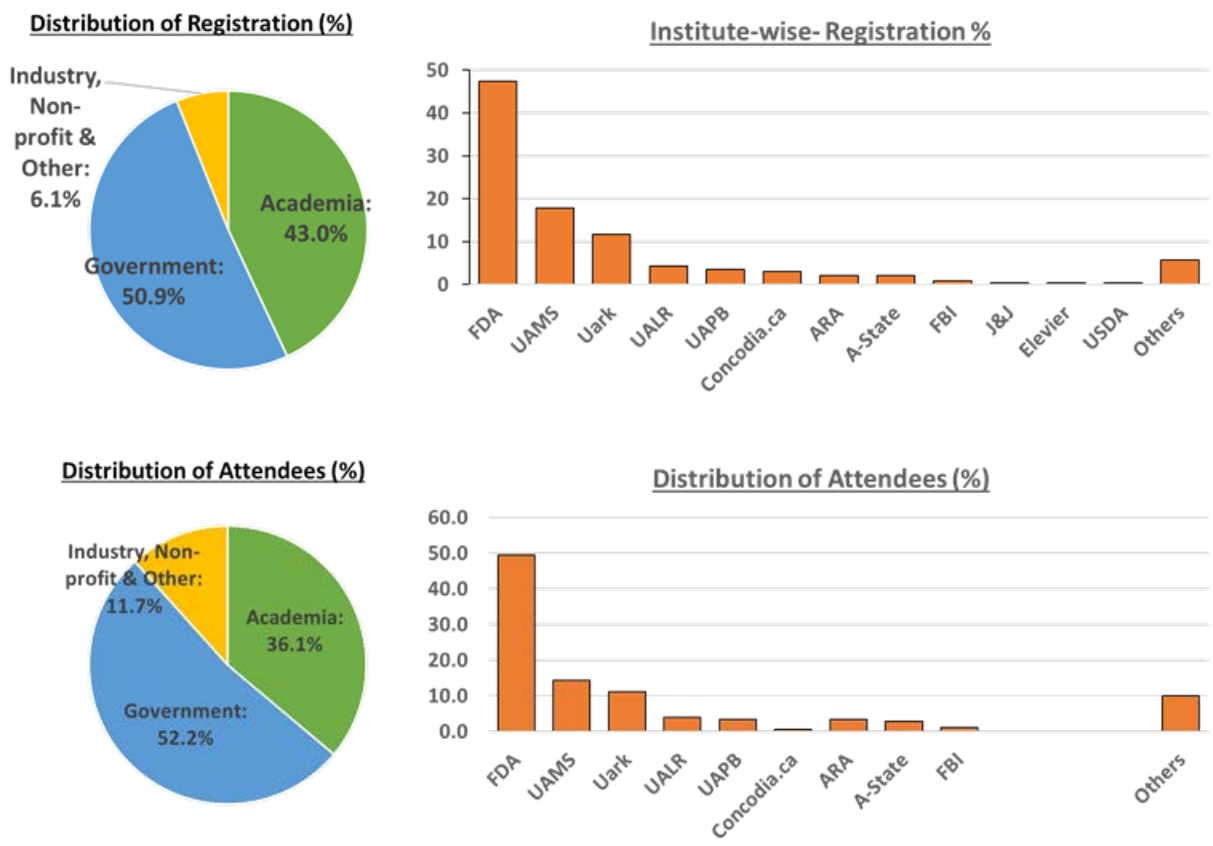


## VIRTUAL AR-BIC 2021: DATA SCIENCE SOLUTIONS FOR COVID-19 EXECUTIVE SUMMARY

March, 4, 2021

Out of concern for public safety, COVID-19 has compelled everyone to adapt and innovate. On February 25, 2021, the Arkansas Bioinformatics Consortium (AB-BIC) conducted its first online event, inviting researchers, students, and leaders from the academic, commercial and government communities to share insights and findings via teleconferencing (Zoom).

The event was intended to “showcase research conducted by world class scientists and highlight exciting projects underway at the graduate and undergraduate levels from research universities across Arkansas.” Approximately 180 people attended the conference and represented many members of the state’s most significant research communities. Registration and attendance distributions are illustrated in the charts below:



The conference, which focused on “Data Science Solutions for COVID-19,” opened at 8:00 A.M. with remarks from William Slikker, Director of the National Center for Toxicological Research (NCTR) and Jerry Adams, President of the Arkansas Research Alliance (ARA). Dr. Slikker

acknowledged the importance of focusing on COVID-19 solutions at this AR-BIC conference. This event signaled the primacy of groups in Arkansas that are developing tools and methods to better collect and disseminate data on surveillance, detection, treatment, and sociological and health impacts of the virus. Mr. Adams amplified that point by speaking to the value inherent in the unique assembly of partners involved with AR-BIC, who are dedicated to sharing knowledge, expertise, and resources to add to the fight against the virus.

The scientific program was organized across **four themes or sessions**:

- 1) Molecular Modeling
- 2) AI and Deep Learning
- 3) Screening and Testing Methods
- 4) Undergraduate Students Projects, included studies on social media sentiment analysis and socioeconomic determinants in reopening strategies.

**Session one, *Molecular Modelling for COVID-19***, was chaired by Dr. Richard Beger from NCTR/FDA, and was comprised of three presentations:

- 1) In his talk, *The Pandemic Experience: Using Computational and Experimental Approaches to Identify Inhibitors of SARS-CoV-2*, Dr. Sean Ekins of Collaborations Pharmaceuticals, described the machine learning approaches in selecting small molecules that could potentially counter the SARS-CoV-2.
- 2) Dr. Zhichao Liu, NCTR/FDA, discussed how AI-powered network pharmacology and transcriptomic analysis can be used for prioritizing the treatment regimen of COVID-19 patients with different severities.
- 3) Barry Hardy of Edelweiss Connect (Switzerland) discussed the importance of advancing better practices in reproducibility in data science and preparedness for similar challenges in the future by reviewing initiatives involving SaferWorldByDesign, OpenTox, OpenCure and Edelweiss data.

**Session two, *AI and Deep Learning for COVID-19***, was chaired by Dr. Jake Qualls of Arkansas State University (A-State), and was comprised of three presentations.

- 1) Dr. Suguna Sakkiah, NCTR/FDA, explored the role of molecular docking strategies in understating the molecular interactions in spike proteins in SARS-CoV-2, in her talk, *Elucidating Interactions between SARS-CoV-2 Trimeric Spike Protein and ACE2 Using Homology Modeling and Molecular Dynamics Simulations*.
- 2) Dr. Chenghui Li, University of Arkansas for Medical Sciences (UAMS), talked about using Twitter data may be used to explore the social discussion and impact of COVID-19 in her talk, *Natural Language Processing for Covid-19 Exploration on Social Media*.
- 3) Dr. Johnathan Stubblefield, A-State, illustrated the potential of using X-ray images in diagnosing SARS-CoV-2 in his talk, *Applying Deep Learning Techniques to Chest X-Rays for Respiratory Diagnostics*.

**Session three, *Screening and Testing Methods for COVID-19***, was chaired by Dr. Marli Azevedo, NCTR/FDA, and who is a virologist and is leading several COVID-19 related research efforts at NCTR, was comprised of three presentations.

- 1) Dr. Dan Buzatu, NCTR/FDA, introduced a new mass-spectrometer-based technique, SpecID, for the rapid (less than eight seconds) detection of viruses directly from saliva samples.
- 2) Dr. Visanu Wanchai, UAMS, described mutations and variants of SARS-CoV-2 and their potential impact in Arkansas in his talk, *What Can We Learn from a Million SARS-CoV-2 Genome Sequences?*
- 3) Dr. Azevedo's talk, *Ongoing Studies to Address Coronavirus Knowledge Gaps*, showed how wastewater in Arkansas is being tested for screening the pandemic and the role (in cellular pathways) of NSP1 and Envelop proteins of SARS-CoV-2 during the process of infecting the host.

**Session four, Undergraduate Student Showcase**, was dedicated to highlighting and encouraging the next generation of researchers in Arkansas. This session was chaired by Drs. Samantha Robinson, University of Arkansas (UA) and David Ussery, UAMS, and presented six lightning talks, where ten undergraduate researchers (all from UA and mentored by Dr. Robinson) presented their projects. The topics were extremely creative and diverse, yet relevant, and included:

- 1) Public perception of COVID-19 on social media (Twitter) by Keaton McDorman and Ethan Pell
- 2) Spatio-temporal analysis of SARS-CoV-2 seroprevalence by Lyndsey Bouve
- 3) Regional dynamics impacting infection rates in the U.S. by Andrew Palmer and Alric Fernandes
- 4) Behavioral changes in hygiene, health-seeking, and consumer purchasing in a pandemic by Azat Sadyrov
- 5) Relationship between infection rates and stress by Mallory Macdonald and Allison Peters
- 6) Impact of the pandemic on employment in healthcare occupations by Haley Stanton and Kayla Simon.
- 7) It is noteworthy that the diverse academic backgrounds of these students (ranging from pre-medical and biomedical engineering to economics, communication sciences, and disorders) as well as their personal experience during the pandemic, led to such a diverse and engaging session. After their talks, the students also shared their future plans, which the ARA would support by providing letters of recommendation.

The conference closed by Dr. Shuk-Mei Ho, UAMS, who expressed her delight in the innovation, dedication, and diversity shown by the presenters in the event. She also commended the manner in which the meeting was organized and the enthusiasm and spirit with which everyone interacted, especially given what can sometimes be the impersonal nature of online meeting platforms. The event concluded with Dr. Weida Tong, NCTR/FDA, bolstering Dr. Ho's thoughts and thanking all the session chairs who comprised Scientific Program Committee, presenters, participants, and the organizer in continuing AR-BIC's tradition of organizing thoughtful, interactive, and successful events.

A special thank you was given to the AR-BIC Governance Board, who was responsible for organizing, promoting and conducting the event:

Jerry Adams, ARA – Chair  
Bill Slikker, NCTR  
Weida Tong, NCTR  
Bobby McGehee, ABI

Shuk-Mei Ho, UAMS  
John English, UA  
Brian Berry, UA Little Rock  
Tom Risch, A-State

Mansour Mortazavi, UAPB  
Tom Chilton, AEDC  
Tanmay Bera, NCTR  
Bryan Barnhouse, ARA

The Zoom conference technical support was provided by the Winthrop Rockefeller Institute (WRI) and led by James Hopper with WRI, ensuring that the conference ran professionally and smoothly. A follow-up evaluation was launched by ARA, with results provided in an addendum.

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