In lieu of the in-person regional meetings cancelled due to the SARS-CoV-2 pandemic, there will be a virtual meeting targeted for the first week of December.

This meeting will be held daily for 3-4 hours. As in past meetings, the goal will be to:

- facilitate information sharing between jurisdictions,
- strengthen the relationship between HAI coordinators and laboratory staff
- and find potential solutions to common barriers.

You will need to have an account before attempting to register. If you do not have an account, below is the link in which you can setup your account.

Create An Account Link

Have an idea, articles or poster to be included in our next newsletter? email Shirley.Kelly-Parson@health.ny.gov
2019 AR Lab Network Regional Meeting Participants

2019 AR Lab Network Regional Meeting Clinical Lab Participants

2019 Candida auris Workshop
JUNE CHAN, PHD – APHL AR FELLOW

After majoring in microbiology at the University of Maryland, June has continued to study pathogenic microorganisms in a variety of contexts — pursuing research on methicillin-resistant *Staphylococcus aureus* (MRSA) at the National Institutes of Health and studying aspects of the gut microbiome and its potential impacts on colorectal cancer at Johns Hopkins University. As an APHL Fellow at the Wadsworth Center, June carries out routine testing to detect and monitor emerging carbapenem resistance found in clinical isolates and colonization screenings. June is also conducting applied research to improve molecular diagnostics for carbapenem-resistant organisms (CROs), to understand the spread of CROs better, and to establish CRO prevalence in high-risk populations (e.g., solid organ transplant recipients). From March to June 2020, June volunteered in the COVID-19 surge capacity response at the New York State Department of Health, participating in all aspects of the Virology Section molecular testing workflow and in the Diagnostic Immunology immunoassay used to test the serum of potential convalescent plasma donors for SARS-CoV-2 antibodies.

CATHARINE PRUSSING, MPH, PHD – APHL BIOINFORMATIC FELLOW

Kate received a master’s degree in Infectious Disease Epidemiology from Johns Hopkins University and completed an Applied Epidemiology fellowship at the NYC Department of Health and Mental Hygiene. She obtained her Ph.D. from the University at Albany Department of Biomedical Sciences in the laboratory of Dr. Jan Conn, where she investigated the effect of anthropogenic environmental modifications on the biting behavior, population genetics and ecology of the south American malaria vector *Nyssorhynchus darlingi*. Kate’s fellowship project looks at the relatedness of bacterial plasmids carrying antibiotic resistance genes using long-read sequencing data and was a joint project of the Bioinformatics Core and Bacteriology Laboratory.

SHANNON KILBURN – AR/EPI LIASION

Shannon graduated from the University at Albany School of Public Health in 2019 with a Master’s in Public Health, Epidemiology concentration. In addition, she has a first degree in Biological Sciences. While a public health student, she had the opportunity to gain professional public health experience through different capacities in different divisions at the New York State Department of Health. She worked part-time as a Graduate Assistant in Office of Public Health Practice, where she assisted with and completed various projects. Her first internship was the Summer of 2018 at the AIDS Institute where she conducted an epidemiological study using New York State HIV surveillance data. Shannon’s second internship was at the Division of Epidemiology, January to May 2019, where she assisted with the investigation of Blastomycosis in Eastern Upstate New York and conducted a study using the data that was gathered. Shannon joined the AR Lab at Wadsworth Center as a Research Scientist/Epidemiologist in February 2020.

KELLI HAGER, MPH – APHL AR FELLOW

Kelli Hager discovered her passion for laboratory sciences while working for IDEXX Laboratories where she served as the Immunology Safety Advisor and Quality Control Manager. She left IDEXX to pursue a Master’s in Public Health with a concentration in Infectious Disease and Vaccinology at UC Berkeley. Her graduate thesis was to develop and validate a quantitative reverse transcriptase-PCR assay for the detection of pyrethroid resistance in West Nile vectors. This assay was used to map pyrethroid resistance in Alameda County, California and found that even though ACMAD applied less than 10 ounces of adulticides to the County, resistance still remained. Kelli believes that the more we know about the resistance mechanisms of emerging pathogens, the more equipped we will be to develop therapeutics and prevention strategies against them. We are excited to have Kelli in the AR Lab Network as an antimicrobial resistance fellow.
CARBAPENEM RESISTANT ORGANISM TESTING DATA

Isolates Submitted in New York State in 2019

States

- CRE
- CRPA
- CRAB

No. of Isolates

- NY: 1506
- Other states: 850, 101

Isolates Submitted by Northeast States in 2019

States

- CT: 6, 39
- MA: 11, 23
- ME: 4
- NH: 1, 5
- NJ: 16, 31
- NYC: 13, 28
- RI: 10
- VT: 5, 1
ISOLATES SUBMITTED BY NORTHEAST AND MID-ATLANTIC STATES FOR AZTREONAM-AVIBACTAM TESTING IN 2019

Expanded Antimicrobial Susceptibility Testing for Hard-to-Treat Infections

Antimicrobial susceptibility testing for Enterobacteriaceae producing a metallo-beta-lactamase (MBL)

Clinicians, hospital laboratories, and public health labs can request expanded antimicrobial susceptibility testing (ExAST) from CDC’s Antibiotic Resistance Lab Network (AR Lab Network) to find new, effective treatment options for their patients’ most resistant infections.

- Enterobacteriaceae are resistant to new drugs for carbapenem-resistant Enterobacteriaceae (CRE) treatment, specifically ceftazidime-avibactam and meropenem-vaborbactam. However, these bacteria may be susceptible to the combination therapy ceftazidime + avibactam + aztreonam*.
- Susceptibility testing is CLIA-compliant and results will be reported for ceftazidime + avibactam, aztreonam; and aztreonam + avibactam to help assess utility of combination therapy.
- CDC plans to expand testing as new antimicrobial treatment options become available for other hard-to-treat bacterial infections.
- There is no cost for this service.

*Ceftazidime + avibactam + aztreonam is a combination of drugs recommended by the 2018 Sanford Guide for treatment of serious infections caused by MBL-producing Enterobacteriaceae.

Isolates Submitted by Northeast and Mid-Atlantic States for Aztreonam-Avibactam Testing in 2019

<table>
<thead>
<tr>
<th>States</th>
<th>No. of Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>7</td>
</tr>
<tr>
<td>ME</td>
<td>2</td>
</tr>
<tr>
<td>MD</td>
<td>4</td>
</tr>
<tr>
<td>NC</td>
<td>2</td>
</tr>
<tr>
<td>NY</td>
<td>5</td>
</tr>
<tr>
<td>VA</td>
<td>1</td>
</tr>
</tbody>
</table>
### Rectal Swabs Submitted to Wadsworth Center for CPO Colonization Screening by State in 2019

<table>
<thead>
<tr>
<th>States</th>
<th>No. of Rectal Swabs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>19</td>
</tr>
<tr>
<td>MA</td>
<td>845</td>
</tr>
<tr>
<td>ME</td>
<td>25</td>
</tr>
<tr>
<td>NH</td>
<td>50</td>
</tr>
<tr>
<td>NJ</td>
<td>63</td>
</tr>
<tr>
<td>NY</td>
<td>541</td>
</tr>
<tr>
<td>RI</td>
<td>66</td>
</tr>
<tr>
<td>VT</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>1612</td>
</tr>
</tbody>
</table>

### Carbapenemase Genes Detected By CPO Colonization Screening By State In 2019

<table>
<thead>
<tr>
<th>Carbapenemase Genes</th>
<th>No. of Positive Rectal Swabs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM</td>
<td>19</td>
</tr>
<tr>
<td>KPC</td>
<td>16</td>
</tr>
<tr>
<td>VM</td>
<td>1</td>
</tr>
<tr>
<td>OXA-48</td>
<td>3</td>
</tr>
<tr>
<td>OXA-23</td>
<td>4</td>
</tr>
<tr>
<td>KPC/NDM</td>
<td>1</td>
</tr>
<tr>
<td>KPC/OXA-23</td>
<td>17</td>
</tr>
<tr>
<td>KPC/VIM</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
CANDIDA AURIS PUBLICATIONS


CANDIDA AURIS DATA

Surveillance Samples Submitted by States to Wadsworth Center for Candida auris Colonization Screening in 2019

- **Samples Submitted**
- **Samples Positive**

<table>
<thead>
<tr>
<th>States</th>
<th>Samples Submitted</th>
<th>Samples Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA*</td>
<td>81</td>
<td>1</td>
</tr>
<tr>
<td>CT</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>MA</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>478</td>
<td>42</td>
</tr>
<tr>
<td>NY</td>
<td>3493</td>
<td>451</td>
</tr>
</tbody>
</table>

*CA Samples were tested as part of surge capacity.
**Candida Isolates Submitted by States to Wadsworth Center for Species-Level Identification in 2019**

<table>
<thead>
<tr>
<th>States</th>
<th>C. auris</th>
<th>C. duobushaemulonii</th>
<th>C. glabrata</th>
<th>C. haemulonii</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>MA</td>
<td>71</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>390</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>NY</td>
<td>880</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>VT</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Antifungal Susceptibility Profile of Candida auris Clinical Isolates Submitted by New York & New Jersey in 2019**

- **Amphotericin B**
  - NJ: 61%
  - NY: 54%

- **Echinocandins**
  - NJ: 100%
  - NY: 97%

- **Fluconazole**
  - NJ: 3%
  - NY: 3%
Pan-resistant Candida auris: New York subcluster susceptible to antifungal combinations

Recently we reported the emergence of pan-resistance in Candida auris from New York.1 Since 2016, New York hospitals and health-care facilities have faced the highest number of clinical cases and surveillance cases of C. auris in the USA.2 Effective strategies for the prevention, control, and treatment of C. auris are still being developed; however, the development of strategies could be complicated by the observed pan-resistance. A conceptual framework supports using drug combinations to combat the threat of antimicrobial resistance.3 Accordingly, we studied strains of pan-resistant C. auris to find out whether they are susceptible to combinations of current antifungal drugs and what genetic features distinguish pan-resistant C. auris found in New York. Details of the methods are in the appendix (pp 8-12). Four pan-resistant C. auris strains were 100% inhibited in vitro by combinations of two antifungal drugs using fixed concentrations achievable in vivo. Expectedly, fluconazole combinations with either amphotericin B, azoles, or echinocandins were the most effective (figure A; appendix pp 8, 12). Time-kill analysis showed that every two-drug combination caused a reduction in growth greater than 2 log10 relative to the same drugs used separately, which is suggestive of fungicidal action (figure B; appendix pp 9, 13). These results are consistent with our recent publication on the efficacy of antifungal combinations for New York C. auris strains with various multidrug-resistance patterns (appendix p 25).

On the basis of a comparative genomic analysis we found four pan-resistant C. auris strains with mutations in 11 gene targets associated with major antifungal drugs (appendix pp 18-24).

Figure: Characterisation of pan-resistant Candida auris
(A) Pan-resistant C. auris susceptible to two-drug combinations fluconazole and amphotericin B, azole or echinocandin, representative data for C. auris 19-4.
(B) Time-kill curve with amphotericin B, or echinocandin alone, or in combination with fluconazole, representative data for C. auris 19-43.
(C) Four pan-resistant C. auris strains, distinct sub-cluster among New York strains. Neighbour joining tree derived from whole genome assemblies of strains representing all known clades.
These findings are similar to other reports\textsuperscript{1–5} for drug-resistant \textit{C. auris} strains. All four pan-resistant strains constituted a distinct subcluster among New York strains (figure, C; appendix pp 16, 17). Two different non-synonymous mutations in the predicted sequence of the FKS1 protein were observed. \textit{C. auris} strains 19–4 and 19–61 showed FKS1 Ser635Pro, whereas \textit{C. auris} strains 19–42 and 19–43 showed FKS1 Ser635Tyr (appendix p 19). These mutations are in a known hotspot of FKS1, a glucan synthase gene, and the target of echinocandin antifungal drugs. Finally, pan-resistance appears to exact a fitness cost in at least two \textit{C. auris} strains (19–42 and 19–43), which showed an extended lag growth phase (appendix p 14) and high resistance to caspofungin (>16 mg/L). Further results are presented in the appendix (pp 2–25).

Our findings suggest that pan-resistant \textit{C. auris} strains remain susceptible to antifungal combinations, which might help to expand the therapeutic options. Genetic analysis suggests that ongoing mutations occurring in response to antifungal drug pressure are the probable drivers of emerging pan-resistance seen in the New York \textit{C. auris} strains.

We declare no competing interests.

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vishnu.chaturvedi@health.ny.gov

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June Chan, PhD Transplant Surveillance Project - In recent years, passive reporting to the CDC has identified carbapenemase-producing carbapenem-resistant organisms (CPOs) among organ transplant recipients. This may represent an emerging source of spread. Rectal swabs were collected from solid organ transplant (SOT) recipients receiving inpatient care, across five academic hospitals. Testing at the Wadsworth Center with commercial and lab-developed assays found that 8% (7 of 92) of SOT recipients were positive for carbapenemase genes. Additional surveillance in areas with varied CPO epidemiology will inform whether SOT recipients should be routinely screened for CPOs.
Kate Prussing, PhD.

Using Long read sequencing to better understand plasmid transfer across antimicrobial resistant bacterial species in healthcare associated infections.
read all about it...


- Massachusetts uses antibiograms to monitor statewide changes in drug resistance.

- Early in the pandemic were antibiotics prescribed too often? (US News & World Reports)

- While the world is gripped by COVID-19, another devastating health threat is building—this one from bacteria (Business Insider)

- COVID-19 and antibiotic Rx: California antibiotic stewardship mandate; AMR Action Fund critique (CIDRAP)

- “Superbugs” far greater risk than COVID in Pacific, scientist warns (Microsoft News- MSN UK)

- First report of an E. coli isolate co-harboring two different mcr genes (Dovepress)

- How Covid-19 might affect antimicrobial stewardship programs (Infection Control Today)

Apply to Host an APHL AR Lab Network Fellow

State and local public health laboratories interested in applying to host an AR Lab Fellow can find additional information on the host laboratory instructions and application page. Application period ends Feb 28, 2021.

Apply to Host an APHL-CDC COVID-19 Laboratory Associate

Does your laboratory need additional personnel to assist with the COVID-19 pandemic response? Consider hosting an APHL-CDC COVID-19 Laboratory Associate! Associates will be available for temporary (through June 2021), full-time assignments and can fill a variety of critical roles at all levels of the laboratory.

Learn more and apply to host a COVID-19 Laboratory Associate

Have an idea, articles or poster to be included in our next newsletter? email Shirley.Kelly-Parson@health.ny.gov