Medical miracles are no cure for vaccine hesitancy

In the last few months, multiple vaccines have emerged that are highly effective in protecting those who receive them against COVID-19. These are a ‘next generation’ type of vaccine, which harnesses the power of molecular biology and molecular engineering of small pieces of the coronavirus that trains our immune systems to recognize it and mount a sufficiently strong response. That these vaccines were developed in less than a year speaks to the ingenuity of the human intellect and a collective determination to control this pandemic that has robbed so many lives, including the survivors who have lost their loved ones.

Yet now we face the strong possibility, a nontrivial probability that the SARS-CoV-2 may not be defeated, and not because we don’t have the tools, but because a broad swath of the population will decline to be vaccinated. A mere 160 years ago, the majority of the U.S. population (and certainly the global population as well) could expect to die before the age of 40. By the turn into the 20th century, U.S. life expectancy had risen to over 45 years. By 1950, this figure was over 60 years, and it peaked at about 78 years in 2015. Comparable countries are at over 81 years. In short, infectious diseases were the predominant factor in curtailing life during what we now think of as early adulthood.

Today we rarely give thought to diphtheria, tetanus, pneumonia, tuberculosis, smallpox, polio (primarily in children), yellow fever and influenza. Having conquered one after the
next, it is now a few generations that stand between us and that ever-present fear of these infectious diseases that would strike without warning and sometimes decimate entire cities. The history is clear, but for most of our population, lost. While multiple advancements have contributed to this remarkable achievement, including sanitation in general, the separation of the water supply and distribution systems from wastewater, and antibiotics, a pivotal role was played by vaccines. The development of vaccines really began around the start of the 20th Century, and with little understanding of biology, and only an inkling of knowledge about viruses, the challenge was enormous. When the diphtheria vaccine was finally successful and presented to a gathering of scientists from around the world, they literally stood on their chairs to applaud the beginning of a new era in the control of infectious disease. These early vaccines were viewed by the public as miracles.

So here we are now: The pushback against vaccines is far stronger in the U.S. than in other socioeconomically comparable countries. What will it take to convince enough people to be vaccinated in order to achieve full herd immunity? Will it be a series of epidemics/pandemics, so that an overwhelmingly large proportion of the population has lost someone close to them? Can a concerted public health education campaign, with tailored messages for all the subcultures in our ‘melting’ pot, be an effective antidote?

One thing we can say thing for certain is that diverse voices and perspectives making the case for vaccines help. Having scientists like Dr. Kizzmekia Corbett leading the way in COVID research, highlights the importance women—and especially women of color—in STEM. From suffragettes to the #MeToo movement, women and girls of all backgrounds have been tearing down myriad forms of barriers to achieve the equity and dignity they’ve been denied. In science, we are breaking glass ceilings to become recognized for pioneering new fields, from gene editing to environmental exposomics and the applications of systems approaches. We still face micro-aggressions at the workplace, but also supportive allies, and when we see the brilliance of our students and trainees, and the adamant refusal of young women to be silenced, we see a future when the barriers, ceilings and all the constricting forces will have been fully evaporated.

Irva Hertz-Picciotto, PhD
Director, UC Davis Environmental Health Sciences Center
We'll miss you, Aubrey (and Finn)!

Effective community engagement in environmental health research requires a combination of skills, including relationship and trust building, attention to collective process, clear communication, creativity, and patience. We've been so fortunate to have Aubrey Thompson as our Community Engagement Core (CEC) Associate Director for the past several years because she has all of these qualities in abundance. Aubrey came to the CEC with 10 years of science communication and community engagement experience, put her skills to the test and greatly elevated our work. She managed the Community Stakeholder Advisory Committee (CSTAC), coordinated the CEC's support of the Center's Pilot Project Program, led a very successful 2-day Environmental Justice Tour in the San Joaquin Valley for NIEHS Director Linda Birnbaum and her executive team and greatly enhanced our community-based participatory action research training—and that's just part of the list!

Jane Sellen, Co-Director of Californians for Pesticide Reform and one of our CSTAC members, honored Aubrey in these terms which also speak to the sentiments of the CEC and EHSC as a whole: "Aubrey has been a joy to work with as our point of contact in the Community Engagement Core. Aubrey is as kind as she is thorough, and a highly skilled mediator between academia and the outside world. I will miss her very much and wish her all the very best in her future endeavors." — Jonathan London
ÓRALE Project: The ÓRALE Project (Organizaciones para Reducir, Avanzar y Lograr Equidad contra el COVID-19) has the goal to identify and overcome barriers to COVID-19 testing in vulnerable Latino/a residents in California's Central Valley. Our team is now ready to go out into these underserved farmworker communities to provide free COVID-19 testing. Our mobile test site will be offering tests in Fresno, Madera, Stanislaus and Yolo counties. We'll also conduct a survey to learn more about the challenges vulnerable Latinos/as and immigrants face, and their experiences during the COVID-19 pandemic.

From the beginning of this project, we have been learning from our collaborators:

- Radio Bilingüe
- Central California Environmental Justice Network (CCEJN)
- Lideres Campesinas
- Centro Binacional Para El Desarrollo Indigena Oaxaqueño (CBDIO)
- Building Healthy Communities-Fresno (BHC)
- Madera Community Coalition for Justice (MCCJ)
- West Modesto Community Collaborative
- California Rural Legal Assistance Foundation (CRLAF)
- Health Education Council (HEC)
- Mexican Consulate in Sacramento
- RISE, Inc.

Our community partners are working to get the word out. They will also help with registration and lead the pre- and post-test counseling at the test sites.

If you have questions about ÓRALE, please reach out to Camille Burlaza (ciburlaza@ucdavis.edu).

COVID-19 & pregnancy: Rebecca Schmidt and her team are recruiting for UCSF’s Healthy Outcomes of Pregnancy for Everyone (HOPE) Study, which now is available in English and Spanish. Read more about it here.

Portable, breath-based COVID diagnostics: Cristina Davis is leading a new project to develop a gas chromatography detector for COVID-19. Her project has two main goals:
- Determine the gas phase breath biomarkers associated with COVID-19
- Prototype, build and test a new portable breath analysis instrument in a hospital setting

Ultimately, the plan is to develop a commercial instrument that can diagnose COVID-19 rapidly at “point of testing” sites. Dr. Davis envisions an instrument that can analyze exhaled breath samples in less than five minutes to provide clinicians with a real-time diagnostic.

The project just launched and is funded by the NIH’s National Center for Advancing Translational Sciences.
Novel COVID-19 lung treatment: Amir Zeki, MD has developed a novel COVID-19 treatment using inhaled statins. While research shows oral statin treatment in COVID patients can reduce the risk of severe disease, lead to faster recovery and reduce mortality, Zeki’s research will look at the impact of using an aerosolized delivery mechanism to explore the full potential of these drugs. Read more about his work here.

Research spotlight

Pam Lein, PhD

Molecular and cellular basis of PCB developmental neurotoxicity

Funded: December 2020

Research on PCB developmental neurotoxicity (DNT) focuses almost exclusively on higher chlorinated (HC)- not lower chlorinated (LC)-PCBs. Previous research helped shed light on this gap with the discovery that LC-PCBs 11 and 28 made up more than 70 percent of PCBs in the serum of pregnant women who had an increased risk of giving birth to a child with a neurodevelopmental disorder. Preliminary data suggested PCB 11 caused DNT via activation of CREB-dependent signaling pathways but wasn’t able to determine if metabolites altered neurodevelopment via the same molecular mechanism.

In this new project, Lein will use a mouse model to test her central hypothesis that CYP-mediated metabolism influences the in vivo effects of LC-PCBs on CREB-dependent neurodevelopmental processes. She hopes to identify LC-PCBs as a new class of contaminants that interfere with neurodevelopment, and novel mechanistic data regarding the role of CREB signaling and CYP-mediated bioactivation in PCB DNT. This research will impact public health by helping to assess the risk LC-PCBs pose to the developing brain and provide critical insights into dietary and pharmacological manipulation of CYP activity to mitigate DNT risk in vulnerable populations.
EHSC Anti-racism Work Group

EHSC kicked off the New Year with a lively group of 13 members who came together to discuss implementing anti-racism projects throughout the work the Center does. The work group specifically discussed the Anti-Racism Praxis Proposal for EHSC, which the Community Engagement Core (CEC) spent several months putting together last year.

In small and full group discussions, we talked about the leadership role EHSC should play in anti-racism work on campus, the diversity of faculty and trainees being brought into the Center and efficacy of translating our research to action through community engagement.

EHSC success stories include leadership in promoting awareness of environmental racism and justice on campus through active research and seminars, the EHSC Scholars program in supporting new women faculty of color through funding and mentorship, as well as the CEC establishing new research projects like the one in Kettleman City. But we also saw areas for improvement such as increasing diversity of faculty, tailoring existing mentoring programs to better suit the needs of diverse faculty and trainees and reaching future researchers at the high school level through our community partners.

The EHSC Anti-racism Work Group is currently soliciting suggestions for potential seminar speakers, starting an anti-racism book club and working with campus administrators on an NIH proposal that would support cluster hiring of faculty working on environmental health disparities. If you’d like to participate in the Anti-racism Work Group, contact Janine LaSalle (jmlasalle@ucdavis.edu). – Janine LaSalle

COVID-19: Profiles from the frontlines of the pandemic
To help promote EHSC’s COVID-19 Survey for Workers, we’re interviewing people we know or have met online through the hundreds of COVID-19 Facebook groups we belong to.

In our interview with Darriene Hosley Stewart, the UX writer at Google talks about what privileged workers like her can do to help those who are struggling, how she makes the most of working from home and what she hopes will come out of the pandemic for all Americans.

Read Darrienne’s interview here.

If there’s someone you know who may want to participate in this project, please contact Jennifer Biddle (jsbiddle@ucdavis.edu).

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Updates from our cores

Community Engagement Core (CEC)

Phoebe Seaton and Shankar Prasad, our Community Stakeholder Advisory Committee Co-Chairs for the past seven years, are stepping down from their positions. We would like to celebrate all of the hard work and dedication that Phoebe and Shankar have given to our Center, campus and state! Good luck in your future endeavors!

Our incoming Co-Chairs are Nayamin Martinez and Marilyn Silva. Nayamin is the Executive Director of the Central California Environmental Justice Network. She works with immigrant and Indigenous communities across the San Joaquin Valley, and manages environmental public health programs involving pesticides, air quality and pollution. Marilyn's illustrious career includes many years at the California Environmental Protection Agency’s Department of Pesticide Regulation, where she worked as a toxicologist on human health risk assessments and exposure studies. — Sarina Rodriguez, Community Engagement Specialist, CEC

Exposure Core

Connect with us! The Exposure Core has a number of activities planned for Winter Quarter and we are looking forward to engaging with Center members. Please reach out to Debbie Bennett (dhbennett@ucdavis.edu) with questions or if you would like to participate.

- **Consultations:** The Exposure Core is currently taking appointments to discuss researchers' exposure questions. If you have an ongoing project or planned grant application that could benefit from insight on measuring or interpreting exposure values, we will arrange a meeting to help you, bringing the relevant expertise to answer your questions.
- **Seed Funding:** February 10th we will begin accepting applications for seed funding for investigators who a) would benefit from adding an exposure measure to an existing study, b) would like to obtain proof-of-concept data or c) would like funding to develop an exposure measure. Other ideas encouraged. Check our seed funding.
Sampling in the 2021 wildfire season: The Exposure Core is hosting a brainstorming meeting to be prepared to measure exposures for the next fire season on February 25th at 2 PM. Bring your expertise on measuring exposures from wildfires, along with your thoughts on what additional measures should be collected during the next wildfire event. We hope to have a lively discussion by bringing together experts on air pollution, chemistry, toxicology and epidemiology.

New chemicals in children's environmental health: Most children’s health research focuses on a handful of compounds that are measured in multiple studies. But what about all those that aren't studied? The Exposure Core plans to discuss how we can be better able to assess emerging exposures March 16th, at 2 PM. The goal of the meeting is to assess the capabilities available at UC Davis to understand the complex mixture of chemicals we’re exposed to, bringing together faculty from multiple departments who are working with methods to detect a broad range of chemicals to share ideas that may enhance overall capabilities. Bring your favorite chemical class to the meeting. – Debbie Bennett

Integrated Health Sciences Facility Core

Kent Pinkerton, PhD edited the second edition of Climate Change and Global Public Health, an up-to-date guide on climate change and respiratory health. The book includes the latest research by international experts on topics such as heat waves causing critical care-related diseases, climate-driven air pollution increases and high-level ozone and ozone exposure linked to idiopathic pulmonary fibrosis, lung cancer and acute lower respiratory infection. New chapters by UC Davis experts and others include extreme weather and agricultural safety in California; desert dust effects on lung health; climate policy and the EPA; California's integrated approach to air quality and climate change; integrating climate change, the environment and sustainability themes into professional health science courses; and the role of the physician as climate advocate.

Published by Springer (Humana Press), it’s also available on Google Play, Kindle, Apple Books and Kobo.

NIEHS news & events

Friends of NIEHS congressional briefing on wildfires and other natural disasters

Tuesday, February 9 from 9:30-10:45 AM PST (12:30 PM-1:45 PM EST)

Don’t miss NIEHS Director Rick Woychik, ESHC Director Irva Hertz-Picciotto, Bernard Fontaine from the NIEHS Worker Training Program Task Force on Natural Disasters and COVID-19 and Elizabeth Del Re from the International Association of Fire Fighters speak on the ways NIEHS is advancing knowledge and response to recent disasters and supporting training initiatives to protect workers.
Compounding environmental health crises: COVID-19 research

The Inaugural Symposium of the NIEHS Disaster Research Response Environmental Health Sciences Network will be held February through March 2021. All sessions of the symposia will be live via Zoom from noon – 1:30 PM EST. Topics include:

- **January 13**: COVID-19 Routes of Transmission and Exposure Mitigation
- **February 4**: Mental Health Impacts of COVID-19 Response
- **February 25**: Addressing COVID-19 Challenges with Community Partners
- **March 2**: COVID-19, Social Vulnerability and Environmental Injustice

Register for future sessions here.

Recently published

- Oh, J; **Bennett DH**; Calafat AM; Tancredi D; Roa DL; Schmidt RJ; Hertz-Picciotto, I; Shin HM. Prenatal exposure to per- and polyfluoroalkyl substances in association with autism spectrum disorder in the MARBLES study. Environment international. 2021 Feb; 147 :106328
- Evelyn SMD, **Vogel CFA**, **Bein KJ**, Lara B, Laing EA, Abarca EA, Zhang Q, Li L, Li J, Nguyen TB, **Pinkerton KE**. Differential inflammatory potential of particulate matter (PM) size fractions from Imperial Valley, CA. Atmospheric Environment, Volume 244, 1 January 2021, 117992
- Rajapakse MY, Borras E, Fung AG, Yeap D, McCartney MM, Fabia FM, **Kenyon NJ**; **Davis CE**. An environmental air sampler to evaluate personal exposure to volatile organic compounds. The Analyst. 2020 Nov 18

Announcements

**Spring CSTAC Meeting**: The Spring Community Stakeholder Advisory Committee Meeting will happen on February 22, 9:00 AM to 12 noon. If you would like to attend, please contact Sarina Rodriguez (sverodriguez@ucdavis.edu) for details.

**We're (still) hiring!** Our Center is expanding and staffing up as we take on new research. Please help by circulating information throughout your networks about these job postings:

- **Program Manager**, UC Davis Environmental Health Sciences Center

Please contact our Human Resources representative Kristi Lusso for details and the link to the Program Manager opening (kllusso@ucdavis.edu).
In the news

- ABC-10 interviewed **Irva Hertz-Picciotto** in [Free coronavirus testing available for Central Valley farmworkers](#)
- Fox40 interviewed **Nicholas Kenyon** in [UC Davis clinic helping COVID-19 long-haulers](#)
- The Aggie interviewed **Cristina Davis** in [Women leading COVID-19 research at UC Davis](#)
- The San Francisco Chronicle interviewed **Anthony Wexler** in [California wildfires could upend years of progress fighting air pollution](#)
- The Tahoe Daily Tribune interviewed **Kent Pinkerton** in [UC Davis webinar discusses affects, dangers of wildfire smoke](#)

Infographic

We created the graphic below for Women & Girls in Science Day on February 11. [You can download it here to share](#)
unrelated observations and a
link for communicating
science to lay audiences. She
gave birth to the field of endo-
pine disruption. I had the
chance to talk to her in person
on several occasions—she was
warm, funny, and inraverted
about many things.

Saraswathi
Vedam, Midwife

Savannah
Mack D’Evelyn,
Physiologist

Cristina Davis,
Biomedical Engineer

Christoph Vogel,
Physicist &
Chemist

Nicholas Kenyon: I admire how
she runs a large, complex research
program that is 100% effort, moh
an administrative leadership
role as department chair, but still
has the time to engage with others
to build relationships and learn to
further novel research.

Environment Health: She is
doing important work on the
brain and how environmental
toxicants can lead to
neurological problems. She is
successful yet pleasant, hum-
ble and respectful. She helps
support young faculty in their
academic Careers without
putting herself in the limelight.

Marie Curie, Physicist

Barbara McClintock,
Cytogeneticist

Jane Sellen,
Citizen Scientist

Jejillah Isler,
Astrophysicist

Annie Jump Cannon,
Astronomer

Clare Cannon: She is
the first African-Americ-
an woman to complete
her PhD in Astrophysics
from Yale (2016). Her
ability to communicate
complex concepts in
astrophysics to the pub-
lic in a way that we can
understand makes her
my favorite scientist. This
is her banner-shattering
career is an inspiration to
e all of us. Don’t just
take my word for it, check out
her Ted Talk on “The
untapped giants that
could change science for
the better” or her
National Geographic
video on “Black holes,
bizzies, and women of
color in science.”

Laura Van Winkle: She
studied genetic trans-
position and regulation in
maize. Her work was very
important and eventually
she won the Nobel Prize,
but initially it wasn’t
completely clear how her
discoveries and research
would lead to advances
in understanding genetic
cancer. She is a true
example of a pioneering
woman scientist doing
basic research.

Hod Gji: She was the
first woman to receive an
unheard Nobel Prize in
Medicine or Physiology. I
dmire her dedication to
research and desire for
scientific freedom.

Clarence Cannon: As a deat
woman, she overcame
enormous obstacles to
make major scientific
discoveries. She manually
catalogued about 350,000
stars on small photo-
graphic plates, binning
them into categories by
trends as observed in
their appearance. Later
when she realized she
was actually measuring their
temperature. Her stellar
classification system is still
used today, 100 years later.
It’s a pure example of
gerious observational
science that lead to a new
understanding of the world
(and universe) around us,
which truly inspires me!

environmentalhealth.ucdavis.edu
You never would have known from Amanda Gorman’s commanding performance at the Inauguration that she once had a speech impediment, which she overcame with the help of a *song from the musical Hamilton*. Watch the ever-confident, younger Gorman recite her poetry in this beautiful *ode to California*.

If you have any announcements, new research, press coverage or anything else you’d like to share with your EHSC colleagues or our community partners in this newsletter, please contact Jennifer Biddle (jsbiddle@ucdavis.edu). Thank you!

Connect with us / environmentalhealth.ucdavis.edu