Priority Topic 13: Exposure - Yay!

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Subtopic numbers:

5 Environmental/geospatial informatics

14 Wireless technologies to assess environmental exposures

19 Does/response application to environmental health

21 Human variability: sources and contribution to differential susceptibility to exposures to environmental agents

27 Environmental justice and health disparities strategy and grant program

30 Traffic related air pollution and human disease

31 Healthy buildings and communities

32 Indoor air quality

33 Novel modeling techniques in environment and health science

47 Exposure science

58 Develop novel technologies and methodologies to detect and analyze (real-time) multiple exposures and their human health effects

71 Environmental pressure over space and time—taking advantage of novel technologies

79 Exposure science and the exposome

82 Environmental light: is NIEHS research focused enough on environmental light and its interaction with chemicals, compounds, and organisms in the environment?

84 Workplace exposure to particulate agents

88 Next steps for exposure biology

93 Remotely-sensed and GIS data

Recommended Strategic Goal:

Lead the advancement of the state-of-the-art for characterizing exposures to promote health and prevent disease

- Address totality of exposures: physical, chemical, biological agents, psychosocial stressors, neighborhood stressors, lifestyle factors, etc.
- Use State of the art approaches
- Take a multi-level systems approach: Focus on multiple levels of organization: Systems science approach.
    - Need to understand what the determinants of exposures across individuals, organizations, biological systems, etc.
    - Focus on built environment and social environment
- Understand historical exposures
- Focus on exposures across the life course
- More work on vulnerability and susceptibility including environmental health disparities
- Assess differential burden, exposure, risks, effects, and health outcomes
- Exposure assessment is more than biological monitoring – not a panacea
- Integration of human and ecological exposure assessment
- Having these tools can change the way we do environmental epidemiology to promote health better
- Promoting health = facilitating prevention, intervention and treatment
- Need to collect relevant exposure data to make decisions

Three major categories emerged:

4. Developing new Tools: 5, 33, 93, 58, 14, 72, 71
    a. Challenge = antiquated tools currently used. Develop state of the art exposure assessment tools and technologies
    b. Ability to quantitate personal environment, space and time, and the provision of exposure technology to environmental epidemiology and the community
    c. Integrated complex exposures to multiple agents and stressors over the lifecourse
5. Exposure science: 79, 47, 88, 19, 21, 87, 27
    a. Understanding environmental components of disease
    b. Understand cumulative exposures and risks
    c. Exposure to multiple agents and stressors including social stressors
    d. Assess differential burden, exposure, risks, and health outcomes
    e. More work on mechanisms
    f. Include systems science
    g. Include lifestyle exposures
    h. Focus on positive exposures
6. Specific environments and populations (Air pollution): 31, 32, 30, 84, 82
    a. Safe living and working environments
    b. Health disparity populations
    c. Susceptible groups including children, pregnant women, elderly, populations with co-morbidities
    d. Maximally exposed populations

e. Urban, suburban, and rural
f. Heavily industrialized areas
g. Agricultural regions
h. Indoor Environment
i. Coastal environments
j. Tribal/Indigenous Communities and Populations
k. Military populations and veterans

Why now: Having exposure data will allow us to better focus limited resources to have the greatest health improvements

Exposure information is a fundamental input for decision making

Need NIEHS to take the lead to do better community engagement and partnerships with community-based organizations for exposure science research including bench and applied research to promote health, prevent disease, and translate into interventions and policies

POTENTIAL BENEFICIARIES OF THIS STRATEGIC GOAL:

Populations that benefit the most: Disproportionately burdened, disproportionately exposed, differential risks, differential health outcomes, maximally and highly burdened, vulnerable populations, everybody benefits because it is a fundamental input; Various life stages (children, pregnant women, elderly); SES status; researchers advancing knowledge;

User groups/Partners: Policy makers, health researchers, vulnerable groups, decision makers, advocacy groups, planners, epidemiologist, toxicologists, community developers, health departments, clinicians working on env medicine, risk assessors, engineers

NIEHS CAPABILITIES AND PARTNERS NEEDED

Partners

Expand partnership with EPA for funding initiatives and other programs

Technology partners include: Government Agencies: CDC/NHANES, NIOSH, DOE, USGS and Census, OSHA, DOL, DOD NASA, other NIH ICs, NSF, NOAA, HUD,

We need multidisciplinary training and research funding initiatives for academics. Various disciplines to be included are: Engineering, Epi, Statisticians, Medicine, Planning, Electrical, Chemical engineers, community development, health and environmental policy, geographers, informaticians; behavioral and social scientists.

Community engagement at all levels of research and public health messaging to nurture and support partnerships

Capabilities and innovations needed

Exposure Science Training Grants and Programs at ASPH schools and other institutions

Intramural exposure science program in this area is needed

Prioritize resources to fund exposure research that expand focus on mechanistic toxicology driven research program (both intramural and extramural)

Revamp and expand the Exposure Biology Program

Expand exposure assessment expertise to NIEHS Staff and Council

Add focal point in the office of the director to coordinate exposure science across agencies

Add requirements for exposure science cores in center and training grants

Fund exposure science centers

Advocate for an exposure science study section

Partner with colleges and universities to start departments of exposure science using infrastructure and seed grants

Support discovery science

Ensure exposure science people are included in the October distillation of the strategic plan