

ADVANCING RESEARCH ON MIXTURES: New Perspectives and Approaches for Predicting Adverse Human Health Effects



NIEHS Mixtures Workshop Closing Remarks: What did we learn and what's next?

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NIEHS Strategic Planning - Overview

- Planning for Institute direction for next 5 years
 - New Mission and Vision statements
 - Strategic Goals and implementation plans
 - <http://www.niehs.nih.gov/about/od/strategicplan/index.cfm>
- Three phase process
 - I. Broad-based stakeholder input (February-July)
 - Visionary Ideas solicited on the Web
 - Stakeholder Community Workshop July
 - II. Draft Mission, Vision, and Strategic Goals (October)
 - Strategic Planning Workshop Oct 13-14
 - III. Develop Implementation Strategies



Strategic Planning

Development of Themes

- Basic Research on Human Health and Disease
- Exposure Science and the Exposome
- Translational Science: Linking Biological Pathways and Bridging the Gaps to Activities that Move toward Actual Health Outcomes
- Collaborative and Integrative Approaches for Conducting Research
- Data Management and Analysis
- Environmental Health Disparities, Environmental Justice, and Climate Change
- Training of the Environmental Science Workforce
- Communication and Outreach



Major Themes across sessions

- Mixtures not a new concept
 - Existing portfolio of grants and projects, e.g. GuLF, DBP's, etc
 - Grand vision of mixture research to enable Exposome
- Understanding the enormity of the challenge with mixtures
 - Modeling all permutations not necessary
 - Defining the real world conditions that create mixtures
 - Better technologies for characterizing mixtures
 - Subdermal chips
 - iPhone apps
 - Others
 - External versus internal exposures



Major Themes across sessions

- Innovative approaches for analyzing and modeling the biological effects of mixtures
 - Both bottom up and top down approach
 - New mathematical, statistical, and computational tools for estimating the effect of mixtures
 - Estimate concentration, potency, and synergism associated with numerous components of mixtures
 - Disentangling the effects understand which components are responsible for the effects
 - EWAS

Major Themes across sessions

- Managing “data rich” experiments
 - Federated data bases to manage the data
 - Innovative bioinformatics tools
- Studying reference populations
 - Epidemiology experiments to generate hypotheses
 - Genetics and epigenetics
 - Other environmental factors, e.g. diet, physical activity, infectious disease, psychosocial stress
 - Better model organisms that go beyond rodents and single inbred backgrounds



Major Themes across sessions

- Windows and routes of exposure are critical
- In vitro versus in vivo approaches
 - Think beyond one versus the other
 - Need for high throughput in vitro systems
 - Validation and understanding limitations in vitro
 - Limitations of in vivo approaches
- Systems-based approaches for studying mixtures
- Cross disciplinary efforts



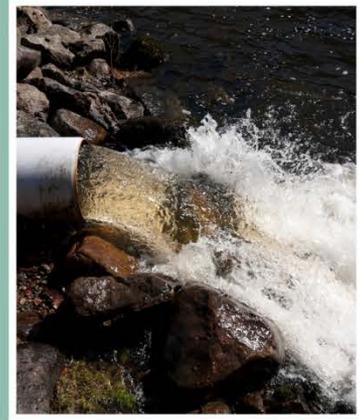
Major Themes across sessions

- Total exposure
 - All routes
 - All sources
 - All chemicals, endogenous and exogenous
 - Differential responses from the host
 - Genetics
 - Genomics
 - Nutritional
 - Psychosocial
 - Infectious disease

Where do we go from here?

- Workshop report
- Possible formation of an External Working Group consisting of members from academia, government, industry, non-profit, and other stakeholders
- Contact key organizer's of other mixtures workshops/meetings to discuss synthesis of information gained in the last year
 - EPA Multipollutant Science and Risk Analysis Workshop,
 - SOT 50th Anniversary Meeting
 - NAS Mixtures and Pathways Meeting
 - International Toxicology of Mixtures Conference
- Incorporation of knowledge gained here in future NIEHS mixtures research agenda

THANK YOU



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