Report to the National Advisory Environmental Health Sciences Council

Director, NIEHS and NTP

September 13, 2021

Appropriations Update

National Institute of Environmental Health Sciences
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Congressional Appropriations

	FY 2020 Enacted	2021 Appropriation	2022 President's Request	2022 House Mark	FY2022 Senate Mark	Δ Between FY 2021 and FY 2022 House Mark
NIEHS (L-HHS)	$ 802,598,000	$ 814,675,000	$ 937,107,000	$ 941,799,000	TBD	$ 127,124,000
NIH [a/]	$ 41,685,000,000	$ 42,935,500,000	$ 51,952,703,000	$ 49,656,990,000	TBD	$ 6,721,490,000
Common Fund [b/]	$ 639,111,000	$ 648,539,000	$ 658,539,000	$ 669,712,000	TBD	$ 21,173,000
Superfund	$ 81,000,000	$ 81,500,000	$ 83,540,000	$ 83,540,000	TBD	$ 2,040,000
NIEHS/DOE Training [c/]	$ 10,000,000	$ 10,000,000		$ 10,000,000	TBD	$ -
COVID-19 Supplemental 5-Year Funds 2020-2024	$ 10,000,000					

a/ Includes NIH Discretionary BA plus Mandatory Type 1 Diabetes Research and Superfund.
b/ Includes addition of $12.6 million for the Gabrielle Miller Kids First Act pediatric research initiative.
c/ Appropriations Committee report language supporting the transfer of funds from the U.S. Department of Energy's Defense Environmental Cleanup account to NIEHS for the NIEHS/DOE Nuclear Worker Training Program.

Legislative Update:

117th Congress (2021-2022):

Labor-HHS Appropriations Hearings

- **House Appropriations Labor-HHS Subcommittee Hearing on NIH FY22 Request:**
  On Tuesday, May 25, 2021, Dr. Collins testified to the House Labor-HHS Subcommittee and was accompanied by Dr. Fauci (NIAID), Dr. Sharpless (NCI), Dr. Gibbons (NHLBI), Dr. Bianchi (NICHD), and Dr. Volkow (NIDA). Chairwoman Rosa DeLauro (D-CT) touted the bipartisan increases to NIH funding of $12.9 billion or 42 percent given by the Committee over the past 6 years, and her support of continued increase in funding for NIH. Ranking Member Tom Cole (R-OK) says he supports Biden's requested top-line funding figures for the NIH. He stated, "A sustained commitment to increasing funding for the NIH is a vital step in preserving our status as the world leader in biomedical research and to finding novel treatments and cures for the many diseases burdening our strained healthcare system."

Topics for the hearing included:

- ARPA-H,
- Maternal health research and addressing maternal mortality,
- Reducing racial and ethnic disparities,
- Health equity,
- COVID-19,
- Gun violence prevention,
- Alzheimer's,
- Cancer,
- Community Engagement Alliance (CEAL)
- Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV) Initiative,
- Grant Application Success rates,
- ECHO,
- Wuhan Lab/COVID-19 Origin,
- Fetal tissue research,
- T-cell testing for COVID,
- Health disparities,
- Diversified workforce,
- UNITE initiative,
- HIV/AIDS,
- Long COVID in Children,
- Mental health consequences of COVID,
- COVID-19 vaccine effects on pregnant/lactating women,
- Biomedical intellectual property,
- Including pregnant and lactating women in Clinical Trials (PREGLAC Task Force),
- Vaccine hesitancy,
- Pain management,
- Opioid Crisis,
- Childhood asthma,
- Climate Change
- Universal influenza vaccine,
- Women's health and heart disease,
- Intellectual property safety,
- Tick-borne Diseases,
- Animal Testing and Research,
- Marijuana effects on the Brain,
- COPD,
- Multiple Sclerosis,
- Sickle Cell Disease,
- Acute and Chronic Kidney Disease in Children,
- Treatments for Addiction,
- OIG report and Cybersecurity, and
- Prostate and gynecological cancers.

Highlights relating to NIEHS:

- Congresswoman Roybal-Allard (D-CA) asked about ECHO and how it compared to the National Children's Study that was cancelled.

  Dr. Bianci responded to her question. "As you know, the ECHO program brings together 72 different cohorts and they're currently doing observational studies on over 50,000 children. One of the most impactful studies that has recently been completed has looked at women entering pregnancy and looking at the connection between a healthy weight in the mother or the pregnant woman and eating a healthy diet during pregnancy, and that has resulted in a statistically significant decrease in the rate of preterm birth.

  And interestingly, it was significant in both black and white women, because black women do have a higher incidence of preterm birth, so that is quite impactful. In addition, NICHD is a works with the ECHO program on an interventional study using the idea states Pediatric Clinical Trials Network which is part of the ECHO program. And we are working together to provide comparative effectiveness studies to determine how best to treat neonatal opioid withdrawal syndrome. So, these include a pharma -- pharmacology free intervention, which is eat, sleep, and console the babies, as well as a weaning trial, and we have trials planned for the future to look at infants."

Congresswoman Roybal-Allard (D-CA) asked a follow-up question if the NIH considering extending ECHO program, given that the original NCS study was designed to follow children from birth through age 21 and the cohorts, as I understand, have not yet reached the age of 21?

Dr. Collins replied "I think that's a very important question and we do want to fully realize the potential of this very important cohort of over 50,000 kids. And obviously, the time is about right in the course of the next year to figure out exactly what that future course will be. We have engaged internally in some deeper discussions about that and would like to get back to you, Congresswoman, about possible paths that we might take this forward, but I do want to endorse how critical we see the ECHO program is for answering all those questions that you and we are quite concerned about."

- Congressman Harder asked about the $110 million in the President's Budget for NIH's Climate Change and Human Health program, and what research projects that Dr. Collins expected to come from that, especially those that focus on health outcomes related to poor air quality and impacts on underserved communities?

  Dr. Collins responded, "Absolutely. And it does tie in very nicely to the question you just posed to Dr. Gibbons. Climate change affects human health in numerous ways. People tend to think about it as perhaps it's more in the area of infectious disease, and there's a lot to be concerned about there as well as climate makes different opportunities for different pathogens to find their way into the human population. But it also affects, as you've just pointed out, air quality, the issues that are going to relate to such things as asthma, as well as heart disease, as well as cancer, all of those are wrapped up in what we think is now an appropriate moment for an enhanced and expanded effort to understand the health consequences of climate change. **Our National Institute of Environmental Health Sciences, NIEHS, will be taking the lead on this, but already, they have reached out to numerous other institutes at NIH so that we can come forward with a really exciting, very broad, holistic approach to how we could tackle this issue of environmental science related to health and the effects of the climate.** So, I'm glad you highlighted it. We're excited about the opportunity here."

- Congresswoman Roybal-Allard (D-CA) asked Dr. Collins about animal testing and research, and what role has NIH played in educating the research community about non-animal research methods? What steps has NIH taken to incentivize researchers to utilize existing human non-animal approaches? And have you offered any training grants, early-stage investigator awards, or supplementary grant funding to give researchers the resources and confidence needed to switch from an animal-based animal-free research method?

  Dr. Collins responded "We are very much interested in trying to be sure that every experiment that involves animals is done appropriately with rigor and reproducibility and that the animal model is, in fact, one that's going to give valuable information for human health. In many instances, there really are no alternatives to the animal model to be able to get those answers, and so we need to support that to be sure we're doing it though with great responsibility. In terms of grants to others, yes, we are supporting vigorously such things as tissue chips, which allow you to look at the effect of a drug or some other intervention in a chip. And it is basically made up of human cells, maybe closer to humans. But that doesn't work for lots of other applications, so we still are going to need animals. But we are looking at this as vigorously as we can, looking forward to a time where we have more substitutions. I think, though, to be honest, for the foreseeable future, if we're going to make advances in things like cancer, diabetes, heart

disease, rare diseases, we are still going to need to depend for a lot of that effort on animal research."

Senate Appropriations Labor-HHS Subcommittee Hearing on NIH FY22 Request:

On Wednesday, May 26, 2021, Dr. Collins testified to the Senate Labor-HHS Subcommittee and was accompanied by Dr. Fauci (NIAID), Dr. Sharpless (NCI), Dr. Pérez-Stable (NIMHD), Dr. Gibbons (NHLBI), Dr. Bianchi (NICHD), and Dr. Tromberg (NIBIB). Chairwoman Murray (D-WA) opened the hearing thanking all of the witnesses and Dr. Collins and Dr. Fauci for their long hours and putting science first. She stated "This should be an important reminder when it comes to biomedical research: You can never fully predict how the discoveries of today will prepare you for the challenges of tomorrow. That's why you have to build a robust research enterprise, and recruit diverse world-class talent, and make sure scientists can do their work free from political interference." Ranking Member Blunt touted NIH by stating "Our research infrastructure was tested like never before and, in my opinion, it succeeded in remarkable ways. I believe there are really three reasons for that. First in the past six years this committee and the Congress in a bicameral, bipartisan way have prioritized and invested in NIH." He also stated how he looks forward to working with Dr. Collins "And, Chair Murray, in making -- and the administration in making ARPA-H a reality. I think there's a moment that's ready for that; I think that because of what's happened in the last two years NIH is ready for that. And look forward to the discussion today."

Topics for the hearing included:

- ARPA-H,
- Structural racism and discrimination,
- Reducing racial and ethnic disparities,
- Health equity,
- RAD-x
- Suicide Prevention
- COVID-19,
- COVID Vaccine Boosters
- Gun violence prevention,
- Social Determinants of Health
- Autoimmune Diseases and the Accelerating Medicines Partnership
- Pancreatic Cancer
- Global Drug Supply Chains
- Alzheimer's,
- Cancer,
- Community Engagement Alliance (CEAL)
- Multi-system inflammatory syndrome in Children due to COVID
- Artificial Intelligence for early detection in cancers
- Wuhan Lab
- Diabetes
- COVID-19 Origin,
- Health disparities,
- HIV/AIDS,
- Long COVID,
- Childhood Cancer
- Vaccines to other Countries
- Biomedical intellectual property rights,
- NCATS Clinical and Translational Science Award (CTSA),
- Rare Diseases and Cures Acceleration Network
- Sexual Harassment
- mRNA for therapies for other diseases/treatments
- Vaccine delivery and administration
- Pain management,
- Opioid Crisis,
- Mental Health drug treatments
- Climate Change
- Marijuana use, and
- Treatments for Addiction and Substance Abuse Disorder

Highlights relating to NIEHS:

- Chairwoman Murray asked Dr. Gibbons about the President's Budget request for $110 million to study the impact climate change is having on health, and asked him to talk about what kind of serious effects have been seeing from climate change and what kinds of research do expect NHLBI to support this kind of funding?

  Dr. Gibbons responded "Yes, thank you for that question. As we know climate change often involves these changes in our air and air quality particularly it's likely to promote more air pollution. Certainly, the constituents on the west coast are familiar with the impact of wildfires on air quality. And although air is all around us, air pollution tends to concentrate and have its greatest impact on certain communities; particularly communities in which those neighborhoods are closer to sources of air pollution and therefore the impact is also inequitable in terms of the health consequences of air pollution. And that's falling on the most vulnerable. We know that it exacerbates certain chronic conditions, certainly cardiopulmonary ones like chronic obstructive pulmonary disease, asthma, heart failure, heart attacks are increased in the context of higher air pollution promoted by climate change. And we anticipate that there'll be a need to not only mitigate the impact of climate change but also to enhance resilience to the effects of the -- of air pollution on health. And we anticipate that will involve enhancing health communities that are disproportionately affected by the consequences of air pollution derived from climate change. And our programs that are community engaged research with that health equity lens should be promising in that regard."

- Senator Manchin spoke about how his state is ranked last in the nation for health outcomes. He asked Dr. Collins what NIH is doing to help bridge the gap in health outcomes and medical research in poor rural communities?

  Dr. Collins responded "Well, it is very troubling to see the facts that you've just cited that health outcomes are not what we would all want them to be and of course there are many factors that play into that, Senator, and we are deeply engaged in research in trying to identify the ones that are addressable. **Certainly, one of the things I might point to is the increasing focus we have on disease prevention.** If we simply are limiting ourselves to trying to help people who've already developed a serious disease, we've kind of missed the opportunity. Unfortunately, our healthcare system doesn't do a great job in that situation of providing support for disease prevention and it seems happier to pay for things once people are already quite ill. So, there's additional work that needs to be done there. One of the things that I think I'd point to is this -- a series of large-scale efforts to really understand what are the factors that play out in people staying healthy or getting a chronic disease or how you manage that? **The All of Us program, which this congress has supported, on the way to enrolling a million participants, including in West Virginia, is a way in which we can collect that kind of evidence, including their electronic health records and lots of information about their environmental exposures, and try to figure out, in a holistic way, how can we take that information and bring forward a better chance for people to live not just a good lifespan, but a good health span."**

FY22 Appropriations Updates

- On Friday, May 28, 2021, the President released his FY2022 Budget Request to Congress. The President's FY2022 Budget Request proposes an increase to Congress for NIH and NIEHS's Labor-HHS and Interior-Environment funding. For NIH, the FY 2022 President's Budget is proposing $52.0 billion, which is $9.0 billion more than the FY 2021 Enacted level (includes ARPA-H). For NIEHS Labor-HHS funding, the FY2022 President's Budget is proposing $937.1 million, which is $122.4 million above the FY 2021 Enacted level. The increase includes $100 million to support research on the human health impacts of climate change. For NIEHS Superfund Funding, the FY2022 President's Budget is proposing $83.54 million, which in an increase of $2.04 million above FY2021 enacted levels. This full budget release highlights the President's priorities that he released in his skinny budget on April 9, 2021, in his FY2022 Discretionary Budget Request to Congress. This is termed a "Skinny Budget" and is a slimmed down version of the full President's Budget request. This FY22 Discretionary Budget request contains the high-level priorities of the Biden Administration for the upcoming fiscal year.

  The full FY2022 President's Budget to Congress and Fact Sheet can be found here. And the President's FY22 Discretionary Request "Skinny Budget" to Congress and Press Release can be found here.

- **House Appropriations Committee markup of Labor, HHS and related agencies portion of FY2022 Appropriations Bill:** On July 15, 2021, the House Appropriations committee marked up the FY22 Labor-HHS bill and report language, and by a vote of 33-25, the House FY22 Labor-HHS Appropriations bill passed out of the House Appropriations Committee and advanced to the House floor. The FY22 Labor-HHS bill has NIEHS at a mark of $941,799,000, an increase of $127,124,000 from the FY21 enacted level. The report language (NIEHS on pg. 129) allocates an increase $100 million for Climate Change and Health research for NIEHS, and has additional NIEHS Significant Item language on Harmful Algal Blooms and Parkinson's Disease.

  For NIH, the bill provides a total of $49 billion for NIH, an increase of $6.5 billion above the FY 2021 enacted level. The bill also includes an increase of $3.5 billion for existing NIH Institutes and Centers, which supports an increase of no less than 5 percent for each Institute and Center to support a wide range of biomedical and behavioral research, as well as targeted investments in several high-priority areas. Additionally, the bill includes $3 billion to establish the Advanced Research Projects Agency for Health (ARPA-H) to accelerate the pace of scientific breakthroughs for diseases such as ALS, Alzheimer's disease, diabetes, and cancer.

  NIEHS text from the Labor-HHS bill:
  "NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
  For carrying out section 301 and title IV of the PHS Act with respect to environmental health sciences, $941,799,000."

  For the NIH OD portion report language, we see NIEHS and NTP mentioned in the Significant items on: ALS coordination and research, Indoor Amplified Microbial Growth Research and the HEALthy Brain and Child Development (HBCD) Study (please see below).
  The direct House FY22 Labor-HHS report language for NIEHS is as follows:
  "NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS)
  Appropriation, fiscal year 2021 ..... $814,675,000

Budget request, fiscal year 2022 937,107,000
Committee Recommendation 941,799,000
Change from enacted level ..... +127,124,000
Change from budget request ..... +4,692,000

Mission. —NIEHS's mission is to discover how the environment affects people in order to promote healthier lives.

Climate Change Research. —The Committee includes an increase of $100,000,000, the same as the fiscal year 2022 budget request, for NIEHS to support research on the impact of climate change on human health.

Harmful Algal Blooms Research. —The Committee recognizes the value of the NIEHS mission and the NIEHS NSF jointly-funded Oceans and Human Health Program as a means to increase scientific knowledge about short-term and long-term human health effects potentially associated with acute and chronic exposures to toxins produced by harmful algal blooms (HABs). The Committee recognizes the increasing relevance of this scientific research to communities directly affected by HABs, including Florida, where a 16- month bloom one of the longest documented HABs in the State's history occurred from late 2017 through early 2019. The Committee encourages NIEHS to continue investing in this research area using its competitive, peer-reviewed grantmaking processes. In particular, the Committee notes growing scientific interest in the use of multidisciplinary approaches to investigate respiratory irritation or illness associated with inhalation of aerosolized HAB toxins and with neurotoxic shellfish poisoning arising from ingestion of contaminated seafood. The Committee commends NIEHS for its collaborations with other agencies, including NSF, NOAA, EPA, and CDC, to advance such research and translate key research findings for clinical and public health benefits.

Parkinson's Disease. —Research suggests that Parkinson's disease (PD) is caused by a combination of genetic and environmental factors. Agricultural exposure to pesticides, including herbicides, has been associated with an increased risk of developing the disease, yet other exposures common to soldiers, firefighters, first responders and others, such as burn pits, insecticides, solvents and heavy metals, need to be explored or should be considered. The Committee urges NIEHS to expand its research and collaborate with appropriate partners to understand effects of these chemicals on PD development and progression. Research should include fundamental approaches to identify other environmental triggers and to understand the expression of PD traits that result from the interplay of genes and environment to advance the development of individualized precision environmental health strategies to prevent and treat PD. The Committee requests an update on these activities in the fiscal year 2023 Congressional Budget Justification."

Language mentioning NIEHS/NTP under OD section is:

*"**ALS Research Coordination and Acceleration***. —The Committee is aware of the significant need to expand scientific understanding of amyotrophic lateral sclerosis (ALS) and to translate ALS science more rapidly into effective treatments that can make ALS a livable disease. To achieve these outcomes as soon as possible, the Committee directs NIH to organize a trans-agency initiative to develop an ALS research strategic plan. The plan, which should be developed in collaboration with the nation's leading ALS patient and biomedical research organizations, should: identify the most promising areas of research and the specific NIH activities where

additional funding could lead to more rapid translation of discoveries for treatments, prevention, and interventions or technologies that can reduce the burden of ALS; identify which Institutes and Centers are undertaking ALS and ALS-related research and which are not but have a role to play; and uncover any impediments to ALS research. As part of this effort, NIH should hold at least one public meeting at which stakeholders can provide testimony. This effort should include, but not be limited to: NINDS, NIA, NIEHS, NIMH, NHGRI, NIAMS, and NCATS. Additionally, The Committee strongly supports the Transformative Research Award program for ALS and directs the Director to continue to fund this critical initiative in fiscal year 2022. Finally, the Committee includes $1,000,000 to commission a study by NASEM to identify and recommend actions for the public, private, and nonprofit sectors to undertake to make ALS a livable disease within a decade. Given the significant adverse physical, financial, psychological impact this progressive neurodegenerative disease has on the individuals and families affected by it, a comprehensive assessment of what is necessary to address its effects is warranted. The study should include, but not be limited to: how to develop more effective and meaningful treatments and a cure; interventions to reduce and prevent the progression and complications of ALS; the type and range of care and services people and families with ALS need and how to ensure they receive comprehensive, quality care; what care, services, and preventive measures people at-risk of ALS need; and how to improve the quality of life, health, and well-being of affected individuals and families. The Committee directs NIH to submit this study to the Committee no later than October 2024 and requests an update on the status of this study in the fiscal year 2023 Congressional Budget Justification."

*"**HEALthy Brain and Child Development (HBCD) Study***. —The Committee recognizes and supports the HEALthy Brain and Child Development Study, which will establish a large cohort of pregnant women from regions of the country significantly affected by the opioid crisis and follow them and their children for at least 10 years. This knowledge will be critical to understanding typical brain development and how pre- and postnatal exposure to opioids and other substances or adverse environments affect brain development and other outcomes, including risk for future substance use, mental health disorders, and other behavioral and emotional difficulties and disorders. The Committee recognizes that the HBCD Study is supported in part by the HEAL Initiative, and NIH Institutes, Centers, and Offices, including OBSSR, ORWH, NIMHD, NIBIB, NIEHS, NICHD, NINDS, NIAAA, NIMH, and NIDA, and encourages other Institutes and Centers to support this important study."

*"**Indoor Amplified Microbial Growth Research. —***The Committee believes that a more robust and focused NIH commitment to research relating to mold and amplified microbial growth in damp and water-damaged buildings would yield significant advancements of knowledge and insight regarding how fungi, mycotoxins, actinobacteria, and endotoxins within indoor environments affect public health. The Committee urges NIH to expedite planned and ongoing studies already nominated and established through the National Toxicology Program (NTP). The Committee is concerned that some of these studies were nominated in 2001 but have yet to be conducted. The Committee also urges NIH to prioritize new research, explore the causal links, and interventions to the potential neurotoxic, immunosuppressive, immunoreactive, autoimmune, nephrotoxic, carcinogenic, and inflammatory responses due to inhalation of indoor amplified microbial growth in damp and water damaged indoor environments. The Committee encourages NIH to improve applied research, communication and education, and coordination with other Federal, State and local health and environmental agencies regarding

mold and microbial growth in damp and water-damaged indoor environments. The Committee requests an update in the fiscal year 2023 Congressional Budget Justification on its efforts."

- **House Appropriations Committee markup of Energy and Water Development and related agencies portion of FY2022 Appropriations Bill:** On July 16, 2021, the House Appropriations Committee approved the FY22 Energy and Water Development and Related Agencies funding bill on a 33-24 vote. The bill report language has the $10 million transfer from DOE to the NIEHS WTP. The report language (pg. 165) pertaining to WTP:

  > "Within available funds, $10,000,000 is provided to fund the hazardous waste worker training program."

  There also was additional language mentioning NIH in the FY22 Energy Report Language:

  - *"Biomedical Sciences.* —Collaborative research efforts between the Department and the National Institutes of Health (NIH), including the National Institute of Mental Health (NIMH), are developing breakthroughs in health research, including drug discovery, brain research, innovative neurotechnologies, diagnostic technologies, and other biomedical research areas. The Department is encouraged to expand its relationships with NIH, including NIMH, to work together more strategically to leverage the Department's research capabilities, including instrumentation, materials, modeling and simulation, and data science. The facilities and equipment funded in this Act support applications in many areas of biomedical research. Better coordination between the Department and NIH could be instrumental in assisting to develop the nation's health, security, and technologies with novel biomedical application. The recommendation includes not less than $2,000,000 for collaboration with NIH within the Department's data and computational mission space."

- **House Appropriations Committee markup of Interior, Environment, and related agencies portion of FY2022 Appropriations Bill:** On June 28, 2021, the House Appropriations' Interior and Environment Subcommittee marked up the Interior, Environment and Related agencies portion of the Appropriations bill and passed it out of committee by Voice Vote. The draft bill matched the President's Request for our NIEHS Superfund Related Activities **at $83.54 million, an increase of $2.04 million or 2.5 percent compared with the FY 2021 Enacted level.**

On July 1, 2021, the Full Appropriations Committee markup of the House FY22 Interior and Environment bill and report language was approved by the House Appropriations by a vote of 32-24. There were no amendments relating to our portion of the bill.

The FY22 Interior and Environment bill language (p. 130) reported by the House Appropriations Committee to the House floor for NIEHS Superfund Related Activities is as follows:
"NATIONAL INSTITUTES OF HEALTH
NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
For necessary expenses for the National Institute of Environmental Health Sciences in carrying out activities set forth in section 311(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9660(a)) and section 126(g) of the Superfund Amendments and Reauthorization Act of 1986, **$83,540,000.**"

The FY22 Interior and Environment report language (p. 132) reported by the House Appropriations Committee to the House floor for NIEHS Superfund Related Activities is as follows:

"NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

The National Institute of Environmental Health Sciences (NIEHS), an agency within the National Institutes of Health, was authorized in section 311(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and in section 126(g) of the Superfund Amendments and Reauthorization Act of 1986 to conduct certain research and worker training activities associated with the Nation's Hazardous Substance Superfund program.

Appropriation enacted, 2021 ..... $81,500,000
Budget estimate, 2022 83,540,000
Recommended, 2022 83,540,000
Comparison:
Appropriation, 2021 ..... +2,040,000
Budget estimate, 2022 0

The Committee recommends **$83,540,000** for the National Institute of Environmental Health Sciences, **$2,040,000 above the enacted level and equal to the request.**

The Committee continues to strongly support the Worker Training Program, which trains workers to safely work in hazardous environments and respond in emergency situations. **NIEHS is encouraged to continue its work supporting communities' capacity to respond to pandemics and disasters.**

Risk Communications. —The Committee is acutely aware of the significant need for effective risk communications methods, particularly as part of broader strategies to reduce exposures and to mitigate risks to public health and the environment. **The Committee strongly supports the Superfund Research Program's ongoing work in this area and urges NIEHS to continue to develop communications toolkits that utilize the most effective strategies for targeting and educating communities of environmental risks.** The Committee believes that such communications toolkits should be tailored to account for differences in regional, cultural, educational, linguistic, and other demographic factors that can impact the effectiveness of risk communications."

- **House Passed FY2022 Minibus:** On July 29, 2021, the House passed H.R. 4502 (FY22 Appropriations Minibus) by a vote of 219 – 208. H.R. 4502 is a minibus that consists of seven appropriations bills that included all of the bills that NIEHS receives funding from (FY22 Labor-HHS, Interior and Environment, and Energy and Water Development bills). Here is a quick summary of the House passed FY22 bills relating to NIEHS appropriations (details above of Labor-HHS and Energy and Water Development):
  - The FY22 Labor-HHS bill has NIEHS at a mark of $941,799,000, an increase of $127,124,000 from the FY21 enacted level. The report language (NIEHS on pg. 130) allocates an increase $100 million for Climate Change and Health research for NIEHS, and has additional NIEHS Significant Item language on Harmful Algal Blooms and Parkinson's Disease. (above President's request)

- The FY22 Interior and Environment bill has NIEHS Superfund related programs at a mark of $83,540,00, which is $2,040,00 above the FY21 enacted level. The report language (NIEHS is on pg. 132) supported WTP's work in responding to pandemics and disasters, and also supported the NIEHS Superfund Research Program's ongoing work with Risk Communications. (at same amount as President's request)
- The FY22 Energy and Water Development bill report language (WTP language on pg. 166) contained the funding transfer language for $10,000,000 from DOE to NIEHS WTP.

The House also passed the Legislative Branch and State and Foreign Operations Appropriations bill out of the chamber at the end of July. There are 3 appropriations bills still remaining for them to take up and pass after the August recess.

- **Senate Appropriations Committee markup of Energy and Water Development and related agencies portion of FY2022 Appropriations Bill:** On August 4, 2021, the Senate Appropriations Committee marked up and passed, with a vote of 25-5, the Energy and Water Development Appropriations bill this week (S. 2605), with two additional bills, out of Committee. The report language did include the $10 million transfer to WTP in it.

  Senate Energy Report Language for WTP:

  > "Within available funds, the Department is directed to fund the hazardous waste worker training program at $10,000,000."

  We should see the rest of the Senate Appropriations bills (including Labor-HHS and Interior and Environment) go through markup after the August/September recess.

Legislation of Interest

- **H.R. 2467- PFAS Action Act of 2021:** On July 21, 2021, the PFAS Action Act of 2021 (H.R. 2467, introduced by Rep. Dingell (D-MI)), passed in the House by a vote of 241 - 183. The bill is awaiting action now in the Senate. It is not clear if the Senate will take up the bill. NIEHS is not mentioned in the bill, but NIEHS, NCI and NIH are mentioned in the Report accompanying the bill (HRept. 117-86) from the House Energy and Commerce Committee.

  According to the Congressional Research Service, "The bill establishes requirements and incentives to limit the use of perfluoroalkyl and polyfluoroalkyl substances, and remediate PFAS in the environment.

  The bill also directs the Environmental Protection Agency (EPA) to designate the PFAS perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) as a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, thereby requiring remediation of releases of those PFAS into the environment. Within five years, the EPA must determine whether the remaining PFAS should be designated as hazardous substances.

  The EPA must also determine whether PFAS should be designated as toxic pollutants under the Clean Water Act. If PFAS are designated as toxic, then the EPA must establish standards to limit discharges of PFAS from industrial sources into waters of the United States. In addition, the EPA

must issue a national primary drinking water regulation for PFAS that, at a minimum, includes standards for PFOA and PFOS.

Among other requirements, the EPA must also issue a final rule adding PFOA and PFOS to the list of hazardous air pollutants, test all PFAS for toxicity to human health, and regulate the disposal of materials containing PFAS.

Finally, the bill provides incentives to address PFAS, such as grants to help community water systems treat water contaminated by PFAS."

The report accompanying the bill has NIEHS and NCI (pgs. 28-30) to be a part of a committee to make recommendations to the EPA Administrator respecting the chemical substances and mixtures to which the Administrator should give priority consideration for the development of information. Also, NIH is mentioned (pg. 45) to potentially be consulted with if the EPA Administrator promulgates an interim national primary drinking water regulation for a contaminant without making a determination for the contaminant, to address an urgent threat to public health.

Congressional Briefings:

- **Appropriations Interior, Environment and Related Agencies 4 Corners:** On June 14, 2021, Dr. Woychik briefed the 4 Corners of the Interior, Environment, and related agencies House and Senate Appropriations Committees on NIEHS's Superfund related activities. After the overview of activities and updates of WTP and SRP, the staffers asked questions of Dr. Woychik.

  Martha Roberts (Senate Majority) spoke about Senator Merkley's (D-OR) concerns about Wildfires and wanted to know more about our WTP activities in this area. Dr. Woychik and Dr. Collman responded by talking about WTP's training in the Western part of the U.S. for Wildfires, the WTP health and safety wildfires materials, and discussed WTP's COVID materials, and that there are other materials are publicly available for disasters. We followed up after the briefing with additional materials on Wildfires research and training.

  Dr. Kusai Merchant (House Majority) asked for specific information on the average wages, how long they stay in the field, if workers were a part of Unions, and average employment length after attending health and safety training with the Worker Training Program. Dr. Collman and Dr. Woychik spoke about how these jobs are "career transformations" for people and create highly skilled positions. We followed up with the Economic Report from ECWTP, the 25th Anniversary article and a grantee example from ECWTP 25th Anniversary website for more detailed information to answer his question.

  Lastly, Martha Roberts (Senate Majority) asked about for additional information on work on building capacity with Tribal Nations in both WTP and SRP. Dr. Collman spoke about SRP work with community engaged research with tribal nations, and how they work with tribal nations' IRBs, and elders. She also spoke of the work SRP is doing to create STEM opportunities in the tribal communities and incorporate students as research staff, interns, etc. into their work to build career opportunities and interest in science. In the WTP, they are working to ensure people on tribal lands have capacity to do cleanup and so they don't have to rely upon people from outside their communities. They have worked to expand their materials and training to tribal communities

to help bring career opportunities to the tribal nations. Dr. Woychik and Dr. Collman also spoke about the RADx-UP efforts to help get COVID testing to underserved communities, and now it is helping to help with vaccine hesitancy in communities of color and tribal communities. One example is SRP's UC-San Diego Center, which received a RADx-UP grant because they had such outstanding connections to communities and they were able to work with other parts of the University to mobilize the infectious disease faculty with mobile clinics, testing and now vaccine education, from San Diego down to the Mexico border. We were able to send examples of Tribal Engagement, research with Tribal nations and activities in both SRP and WTP to the four corners to expand upon this question's answer.

Attendees included: Dr. Kusai Merchant (D-House Majority), Martha Roberts (D-Senate Majority), Kristin Clarkson (R-House Minority), and Lucas Agnew (R-Senate Minority), Dr. Woychik (NIEHS), Dr. Gwen Collman (NIEHS), Dr. Sheila Newton (NIEHS), Mike Robinson (NIH OLPA), James Mackenzie (NIH OLPA), Larry Lohmann (NIH OLPA), Gina Hambrink (HHS ASFR) and April Bennett (NIEHS).

- **Congressman Josh Harder (D-CA-10) on Asthma, Air Pollution and Climate Change with NHLBI:** On June 24, 2021, Dr. Woychik and Dr. Collman briefed Congressman Harder and his staff with NHLBI Director, Dr. Gibbons, and Dr. Kiley, NHLBI Lung Division Director, on health effects of air pollution and climate change, and asthma**.**

  Dr. Gibbons gave an overview of NHLBI's work on asthma and the intersection with environmental exposures, precision health, treatment strategies, and bringing evidence-based treatments to children. Congressman Harder asked about if it "is possible to quantify environmental factors in any way? Such as in a bad year of Wildfires we expect asthma incidences to increase by X amounts?" Dr. Woychik answered his question by speaking about our grantees using geospatial tools to evaluate wildfires, as well as grantees looking at the composition of the smoke of the wildfires. Dr. Collman expanded on how NIEHS wants to learn from past experiences to look at geospatial spread of wildfires and predict what will happen in the future through modeling by climate scientists.

  Dr. Woychik then took a few minutes to expand on NHLBI's overview to talk in detail about NIEHS's portfolio relating to environmental exposures impacting asthma (and gave examples of those environmental exposures), several climate change effects can impact asthma, and gave examples from disasters and climate related grantee research. He discussed how people who are most at risk are those in health disparate communities and gave an example of where health improved when exposures to pollution were reduced. Dr. Woychik emphasized that our Climate Change and Health program at NIEHS is working with other NIH ICs to develop a broad-based strategy on Climate Change that involves all of NIH and synergies with CDC's efforts on Climate Change and Health as well as other agencies across the federal government.

  Congressman Harder asked if asthma is increasing in prevalence across the country? Is it a measurement issue or is it due to increased environmental factors? Dr. Collman responded by talking about the difference between disease occurrence, prevalence of disease, and the exacerbation of asthma. She went on to explain that we usually see higher rates in communities of color and other stressors, and these are communities that tend to use emergency rooms more often. Data is compiled to provide statistics through CDC studies and studies like NHANES. She

said that it is a big public health issue and has likely increased over the past decade. We currently trying to tease out what the factors to help us understand the causes. Dr. Kiley further expanded that in cohort studies, you can see the prevalence of disease over time. He discussed how we have made significant strides in the past ten years, and we need to continue to better be able to recognize and diagnosis it. He stated that we cannot use a one size fits all treatments and interventions. We need to understand biology, target pathways, and bring into precision medicine, and expect to see breakthroughs in interventions for all populations utilizing these strategies.

Congressman Harder asked what does success look like in 10 years from now? Dr. Gibbons spoke about the need for developing better primary preventative strategies which he noted includes the identification of biological markers that predispose people to getting asthma in the first place, as well as identifying those populations that can really benefit from specific preventative strategies. He further spoke about the need to reduce exposures that are triggers and inducers for asthma. He stated they believe that environmental exposures are manageable with choices, policies, and practices at a community and home level scales to help prevent and control asthma. Dr. Kiley further discussed that right now, it is mostly secondary prevention where interventions are deployed to and try to identify pathways and mechanisms to be able to target treatments and being able to measure those to be able to show progress. He further stated that the key part of prevention and preemption to stop this disease from being chronic. Dr. Woychik expanded by talking about the need to study which cells are predisposed, and how we need to integrate geospatial and exposure data into big studies like All of Us to help us learn more.

Congressman Harder asked if we spend less money on asthma than we do for health conditions? Dr. Gibbons responded that we probably don't spend as much as we should based upon the prevalence of asthma, and stated they try to do the best they can with funding and competing priorities with other diseases and illnesses.

Jessica Ilaria (Congressman Harder's Labor-HHS staffer) had one question: She asked about the Climate Change strategy being across NIH and federal agencies, and if there is a similar strategy for asthma? She knows that they have some of the CDC's National Asthma Control program work in their district and if there is a partnership with CDC. Dr. Woychik said that our strategy for Climate Change and Health will be across the NIH and will dovetail with the strategy at CDC, and we would be happy to keep the Congressman and his office apprised of developments as we move forward. Dr. Kiley added that NHLBI has national asthma education and prevention program that brings together stakeholders and federal agencies twice a year to deal with gaps in research and guidelines and implementation relating to asthma. He thinks that effort will be a great one that will dovetail nicely into the Climate Change efforts at NIH.

Attendees included: Congressman Harder (D-CA-10), Michelle Gilbert (Congressman Harder's Health Policy fellow), Jessica Ilaria (Health Staffer), Adele Amador (Deputy Chief of Staff and Legislative Director), Dr. Woychik (NIEHS), Dr. Gwen Collman (NIEHS), Dr. Gibbons (NHLBI), Dr. Jim Kiley (NHLBI), Dan Simpson (NHLBI), April Bennett (NIEHS), Michelle Mitchell (NIH OLPA), Larry Lohmann (NIH OLPA), Camille Sealy (HHS ASFR), Lenora Johnson (NHLBI), and Dina Paltoo (NHLBI).

Presidential Appointments of Interest:

- On April 29th, 2021, Dr. Eric Lander, President Biden's nominee for Director of the Office of Science and Technology Policy (OSTP) had a nomination hearing held in the Senate Committee on Commerce, Science and Transportation. Dr. Lander was reported out favorably by the Committee on May 20, 2021 and confirmed on the Senate Floor on May 28, 2021 by voice vote.
- Dawn O'Connell, nominee for HHS Assistant Secretary for Preparedness and Response (ASPR), and Miriam Delphin-Rittmonhad, Ph.D., nominee for Assistant Secretary for Mental Health and Substance Abuse, had their confirmation hearing in the Senate Health, Education, Labor and Pensions (HELP) on June 8, 2021, and were confirmed on June 24, 2021 in the Senate. Ms. O' Connell is formerly the Director of the Coalition for Epidemic Preparedness and Innovation's (CEPI) US Office and was in the Obama Administration Senior Counselor to Secretary Burwell on high-priority global health and humanitarian issues, including infectious diseases, unaccompanied children, and refugees. Dr. Delphin-Rittmonhad previously was Associate Professor Adjunct of Psychiatry at Yale School of Medicine and Commissioner of the Connecticut Department of Mental Health and Addiction Services (DMHAS).
- On June 18, 2021, President Biden nominated Christi Grimm to be the Inspector General at HHS. Ms. Grimm has been with the HHS Office of Inspector General since 1999, and currently is the HHS principal deputy inspector general and has been performing the duties of the inspector general since January 2020. Her office released a report that there were "severe" shortages of usable coronavirus tests and "widespread" shortfalls of protective equipment for workers in April 2020, which was highly criticized by the Trump White House. She stood behind the report stating that independent investigators should complete their probes without undergoing political interference. She is currently awaiting her hearing in the Senate.
- Dr. Melanie Egorin, nominee for HHS Assistant Secretary of Legislation (ASL) had her hearing on her nomination on June 24, 2021 in the Senate Committee on Finance. Dr. Egorin was former House Ways and Means Health Subcommittee Deputy Staff Director and a professional tax staffer. She was reported out favorably from the Senate Committee on Finance in July and awaits final confirmation on the Senate Floor.

Stakeholder Engagement:

- **Meeting with American Thoracic Society Leadership:** On June 15, 2021, Dr. Woychik met with ATS leadership and NIEHS staff to discuss ATS workshops, conference sessions and issue areas of interest for ATS and NIEHS. ATS thanked NIEHS for our support for workshops and the Annual ATS Conference. ATS suggested topics for future workshop and sessions for their ATS Annual Conference. Topics covered in the meeting were: Climate Change, Microbiome, Assessments of air pollutants, environmental stress, Implementation Science, Early career members during the Pandemic and their opportunities and developments, Health Equity and Diversity, Equity and inclusion, "Open Access Policy" for journals, ATS working with EPA on standards being reconsidered, Vaping, and Cannabis.
  Attendees: NIEHS- Dr. Woychik, Dr. Collman, Dr. Ellison, Dr. Newton, April Bennett, Dr. Balbus; **ATS-** Lynn Schnapp (Univ. Of WI), Irina Petrache (Nat'l Jewish Health and Univ. of CO-Denver), Gary Ewart (ATS Staff), Karen Collishaw (ATS Staff), Gregory Downey (Nat'l Jewish Health and Univ. of CO-Denver), Juan Celedon (Univ. of Pitt), and Patricia Rivera (UNC).

Advanced Research Projects Agency for Health (ARPA-H) and Environmental Health Science

ARPA-H will benefit the health of all Americans by catalyzing health breakthroughs that cannot readily be accomplished through traditional research or commercial activity. It will do so by supporting high-

risk, high-reward science with the potential to catalyze disruptive progress across a multitude of disease areas – seeking solutions at levels from the molecular to the societal. NIEHS is excited to explore how the ARPA-H program can help the environmental health sciences community. NIEHS studies how the environmental affects people to promote healthier lives. This is complicated by the fact that "environment" is defined broadly, encompassing a large spectrum of synthetic and naturally occurring chemicals and other environmental agents, including pollutants in the air we breathe and the water and food we eat. It also includes the influence of lifestyle factors such as nutrition, smoking, vaping and psychosocial stress, including that from violence and racism.

While the environmental health sciences community has been successful in establishing associations between single exposures and disease, for example by establishing the connection between lead and neurological disorders, arsenic and various types of cancers, air pollution and emphysema, asthma, and cardiovascular disease, the global environmental health sciences community has come to recognize this critical inflection point where the time has come to embrace an experimental framework, called the exposome, that moves beyond studying individual exposures one at a time. The exposome is a paradigm shifting concept that will enable studying the totality of exposures over an individual's lifetime.

There will be a need to create new tools and approaches, including personal monitoring devices, to precisely measure a large array of exposures in real time, and to do this over critical periods of vulnerability at both the individual and population levels. There will be an unprecedented need to develop and standardize a compendium of biomarkers that clearly identify the biological consequences of environmental exposures. To make this happen, there will need to be new, innovative, and comprehensive approaches to catalogue exposome data and to develop the AI and ML computational tools to integrate comprehensive exposure data with the genetics, epigenetics and genomics data being collected across the globe, especially that from highly diverse populations and communities. By doing this, we hope that ARPA-H can help usher in an era of what the environmental health community come to refer to as Precision Environmental Health.

On July 22, 2021, Dr. Rick Woychik participated in a listening session, led by Dr. Francis Collins, Director of the National Institutes of Health, in which Dr. Woychik and the Directors of the National Cancer Institute (Dr. Ned Sharpless) and the National Heart, Lung, and Blood Institute (Dr. Gary Gibbons) heard from stakeholders from the Association of American Cancer Institutes, the American Cancer Society, the American Heart Association, the American Society of Hematology, the American Thoracic Society, The Endocrine Society, the National Brain Tumor Society, and the Sickle Cell Disease Association of America Inc. This was one of 15 listening sessions conducted by the White House and NIH. Over 5,100 registered participants, including nearly 250 organizations, from across the country attended the events, which provided a forum to share their views on the scientific areas ripe for transformation. Participants offered many specific ideas that ranged from developing novel imaging technologies to modernizing clinical trial approaches. Several areas, such as the need for better, more integrated data, the imperative to reduce or eliminate health inequities, and the potential for novel advances catalyzed by collaboration across scientific disciplines, were common themes echoed throughout the sessions.

OSTP and NIH will analyze the robust input received over the course of the listening sessions. These thoughtful contributions will help inform the collaborative development of potential areas of focus and priority to further crystalize the initial breath and scope of ARPA-H.

NIEHS Leadership Values

In developing his philosophy for leading the institute, Dr. Rick Woychik brought attention to the need for Leadership Values to help guide the institute. The entire NIEHS community was engaged to provide input and comments in developing the values: workforce, innovation, collaboration, communication, and distributive leadership. The NIEHS Values Committee gathered the input from around the institute to develop descriptors for each value:

- **Workforce:** An inclusive, diverse, and well-equipped pipeline of people whose perspectives are respected and valued
- **Innovation:** Forward thinking, cutting-edge, and diverse ideas are fostered and applied to solve current and emerging challenges
- **Collaboration:** Cooperative teamwork that leverages transparent and respectful partnerships to drive synergistic engagement towards a common mission
- **Communication:** Intentional and transparent exchange of information that is built on mutual trust, respect and inclusion
- **Distributive Leadership:** An environment that inspires and empowers the entire workforce to utilize their talents, strengths and expertise to assume leadership responsibilities and accountability

NIEHS' leadership identified two representatives from each division or office at NIEHS to form a Values Committee to help consolidate and refine the input from across NIEHS and develop the final versions of the descriptors:

- L. Michelle Bennett, Chief innovation Officer, Values Committee Chair
- Esra Mutlu, Office of Program Operations, DNTP
- Clark Phillips, Grants Management Branch, DERT
- Elizabeth Ruben, OD
- Lisa Wolf, DNTP
- Arrash Yazdani, Health and Safety Branch, OM
- Hans Luecke, DIR
- Patricia Jensen, Neurobiology Laboratory, DIR
- Jennifer Collins, Exposure, Response, and Technology Branch, DERT
- Kelly Chandler, Office of Policy, Planning, and Evaluation, OD
- La Vern James, Administrative Services and Analysis Branch, OM
- Alex Torres, OD, Committee Manager

Strategic Plan Theme 1

Science Advances

DERT

- Gaskins AJ, Minguez-Alarcon L, VoPham T, Hart JE, Chavarro JE, Schwartz J, Souter I, Laden F. 2021. **Impact of ambient temperature on ovarian reserve**. Fertil Steril; doi: 10.1016/j.fertnstert.2021.05.091. [Online 8 June 2021]

DIR

- Karcz TP, Whitehead GS, Nakano K, Nakano H, Grimm SA, Williams JG, Deterding LJ, Jacobson KA, Cook DN. 2021. **UDP-glucose and P2Y14 receptor amplify allergen-induced airway eosinophilia**. J Clin Invest 131(7):e140709

DNTP

- Crizer DM, Ramaiahgari SC, Ferguson SS, Rice JR, Dunlap PE, Sipe NS, Auerbach SS, Merrick BA, DeVito MJ. 2021. **Benchmark concentrations for untargeted metabolomics versus transcriptomics for liver injury compounds in *in vivo* liver models**. Toxicol Sci; 181(2):175-186. doi: 10.1093/toxsci/kfab036.

Strategic Plan Theme 2
Spotlight on NIEHS: COVID Research Updates

Pandemic Vulnerability Index

Expert groups have coalesced around a roadmap to address the current COVID-19 pandemic centered on social distancing, monitoring case counts and health care capacity, and, eventually, moving to pharmaceutical interventions. However, responsibility for navigating the pandemic response falls largely on state and local officials. To make equitable decisions on allocating resources, caring for vulnerable subpopulations, and implementing local- and state-level interventions, access to current pandemic data and key vulnerabilities at the community level are essential. Although numerous predictive models and interactive monitoring applications have been developed using pandemic-related data sets, their capacity to aid in dynamic, community-level decision-making is limited. We developed the interactive COVID-19 Pandemic Vulnerability Index (PVI) Dashboard (https://covid19pvi.niehs.nih.gov/) to address this need by presenting a visual synthesis of dynamic information at the county level to monitor disease trajectories, communicate local vulnerabilities, forecast key outcomes, and guide informed responses.

Recent work has resulted in a number of improvements. Most notably, as vaccination rates are now nationally available, the PVI model has been updated to include this important vulnerability measure. The Dashboard now displays two models: PVI without vaccine from the start of the pandemic before the vaccine was developed and then the updated PVI with vaccine information starting in January 2022. The machine learning and predictive modeling has also been updated with this important new data. Additionally, there have been substantial improvement and extensions to the software that underlies the Dashboard. The ToxPI*GIS software used for the Dashboard has now been connected to ArcGIS, which expands the types of analyses that are possible. Notably, there are tools to test and predict for hotspots, and empowers users to develop custom visualizations and additional data for their own visualizations and analysis.

Additionally, there are a growing number of use cases, including use by partners at the CDC, decision makers in local government, and leadership in businesses across the country that are using the tool to support decision making and resource prioritization. The website has been accessed by people in 4,246 distinct U.S. cities, and 121 different countries such as Canada, UK, Indonesia, Thailand, Portugal, Chile, Kenya and Israel.

NIEHS COVID-19 Mouse Model: Cre-Inducible hACE2

Following the 2003 outbreak of SARS-CoV-1, human Angiotensin I Converting Enzyme 2 (hACE2) was identified as the receptors utilized by the coronavirus to gain entry into the cell, thereby infecting the host. In 2007, the lab of Dr. Stanley Perlman developed a transgenic mouse line with epithelial-specific expression of the human ACE2 isoform, Tg(K18-ACE2)2Prlmn. Since then, the K18-hACE2 mouse line has become an invaluable mouse model for COVID19/SARS-CoV-2. During the pandemic, NIEHS developed a new COVID19 mouse model that would allow for tissue-specific and/or temporal hACE2 expression to

study the role of other cell types in COVID19 infection. For proof-of-concept infection studies, our Cre-inducible Rosa26-hACE2 model was bred to Alveolar type II cell-specific Spc-Cre transgenic mice. Following SARS-CoV-2 exposure, severity of symptoms and moribundity was increased in the Rosa26-hACE2 Spc-Cre mice compared to the K18-hACE2 mice. Interestingly, despite more severe symptoms, the viral load at 7 days post infection was close to 20-fold lower in the Rosa26-hACE2 Spc-Cre mice. Perhaps one of the largest confounding effects observed in the K18-hACE2 mice is the very high viral load that results following SARS-CoV-2 infection. Based on preliminary/interim results the NIEHS COVID19 mouse model has similar disease severity but without the extremely high viral load, which suggests it might be a better mouse model for preventative intervention or disease treatment than the K18-hACE2 transgenic mouse line. With proof-of-concept completed, our future direction includes the crossing of our Rosa26-hACE2 mouse line to numerous other pulmonary-specific Cre lines for viral exposure studies at NIAID/RML in collaboration with the lab of Dr. Catharine Bosio.

RADx-rad Update

A particular challenge in the fight against COVID-19 is its infection-to-disease timeline. Today, we know that screening for SARS-CoV-2 viral infection by qPCR is most successful in asymptomatic and pre-symptomatic stages, and antibody-based detection is only reliable weeks after exposure and once COVID-19 has already set in. That also means it is difficult to correlate viral load of SARS-CoV-2 (the pathogen) with presentation or severity of COVID-19 (the disease) because they don't necessarily coincide. With that in mind, Drs. Oswaldo Lozoya and Douglas Bell secured endorsement by the NIH RADx-rad initiative to advance a sequencing-based method that can simultaneously screen for thousands of individuals for viral load and COVID-19 risk by performing biomarker analysis of their gene expression, requiring minimal re-tooling and additional expenses for CLIA-compliant laboratories already performing PCR testing and access to next-generation sequencers.

This method, currently on track towards full patent application, has been tested on NP swabs and saliva from 111 donors from Florida and South America, 70% of which presented COVID-19 of different severity and whose samples were collected 1-2 weeks after first symptoms. As expected at this stage of the COVID-19 timeline, the assay only confirmed 9 donors positive for SARS-CoV-2 RNA but was still able to discriminate samples based on gene expression patterns from the donors themselves and extracted directly from their swabs. Most importantly, this technique identified a gene expression signature that corresponded with donors who, at the time of swab collection, were hospitalized with severe COVID-19 and required mechanical ventilation.

Women's Health Awareness

Joan Packenham, Ph.D., Director of the NIEHS Office of Human Research Compliance, submitted a co-funding application to the Office of Research on Women's Health for her project Women's Health Awareness Community Resiliency, Environmental Action, and Collaborations for Health (REACH) Equity. She was awarded the full funding request of $290, 608. The overarching goal of the project is to identify predisposing factors and COVID-19 related factors that contribute to adverse health outcomes within the Women's Health Awareness population and their families. The overall goal is to develop effective interventions to assist with disease prevention, control and management for successful recovery, and resilience of underrepresented, underreported, and understudied women post-COVID-19.

Spotlight on NIEHS: Climate Change

NIH-Wide Working Group on Climate Change and Health

NIEHS is taking the lead in building the NIH-wide working group on Climate Change and Health. The NIH Working Group on Climate Change and Health has been re-chartered and is being co-chaired by NIEHS and the Fogarty International Center. A concept clearance for this all-of-NIH initiative will be presented at a special session of the NAEHSC in November. The priority areas identified for this initiative are below.

- **Support innovative discovery and solutions-based research**
    - Better understand the complex and changing environmental influences on human health
    - Better anticipate potential "surprises" from climate change related disruption of ecological and biological systems (e.g., novel food contaminants)
    - Analyze climate actions to understand health and economic benefits
    - Implementation science to improve provision of preventive services where there is existing evidence base (e.g., mental health services in affected communities)
- **Build healthy, resilient communities by supporting sustained research partnerships with disadvantaged communities**
    - Integrate community knowledge to enhance resilience and climate change adaptation
- **Implement rapid disaster research response capacity** to better understand health implications of climate-related disasters and effectiveness of disaster health risk reduction interventions
- **Develop state of the art data infrastructure** to support research and analysis of climate change health impacts, promoting integration of climate-related exposures in NIH studies
- **Build the research workforce** of well-trained multidisciplinary scientists to further our understanding of the health risks and prevention measures
    - The key to success of this research to action is the involvement of multiple disciplines

The Climate Change and Health Request for Information (NOT-ES-21-009) was released on July 30, 2021 and has been extended to **September 17,2021**. This request for information (RFI) invites comments from diverse stakeholder groups that include scientific researchers, community advocates, clinicians, and policy makers. The NIH has identified six priority areas of research on human health and climate change, listed below. This RFI seeks to identify research gaps and priorities in these areas and encourages responses on related topics that are not listed.

- Innovative Research that Addresses Climate Change and Human Health
- Scientific Infrastructure to Address Human Health and Climate Change
- Research and Community Partnerships to Address Environmental Injustice and Foster Resilience
- Rapid Research Response Capacity to Address Human Health and Climate Change
- Diverse Workforce to Address Human Health and Climate Change
- Translation and Dissemination of Research Findings and Health Protective Strategies

NIEHS Environmental Career Worker Training Program Designated Justice40 Pilot Program

The NIEHS Environmental Career Worker Training Program (ECWTP) provides training to increase opportunities for individuals from disadvantaged and underserved communities to obtain careers in environmental cleanup, construction, hazardous waste removal, and emergency response. Disadvantaged communities include those that are traditionally burdened by economic distress

(unemployed or underemployed), health disparities, environmental injustice, or hazardous environmental conditions. Since 1995, ECWTP has developed skilled workers and leaders from environmental justice (EJ) and underserved communities to help with cleanup and recovery efforts, providing pre-employment and health and safety training to thousands of people. The program has trained over 13,000 workers, with an average job placement rate of 70%. ECWTP celebrated 25th years of accomplishments last year. Read more about ECWTP in the program's fact sheet .

ECWTP has recently been recognized and included in the **Justice40 initiative** recommendations from the White House Environmental Justice Advisory Council. Based off of Executive Order 14008, the Justice40 Initiative has a the goal of delivering 40 percent of the overall benefits of relevant federal investments to disadvantaged communities and tracks performance toward that goal through the establishment of an Environmental Justice Scorecard. ECWTP surpasses the Justice40 initiative goals, with 100% of training activities taking place in disadvantaged communities. NIEHS is looking at expanding ECWTP to train in additional cities and seeing how our community health worker model can be utilized to address the health impact of COVID-19 on vulnerable communities. A strength of ECWTP is that many of the grantees address the administration's climate change goals, such as bringing job skills to EJ communities that support employment in the clean energy sector as well as building capacity for community-based organizations to conduct this work.

In addition to the ECWTP, the Low Income Home Energy Assistance Program (LIHEAP) was selected as a second pilot program for the Justice40 Initiative. LIHEAP helps keep families safe and healthy through initiatives that assist families with energy costs. The program provides federally funded assistance in managing costs associated with home energy bills, energy crises, weatherization and energy-related minor home repairs.

Strategic Plan Theme 3

Staff Updates

After 36 years of federal service, Chris Long has retired from NIEHS. Mr. Long came to NIEHS in November 2007 to become the deputy associate director for management. On August 7, 2016, he was named the NIEHS Executive Officer. In his time at the institute, Mr. Long has overseen many high-profile projects, from the transformation of lab corridors and break rooms to the groundbreaking for the institute's net-zero-energy warehouse. Following Mr. Long's departure, Mitch Williams is serving as the Acting Executive Officer.

Interim leadership within the Office of Management starting September 1, 2021:

- Acting Executive Officer – Mitch Williams
- Acting Deputy Executive Officer – Scott Redman
- Acting Budget Officer – Alicia Hawley Abdelmasih

Elizabeth Martin, Ph.D. has been selected to the NIH Independent Research Scholars program and will start her independent research group in ESCBL in September 2021.

Sharon Beard, M.S. has been named Branch Chief of the Worker Education and Training Branch (WETB). Beard has served as acting Branch Chief since the retirement of Chip Hughes at the end of 2020. She first came to WETB in 1994 as an Environmental Science and Management Fellow under the direction of Dr.

Kenneth Olden. Following her experience as an NIEHS fellow, Ms. Beard served as Industrial Hygienist and Program Administrator in the WETB for more than 25 years.

As Branch Chief, she will provide oversight of all activities of the NIEHS Worker Training Program, whose mission is the development of health and safety training for workers who are involved in handling hazardous waste and responding to emergency releases of hazardous materials.

CDR Mark Miller, Ph.D., has been named the Lead for DNTP Workforce Development Strategy. Miller served as Linda Birnbaum's Chief of Staff throughout much of her tenure reporting into the NIEHS Office of the Director. More recently, he has supported various functional responses to the Unaccompanied Children Humanitarian Mission and the COVID pandemic with exemplary performance (e.g., he was recently recognized with an HHS Secretary's Award for Distinguished Service for his contributions to the COVID Testing and Diagnostics Working Group). Also, over the past year, CDR Miller has taken on a detail assignment supporting the DNTP in its efforts to build a workforce development strategy. In this role, he will continue his work leading the DNTP's workforce strategy and also support the implementation of DNTP's strategic research portfolio.

Diversity, Equity, Inclusion, and Accessibility Updates

Marie A. Bernard, M.D., as NIH's next Chief Officer for Scientific Workforce Diversity (COSWD). Dr. Bernard will lead NIH's effort to promote diversity, inclusiveness, and equity throughout the biomedical research enterprise. Dr. Bernard has served as the acting COSWD since October 2020, after the retirement of Hannah A. Valentine, M.D., who served as NIH's first-ever COSWD. Dr. Bernard has also served as the deputy director of the National Institute on Aging (NIA) since October 2008.

NIH UNITE Initiative
The UNITE initiative was established to identify and address structural racism within the NIH-supported and the greater scientific community. UNITE is comprised of five committees with separate but coordinated objectives on tackling the problem of racism and discrimination in science, while developing methods to promote diversity and inclusion across the biomedical enterprise. The five committees are:

- **Committee U:** Understanding stakeholder experiences through listening and learning
  To perform a broad, systematic self-evaluation to delineate elements that perpetuate structural racism and lead to a lack of diversity, equity, and inclusion within the NIH and the external scientific community.
- **Committee N:** New research on health disparities, minority health, and health equity
  To address long-standing health disparities and issues related to minority health inequities in the United States by ensuring NIH-wide transparency, accountability, and sustainability in marshaling resources for health disparity, minority health, and health equity research.
- **Committee I:** Improving the NIH culture and structure for equity, inclusion and excellence
  To change the NIH organizational culture and structure to promote diversity, equity, and inclusion throughout the NIH workforce.
- **Committee T:** Transparency, communication, and accountability with our internal and external stakeholders
  To ensure transparency, accountability, and sustainability of all UNITE efforts amongst internal and external stakeholders.

Coordinate NIH-wide efforts and communicate findings from other UNITE committees to internal and external stakeholders, and the public.

- **Committee E:** Extramural research ecosystem: changing policy, culture and structure to promote workforce diversity
  To perform a broad systematic evaluation of NIH extramural policies and processes to identify and change practices and structures that perpetuate a lack of inclusivity and diversity within the extramural research ecosystem.

UNITE Actions/Priorities Going Forward

- Listen and learn from a wide variety of stakeholders, including those who are not frequently engaged
- Develop actionable data dashboards that track and provide visualizations of intramural workforce and NIH HD/MH/HE research investments
- Develop programs to spur institutional culture change in support of inclusivity and equity
- Change physical and virtual representations at NIH to more accurately reflect the diversity of our society
- Publish revised NIH internal guidance for reporting racial discrimination (**Manual chapter 1311)**
- Additional Funding Opportunity Announcements (FOAs) that focus on IC-specific disease/topic areas related to HD/MH/HE
- Develop programs to expand NIH interactions with and support of HBCUs, TCUs and other MSIs

HBCU Listening Sessions

To address potential disparities in research funding and training opportunities among scientists and students at historically black colleges and universities (HBCUs) and other minority-serving institutions, NIEHS is hosting four listening sessions in July and August. Individuals from those schools are invited to share their thoughts on topics such as obstacles in the grant application process and ways to increase the number of minority students receiving graduate degrees.

Personalized Environment and Genes Study

The NIEHS Environmental Polymorphisms Registry is now The Personalized Environment and Genes Study (PEGS). The study now has new leadership but will continue to study the relationship between genes and the environment, on a much larger scale. This growth will allow researchers to improve the information that is shared to learn more about risks for common diseases. Over the past 20 years, contributions from study participants have allowed researchers to:

- **Determine Factors That Increase Risk of Disease**. PEGS is able to study the relationship between the environment and genes to identify factors that increase the risk of several common diseases, such as diabetes, heart disease, stroke, psoriasis, rheumatoid arthritis, allergies, asthma, cancer, and more.
- **Improve Disease Risk Prediction**. By using genetic information along with environmental exposures and clinical data, researchers are able to study how to improve the prediction of disease risk.
- **Identify Differences in Risk Factors**. Using study data, PEGS is able to examine the differences in age, race, or ethnicity to determine if this can increase the chances of disease.

- **Understand Diseases and Their Causes**. Using participants' contributions to PEGS, researchers are able to identify key hypotheses about how the environment and genes affect health.

Awards and Recognition

2021 Summer Internship Program Poster Winners:

Undergraduate Winners:

- **1st Place:**
  Jayalakshmi Alagar
  Williams College
  Dr. Ron Cannon and Dr. Linda Birnbaum
  Mechanistic Toxicology Branch- DNTP
- **2nd Place:**
  Mlana Lore
  Dr. Laura Bisogno and Dr. Trevor Archer
  Epigenetic and Stem Cell Biology Laboratory- DIR
- **3rd Place (tie):**
  Matthew Chen
  University of Chicago
  Dr. Arun Pandiri
  Cellular and Molecular Pathology Branch- DNTP
- **3rd Place (tie):**
  Spencer Maranto
  University of North Carolina- Chapel Hill
  Dr. Jesse Cushman
  Neurobiology Laboratory-DIR
- **3rd Place (tie):**
  Kayen Tang
  Vassar College
  Dr. Ayland Letsinger and Dr. Jerry Yakel
  Neurobiology Laboratory-DIR
- **Undergraduate Honorable Mention:**
  Shawn Mathew
  University of North Carolina- Chapel Hill
  Dr. Lalith Perera
  Genome Integrity and Structural Biology Laboratory-DIR
- **Undergraduate Honorable Mention:**
  Kim Nguyen
  University of North Carolina- Chapel Hill
  Dr. Justin Collier and Dr. Anton Jetten
  Immunity, Inflammation and Disease Laboratory-DIR

Graduate Winners:

- **1st Place:**
  Opal Patel
  University of North Carolina- Chapel Hill
  Dr. Kaitlyn Lawrence and Dr. Dale Sandler
  Epidemiology Branch-DIR

- **2nd Place (tie):**
  Yilda Macias
  New Mexico State University
  Dr. Katie O'Brien and Dr. Dale Sandler
  Epidemiology Branch- DIR
- **2nd Place (tie):**
  Rachel Thompson
  Grand Valley State University
  Dr. Ann Von Holle and Dr. Clarice Weinberg
  Biostatistics and Computational Biology Branch-DIR
- **3rd Place:**
  Courtney Moore
  Tuskegee University College of Veterinary Medicine
  Dr. Ron Herbert
  Cellular and Molecular Pathology Branch- DNTP
- **Graduate Honorable Mention:**
  Sharonda Lovett
  Boston University
  Dr. Katie O'Brien and Dr. Dale Sandler
  Epidemiology Branch-DIR
- **Graduate Honorable Mention:**
  Claire Ashley
  University of North Carolina- Chapel Hill
  Dr. Suril Mehta
  Integrative Health Assessments Branch- DNTP

NSCP Summer 2021 Poster Winners:

Group 1 (NSCP 2020-21)

(1) Best Presenter: Eddy Rios
Mentored by Dr. Linda Yu and Dr. Darlene Dixon

(2) Honorable Mention: Jadesola Oladosu
Mentored by Dr. Sue Fenton

Group 2 (NSCP 2021-22)

(1) Best Presenter: Jessica Wu
Mentored by Dr. Ayland Letsinger and Dr. Jerrel Yakel

(2) Honorable Mention: Helena Hysong
Mentored by Dr. Joseph Rodriquez

Liz Garcia-Peterson, Ph.D., from the Metabolism, Genes, and Environment Group, and **Saniya Rattan, Ph.D.,** from the Reproductive Developmental Biology Group, have been named Postdoctoral Research Associate Training (PRAT) Program Fellows. The program is sponsored by the National Institute of General Medical Sciences (NIGMS). Of the eight available PRAT fellowships, two went to NIEHS postdocs. That means the institute garnered 25% of the positions. For the next three years, the PRAT program will pay their salaries, buy needed research supplies, offer training in leadership skills and grant writing, and foster a sense of collaboration with other PRAT fellows through networking events.

K.C. Donnelly Externship Awards:
The Superfund Research Program (SRP) has established an honorary award in memory of K.C. Donnelly, Ph.D., a longtime SRP grantee who worked tirelessly to improve our understanding of environmental exposure and genotoxicity of complex chemical mixtures. The purpose of these supplements is to provide current SRP-funded graduate students/post-doctoral researchers with translational/transdisciplinary opportunities and experiences within other SRP-funded grants, government laboratories (EPA, ATSDR, NIEHS), or other agencies (state, local, Tribal). This year, 14 outstanding trainees received K.C. Donnelly Externship Awards:

- University of Iowa SRP Center trainee **Christian Bako** will work at the EPA Center for Public Health and Environmental Assessment.
- **Victoria Colvin**, from the OSU SRP Center, will travel to the Massachusetts Institute of Technology SRP Center.
- Texas A&M SRP Center trainee **Alexandra Cordova** will work at the Los Alamos National Laboratory.
- **Subham Dasgupta, Ph.D.**, from the OSU SRP Center, will travel to the Dartmouth College SRP Center.
- University of Rhode Island (URI) SRP Center trainee **Matthew Dunn** will conduct an externship with SRP-funded small business Cyclopure, Inc.
- **Luisa Feliciano**, a Northeastern University SRP Center trainee, will work at the U.S. Army Corps of Engineers Geospatial Research Laboratory.
- **Molly Frazar**, from the University of Kentucky SRP Center, will work at the EPA.
- **Kamila Murawska-Wlodarczyk**, a trainee at the University of Arizona SRP Center, will travel to the UC San Diego SRP Center.
- University of Kentucky SRP Center trainee **Ariel Robinson** will travel to the North Carolina State University SRP Center.
- **Bridger Ruyle**, from the URI SRP Center, will work at the National Toxicology Program Laboratory.
- UC Davis SRP Center trainee **Brittany Saleeby** will travel to the Duke University SRP Center.
- **Breandon Taylor**, of the University of Louisville SRP Center, will travel to the Louisiana State SRP Center.
- Northeastern University SRP Center trainee **Skarlet Velasquez** will travel to the Dartmouth College SRP Center.
- **Guobin Xia, Ph.D.**, from the Baylor College SRP Center, will travel to the UC Davis SRP Center.

K99/R00 Award:
Cassandra Hayne, Ph.D. in STL was awarded a K99 MOSAIC Award (1K99GM143534-01). This central NIH program is awarded by NIGMS. Dr. Hayne will be mentored by Dr. Robin Stanley. The Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) program is part of NIH's efforts to enhance diversity within the academic biomedical research workforce and is designed to facilitate the transition of promising postdoctoral researchers from diverse backgrounds, for example individuals from groups underrepresented in the biomedical research workforce at the faculty level, into independent, tenure-track or equivalent research-intensive faculty positions.

K43 Award:
Dr. Temitope (Temi) Adedeji, a Visiting Fellow in the Wade group, received an NIH Emerging Global Leader Award (K43) from the NIH Fogarty International Center. The Fogarty Emerging Global Leader Award aims to provide research support and protected time to a research scientist from a LMIC who holds an academic junior faculty position or research scientist appointment at an LMIC academic or

research institution. Low-income, lower-middle-income and upper-middle-income countries are included.

Science Communication Fellowship:
Dr. Emily Werder, an IRTA Postdoctoral fellow in Dale Sandler's group, was selected to participate in the prestigious Science Communication Fellowship program. The Science Communication Fellowship is a nine-month program for early career PhD scientists who want to maximize the impact of their work to benefit public health and the environment and share their passion for science. Fellows are chosen from the fields of green chemistry/engineering and the environmental health sciences, and work in academia and government.

NIH Matilda White Riley Early-Stage Investigator Paper Competition: The NIH Office of Behavioral and Social Sciences Research (OBSSR) Early-Stage Investigators (ESI) Paper Competition awards recognize emerging scientists whose research reflect Dr. Matilda White Riley's vision of research excellence in health-related behavioral and social sciences. This year, Kaitlyn Lawrence, Ph.D. an IRTA Postdoctoral Fellow in the Chronic Disease Epidemiology Group (EB) was one of four awardees for the 14th Matilda White Early-Stage Investigator Paper Award.

Best Poster Award, American Society for Biochemistry and Molecular Biology Symposium Celebrating Protein Data Bank at 50 (PDB@50):
Seda Kocaman, Ph.D., Visiting Postdoctoral Fellow in the Nucleolar Integrity Group (STL)

Intramural AIDS Research Fellowship:
Alexander Foo, Ph.D., Visiting Postdoctoral Fellow in the Nuclear Magnetic Resonance Group (GISBL)

2022 NIH FARE Awards:
17 early-career scientists from NIEHS won the annual National Institutes of Health (NIH) Fellows Award for Research Excellence (FARE). FARE awardees receive $1,500 to attend a scientific meeting and present their abstracts, and the winners will judge next year's FARE competition. The NIH Fellows Committee, the Scientific Directors, and the NIH Office of Intramural Training & Education sponsor the awards.

- Alexander Foo, Ph.D.
  Mentor: Geoffrey Mueller, Ph.D.
  Project: Vicilin Buried Peptides (VBP)'s Mediate Cross-Reactivity Between Evolutionarily-Distant Species
- Matias Grodzielski, Ph.D.
  Mentor: John Cidlowski, Ph.D.
  Project: Glucocorticoids Regulate Gene Expression and Stimulate Proplatelet Formation in Murine Megakaryocytes
- Yosuke Sakamachi, Ph.D.
  Mentor: Stavros Garantziotis, M.D.
  Project: Toll-Like-Receptor 5 Protects Against Pulmonary Fibrosis by Reducing Lung Dysbiosis
- Dana Al-Hasan, Ph.D.
  Mentor: Chandra Jackson, Ph.D., M.S.
  Project: Using INLA-SPDE Spatial Modeling to Examine Associations Between Neighborhood Characteristics and Alzheimer's Disease and Related Dementia
- Jennifer Woo, Ph.D., M.P.H.

Mentor: Dale Sandler, Ph.D.
Project: Early Life Trauma and Incident Breast Cancer

- Ciro Amato, Ph.D.
  Mentor: Humphrey Yao, Ph.D.
  Project: Our Differences Make Us Complete: The Identification of Novel Cell Populations in Penis Development and their Involvement in Hypospadias
- David Diaz Jimenez, Ph.D.
  Mentor: John Cidlowski, Ph.D.
  Project: Glucocorticoids Rewire Macrophage Metabolism and Inflammation through Transcriptional Reprogramming of the IRG-1 and SUCNR1 expression
- Justin Collier, PharmD, Ph.D.
  Mentor: Anton Jetten, Ph.D.
  Project: GLIS3-Deficiency Leads to Impaired Renal Mitochondrial Metabolism and Polycystic Kidneys
- Komlan Atitey, Ph.D.
  Mentor: Benedict Anchang, Ph.D.
  Project: Performance Metrics of High Dimensional Reduction Methods for Better Visualization and Interpretability of Separable Biological Data
- Yun-Gil Roh, Ph.D.
  Mentor: Anton Jetten, Ph.D.
  Project: Loss of GLIS2 Initiates Nephronophthisis Through Macrophage Infiltration by Direct Regulation of Fibrosis/ECM and Immune/Inflammation Gene Expression.
- Tapas Pradhan, Ph.D.
  Mentor: Anton Jetten, Ph.D.
  Project: GLIS3 Plays a Critical Role in Astrocyte Differentiation and Function
- Jicheng Li, Ph.D.
  Mentor: Guohong Cui, M.D., Ph.D.
  Project: DBS-based Chemogenetic Gene-Therapy Rescues Motor Deficits in Mice with Advanced Parkinson's Disease
- Yichang Chen, Ph.D.
  Mentor: Erik Tokar, Ph.D.
  Project: A Human Pluripotent Stem Cell-Based High-Throughput Platform with Artificial Intelligence Technology to Screen for Developmental Toxicants
- Sukanya Saha, Ph.D.
  Mentor: Guohong Cui, M.D., Ph.D.
  Project: Pathophysiological Study of Fungicide Benomyl in Parkinson's Disease
- Xian Wu, Ph.D.
  Mentor: Erik Tokar, Ph.D.
  Project: Mechanisms of Cadmium-Induced Aberrant Differentiation of Human Embryonic Stem Cells to Cardiomyocytes and Cardiac Organoid Formation Mimicking Heart Development
- Meredith Frazier Ph.D.
  Mentor: Robin Stanley, Ph.D.
  Project: Searching for U: Cryo-EM Structures of the SARS-CoV-2 Endoribonuclease Nsp15 Reveal Insight into Nuclease Specificity and Dynamics
- Guangning Zong, Ph.D.
  Mentor: Stephen Shears, Ph.D.

Project: Diphosphoinositol Phosphatase 1 (DIPP1): Moving the Structural Spotlight to Illuminate Dynamic Aspects of Protein Function

2021 Virtual Postbac Poster Days – Outstanding Posters:
189 of the 950 posters presented at NIH Postbac Poster Day were recognized as outstanding (top 20% of all posters). 10 NIEHS posters presenters were recognized as outstanding

- Alexander Merder
  Examining the CD8 T Cell Receptor Repertoire of Smokers
  Preceptors: Douglas Bell, Suzanne Martos
- Kamiya Bridges
  Loss of Runx1 Leads to Development of Ovarian Pathologies
  Preceptor: Barbara Nicol
- Kathleen Embury
  Detecting Epigenetic Effects of Poly Aromatic Hydrocarbon Exposure in Mouse Bone Marrow with DNA Methylation Array Analysis
  Preceptors: Douglas Bell, Oswaldo Lozoya
- Lauren Gullett
  Neighborhood Social Cohesion and Serious Psychological Distress among Asian, Black, Hispanic/Latinx, and White Men and Women in the United States
  Preceptors: Chandra Jackson, Dana Alhasan
- Ruth Parsons
  Treacle N-Terminal Region Missense Mutations Decrease Protein Stability and DNA Binding
  Preceptors: Scott Williams, Percy Tumbale
- Sanya Mehta
  Bacterial Activation of Lung Innate Immunity Affects Fibrosis Development
  Preceptors: Stavros Garantziotis, Yosuke Sakamachi
- Sarah Chong
  Mossy Fiber Inputs to Hippocampal Area CA2
  Preceptors: Serena Dudek, Daniel Radzicki
- Sarah Jo Sleiman
  Hippocampal CA2 Development under the Influence of Prenatal Spironolactone
  Preceptors: Katharine McCann, Serena Dudek
- Suzanna Kafer
  Potential Role of With-No-Lysine Kinase 1 (WNK1) in Oocyte Maturation
  Preceptors: Carmen Williams, Paula Stein
- Sydney Fry
  3D-printed Capacitive Sensor Objects for Object Recognition Assays
  Preceptor: Jess Cushman

International Freezer Challenge:
For a second year in a row, **NIH has won the Top Government Organization Award for the International Freezer Challenge**! Across all of NIH, freezer challenge efforts saved an estimated 535,000 kWh per year, the equivalent annual electricity use of 45 US households. **Half of those savings were due to efforts at NIEHS.**

In addition to multiple energy efficient freezer upgrades across the Institute, the following NIEHS labs participated in the challenge by creating/maintaining searchable sample inventories, disposing of unneeded samples, defrosting freezers, and/or sharing freezer space.

- Lisa Padilla-Banks, Reproductive & Developmental Biology Laboratory, Reproductive Medicine Group, PI Dr. Carmen Williams
- Amy Papaneri, In Vivo Neurobiology Lab, PI Dr. Guohong Cui
- Tanya Whiteside, Quality Assurance Lab, Comparative Medicine Branch, PI Dr. David Kurtz

In Memoriam:

Scott Burchiel, PhD, emeritus distinguished professor in The University of New Mexico Department of Pharmaceutical Sciences, died unexpectedly on July 24 in Albuquerque. Burchiel, the Nunzio and Sherolyn DeSantis Endowed Chair of Pharmacogenomics, was an expert in immunotoxicology and environmental carcinogenesis who had published more than 125 scientific manuscripts and received research funding from the National Institutes of Health for more than 35 years. He was instrumental in securing a National Institute of Environmental Health Sciences center grant to establish the UNM Health Sciences Signature Program in Environmental Health Sciences.

Dr. Burchiel received his BS in biochemistry from the University of California, Davis, in 1973, and a PhD in pharmacology from the University of California, San Francisco, in 1977. He was a postdoctoral fellow in the UNM School of Medicine's Immunology Laboratory before joining the College of Pharmacy in 1978. Dr. Burchiel retired from UNM in 2016 but continued his research as a working faculty member. He is survived by his wife Judy, son Andrew and daughter Amy Boger, her husband Eric and their children Shelton and Sophie.