Progress in Suicide Prevention

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Board of Directors:
AFSP, Gratitude America, ADAA

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American Psychiatric Publishing, Xhale, Clintara, CME Outfitters, Takeda

Patents:
Method and devices for transdermal delivery of lithium (US 6,375,990B1)
Method of assessing antidepressant drug therapy via transport inhibition of monoamine neurotransmitters by ex vivo assay (US 7,148,027B2)

Speakers Bureau:
None
The number of suicides in the United States in 2013 was 41,149.

It exceeds the rate of homicide greatly.

Suicide is the 10th leading cause of death in the United States.
Suicide Rates by Sex from 1981 to 2013

- Males
- Females
Suicide is considered to be the second leading cause of death among college students. 1100 college students died by suicide in 2009.

Suicide is the third leading cause of death for youth, 5-24 years old.

Suicide is the fourth leading cause of death for adults between the ages of 18 and 65.
Suicide Rates by Age from 2000 to 2013

Age Range
- Less than 14
- 15 to 24
- 25 to 44
- 45 to 64
- 65 to 84
- 85 or older
Number of Deaths, by Cause, 2002

- Asthma: 5,000
- HIV/AIDS: 14,095
- Parkinson's Disease: 17,997
- Suicide: 31,655
- Breast Cancer: 40,410
- Diabetes: 73,249

CAUSES OF DEATH

- Asthma
- HIV/AIDS
- Parkinson's Disease
- Suicide
- Breast Cancer
- Diabetes
A number of psychological autopsy studies have found that approximately 90% of all completed suicides could be retrospectively diagnosed with a major mental disorder.
Suicide Deaths by Method, 2013

- Firearm: 51.5%
- Poisoning: 16.1%
- Suffocation: 24.5%
- Other: 8.0%
Prediction is hard, especially when you’re talking about the future.

Yogi Berra
SUICIDE IS AN OUTCOME THAT REQUIRE SEVERAL THINGS TO GO WRONG ALL AT ONCE.

-- There is no one cause of suicide and no single type of suicidal person.

**Biological Factors**
- Familial Risk
- Serotonergic Function
- Neurochemical Regulators
- Demographics
- Pathophysiology

**Predisposing Factors**
- Major Psychiatric Syndromes
- Substance Use/Abuse
- Personality Profile
- Abuse Syndromes
- Severe Medical/Neurological Illness

**Proximal Factors**
- Hopelessness
- Intoxication
- Impulsiveness Aggressiveness
- Negative Expectancy
- Severe Chronic Pain

**Immediate Triggers**
- Public Humiliation Shame
- Access To Weapons
- Severe Defeat
- Major Loss
- Worsening Prognosis
REASONABLY FORMULATING A PATIENT’S RISK FOR SUICIDE REQUIRES BOTH AN UNDERSTANDING OF RESEARCH-BASED RISK FACTORS AND AN ARTICULATED RATIONALE FOR MAKING A JUDGMENT ABOUT THE PATIENT’S LEVEL OF RISK.

“Well, this is just going from bad to worse.”
— There is no valid actuarial system, e.g. no assessment scale with a cutoff score, that has any validity in the assessment of suicide risk. Rating scales may, however, be helpful to establish the degree to which a patient has an individual risk factor, e.g., is depressed (e.g. Beck Depression Scale) or hopeless (e.g., Beck Hopelessness Scale), as a part of a complete risk evaluation.
DETERMINATION OF RISK

Psychiatric Examination

Risk Factors

Protective Factors

Specific Suicide Inquiry

Modifiable Risk Factors

Risk Formulation
TRIGGERING EVENTS

— Loss of social support (friends, family)
— Loss of identity/meaning (job, career, financial, legal problems)
— Loss of independence/autonomy, or function (major health problem)
— Acute psychiatric symptoms (psychosis, depression, panic…)
— Loss of hope/Sense of failure
— Date of a significant past interpersonal loss: Anniversary reaction
• Acute stressors (in the context of vulnerability)
  — Real/threatened losses of valued/desired attachments
  — Acute disappointments
  — Threat of legal action/incarceration
  — Embarrassments, humiliations, threat to status/ego
  — Threat of/actual loss of job/financial loss
  — Chronic health problems with pain, deterioration, stigmatization, cognitive impairment, dependency (males), debilitation, burdensomeness…
Perpetuating risk factors

Typically, these are historic and static/unchangeable, but are associated with higher lifetime risk for suicide – they increase the patients vulnerability to be in a suicidal state:

— Family history (of violence, suicide, suicidal behavior, mental disorder [requiring hospitalization])
— Previous suicidal behavior (risk is greater if multiple past attempts, and/or high lethality of or low rescuability of any prior attempt)
— Skill deficits (social, cognitive…)
— Multiple/chronic personal losses
— History of developmental trauma (e.g., abuse, neglect, family violence, early bullying, victimization)
— Prior history of violence – toward others (assaultive behaviors, bullying), toward animals…
SEROTONIN

- Raphe nuclei
  - Medulla (pain)
- Sleep
- Eating
- Sexual behavior
- Mood
- Suicidal Behavior
Serotonin transporters measured with $^{123}\text{I} \beta$-CIT and SPECT

Sagittal image through brainstem and basal ganglia

Coronal image
Reduced Brainstem $[^{123}\text{I}]\beta$-CIT Binding in Depression

DECREASED BRAINSTEM AND PUTAMEN SERT BINDING POTENTIAL IN DEPRESSED SUICIDE ATTEMPTERS USING [$^{11}$C]-ZIENT PET IMAGING

Jonathon A. Nye,1 David Purselle,2 Christophe Plisson,1 Ronald J. Voll,1 Jeffrey S. Stehouwer,1 John R. Votaw,1 Clinton D. Kilts,2 Mark M. Goodman,1,2 and Charles B. Nemerooff2*

Background: Deficits in serotonergic neurotransmission have been implicated in the pathogenesis of depression and suicidality. The present study utilized a novel positron-emission tomography (PET) ligand to quantitate and compare brain regional serotonin transporter (SERT) binding potential in depressed patients with a past history of suicide attempts to that of healthy comparison subjects. Method: We used [$^{11}$C]-ZIENT PET to label SERT in the serotonergic cell body rich brainstem, and forebrain projection fields. Quantitative PET emission data from 21 adults (10 healthy controls and 11 drug-free patients with major depression) was used for group comparison. SERT binding potential (BPND) in eight MRI-based brain regions of interest (ROI) were compared in high-resolution PET images. Results: SERT binding potential was significantly decreased in the midbrain/pons (P = .029) and putamen (P = .04) of depressed patients with a past suicide attempt relative to comparison subjects. Forebrain SERT binding was also reduced in the patient sample, though these region effects did not survive a multiple comparison correction. Conclusion: These results suggest that decreased availability of the brainstem and basal ganglia SERT represents a biomarker of depression and thus confirm and extend the role of dysregulation of brain serotonergic neurotransmission in the pathophysiology of depression and suicide. Depression and Anxiety 30:902–907, 2013. © 2013 Wiley Periodicals, Inc.
Childhood Abuse, Household Dysfunction, and the Risk of Attempted Suicide Throughout the Life Span: Findings From the Adverse Childhood Experiences Study

Shanta R. Dube, MPH; Robert F. Anda, MD, MS; Vincent J. Felitti, MD; Daniel P. Chapman, PhD; David F. Williamson, PhD; Wayne H. Giles, MD, MS
Conclusions: A powerful graded relationship exists between adverse childhood experiences and risk of attempted suicide throughout the life span. Alcoholism, depressed affect, and illicit drug use, which are strongly associated with such experiences, appear to partially mediate this relationship. Because estimates of the attributable risk fraction caused by these experiences were large, prevention of these experiences and the treatment of persons affected by them may lead to progress in suicide prevention.
In a prospective-longitudinal study of a representative birth cohort, we tested why stressful experiences lead to depression in some people but not in others. A functional polymorphism in the promoter region of the serotonin transporter (5-HT T) gene was found to moderate the influence of stressful life events on depression. Individuals with one or two copies of the short allele of the 5-HT T promoter polymorphism exhibited more depressive symptoms, diagnosable depression, and suicidality in relation to stressful life events than individuals homozygous for the long allele. This epidemiological study thus provides evidence of a gene-by-environment interaction, in which an individual's response to environmental insults is moderated by his or her genetic makeup.

SUICIDE BY FIREARMS

- The risk of suicide of a household member is increased nearly five times in homes with guns (versus those without).

  (Kellerman, 1992)

- Guns in the home, particularly loaded guns, are associated with increased risk for suicide by youth, irrespective of whether these youth have identifiable mental health problems or suicidal risk factors.

  (Brent et al, 1993)
Figure 3. Method specific suicide rates per 100,000 Danish women, from 1970 to 2000, selfpoisoning.

- Suicide rate, car exhaust, women
- Suicide rate, household gas, women
- Rate other drugs, women
- Suicide rate, barbiturates, women
- Suicide rate, antidepressant, women
- Suicide rate, analgetics, women
Figure 1. Method-specific suicide per 100,000 men, Denmark 1970-2000, self-poisoning.
# STUDY OF SUICIDES IN DANISH OCCUPATIONS

<table>
<thead>
<tr>
<th>OCCUPATION</th>
<th>NO. OF CASES / CONTROLS</th>
<th>RATE RATIO</th>
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<tbody>
<tr>
<td>Medical doctors</td>
<td>36/344</td>
<td>2.73 (1.77-4.22)</td>
</tr>
<tr>
<td>A residual group without occupation</td>
<td>6884/132916</td>
<td>2.47 (1.87-3.28)</td>
</tr>
<tr>
<td>Nursing associate professionals</td>
<td>40/530</td>
<td>2.04 (1.34-3.11)</td>
</tr>
<tr>
<td>Bricklayers and stonemasons</td>
<td>26/388</td>
<td>1.76 (1.09-2.84)</td>
</tr>
<tr>
<td>Painters and related workers</td>
<td>26/388</td>
<td>1.73 (1.07-2.79)</td>
</tr>
<tr>
<td>Cooks</td>
<td>21/335</td>
<td>1.72 (1.03-2.88)</td>
</tr>
<tr>
<td>Carpenters and joiners</td>
<td>56/993</td>
<td>1.49 (1.02-2.18)</td>
</tr>
<tr>
<td>Mail carriers and sorting clerks</td>
<td>30/642</td>
<td>1.25 (0.80-1.97)</td>
</tr>
<tr>
<td><strong>Primary education teaching professionals</strong></td>
<td>57/1496</td>
<td>1</td>
</tr>
<tr>
<td>Secretaries</td>
<td>43/1198</td>
<td>0.97 (0.65-1.46)</td>
</tr>
<tr>
<td>Shop salespersons and demonstrators</td>
<td>33/1138</td>
<td>0.79 (0.51-1.22)</td>
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RELATIVE RISK OF COMPLETED SUICIDE

- Discharge from Psychiatric Hospital

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<tr>
<th>Time</th>
<th>Odds Ratio</th>
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<tbody>
<tr>
<td>Last week</td>
<td>278*</td>
</tr>
<tr>
<td>Last month</td>
<td>133</td>
</tr>
<tr>
<td>Last year</td>
<td>34-61</td>
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</tbody>
</table>

- Particularly for brief hospitalization for affective disorder with symptom improvement; limited external resources
- Qin & Nordentoft (2005)
21st Century Medicine

Prevention

Disease susceptibility

Interventions

Tipping Points

Treatments

Clinical Manifestations

Clinical Testing

Molecular Markers/Imaging

Genetics/Genomics

Organ Integrity (%)

Birth

Time

Death