

## LABSTRACT – January 2019

# *Candida auris* reference identification and susceptibility testing

## Audience

Laboratorians and health care providers who require reference identification and susceptibility testing of *Candida auris* isolates.

## Overview

Public Health Ontario (PHO) encourages all laboratories that have identified, or are querying, *Candida auris* in clinical specimens or environmental samples linked to confirmed patient cases to refer isolates to PHO Laboratory for confirmation and as appropriate, antifungal susceptibility testing, as it is an emerging pathogen of clinical and public health concern.

## Background information

Prompt and accurate identification of *C. auris* is a crucial step for controlling the spread of this emerging fungal pathogen. This Labstract is intended to provide guidance to clinical laboratories on the current limitations to the identification of *C. auris* and communicate the support services that PHO Laboratory can provide.

*Candida auris* is an emerging pathogen, which is significant in that, it:

- has been identified from many countries within a short period of time<sup>1</sup>
- effectively colonizes patients (skin and other body sites), contaminates healthcare settings and equipment, and has caused several large healthcare-associated outbreaks<sup>2,3,4</sup>
- causes invasive disease associated with high mortality<sup>5</sup>
- is often resistant to fluconazole and is commonly resistant to multiple classes of antifungal drugs<sup>1</sup>
- is tolerant to many commonly used disinfectants (e.g., quaternary ammonia-based disinfectants)<sup>4</sup>
- is challenging to identify using many common commercial yeast identification systems<sup>6,7</sup>

Additional information for healthcare facilities on how to prevent the transmission of *C.auris* in Ontario healthcare facilities is available in the following document, available on the Public Health Ontario (PHO) website at: [Ontario Agency for Health Protection and Promotion \(Public Health Ontario\) Interim Guide for Infection Prevention and Control of \*Candida auris\*](#)<sup>8</sup>.

## Content

### Identification Challenges

As *C. auris* is a relatively newly described organism, first identified in 2009, the databases of many commercial yeast identification systems do not yet include its profile. More significantly, many systems are unable to differentiate *C. auris* from other yeast species which can result in misidentifications, for example *C. auris* is commonly misidentified as *Candida haemulonii* by several different systems. The ability to identify *C. auris* on these identification systems will likely improve as databases are supplemented over time. In the interim, it is very important for laboratorians to be familiar with the capabilities and limitations of the specific identification systems and database versions in use in their laboratories and create strategies which will ensure the accurate identification of this pathogen of clinical, infection prevention and control, and public health interest.

Below in Table 1 is a list of common yeast identification systems as well as the organisms that *C. auris* may possibly be misidentified as<sup>6,7</sup>. It is important to also remember that “no identification” or identification with low confidence, could also potentially be *C. auris*.

Please note, this list is a guide and is not comprehensive and information may change as identification systems are updated; laboratorians should ensure they know how their yeast identification systems perform with respect to *C. auris* identification.

**Table 1.** Possible misidentifications of *C. auris* by commercial yeast identification systems

Yeast Identification System	Possible <i>Candida auris</i> Misidentifications
RapID YEAST PLUS	<i>Candida parapsilosis</i>
API 20C	<i>Rhodotorula glutinis</i> , <i>Candida sake</i>
MicroScan	<i>Candida famata</i> , <i>Candida guilliermondii</i> , <i>Candida lusitanae</i> , <i>Candida parapsilosis</i>
BD Phoenix yeast identification system	<i>Candida haemulonii</i> , <i>Candida catenulata</i>
VITEK 2 YST (version 8.01 and older)	<i>Candida haemulonii</i> , <i>Candida duobushaemulonii</i>
bioMérieux VITEK MS, IVD (versions earlier than 3.2)	<i>Candida haemulonii</i>
bioMérieux VITEK MS, RUO Saramis Ver 4.14 and Saccharomycetaceae update	<i>C. auris</i> is able to be identified
Bruker MALDI Biotyper, FDA -approved CA system (version claim 4)	<i>C. auris</i> is able to be identified
Bruker MALDI Biotyper, RUO libraries version 2014 [5627] and beyond	<i>C. auris</i> is able to be identified

# Specimen Collection Instructions and Collection Requirements

## SUBMISSION TO PHO LABORATORY FOR REFERENCE IDENTIFICATION AND/OR CONFIRMATION

### Patient Isolates

As *C. auris* is an emerging pathogen and little is known about its prevalence and public health impact in Canada, **all sterile and non-sterile clinical and patient screening isolates suspected of being *C. auris* should be sent to PHO Laboratory for confirmation of identification** and as a part of provincial and national surveillance programs. While this is not a mandatory program, it is strongly recommended that all laboratories participate in order for the detection and epidemiology of this emerging threat be understood. The site of isolation and whether the yeast was isolated from a clinical sample or from a screening/surveillance program must be indicated on the requisition.

**Please note, PHO Laboratory will not accept primary surveillance/screening swabs directly. Only isolated colonies of yeast suspected of being *C. auris* will be accepted for identification and susceptibility testing from patient screens.** Direct clinical specimens will continue to be processed as outlined in our Test Information Sheets (see Fungus Culture).

### Environmental Isolates

*C. auris* is known to colonize, or remain viable, in healthcare environments and be a source of nosocomial outbreaks. Testing environmental isolates requires approval by a PHO microbiologist. Contact PHO Laboratory Customer Service Centre prior to submission. Testing to confirm the identification of yeast suspected to be *C. auris* from an environmental source will be considered if there is a link to a confirmed patient case.

Only isolated colonies of yeast suspected of being *C. auris* will be accepted for identification and no susceptibility testing will be performed on these isolates.

Information **required** on the requisition form for *C. auris* identification includes:

- information on type of specimen (clinical or surveillance or environmental), source
- presumptive identification and method used for identification
- whether this is part of an outbreak investigation (ensure the outbreak or investigation number is included)
- any known risk factors for *C. auris* (eg. direct contact with a *C.auris* case, admission to a health care facility with known *C. auris* cases, hospitalization outside of Canada within the last 12 months, etc.)

## Candida auris Testing Available at PHO Laboratory

Yeast presumed to be *Candida auris* will be identified using a MALDI-ToF MS system which has been validated for the identification of *C. auris*, and/or through PCR and sequencing. Testing will be performed at PHO Laboratory in Toronto.

### ANTIFUNGAL SUSCEPTIBILITY TESTING

#### Sterile Site Patient Isolates

Susceptibility testing for *C. auris* isolated from normally sterile sites will be performed by broth microdilution assay (Sensititre™ YeastOne™) and MICs (minimal inhibitory concentration) will be reported as there are currently no interpretations available. Susceptibility testing can be performed on isolates repeatedly isolated from the same patient up to one time per week.

#### Non-sterile Site & Screening Patient Isolates

Typically PHO Laboratory does not perform antifungal susceptibility testing on yeast from non-sterile sites unless there is a particular clinical indication (eg. an immunocompromised patient). However, due to the fact that *C. auris* is often drug resistant, there are limited classes of antifungal drugs available, and this organism has a propensity for nosocomial spread, PHO Laboratory will perform susceptibility testing on the first isolate from a newly identified colonized patient.

In cases such as nosocomial outbreaks not all screening/surveillance isolates will have susceptibility testing performed. Consultation with a microbiologist *prior* to submission of such isolates will be required to determine the appropriate number of susceptibility tests to be performed and over what time period.

#### Environmental Isolates

Susceptibility testing for *C. auris* isolated from environmental sites will not be performed.

### TYPING AND NATIONAL SURVEILLANCE

All confirmed *C. auris* isolates will be forwarded to the National Microbiology Laboratory for typing by next generation sequencing as part of a national effort to better understand the epidemiology of this emerging pathogen in Canada. In order to expedite this process, information on any risk factors for acquisition of *C. auris* (eg. hospitalization outside of Canada, or at an institution known to have cases of *C. auris*) should be included on the original requisition.

## Specimen Handling

#### Preparation prior to transport

Store isolate on fungal media at room temperature or 28°C. Place pure culture of the yeast in a biohazard bag and seal. Isolates should be shipped to a PHO Laboratory site ASAP. Indicate 'C. *auris* Identification' and/or 'Species level identification' on the [General Test Requisition Form](#). Please see Test Information Sheet: "[Fungus Culture – Reference Identification](#)" on the PHO website for more information.

## Testing Frequency and Turn-Around Time

- Yeast identification and susceptibility testing: performed daily Monday to Friday
- Turn-around time for identification: typically within 3 working days
- Turn-around time for susceptibility testing for *Candida spp.*: typically within 5 working days

## References

- (1) Lockhart SR, Etienne KA, Vallabhaneni S, Farooqi J, Chowdhary A, Govender NP, et al. Simultaneous emergence of multidrug-resistant *Candida auris* on 3 continents confirmed by whole-genome sequencing and epidemiological analyses. *Clin Infect Dis*. 2017;64(2):134-40. Available from: [academic.oup.com/cid/article/64/2/134/2706620](http://academic.oup.com/cid/article/64/2/134/2706620)
- (2) Schelenz S, Hagen F, Rhodes JL, Abdolrasouli A, Chowdhary A, Hall A, et al. First hospital outbreak of the globally emerging *Candida auris* in a European hospital. *Antimicrob Resist Infect Control*. 2016;5:35. Available from: [aricjournal.biomedcentral.com/articles/10.1186/s13756-016-0132-5](http://aricjournal.biomedcentral.com/articles/10.1186/s13756-016-0132-5)
- (3) Eyre DW, Sheppard AE, Madder H, Moir A, Moroney R, et al. A *Candida auris* outbreak and its control in an intensive care setting. *N Engl J Med*. 2018; 379:1322-31. Available from: [nejm.org/doi/full/10.1056/NEJMoa1714373](http://nejm.org/doi/full/10.1056/NEJMoa1714373)
- (4) Welsh RM, Bentz ML, Shams A, Houston H, Lyons A, Houston H, et al. Survival, persistence, and isolation of the emerging multidrug-resistant pathogenic yeast *Candida auris* on a plastic healthcare surface. *J Clin Microbiol*. 2017;55(10):2996-3005. Available from: [jcm.asm.org/content/55/10/2996.long](http://jcm.asm.org/content/55/10/2996.long)
- (5) Osei Sekyre J. *Candida auris*: A systematic review and meta-analysis of current updates on an emerging multidrug-resistant pathogen. *MicrobiologyOpen*. 2018; 7(4):e00578. Available from: [doi.org/10.1002/mbo3.578](http://doi.org/10.1002/mbo3.578)
- (6) Mizusawa M, Miller H, Green R, Lee R, Durante M, Perkins R, et al. Can multidrug-resistant *Candida auris* be reliably identified in clinical microbiology laboratories? *J Clin Microbiol*. 2017;55(2):638-40. Available from: [jcm.asm.org/content/55/2/638.long](http://jcm.asm.org/content/55/2/638.long)
- (7) Centers for Disease Control and Prevention. Recommendations for Identification of *Candida auris* [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2017 [updated 2018 Jun 22; cited 2018 Nov 20]. Available from: [www.cdc.gov/fungal/candida-auris/recommendations.html](http://www.cdc.gov/fungal/candida-auris/recommendations.html)
- (8) Ontario Agency for Health Protection and Promotion (Public Health Ontario) Interim Guide for Infection Prevention and Control of *Candida auris*. Toronto, ON : Queen's Printer for Ontario; 2018. Available from: [publichealthontario.ca/en/eRepository/pidac-ipac-candida-auris.pdf](http://publichealthontario.ca/en/eRepository/pidac-ipac-candida-auris.pdf)

## For further information

- Contact the PHO Laboratory Customer Service Centre at 416-235-6556 or 1-877-604-4567 (toll-free), or by email at [customerservicecentre@oahpp.ca](mailto:customerservicecentre@oahpp.ca)
- For PHO Laboratory specimen collection information and previous Lababstracts, refer to [publichealthontario.ca/Labs](http://publichealthontario.ca/Labs)
- The current version of the PHO Laboratory General Test Requisition and other forms are available at [publichealthontario.ca/Requisitions](http://publichealthontario.ca/Requisitions)
- To subscribe to future Lababstracts, [register on our website](#)
- To register for Autofax and receive laboratory reports by fax directly from our laboratory information system as soon as they are released, contact the PHO Laboratory Customer Service Centre.