1. Disaster Occupational Health

   - World Trade Center Terrorist Attacks
     - Significant particulate exposure; dense urban environment, largely professional responders in good physical health; but lots of spontaneous volunteers from across the nation; recovery involved construction specialties

   - Hurricane Katrina
     - Destruction; population exodus and civil unrest; inundation and fungal exposure

   - Deepwater Horizon Disaster
     - 600,000 square mile disaster area; exposure assessment mostly negative; scant pre-placement medical screening; heat stress biggest health issue; first time OSHA and NIOSH issued joint guidance

Six Areas of Discussion

- Disaster Response
  - How can you tell when response is really over?

- Influenza
  - Should vaccination be mandatory?

- Nanotechnology
  - When do we know enough about risk to regulate?

- Genome & Exposome
  - Chicken or egg?

- Aging Workforce
  - What are the safety and health implications?

- Risk Regulation
  - Who has the better model, the US or the EU?
Populations of Concern

NIOSH Activities

- Rostering
- Health Hazard Evaluations
- Guidance
  - OSHA-NIOSH Interim Guidance
- Health Surveillance
- Toxicity Testing

Deepwater Horizon Response Worker Rostering

Exposure Model for HHEs

- On the Water
  - Source Control
  - Burning
  - Booming and Skimming
- On the Land
  - Shore and marsh cleanup
  - Decontamination
  - Waste Stream Management
Interim Guidance for Protecting Deepwater Horizon Response Workers and Volunteers

NIOSH & OSHA Joint Guidance

For more information on general disaster response, consult the NIOSH Emergency Response Topic Page at http://www.cdc.gov/niosh/topics/emergency.html
Dispersants

• Purpose
  – Enhance amount of oil that physically mixes into the water column
  • Reduces risk that oil will contaminate shoreline habitats or to come into contact with fish, birds and sea mammals
  • Increases exposure of water-column and benthic biota to spilled oil
  • Use represents a decision to increase the hydrocarbon load on the water column while reducing it on the coastal wetland


NIOSH DWH Toxicity Testing

• Acute animal testing (rats):
  • Dispersant (Nalco Corexit 9500A)
  • Crude Oil from the source (sample from well head obtained May 23rd)
  • Dispersant/crude oil mixture

• Inhalation studies:
  • Measuring pulmonary, cardiovascular, and CNS outcomes

• Dermal studies:
  • Assessing hypersensitivity and immune-mediated responses

WTC DUST: Particle Size

Large particles >> Small (respirable)
Alkaline pH (lye)
Larger the size, the more alkaline the pH
1-4% by mass were respirable particles PM$_{2.5}$
Even large particles reached lower airways
  – High concentrations
  – Mouth breathing

<table>
<thead>
<tr>
<th>Particle Size (MMAD µm)</th>
<th>2.5</th>
<th>10</th>
<th>53</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>&gt;8.1</td>
<td>10</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Sources: Chen et al; Lancet 2002;360:S37-8.
Gavett et al; Environ Health Perspect 2003;111:981-91
Principal Findings

- Lung function was measured in firefighters and EMS workers who responded to the collapse of the World Trade Center towers in New York on September 11, 2001.

- There was initial marked loss in lung-function measures in a substantial minority of study subjects without substantial recovery during the following 7 years.

Disaster Occupational Health: Multi-Federal Agency Model Program

- Responder Safety and Health
  - Pre-Deployment
    - Qualifications
    - Medical screening
  - During Deployment
    - Rostering
    - Exposure Assessment
    - Surveillance
  - Post-Deployment
    - Cohort medical follow-up for chronic health effects triggered by specific indicators
2. Influenza

- Is the word “pandemic” counterproductive?
- H5N1 Influenza – Is it coming?
- What is the relative contribution of droplets vs. aerosols in influenza transmission?
- What is current CDC Guidance?
- Should CDC Guidance become an OSHA standard?
- Should vaccination be mandatory for healthcare providers?

What Does “Pandemic” Mean?

» Indicates the extent of geographical spread around the world

» Does not mean pathogenicity or virulence

» WHO declared pandemic level 6 in June 2009

» Concept of geographical spread versus severity is confusing to the media and to the public

---

**Pandemic Severity Index**

<table>
<thead>
<tr>
<th>Case Fatality Ratio</th>
<th>Projected Number of Deaths* US Population, 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥2.0%</td>
<td>≥1,800,000</td>
</tr>
<tr>
<td>1.0 - &lt;2.0%</td>
<td>900,000 - &lt;1,800,000</td>
</tr>
<tr>
<td>0.5 - &lt;1.0%</td>
<td>460,000 - &lt;900,000</td>
</tr>
<tr>
<td>0.1% - &lt;0.5%</td>
<td>90,000 - &lt;460,000</td>
</tr>
<tr>
<td>&lt;0.1%</td>
<td>&lt;90,000</td>
</tr>
</tbody>
</table>

* Assumes 30% illness rate

---

**“Expected” Avian Influenza (H5N1)**

- In 1997, influenza A viruses of H5N1 subtype first isolated from a patient in Hong Kong
- Highly contagious and deadly pathogen in poultry and has reached epizootic levels in Asian domestic fowl
- Spread to wild bird populations across Europe and Africa, but no cases yet in US birds
- Human spread has been limited:
  - WHO reports 505 confirmed cases
  - 168 Indonesia, 119 Viet Nam, 112 Egypt, 39 China
  - 300 deaths for a 59.4% case fatality rate!
Transmissibility & NIOSH Research

- Transmissibility
  - Refers to ability of virus to pass from one person to another person

- Routes for Influenza
  - Large droplets
  - Small particle aerosols
  - Direct Contact

- What is the relative contribution of each?

NIOSH Influenza Research

- Transmissibility Study
  - Droplet v. Aerosol Debate
  - Respirable aerosol sampler
  - Live virus laboratory analysis
    - Lab v. clinical studies

- N95 vs. Surgical Masks
  - Effectiveness
    - Laboratory Tests
    - Large-scale clinical trial at VA facilities

Aim 1: Measure airborne influenza virus in healthcare facilities

- Aerosol sampler developed at NIOSH Morgantown.
  - Separates particles by size.
- Aerosol sampling conducted at healthcare facilities.
  - Hospital emergency department.
  - Urgent Care walk-in clinic.
  - Two dental clinics.
- Stationary and personal aerosol sampling were performed.
- Aerosol samples were analyzed using quantitative PCR.
  - PCR detects the genetic material (RNA) of the influenza virus.
  - PCR does not tell you if the virus is infectious.

Aim 2: Determine how much influenza virus patients expel when they cough

- A system was built to collect cough-generated aerosol particles.
- Patients were asked to seal their mouth around the mouthpiece and cough using as much of the air in their lungs as possible.
- Cough aerosol particles were then collected using an aerosol sampler.
Results of influenza cough aerosol study

- Influenza RNA was detected in coughs from 38 of 47 influenza patients (81%).
- 65% of the influenza RNA was in the respirable size fraction.
- Viable influenza virus was cultured from the cough aerosols generated by 2 of 21 subjects with influenza.
  - Shows that at least some patients do cough out potentially infectious aerosols.
  - Better collection methods and more sensitive assays would likely increase this number.
- This work will continue during the next influenza season with a focus on the viability of the virus.

Aim 3: Simulate a healthcare worker exposed to a coughing infectious patient

Simulated medical examination room contains:
- Cough aerosol simulator to represent a coughing patient.
- Breathing mannequin to simulate a healthcare worker.
- Aerosol particle counters to monitor particle spread.
- Breathing machine can be outfitted with different types of personal protective equipment.

Particles inhaled while wearing no mask, surgical mask & N95 respirator

- Coughing and breathing systems were 6 feet apart and facing each other.
- Plot shows concentration of aerosol particles at mouth of breathing mannequin.
- Surgical mask admitted ~20% of particles.
- N95 respirator blocked virtually all particles.
- Similar results are seen for other masks and respirators and for all positions of the breathing simulator.

Spread of particles in room after cough

- Coughing and breathing systems were 6 feet apart and facing each other.
- Breathing machine wearing N95 respirator and operating at 32 liters/minute.
- Plot shows concentration of 0.3 to 0.4 µm KCl aerosol particles at different locations after a single cough.
Simulated Examination Room: Future Work

- Test different types of personal protective equipment such as PAPRs and face shields.
- Measure the effects of room ventilation.
- Study the persistence and viability of aerosols containing live influenza virus under different environmental conditions.

Aim 4: Study generation of infectious aerosols during medical procedures

- Certain medical procedures may generate potentially infectious aerosols.
  - Bronchoscopy.
  - Suctioning.
  - Intubation.
- Data on the actual potential for disease transmission is very limited.
- Work is now underway to measure the amount and size of aerosol particles produced during medical procedures.
- In the future, will look at infectivity of aerosols.

NIOSH Studies in Healthcare Facilities

- Airborne particles containing influenza virus RNA were found throughout the Emergency Department and Urgent Care clinic during influenza season.
- Exposure levels were highest in the locations and at the times when the patient loads were heaviest.
  - On the busiest day at the Urgent Care clinic, airborne influenza virus RNA was detected in every room.
- 42% to 53% of the influenza virus RNA was in respirable particles (< 4 µm).

Method to Aerosolize Virus and Monitor Viability

- Simple cost-effective setup vs an Environmental Chamber
- Can evaluate the collection efficiency of samplers
- Can test multiple parameters for ability to maintain viability, i.e. effect of humidity, temperature, aerosol particle size
- Can devise techniques to improve the preservation of viability of collected virus

Advantages of the Calm Air Chamber

- Can evaluate the collection efficiency of samplers
- Can test multiple parameters for ability to maintain viability, i.e. effect of humidity, temperature, aerosol particle size
- Can devise techniques to improve the preservation of viability of collected virus
Viral Plaque Assay

- Isolate virus released from cells 20 h post-infection
- No waiting for plaque development

Isolate viral RNA

qPCR to amplify viral M gene

Sensitivity
- 1-2 plaques
- $10^3-4$ copies of M gene

Timeframe
- 6-8 days

Infect MDCK cells with virus

Stain plaques & count

Timeframe
- 2 days

Disadvantages
- Inefficient reinfection to form visible plaques
- Plaque size small and not well defined
- Plaques overlap - inaccurate counting

Disadvantages
- Correlation with initial titer is unknown
- More costly?

Increasing the Sensitivity of Viral Detection

2010 Updated CDC Guidance:
Prevention Strategies for Seasonal Influenza in Healthcare Settings

- 75 Fed Reg 35,497 (22 June 2010)
  - Notice posted for public comment
  - Comment period (June 22 – July 22)
- Content essentially similar to 2007 isolation precautions document (no N95 requirement as seen in 2009 Interim Guidance)
- Airborne precautions are now extended to aerosol-generating procedures performed on patients with seasonal influenza
- Final posted on 17 Sep 2010:

Mandatory CDC Guidance?

- Should CDC’s voluntary infection control guidance for healthcare institutions be made mandatory?
  - OSHA Spring 2010 Regulatory Agenda
  - Should OSHA rely solely on CDC Guidance for provisions of an Infectious Diseases Standard?
  - Cal/OSHA’s Aerosol Transmissible Diseases Standard
  - http://www.dir.ca.gov/Title8/5199.html

Mandatory Influenza Vaccination?

- ID groups favor annual vaccination for HCW:
  - Society for Healthcare Epidemiology of America (SHEA)
  - Infectious Diseases Society of America (IDSA)
  - American Academy of Pediatrics (AAP)
- Position Papers General Argue:
  - HCW vaccination is an important patient safety issue
  - Voluntary approaches do not work
  - HCW risk is small relative to patient risk of influenza
  - Moral obligation for HCW to get vaccinated
    - Except for medical contraindications like vaccine allergy
    - Benefits outweigh any HCW concerns about coercion, impact on employer-employee relationship, and individual religious or personal belief objections.
- Likely to continue to be a prominent and contentious issue
Mandatory Vaccination?

- Mandatory bargaining issue
  - 2009 legal cases resulted in injunctions against unilateral employer actions to force vaccinations on HCWs.
- Religious and privacy issues
  - Hard hat requirements and 1st Amendment issue
- Reliance on vaccine with only 50-60% range of efficacy may actually increase transmission

3. Nanotechnology

- Mar 2009:
  - New Edition of Approaches to Safe Nanotechnology
- Nov 2009:
  - Progress Toward Safe Nano in the Workplace
- January 2010:
  - Strategic Plan Update
- Genotoxicity Studies
  - Raises the “C-word”?

### Nanotechnology

<table>
<thead>
<tr>
<th>Natural</th>
<th>Anthropogenic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Incidental</td>
</tr>
<tr>
<td>Forest Fires</td>
<td>Combustion engines</td>
</tr>
<tr>
<td>Volcanoes</td>
<td>Incinerators</td>
</tr>
<tr>
<td>Ocean Spray</td>
<td>Jet engines</td>
</tr>
<tr>
<td>Viruses, macromolecules</td>
<td>Welding fumes</td>
</tr>
</tbody>
</table>

Size of nanoparticles relative to microorganisms and cells

- **Influenza virus** 75-100 nm
- **Tuberculosis bacteria** 2,000 nm
- **Red blood cells** 8,000 nm
New properties of matter based on size and surface area

- Each side= 1 M
  - Mass= 43,000 lb
  - Surface Area (SA)= 6 m²
  - 8 ft x 8 ft room

- Each side= 1/4 M
  - Mass= 43,000 lb
  - SA= 24 m²

- Each side= 1 nm
  - Mass= 43,000 lb
  - SA= 6 billion m²
  - 2500 miles
  - State of Delaware= 2490 miles²

Steps to protect workers from hazards of an emerging technology

1. Anticipate & identify potential hazards
2. Take precautions
3. Assess effectiveness of precautions
4. Clarify knowledge of hazards
5. Determine risks
6. Clarify risk management practices
7. Establish standard risk management practices
8. Continuously evaluate evidence & approaches

Epidemiologic research
Occupational health surveillance
Establish exposure registries

Ultrafine and nanoparticles: Clearance; Translocation; Reactivity

- Alveolar type
- Alveolar type
- Surfactant
- Alveolar air space
- Macrophages
- Blood-air barrier: ~200 nm thick

Carbon Nanotube Toxicity

Whole body inhalation exposure to SWCNT elicited acute inflammation combined with early progressive fibrosis and granulomas in mice.

**Carbon Nanotubes: NIOSH Criteria Document**

- SWCNTs more fibrogenic than an equal mass of ultrafine carbon black or fine quartz
- Recommended Exposure Limit under development
- If a worker were exposed to SWCNTs at the graphite PEL (5 mg/m³), lung burdens equivalent to those in the mouse would be achieved after only a few months.

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**In Vitro Genotoxicity of SWCNTs**

SWCNT alters # spindle poles from normal 2 to 4

Red= spindle tubulin; blue = DNA; black = SWCNT


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**Human Occupational Disease and Nanoparticles**

Song Y, Li X, Du X. Eur Respir J 2006;43:559-567

- 5-13 month exposure to a chemical "paste" mixture containing undefined 30 nm "nanoparticles"
- Nanoparticles (?) found in lung tissue and fluid
- 2 of 7 exposed died
- Further studies are needed

[www.cdc.gov/niosh/blog/nsb02409_nano.html](http://www.cdc.gov/niosh/blog/nsb02409_nano.html)
**In Vitro** Genotoxicity of SWCNTs

Accumulation of SWCNTs at bridge between two dividing cells

![Figure 4e](image)

(Sargent et al. Environ. Mol. Mutagen., 2009)

Centrosome Fragmentation: six instead of normal two

![Figure 5e](image)

(Sargent et al. Environ. Mol. Mutagen., 2009)

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### Medical Screening and Hazard Surveillance for Workers Potentially Exposed to Engineered Nanoparticles

- **NIOSH** recommends for workplaces where a potential exposure may occur:
  - Conduct a needs assessment
  - Take practical measures to control exposures
  - Conduct hazard surveillance as a basis for implementing controls
  - Consider implementing established medical surveillance approaches to help assess whether controls are effective.

- **U.S. Department of Energy**
  - Issued Notice in January 2009 providing for safe handling of unbound engineered nanoparticles
  - Requires DOE:
    - Establish a process to maintain registries of all personnel designated as nanomaterials workers
    - Offer medical surveillance to all nanomaterial workers

### Examples of NIOSH field investigations

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Type of Particle, Morphology</th>
<th>Size of Particle</th>
<th>Range of “Potential” Exposure Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Research lab</td>
<td>Carbon Nanofibers</td>
<td>Approx. 100 nm diameter, 1–10 microns long</td>
<td>50–80 µg/m³ Total Carbon</td>
</tr>
<tr>
<td>Metal Oxide Manufacturer</td>
<td>TiO₂, Lithium Titanate powder</td>
<td>100–300 nm</td>
<td>&lt;100 nm: 1.4 µg/m³ (TiO₂)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total dust: 4–45 µg/m³ (TiO₂)</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Carbon Nanofibers</td>
<td>Approx. 100 nm diameter, 1–10 microns long</td>
<td>15 – 1800 µg/m³ Total carbon</td>
</tr>
<tr>
<td>Research and Development lab</td>
<td>Quantum Dots, spheres</td>
<td>2–8 nm</td>
<td>ND</td>
</tr>
<tr>
<td>Metal Oxide Manufacturer</td>
<td>Manganese, Silver, Nickel, Cobalt, iron oxides, spheres</td>
<td>8–50 nm</td>
<td>67 – 3619 µg/m³ Mg, Ag, Al, Ni, Co, Fe</td>
</tr>
<tr>
<td>Research and Development lab (Pilot Scale)</td>
<td>Aluminum, spheres</td>
<td>50–100 nm</td>
<td>40 – 276 µg/m³ Al</td>
</tr>
<tr>
<td>Research and Development lab</td>
<td>Elemental metal, Silver, copper, TiO₂</td>
<td>15–40 nm</td>
<td>ND</td>
</tr>
<tr>
<td>Filter Media Manufacturer</td>
<td>Nylon 6 Nanofiber</td>
<td>70–300 nm diameter, continuous length</td>
<td>ND</td>
</tr>
</tbody>
</table>
**4. Genome v. Exposome**

- Human Genome Project
  - Clinical tests
- New Laws
  - GINA
  - ADA Amendments Act
- Genetic Susceptibility
  - Health Standards

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**Exposome**

**Emerging Science for Environmental Health Decisions**

- Workshop: February 25-26, 2010
- The Exposome: A Powerful Approach for Evaluating Environmental Exposures and Their Influences on Human Health

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**Genome and Exposome Interactions in Disease Development**

- Study of the exposome
  - Measures of all the exposures of an individual in a lifetime and how those exposures relate to disease.
- Exposomics relies on other fields like genomics; metabolomics; lipidomics; transcriptomics and proteomics.

**Exposomics**

- Common threads of these fields are:
  - Use of biomarkers to determine exposure, effect of exposure, disease progression, and susceptibility factors;
  - Use of technologies that result in large amounts of data; and
  - Use of data mining techniques to find statistical associations between exposures, effect of exposures, and other factors such as genetics with disease.
- Exposomics could also potentially include the study of exposures in the environment that might improve or enhance health.
Research Needs

- Develop and characterize biomarkers.
- Develop improved study tools and increased data sharing.
- Develop standardized criteria for study design and reporting.
  - A standardized manner for the collection and storage of data that incorporates information on epidemiology, genetics, biomarkers and exposure will allow for more holistic determination of exposure and improve our knowledge on the interaction of factors that lead to disease like the standardized approach for collection, analysis and dissemination of microarray data for genomics (called minimum-information-about-a-microarray-experiment (MIAME)).
- Improvement of all exposure assessment tools to comprehensively assess relationships among health outcomes and the many factors of exposure would aid in the knowledge about the insults in our environment, provide information concerning potential exposures, and provide an avenue for prevention.

5. WorkLife

- Hazards
  - Persistent
  - Emerging
- Employment
  - Flexible v. Precarious
  - Innovate v. Misclassify
  - Globally Competitive
- Workforce
  - Age-Related Health
  - Generational Attitudes
  - OSH Challenges
  - Social Benefits

Occupational Safety & Health Act
29 U.S.C. 651(b)

- Congress declares it to be its purpose and policy
  - To assure as far as possible every working man and woman in the Nation safe and healthful working conditions and
  - To preserve our human resources--
  
(5) By providing for research in the field of occupational safety and health, including the psychological factors involved, and by developing innovative methods, techniques, and approaches for dealing with occupational safety and health problems.

Workforce Challenges

Limited availability
Chronologically gifted
Health-challenged Young Workers
Growing Shortage of U.S. Workers

Expected Labor Force and Labor Force Demand

Source: Employment Policy Foundation analysis and projections of Census/BLS and BEA data.

Screeching to a Halt:
Growth in the Working-Age Population

Source: Deloitte Research/UN Population Division (http://esa.un.org/unpp/)

It's 2008: Do You Know Where Your Talent Is? Why Acquisition and Retention Strategies Don't Work, p.6

Dramatically Different Patterns of Growth by Age

Percent Growth in U.S. Population by Age: 2000-2010

1. Declining number of mid-career workers
2. Few younger workers entering
3. Rapid growth in the over-55 workforce

Source: U.S. Census Bureau, 2008

. . . Continuing Into the Future

Percent Growth in U.S. Workforce by Age: 2000-2020

Source: U.S. Census Bureau
“Sudden” Boom in Life Expectancy

Life Expectancy at Birth: 1000 - 2000

And a Dramatic Drop in Birth Rates

Total Fertility Rate: 1960 ▼ and 2000 ▼

Why? The Baby Boom Pattern

The Boom Years: 1946-1964

Health Challenged Young Workers
Childhood Obesity by Country

Diabesity and the Future Workforce

- 39 States with 40% of young adults considered to be overweight or obese in just last decade!
  - In Kentucky, Alabama and Mississippi, >50% young adults are overweight
- Medical Consequences:
  - High Blood Pressure
  - High Fats in the Blood
  - Type 2 Diabetes (formerly called adult-onset)
  - Hepatic steatosis epidemic (fat deposits in the liver)
  - Sleep apnea (too much fat around the upper airway)
- Psychological stress
- Musculoskeletal disorders
  - what the old and the young worker share
**Too Fat to Fight**

- Since 1995, proportion of recruits who failed their physical exams because they were overweight has risen by nearly 70%.

- Being overweight is now the leading medical reason for rejection.

**Aging Productively**

**Aging: A Balance of Factors**

- Possible Limitations
  - Mental Capacity & Cognitive Limitations
  - Chronic Conditions
  - Physical Capacity

- Compensating Factors?
  - Attitude
  - Judgment
  - Flexibility
  - Interest in learning new things
Mental Capacity

- Laboratory Tests
  - Cognition speed
    - Information retrieval slower, unless material is familiar
  - Learning and recall slower, but equally successful in the end
  - Greater retention, higher learning achievement and more likely to complete a new field of study than younger workers

Mental Capacity: Relevance to On-the-Job Performance

- Lab tests do not translate well to actual work settings
- Factors other than psychometric cognitive abilities appear important to perform well at work
  - How well worker gets along with co-workers
  - Desire to perform well
- Individual measures are quite sensitive to occupational class
Age and Chronic Conditions: How healthy are older workers?

Physical Capacity: Can Older Workers Keep Up?
- **Physiology Facts**
  - Maximal strength at 20-30 years
  - $O_2$ uptake reduced to 70% (max) by 65 years
  - Older adults work closer to capacity!
- **Decreased Performance, Yes But …**
  - For physically demanding work only
  - Work *uncommonly* demands maximal effort
- **Non-physical advantages that older workers bring to a job are rarely measured in studies!**

Physical Capacity: Match Task to Ability
- **Maintaining musculoskeletal health will be increasingly important**
- **Workers abilities matched to the job**
  - Results in less morbidity
  - Based on practical ergonomics principles
  - Accommodation thinking not fully developed in industry
    - May change with ADA Amendments Act of 2008
    - Increases chances lawsuit will go to trial
Aging Workforce and Social Security

- Social Security
  - In 1935, average life span at birth was 62
  - So, retirement benefits started at 65!
  - In 2010, figure has risen to 78.4 years and growing
  - Will impact U.S. Federal deficit
- Nations are banning early retirement and raising age
  - Greece @ 55 years
    - Plans to raise age to 63 and ban early retirement altogether
  - Other developed nations following suit?
    - French National Assembly voted to raise age from 60 to 62 by 2018
    - Disadvantages workers in physically demanding jobs

Mental Retirement

- “Use it or lose it” (popular and scholarly literature)
  - Stave off normal cognitive aging or dementia by engaging in cognitively demanding activities
  - Converse: Un-demanding environment may fail to impede or even accelerate the process of cognitive decline
- Hypothesis that people can maintain their cognitive abilities through mental exercise is not proven, but suggestive
- 2010 Journal of Economic Perspectives' paper addresses the question of whether retirement leads to cognitive decline
  - Uses cross-national comparable surveys of older persons from US, UK and eleven EU countries in 2004

NIOSH WorkLife Centers

- University of Iowa Healthier Workforce Center for Excellence
  - http://www.public-health.uiowa.edu/hwce/
- Center for the Promotion of Health in the New England Workplace
  - At the University of Massachusetts
    - http://www.uml.edu/centers/cph-new/
  - At the University of Connecticut
    - http://www.oehc.uchc.edu/healthywork/index.asp
- Harvard School of Public Health Center for Work, Health and Wellbeing
  - http://centerforworkhealth.sph.harvard.edu/
- Veterans’ Administration, OPM & OMB
Employee Wellness Practices: What's the Evidence?

- Evidence:
  - More than opinion, anecdote or testimonial

- “…Growing body of empirical evidence*
  - Large proportion of diseases are preventable (risks are modifiable)
  - Risk-dependent diseases are costly & reduce worker productivity
    within short time window
  - Targeting risk behaviors can decrease costs and increase
    productivity
  - Worksite health promotion and disease prevention programs save
    companies money and produce + ROI

* Goetzel &Reuters, Value in Health Care, Institute of Medicine (2010)

Integrating Promotion & Protection

- Workers’ (modifiable) disease risks increased by exposure to occupational risks
- Workers at highest risk of work hazards are more likely to engage in (modifiable) health risks
- Workers at highest risk of work hazards are more likely to live in higher risk communities
- For workers’ at highest risk, integrating protection and promotion increases participation and program effectiveness

E.g. Protection & Promotion

- Respiratory protection programs that address tobacco use
- Ergonomics programs that discuss arthritis management
- Stress management efforts that seek to diminish workplace stressors, first, personal stressors second, then build worker resiliency
- Comprehensive health screenings for work and life risks
- Full integration of clinics, behavioral health, traditional safety, health promotion, mentoring, EAP, nutrition, disability and workers compensation programs
- Integrated training and prevention programs for falls, motor vehicle safety, first aid, hearing conservation, stretching, flexibility and lifting programs

6. Risk Regulation: Whose Model is Better?

- In 1970, adopting a occupational health regulation was easy
- Conformed to Administrative Procedures Act and OSH Act
- Brief notice and comment rulemaking
- 1970 vision not the reality today
Adding to the APA

- Procedural Requirements
  - Additional requirements have been added by Courts, Congress or President
- Analytical Requirements
  - "Reasoned Explanation" – Benzene case
  - Regulatory Flexibility Act
  - Regulatory Impact Analysis (Ex Order 12291) and Ex Orders 12498, 12666, 12630, 12612 & 12606
- Science Review Requirements
  - FACA, FOIA and Information Quality Act
  - Information Quality Guidelines, Peer Review Bulletin & Risk Assessment Principles Memorandum
- Substantive Review Requirements
  - Judicial Review: From Zero to “Hard Look” Doctrine (State Farm, 1983)
  - Congressional Review Act
  - Ex Orders 12498 & 12666 require agencies to submit all rules to OMB for review
  - Statistical Practices Bulletin
  - Good Guidance Practices Bulletin

Fundamental Issue 40 Years Later

- Aims of OSH Act have not been fulfilled
- Was the OSH Act of 1970 more aspirational than practical?
  - Product of its time
  - Fusion of labor law and public health principles
  - Contains a stunning set of principles:
    - Every man and woman is entitled to safe and healthful working conditions
    - Employers are responsible for work being free from all recognized hazards

OSH Risk Regulation in 2010

- No empirical studies of the comparative burdensomeness of rulemaking 1970 vs. 2010
- No doubt the pace of OSH rulemaking has significantly slowed
- Causes are uncertain, but may include:
  - Lack of political will?
  - Lack of resources devoted to standards setting?
  - Added rulemaking requirements since 1970s for all Federal agencies which has affected OSHA disproportionately?

OSH’s Spring 2010 Reg Agenda (Health)

- Prerule
  - Beryllium
  - Methylchloride
  - Bloodborne Pathogens (610 Review)
  - Diacetyl and Food Flavorings
  - Infectious Diseases
  - Injury and Illness Prevention Program
  - Recording and Reporting Requirements (Modernizing Reporting)
- Proposed Rule
  - Crystalline Silica
  - Hazard Communication (GHS)
- Final Rule
  - Musculoskeletal Disorders (MSD) Column
- Long-Term Actions
  - Combustible Dust
E.U. -- REACH

- "No data, no market"
- Reverses burden:
  - Instead of government proving harm post-marketing, manufacturers have to show safety pre-marketing
- EPA is considering REACH principles in TSCA reauthorization
- Congress is also considering REACH principles

Thank You for Your Attention!