COVID-19 AND RESEARCH

UNPRECEDENTED CHALLENGES, UNPARALLELED RESPONSE

UNIVERSITY OF IOWA OFFICE
OF THE VICE PRESIDENT FOR RESEARCH
ANNUAL REPORT, FY2020
Combating COVID-19

In the face of a global pandemic, University of Iowa researchers faced twin challenges: ramping down on-campus and human subjects research to prevent the spread of COVID-19, while also bringing their expertise to bear on developing treatments and vaccines that could save countless human lives. The Office of the Vice President for Research worked closely with investigators to help ensure both their health and their research success.

Building a Better Mouse

The testing of COVID-19 vaccines requires more than your average lab mouse. Mice aren’t naturally susceptible to human coronaviruses, making it difficult to use them to measure the safety and efficacy of various treatments. But University of Iowa Carver College of Medicine researchers Paul McCray, MD, and Stanley Perlman, MD, Ph.D., had a solution, one they’d actually developed long before the pandemic: a transgenic mouse that expresses the human ACE2 receptor for the virus, making it susceptible to infection by SARS-CoV and SARS-CoV-2. The human ACE2 protein made the mice susceptible to infection, which in turn made them suitable for COVID-19 research. Early in the pandemic, frozen sperm from these mice was used to revive this mouse model and make it widely available to the research community at cost. Under a license agreement arranged by the UI Research Foundation, the Jackson Laboratory in Maine was able to quickly distribute these mice to universities and companies around the world racing to develop effective COVID-19 treatments and vaccines.

Putting Trial Vaccines to the Test

Pat Winokur, MD, executive dean and professor of internal medicine in the University of Iowa Carver College of Medicine, received funding from Pfizer, Inc. and BioNTech SE to study the effectiveness of messenger ribonucleic acid (mRNA) vaccines in potentially preventing COVID-19, which is caused from infection by severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2, the formal name for the virus that causes the disease. Winokur said finding a vaccine that was effective against the virus was “of paramount importance in quelling this pandemic.” She said advances in molecular biology provided many new insights into how to create vaccines more quickly for novel viruses, and that RNA vaccines were some of the first to be tested in humans. “Basically, the RNA codes for the surface protein of SARS-CoV-2 allow the human body to create the part of the virus that is most likely to generate antibodies that will protect us from or reduce the severity of the infection. These RNA vaccines are easier to produce in large quantities so if the trials of this vaccine are successful, this will improve the timing for getting a vaccine into use.

Jackson Labs has distributed UI-engineered mice for COVID-19 research to 264 institutions globally to date, including:

- CANADA 10
- GERMANY 46
- KOREA 14
- SINGAPORE 6
- USA 152
Exploring New Applications for Existing Therapies

Alejandro P. Comellas, MD, professor of medicine and director of the Institute for Clinical and Translational Science (ICTS) Clinical Research Unit, received support from Novartis Pharmaceuticals Corporation and aTyr Pharma, Inc. to examine the effectiveness of existing and experimental therapies that target the immune system for treating COVID-19 infection. Comellas’s study was to examine whether and how canakinumab (used to treat arthritis) or ATYR1923 (in development for interstitial lung diseases) may prevent or minimize cytokine release syndrome, an excessive inflammatory response that can damage organs—including the lungs—and sometimes lead to death. His team is also involved in several clinical trials for Regeneron Monoclonal Antibody therapy, and it’s established a Post-COVID clinic that has seen more than 200 patients—90 percent of them part of a research registry the team has established.

Checking the Spread of COVID-19

H.S. “Uday” Udaykumar, Ph.D., professor of mechanical engineering in the College of Engineering, received a $199,544 National Science Foundation Rapid Response Research grant to develop a physics-based model for studying how droplets dry on different kinds of surfaces under different seasonal conditions, and the implications for the variation on COVID-19 survival. “COVID-19 spreads primarily by inhaling viruses suspended in aerosol form, and secondarily by touching surfaces on which virus-laden droplets have deposited,” Udaykumar said. “This work will deliver knowledge to answer this question: how does the survivability of viruses inside droplets depend on ambient conditions, across seasons and in the air and on surfaces?” Udaykumar’s team, consisting of engineers and biomedical scientists, are delving into the physics of virus survival outside of the human body. They are also studying laser-based approaches to engineer surfaces that are pathogen-resistant.

Engaging Student Researchers

While student researchers were restricted from working on campus early in the pandemic, many continued supporting, and learning from, faculty by conducting research remotely. That was the case for Kaleb Brooks, a student research fellow in the UI Injury Prevention Research Center supported by the Iowa Center for Research by Undergraduates, and Hannah Rochford, a doctoral student in health management and policy. The pair worked with Cori Peek-Asa, Ph.D., MPH, professor and associate dean for research in the College of Public Health’s Department of Occupational and Environmental Health, and Mark Berg, Ph.D., an associate professor in the College of Liberal Arts and Sciences Department of Sociology and Criminology, to develop a compendium of resources tracking the impact of COVID-19 on community and intimate partner violence as well as firearm purchases and permits. The compendium includes real-time and national databases that can be used to study COVID trends related to violence.
SPOTLIGHT: HUMAN SUBJECTS OFFICE

The Human Subjects Office (HSO) supports the Institutional Review Boards (IRBs), which are responsible for reviewing and overseeing social science and biomedical research involving human participants. The IRBs’ goal is to support research activities while protecting the rights, safety, and welfare of human subjects and ensuring that research is conducted ethically.

Get to Know HSO
- HSO staff specialize in reviewing different types of research to help researchers prepare forms for IRB review.
- HSO staff conduct compliance monitoring visits and provide education and outreach services.
- The HSO includes the Conflict of Interest in Research Office and staff who provide support for registration and reporting in ClinicalTrials.gov.
- HSO staff can offer guidance for establishing reliance agreements for sites engaged in federally funded, multi-site research and industry-supported research.
- The university’s three active IRBs specialize in particular kinds of research reviews: biomedical; social, behavioral, educational; and research conducted at the Veterans Administration Health Care System or using VAHCS resources.

Researcher Resources
- New faculty and staff involved in human subjects research can fill out a survey to get a custom-tailed, one-on-one orientation to help them secure IRB approval more easily.
- HSO’s four-part HawkIRB Trainings help researchers learn to navigate the eResearch IRB application system and submit forms for IRB approval.
- Anyone with a HawkID can access a wealth of online materials, including recordings of HawkIRB trainings and a core IRB course with a certificate of completion.
- IRB offers open, (virtual) drop-in office hours twice a week during the spring and fall, and once a week during the summer—no appointments necessary.
- HSO offers both class and small-group presentations tailored to meet the needs of faculty, staff, or student researchers.

By the Numbers

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<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
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<tbody>
<tr>
<td>UI IRB meetings held each year on average</td>
<td>75-95</td>
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<td>Agenda items discussed by all IRBs in a year</td>
<td>600</td>
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<td>Open, active research protocols in 2020</td>
<td>4,493</td>
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<tr>
<td>Staff who handle compliance, education and outreach, and operations</td>
<td>7.5</td>
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<tr>
<td>Forms reviewed each year by 13 IRB staff members</td>
<td>10,000</td>
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<tr>
<td>Financial disclosures related to conflict of interest in research reporting requirements reviewed and certified by 1.5 HSO staff members</td>
<td>15,712</td>
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The University of Iowa is Iowa’s largest comprehensive research university, with a balanced commitment to the arts, sciences, and humanities. It’s home to one of the nation’s largest academic medical centers and the pioneering Iowa Writers’ Workshop.

**TOTAL FEDERAL AND NON-FEDERAL RESEARCH FUNDING**
**FY18-20 (MILLIONS OF DOLLARS)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding (Millions)</th>
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<tbody>
<tr>
<td>FY18</td>
<td>$434.5</td>
</tr>
<tr>
<td>FY19</td>
<td>$466.9</td>
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<tr>
<td>FY20</td>
<td>$535.5</td>
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**FY20 RESEARCH HIGHLIGHTS**

- **15%** ($68.6 million) increase in research funding over FY19
- **150%** ($37 million) increase in Health & Human Services (non-NIH) funding
- **58%** ($14.5 million) increase in Department of Education funding
- **37%** ($2.5 million) increase in NASA funding
- **9%** ($15.7 million) increase in National Institutes of Health funding

**FY20 SPONSORED RESEARCH**

**BY SPONSOR TYPE**
- Federal: 65%
- Business & Corporations: 13%
- State and Local: 8%
- Foundations & Associations: 8%
- Other: 7%

**BY FEDERAL AGENCY**
- NIH: 35%
- HHS (NON-NIH): 12%
- Education: 7%
- DoD: 3%
- NSF: 2%
- Other: 6%
TECHNOLOGY TRANSFER

FY20 NEW FOREIGN PATENT APPLICATIONS GLOBALLY

ON THE COVER: (clockwise, starting upper left): Stanley Perlman, Paul McCrory, Pat Winokur, H.S. “Uday” Udaykumar, Alejandro P. Comellas, Cori Peek-Asa, Mark Berg

IOWA

RESEARCH

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FY20 Patents and Licenses

$1.6 million
licensing income

$1.1 million
total revenue to Iowa-based companies from UI-licensed technologies

95
new invention disclosures

89
new products to market

79
new patent applications filed

37
new licenses and options

FY20 New Disclosures by College

51 Carver College of Medicine
13 College of Engineering
8 College of Dentistry
7 College of Liberal Arts and Sciences
6 College of Pharmacy
3 College of Nursing
3 University of Iowa Hospitals and Clinics
1 College of Education
1 Division of Student Life
1 Information Technology

For more information ➔ research.uiowa.edu