UNDERSTANDING THE EFFECTS OF OIL SPILLS ON HUMAN HEALTH

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Major Themes

• The unity of human health and the environment;

• We are now better able to respond to the public health consequence of disasters, including the social and cultural issues that affect health - but we have a long way to go;

• The majority of the expertise needed for disaster response, just as the majority of the impact, will always be local.
Algal Blooms Affecting Human Health

- Ciguatera Toxin
- Red Tide (brevetoxins)
- Cyanobacteria
- *Pfiesteria piscicida* (?)
Issues in Ecotoxicological Testing of a Dispersant in the Gulf

- Fate and transport
- Hazard
  - To individual species
  - To ecosystem
- Concentration
- Persistence
- Salinity
- Temperature
- Pressure
- Degradation products
  - Of chemical
  - Of crude oil following interaction with chemical
- Impact on Dead Zone
2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous:

<table>
<thead>
<tr>
<th>Hazardous Substance(s)</th>
<th>(w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Distillates, petroleum, hydrotreated light</td>
<td>10.0 - 30.0%</td>
</tr>
<tr>
<td>- Propylene Glycol</td>
<td>1.0 - 5.0%</td>
</tr>
<tr>
<td>- Organic sulfonic acid salt (Proprietary)</td>
<td>10.0 - 30.0%</td>
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Corexit is a Poster Child for the Reformation of the US Toxic Substances Control Act
Social, Cultural, and Psychological Impacts of the Exxon Valdez Oil Spill

LAWRENCE A. PALINKAS, MICHAEL A. DOWNS, JOHN S. PETTERSON, and JOHN RUSSELL

The sociocultural and psychological impacts of the Exxon Valdez oil spill were examined in a population-based study of 594 men and women living in 13 Alaskan communities approximately one year after the spill occurred. A progressive “dose-response” relationship was found between exposure to the oil spill and the subsequent cleanup efforts and the following variables: reported declines in traditional social relations with family members, friends, neighbors and coworkers; a decline in subsistence production and distribution activities; perceived increases in the amount of and problems associated with drinking, drug abuse, and domestic violence; a decline in perceived health status and an increase in the number of medical conditions verified by a physician; and increased post-spill rates of generalized anxiety disorder, post-traumatic stress disorder, and depression. Alaskan Natives, women, and 18–44 year olds in the high- and low-exposed groups were particularly at risk for the three psychiatric disorders following the oil spill. The results suggest that the oil spill’s impact on the psychosocial environment was as significant as its impact on the physical environment. The results also have important theoretical and pragmatic implications for the understanding and mitigation of adverse impacts of long-term processes of sociocultural change.

Key words: Alaska, disasters, psychosocial stress, sociocultural change, subsistence
Ethnic Differences in Stress, Coping, and Depressive Symptoms after the Exxon Valdez Oil Spill

LAWRENCE A. PALINKAS, Ph.D., JOHN RUSSELL, Ph.D., MICHAEL A. DOWNES, Ph.D., AND JOHN S. PETTERSON, Ph.D.

This study assessed levels of depressive symptomatology in a household probability sample of Alaskan Native (N = 188) and Euro-American (N = 371) residents of 13 communities in Alaska. Our objective was to examine ethnic differences in both the association between depressive symptomatology and exposure to the Exxon Valdez oil spill and subsequent cleanup efforts, and in the role of family support as a moderator of exposure to this technological disaster. Level of exposure was significantly associated with mean Center for Epidemiological Studies-Depression Scale scores in both Natives (p < .05) and Euro-Americans (p < .01). Both ethnic groups also reported significant declines in traditional relations with increasing levels of exposure (p < .001). However, Natives had a significantly higher mean Exposure Index score than Euro-Americans and were more likely to report working on cleanup activities, damage to commercial fisheries, and effects of the spill on subsistence activities. Depressive symptomatology was associated with reported participation in cleanup activities and other forms of contact with the oil in Natives, and reported damage to commercial fisheries, use of affected areas, and residence in a community in geographic proximity to the spill in Euro-Americans. Perceived family support was not directly associated with depressive symptoms in either ethnic group, but did serve to buffer the effects of exposure on depressive symptoms in Euro-Americans. The results suggest that cultural differences play an important role in determining the psychosocial impacts of a technological disaster, particularly with respect to exposure, appraisal of an event as stressful, perceived family support as a moderator of stress, and expression of depressive symptomatology.

Responder Safety and Health: Preparing for Future Disasters
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Peritraumatic and persistent panic attacks in acute stress disorder
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WTC Medical Monitoring and Treatment Program: Comprehensive Health Care Response in Aftermath of Disaster
Jacqueline M. Moline, MD, MSc,¹ Robin Herbert, MD,¹ Stephen Levin, MD,¹ Diane Stein, BS,¹ Benjamin J. Luft, MD,² Iris G. Udasin, MD³ and Philip J. Landrigan, MD, MSc³

Health Care and Social Issues of Immigrant Rescue and Recovery Workers at the World Trade Center Site
Rafael E. de la Hoz, MD, MPH, MSc
Scottie Hill, LCSW
Rachel Chasan, MD, MPH
Laura A. Bienenfeld, MD, MPH
Aboaka A. Afliaka, MD, MPH
Elizabeth Wilk-Rivard, MD, MPH
Robin Herbert, MD
Disability and Posttraumatic Stress Disorder in Disaster Relief Workers Responding to September 11, 2001 World Trade Center Disaster

Susan Evans, Ivy Patt, Cezar Giosan, Lisa Spielman, and JoAnn Difeòe
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Epidemiologic Research on Man-made Disasters: Strategies and Implications of Cohort Definition for World Trade Center Worker and Volunteer Surveillance Program

David A. Savitz, PhD, Rachael T. Oxman, BA, Kristina B. Metzger, PhD, MPH, Sylvan Wallenstein, PhD, Diane Stein, BS, Jacqueline M. Moline, MD, MSc, and Robin Herbert, MD

Enduring Mental Health Morbidity and Social Function Impairment in World Trade Center Rescue, Recovery, and Cleanup Workers: The Psychological Dimension of an Environmental Health Disaster

Jeanne Mager Stellman, Rebecca P. Smith, Craig L. Katz, Vansh Sharma, Dennis S. Charney, Robin Herbert, Jacqueline Moline, Benjamin J. Luft, Steven Markowitz, Iris Udasin, Denise Harrison, Sherry Baron, Philip J. Landrigan, Stephen M. Levin, and Steven Southwick
Broadening Federal Programs Related to Human Health and the Environment

- **EPA:** Environmental Justice Program
- **NIEHS:** Hazardous Waste Worker Training Program
- **White House:** President’s Executive Order on Sustainability
- **CDC:** Centers for Public Health Preparedness; Preparedness and Emergency Response Research Centers.
- **HRSA:** Public Health Training Centers
Centers for Public Health Preparedness (CPHP) and Preparedness & Emergency Response Research Centers (PERRC)
Examples of SPH Response to Oil Spill

- Resource for media
- Expert testimony
- Training
- Evaluation
- Technological Capacity
- Surge Capacity/Student Volunteers
- Evidence base
Effects of the Exxon Valdez Oil Spill

“When the Exxon Valdez ran aground in Prince William Sound, it spilled oil into a social as well as a natural environment”

Social Determinants of Health (World Health Organization)

“...the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies and politics”

(see Satcher, D. *Public Health Reports* 125:6-7, 2010)
Environmental Justice
Indisputable truisms

• There are more environmental hazards in disadvantaged communities
• There are more individuals with poor health in disadvantaged communities
• Individuals with poor health tend to be more susceptible to environmental pollutants
Policy Implications of the Three Truisms

• Environmental health research should be focused in disadvantaged communities

• To be successful, environmental health research requires the cooperation of disadvantaged communities
Three Levels of Community Participation in Academic Research

1) We will tell you the outcome of our study affecting your community

2) We will let you participate in the study

3) Working with you, we will together decide what research should be done and how to do it
Alcoa Lost Workday Performance 1987-2004
Impediments to obtaining information relevant to the health effects caused by this disaster – and relevant to the next disaster
Impediments

• Lack of background information
• Failure to ask the right questions early enough
• Urgency of environmental/economic issues
• Failure to seek and engage local expertise
• Failure to evaluate actions and outcomes
• Multisectorial, multidisciplinary, multi-governmental, multi-everything else
• Unwillingness to say “I don’t know”
• Barriers caused by litigation
Dr John Snow and the Broad St Pump

• John Snow is famous as the “founding father” of epidemiology because of his scientific investigation of a disastrous cholera epidemic in London in 1853 which led to identification of cholera as a water-borne disease.

• He is credited with removal of the pump handle from the water source that was causing the cholera outbreak.
Dr John Snow and the Broad St Pump

• In fact, Dr Snow did not remove the pump handle. Instead, he convinced the local public health authority who had it removed.

• Without the action of this local public health authority, Dr Snow’s scientific achievements would today be little more than a footnote.