical Investigations Group (NCIG) to streamline AUD medications development by conducting “fast success/fast fail” phase II clinical trials with 18 month turn-around time
    • launched a clinical trial of gabapentin in June 2015
• NIAAA’s intramural program conducts clinical studies on novel compounds with AUD treatment potential
• NIAAA disseminates information about treatment options including medications to health professionals and the general public
Novel AUD Targets by Stage of the Addiction Cycle

Dopamine receptors (DRD2)
GABA<sub>A</sub> receptors (GABRA2)
Opioid receptors (OPMR1)
Acetylcholine receptors (CNRNA5)
Glycine receptors (GLRA1)
Serotonin receptors (HTR3A)
Serine/Threonine Kinases (MTOR)
Cannabinoid receptors (CNR1)
GIRK channels (KCNJ6)

Norepinephrine receptor (ADRB2)
Hypocretin (Orexin) receptor (HCRTR1)
Neuropeptide Y receptor (NPY1R)
CRF receptor (CRHR1)
Kappa opioid receptor (OPRK1)
Substance P receptor (TACR1)
Nociceptin receptor (OPRL1)
Oxytocin receptor (OXTR)
Vasopressin receptor (AVPR1B)
Glucocorticoid receptor (NR3C1)
Neuroimmune factors (NFKB1)

Phosphodiesterases (PDE10A)
Protein kinases (PRKCE)
Transcription factors (CREB1, FOSB)
NMDA & AMPA receptors (GRIN2B, GRIA1)
Metabotropic glutamate receptors (GRM8)
Actin cytoskeleton (ACTB)
Matrix Metallopeptidase (MMP9)
Vasopressin Receptor Antagonist as Possible Treatment for AUD

- Multisite clinical trial of ABT-436, a novel V1b receptor antagonist

- ABT-436 significantly increased percentage of days abstinent

- Participants who reported high levels of stress responded better: decreased frequency of drinking and number of heavy drinking days
Coming Soon: NIAAA Treatment Navigator

• To assist people in finding AUD treatment, NIAAA is developing the NIAAA Alcohol Treatment Navigator℠

• One-of-a-kind resource will:
  – outline the features of evidence-based AUD treatment
  – describe the varied routes to recovery
  – provide tools for locating the most qualified treatment specialists
Identifying Factors that Facilitate or Inhibit Recovery from Alcohol Use Disorder

Gray Matter Volume Deficits Predict Time to Relapse in Alcohol-Dependent Patients

Rando K, Hong K-I, Bhagwagar Z, Li C-S R, Bergquist K, Guarnaccia J, Sinha R.

*Am J Psychiatry, 168:2, February 2011*
Alcohol Policy Information System

- APIS database tracks and facilitates research on alcohol-related policies at the state and federal levels

- Recently expanded to include recreational marijuana policies:
  - Regulatory agency
  - Permitted products
  - Cultivation restrictions
  - Retail sales
  - Pricing controls
  - Taxation
  - Underage prohibitions
  - Impaired driving prohibitions
  - Local authority

- Additional policies under consideration for inclusion:
  - Structure of distribution system
  - Industry makeup
  - Tracking systems
  - Health and safety labeling
  - Packaging
  - Advertising
  - Public consumption
  - Home delivery
  - Open container
Thank You!

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