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Strengthening the Connection between Air Quality and Health Effects Science

- Additional collaborations needed
- Key research questions
- Improved information flow
- Team approach
- Improve protection of Public Health
- Achieve better air-quality management

Environmental Health Science Determinants for the 21st Century*

- Population Growth
- Command and Control
- Take It or Leave It
- Toxin Based
- DNA Damage
- Disease
- Powerless Epidemiology
- Single Agent
- Unidirectional Mechanisms
- Exposure-Based Cohorts
- Exposure Surrogates
- Effluent Measurement
- Source Assumptions
- Secondary Prevention
- Population Stability
- Stakeholder Guided
- Options (analysis)
- Disease-Based
- DNA Function
- Health
- Powerful Epidemiology
- Multiple Agent
- Multidirectional Mechanisms
- Susceptibility and Dose Based Cohorts
- Dose Measures
- Indicator Measurements
- Source Attribution
- Primary Prevention

* Goldstein, 2002

Challenges – Research

- Air Quality
 - Role (including interactions) of organic components of air pollution
 - Early characterization of “Natural Experiments”
 - Emissions to Dose
 - Emerging new air contaminants (ie.nanotech products)
- Health Effects
 - Role of air pollutants in initiating illness/disease
 - proteomic & metabolomic markers of exposure/dose
 - Effects of low (or varying) level, chronic exposures and development of chronic disease
 - Genetics of Susceptibility

Regulatory Challenges

- Ensure that we are regulating the most likely substance(s) that cause or may cause illness/disease
- Identifying data needs (research and monitoring) to support intervention / regulation
- Are exposures changing (time/space)
- Use of biomarkers (exposure / response)

Opportunities for Collaboration

- Biomarkers
 - Of exposure - to well characterized pollutants (single and multi-pollutants) and develop BM-dose responses (over time)
 - Of response – in alternate organ systems ie. neurological, immunological, endocrine (beyond inflammation) // public health indicators(?)
 - Linkages between molecular biologists, chemists & biochemists (occupational health model)
- High Density Health/Exposure Studies
 - Combining advanced epidemiologic designs with high intensity “exposure/biomarker” profiling

Strengthening the Connection between Air Quality and Health Effects Science

- Additional collaborations / Team Approach
 - Absolutely (multi and inter disciplinary)
 - Centers of Excellence / focused investments
- Key research questions
 - Depend on purpose (risk, mechanisms, regulatory)
- Improved information flow
 - Propose: focused “forums series” ie. methods
- Improve protection of Public Health
 - Action on the right issues
 - Developing biomarkers/indicators of impact (benefit and risk)
- Achieve better air quality management
 - Clear targets
 - Regular reporting of information locally and regionally

- **Can Lessons from Public Health Disease Surveillance Be Applied to Environmental Public Health Tracking? Beate Ritz, Ira Tager, and John Balmes**

- **Abstract**

Disease surveillance has a century-long tradition in public health, and environmental data have been collected at a national level by the U.S. Environmental Protection Agency for several decades. Recently, the Centers for Disease Control and Prevention announced an initiative to develop a national environmental public health tracking (EPHT) network with "linkage" of existing environmental and chronic disease data as a central goal. On the basis of experience with long-established disease surveillance systems, in this article we suggest how a system capable of linking routinely collected disease and exposure data should be developed, but caution that formal linkage of data is not the only approach required for an effective EPHT program. The primary operational goal of EPHT has to be the "treatment" of the environment to prevent and/or reduce exposures and minimize population risk for developing chronic diseases. Chronic, multifactorial diseases do not lend themselves to data-driven evaluations of intervention strategies, time trends, exposure patterns, or identification of at-risk populations based only on routinely collected surveillance data. Thus, EPHT should be synonymous with a dynamic process requiring regular system updates to **a) incorporate new technologies to improve population-level exposure and disease assessment**, *b)* allow public dissemination of new data that become available, *c)* allow the policy community to address new and emerging exposures and disease "threads," and *d)* evaluate the effectiveness of EPHT over some appropriate time interval. It will be necessary to weigh the benefits of surveillance against its costs, but the major challenge will be to maintain support for this important new system. *Key words:* environmental health, evaluation, intervention, registries, surveillance. *Environ Health Perspect* 113:243-249 (2005). doi:10.1289/ehp.7450 available via <http://dx.doi.org/> [Online 2 December 2004]