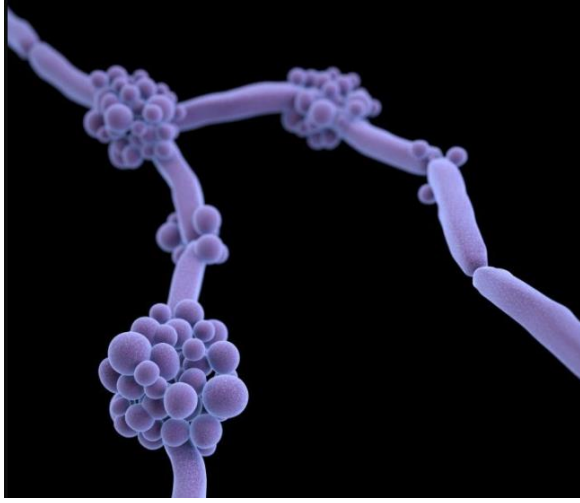
A new emerging and deadly pathogen . . .



CANDIDA AURIS

What can be done to identify, treat, and prevent this worrisome fungal infection?

By Kerry Pierce
Design and Development Microbiologist
HARDY DIAGNSOTICS

September, 2021

In July 2021, the Centers for Disease Control and Prevention (CDC) announced 123 new cases of a fungal infection caused by pan-resistant and echinocandin-resistant strains of *Candida auris*—some resistant to all three common antifungal classes known as azoles (fluconazole), polyenes (amphotericin B), and echinocandins—in patients in healthcare facilities in Texas and the District of Columbia.(10)

The report suggests infections in different geographic regions were discrete and not related to one another, but there is evidence to suggest the infection clusters demonstrate common healthcare exposure or transmission within a healthcare facility. In Texas, at least a portion of the 22 cases were identified in patients who had been treated at two facilities that share patients and patient care.

Moreover, a study performed in 2020 tracked 4,733 cases of *C. auris* from over 33 countries and showed the overall mortality rate of *C. auris* infection was 39%. For

bloodstream infections the death rate was 45%.(9)

Pan-resistant strains of *C. auris* have been reported in the United States and in other countries, but only rarely.(1,2) However, in a 2019 report for a strain identified in New York, the patient had been unsuccessfully treated with echinocandins. At that time, the organism's resistance was believed to be the result of isolated selective antifungal pressure during patient treatment and not the result of person-to-person or healthcare transmission. For the first time, the CDC now believes these more recent cases demonstrate infections by resistant strains with no prior patient treatment.(3) In other words, the resistant strains causing infections were already resistant when the patients became infected.

Invasive candidiasis is the result of severe fungal infection caused by members in the genus *Candida.* Candidiasis is an increasing risk in healthcare settings, particularly to the most vulnerable patients, such as those in critical condition or with compromised immune systems, like cancer patients, the elderly, and premature infants.(4) Patients with various tubes, lines, and surgical wounds colonized with *C. auris* are at greater risk of further invasive systemic disease.

Figure 1: Patients with underlying conditions are at risk of *C. auris* infections.

Diagnosis to selection of therapeutic protocol for invasive candidiasis is a challenge. Though early detection and treatment often improve some patient outcomes, diagnosis is neither sensitive nor specific. The mortality rate due to infection by drug-resistant strains is high.(5) Patient testing often relies on a battery of different factors, including clinical symptoms, culture or fluid/tissue biopsy, or laboratory findings, and there is a growing need for the detection of more specific disease markers.

The CDC states that commonly used *Candida* identification methods, such as Vitek, API, Microscan, and Phoenix often misidentify *C. auris*.(7) Definitive identification can be accomplished using MALDI-TOF mass spectrometer or Whole Genome Sequencing techniques.(6) Advances in serodiagnostic assays and molecular techniques for the detection of fungal-specific DNA markers are available. However, when infection becomes blood-borne, the need for risk-based diagnosis to identify patients in need of preemptive or empirical treatment before candidemia is detected in blood culture is imperative.(5)

Figure 3: The MALDI-TOF mass spectrometer can be instrumental in the identification of *C. auris*.

Susceptibility testing can also be problematic, since definitive breakpoints have not been established for *C. auris*. However, the CDC has published tentative breakpoints for MICs, which is the preferred method.(7) Data from the CDC reports also shows many isolates are resistant to multiple classes of drugs. Some US *C. auris* isolates, and from other countries as well, have been found to be resistant to all three classes of available antifungal drugs. In the United States, about 90% of *C. auris* isolates have been identified as resistant to fluconazole, about 30% are resistant to amphotericin B, and less than 5% are resistant to echinocandins. The majority of *C. auris* strains are still believed to be susceptible to echinocandin drugs, which is now known as the first-line therapy for *C. auris* infection.(7)

C. auris can persist on surfaces in healthcare environments, where it has been cultured from multiple locations in patient rooms, including high-touch surfaces like bedside tables and bedrails, and general environmental surfaces farther away from the patient, such as windowsills. *C. auris* has also been identified on mobile equipment shared between patients, such as glucometers, temperature probes, blood pressure cuffs, ultrasound machines, nursing carts, and crash carts. The CDC recommends using disinfectants approved for use against *Clostridioides difficile* spores, which are also effective against *C. auris.* Quaternary Ammonium Compounds (QAC) are not effective and, hence, are not recommended.(8)

In the regional *C. auris* clusters from Texas and the District of Columbia recognized in the CDC report, cases were identified through skin colonization screening, as well as blood, and wound screening. Patients came from long-term, acute care facilities for the severely ill, as well as from short-term, acute care hospitals. The recent cases suggest pan-resistant and echinocandin-resistant *C. auris* transmission in U.S. healthcare settings has begun. Consequently, surveillance, public health reporting, and infection control measures are critical to identify and contain the spread, particularly for the severely ill or

Figure 2: Thorough cleaning of patient rooms with an appropriate disinfectant is crucial for effective infection control.

those most at risk. In addition, more sensitive and specific tools are needed to monitor healthcare settings and prevent transmission, as well as detect colonization through screening and infection diagnosis.

In response to the growing threat of *C. auris*, the Research and Development team at Hardy Diagnostics has recently released a new formulation of HardyCHROM Candida that includes specific chromogens for the detection and screening of *C. auris*. Not only do the *C. auris* colonies turn a unique color, they also fluoresce under UV light. This new plate can be very useful as an initial screen. Follow up identification can be performed via MALDI-TOF. More information about this innovative new medium can be found on the Hardy Diagnostics website.

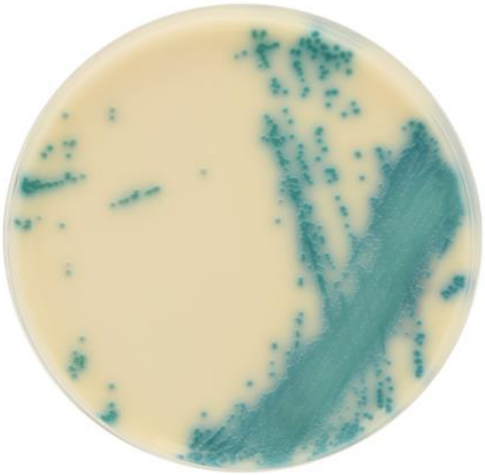


Figure 4: The new HardyCHROM Candida + auris plates showing colored colonies of *C. auris* at 48 hours.

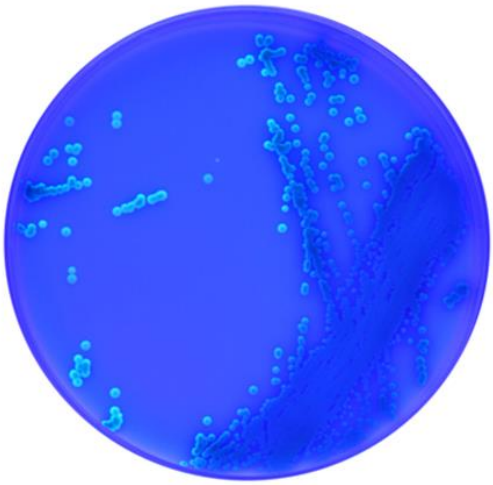


Figure 5: The same plate as above showing colony fluorescence under UV light (wavelength 366nm).

References:

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6973342/
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5215215/pdf/ciw691.pdf
3. https://www.cdc.gov/mmwr/volumes/70/wr/mm7029a2.htm
4. https://journals.asm.org/doi/10.1128/JCM.00921-17
5. https://onlinelibrary.wiley.com/doi/10.1111/j.1439-0507.2009.01732.x
6. https://www.cdc.gov/fungal/candida-auris/identification.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.go

v%2Ffungal%2Fcandida-auris%2Frecommendations.html

7. https://www.cdc.gov/fungal/candida-auris/c-auris-antifungal.html

8. https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html

9. https://pubmed.ncbi.nlm.nih.gov/33176724/

10. https://www.cdc.gov/mmwr/volumes/70/wr/mm7029a2.htm