

Concept: Continuation of the NIEHS Environmental Health Sciences Core Centers Program

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National Institutes of Health • U.S. Department of Health and Human Services



Outline

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 - Disaster Response
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Importance of the EHS Core Center Program

By the end of this presentation, I want to have demonstrated that Centers are incubators for:

- Science
- Translational Research
- Careers
- Communityengagement/Partnerships



APPLIED PHYSIOLOGY

P

america physiolo



Background and Structure



EHSCC Program Goals

Environmental Health Sciences Core Centers guide and support environmental health research at an Institution or region. Their goals are to:

- Provide intellectual leadership and foster innovation
- Translate research into public health outcomes
- Support new ideas and collaborations
- Provide career development for future leaders
- Engage communities in multi-directional communication





EHSCC Program By the Numbers





Core Center Highlights: Career Development





Career Development Summary 2017-2024

- Approx. 223 career development recipients
- Approx 135 pilot awards
- Over 228 NIH grants awarded
- Over 2600 publications



*19 Centers responded to the request for career development highlights.





Core Center Highlights: Pilot Projects





Pilot Project Approach Topics

Pilot Project Methods Topics





Pilot Project Top Ten Exposures and Outcomes



Outcomes Inflammation Neurological Cardio/Cardiometabolic Metabolism Reproductive, incl Men's Health Respiratory Microbiome Cancer Lung Woman's Health 0 10 20 30 40 50 60



EHSCC Pilot Project: Action on Spina Bifida in Bangladesh

Maitreyi Mazumdar, MD





Pilot Project: Neural Tube Defects and Environmental Arsenic Exposure

- case-control study to assess the relationship between environmental arsenic exposure and neural tube defects
- Partial support for the development of a birth defect surveillance program

R01 026317-01: Does Arsenic increase risk of neural tube defects in a highly exposed population – ONES Awardee (2016-2020)

In June 2024, the Bangladesh Ministry of Health passed resolutions related to spina bifida including setting standards for folate intake and recommending a surveillance program for neural tube defects



Core Center Highlights: Nimble, translational, and collaborative

Nanoplastics: Responding to emerging topics



Rutgers & Columbia

PNAS

AS RESE

RESEARCH ARTICLE CHEMISTRY ENVIRONMENTAL SCIENCES Rapid single-particle chemical imaging of nanoplastics by SRS microscopy

Naixin Qian⁴ 🧐, Xin Gao⁴ 😇, Xiaoqi Lang^a, Huiping Deng^a, Teodora María Bratu⁶, Qixuan Chen⁵, Phoebe Stapleton⁴ 💭, Beizhan Yan^{6,1} 🥥, and Wei Min^{1,4,7} 🧿

240,000 – 400,000 nanoplastic particles per Liter of bottled water

 Image: A There's much more plastic in our brains than I ever would have imagined or been comfortable with
 Matthew Campen, Alex Tamara Howard, Jorge

Matthew Campen, University of New Mexico

Bioaccumulation of Microplastics in Decedent Human Brains Assessed by Pyrolysis Gas Chromatography-Mass Spectrometry

Matthew Campen, Alexander Nihart, Marcus Garcia, Rui Liu, Marian Olewine, Eliseo Castillo, Barry Bleske, Justin Scott, Tamara Howard, Jorge Gonzalez-Estrella, Natalie Adolphi, Daniel Gallego, and Eliane El Hayek

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The quantity of microplastics in brain samples from 2024 was about 50% higher from the total in samples that date to 2016, suggesting the concentration of microplastics found in human brains is rising at a similar rate to that found in the environment.

Microplastics: Responding to Communities



University of Rochester



EHSCC P30 Pilot projects



Community Inputs



New COHH P01

Lifecycle of microplastics, origins, distribution, human exposure, health effects, and impacts of changing climate

The over-arching goal of this new Center, led by Katrina Korfmacher, is to prevent negative human health impacts of MP in the context of climate change in the Great Lakes. The Community Engagement Core involves diverse partners in all aspects of the Center, including community science, direct action, development and dissemination of materials, and building partners' capacity to promote solutions.

EHS Core Center Meeting (September 25, 2024) Special scientific session on micro-plastics



Promoting Translational Research

- ~2006 -- new requirement for Centers to focus on translation of research to clinical and public health practice
 - Core structure was left to the grantees to develop as needed to meet the Center's goal
- 2017 NIEHS rolled out a new translational research framework (TRF)
- 2021 cores renamed to Translational Research Support Cores



Translational Research: Value of Bi-directional Community Engagement





Zhu et al., Front Public Health, 2023, PMC10332161



Findings from large scale epidemiological study inform ongoing mechanistic research on Cd exposure supported by CHHE infrastructure.

Data from these studies inform ongoing CEC work with communities and educators.

Heavy metal exposure remains a concern for residents of central NC.

> - State, federal policies become more protective.

- Exposure reduction behaviors informed by research and policy.



Core Center Infrastructure Supports Translational Heavy Metals Research





Highlights: Power of Center Collaborations

Imperial Valley, California

- Issue: multiple air quality concerns
- Sensor development for community air monitoring network
- Dust analysis from Salton Sea
- Examine child respiratory health outcomes

Air Sensor Stories

- Issue: knowledge gap on air sensors types & purpose
- Workshop materials developed & tested
- Resources for communities

Hydraulic Fracturing

- Issue: new exposure with many unknown factors
- Inter-center working group established
- Data collection
- Research translation





Core Center Highlights: Disaster Response

PNW EHSC at Oregon State University

Pacific Northwest Center for Translational Environmental Health Research



Research Support CORE



Exposure Core



Community Engagement Core

Developing capacity for research in Environmental **Health Sciences**





Flexible "just in time" pilot grant funding allowed a rapid response by the Chemical Exposure Core to an environmental disaster (East Palestine train derailment) to start a canine-sentinel exposure study.

Studying inflammatory gene expression response to wildfire exposure (pilot funded by UW EDGE Center 2022-2023 in support of rapid field research)



RNA yield and integrity are sufficient for downstream transcriptomics analysis.



Haack*, Lim*, Kennedy, Day, Adams, Lee, Berthier, Theberge, Anal. Chem. 2021. 93, 13196.

- Technology to collect blood samples at home
- Innovation to stabilize RNA for shipment
- Allows for transcriptomics analysis of samples collected remotely

EDGE pilot provided first dedicated funding for application of this approach

- Samples collected before, during, and after wildfire smoke exposure in high and low wildfire areas
- Two publications to date
- Supported new NIEHS grant 1R21ES034338-01

Images courtesy of Ashleigh Theberge





Summary and Future Vision for the Core Centers



NIEHS Emerging Scientific Priority Areas





Previous Core Center Evaluations

	2004	2010	2015	2019	2024
Timeframe	1993-2003	2007-2010	2004-2014	2015-2019	2017-2024
Туре	Outcome	Process	Process and Outcome	Process	Outcome
Focus	Key highlights Pilot projects Supplements	Programmatic and structural changes that were made in the 2005 FOA	Complex, Emerging and Translational Research	Impact of Centers on ESI/NI Success and Change in funding base & sliding scale	Career Development & Contribution of Centers to NIEHS grant base
Outcome	Made major changes to FOA Added IHSFC	Updated eligibility criteria in 2013	Developed EHS Translational Research Framework	Eliminated sliding scale Required Translational Vision	Changed eligibility criteria



Core Center Program Responsiveness





Proposed Concept

- Mechanism: P30
- NOFO: RFA with annual receipt dates for next 3 years
- **Minimum requirement:** funded research base of 3.0M in DC of supported Environmental Health Sciences projects that can be a mix of NIH, Federal and private grant support; at least 50% of the research base must be from NIH.

• Structure: Required

- Admin Core
- Facility Core
- Career Development
- Community Engagement Core
- Total cost for program:
 - \$6.0 \$7.5M/year based on availability of funds
 - New: \$850K/yr for 4 yrs; Competing renewals \$1.0M/yr for 5 years

- Pilot Project Program
- Translational Vision
- Plan for Enhancing Diverse Perspectives



Discussion and Questions

Council Discussants:

Dr. Gary Miller Dr. Darryl Hood



Questions for Council

- What input or recommendations does Council have for advancing efforts to address the gap areas?
- A new evaluation of the Core Centers Program seems appropriate, what topics or focus areas would interest Council?



THANK YOU