

Labstrack – December 2016

Mycobacterium chimaera – Clinical Testing Guidelines for Symptomatic Persons with Potential Exposure to Contaminated Heater-Cooler Units During Open-Chest Heart Surgery

Audience

Health Care Providers, Laboratory, and Health Unit Staff

Overview

This document provides:

- information on an international cluster of invasive *Mycobacterium chimaera* infections following open-chest heart surgery with cases identified in Europe, the United States and Quebec that have been attributed to contamination of heater-cooler units (HCUs) used during the surgery.
- laboratory testing criteria
- specimen and testing recommendations (for detailed clinical testing guidance please see **Table 1**).

Background

Public Health Ontario (PHO) is aware of an international cluster of invasive *M. chimaera* infections following open-chest heart surgery with cases identified in Europe, the United States and Quebec^{1,2,3,4}. These cases have been attributed to contamination of HCUs used during the surgery⁵. Microbial transmission in this cluster is thought to occur through aerosols of contaminated water from the HCU⁶. Current reports suggest contamination of the HCU may have occurred at the manufacturing plant of a single device manufacturer⁷; however, it is unknown whether multiple manufacturers and devices may cause similar risks.

Cases identified to date have all been associated with patients who have undergone open-chest cardiac valve replacement or repair, or received a cardiac prosthetic device^{1,8,9}. Current evidence suggests that individual risk of infection is very low (<1%), and that delaying surgery may pose a greater risk than the potential risk of acquiring an infection^{7,9}. However, disease can be severe for those infected despite appropriate treatment, even in immunocompetent hosts.

Most patients present with *M. chimaera* infection between three months to five years (median 18 months) after the index surgery, with symptoms of recurrent or persistent fever (weeks to months), fatigue, shortness of breath, and unexplained weight loss^{1,3,7}. Cardiac manifestations include prosthetic valve endocarditis, prosthetic vascular graft infection, paravalvular abscess, and pseudo and mycotic aneurysms^{7,10}. Extracardiac

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manifestations have also been reported, including bone infection (osteoarthritis, spondylodiscitis), sternotomy wound infection, mediastinitis, hepatitis, and bloodstream infection (BSI)^{3,7,10}. Approximately 50% of patients have ocular manifestations due to emboli (panuveitis, multifocal chorioiditis, chorioretinitis)³. Other embolic and immunologic manifestations (arthritis, osteomyelitis, bone marrow involvement with cytopenia, cerebral vasculitis, pneumonitis, myocarditis, granulomatous nephritis) have also been described^{7,10}. Splenomegaly is observed in approximately 80% of cases³.

Laboratory Testing Criteria for *M. chimaera* Infection

If you suspect *M. chimaera* infection, please consider the following criteria:

1. Presence of cardiac and/or extracardiac symptoms (listed above) in patients who had open-chest surgery with implanted devices between 3 months and five years prior to onset of symptoms.
2. Symptoms should be present for ≥ three weeks. Common causes of symptoms (both infectious and not-infectious) should be ruled out prior to submitting samples for *M. chimaera*
3. Consultation with an infectious disease specialist for investigation possible NTM infections is recommended, if possible.

Testing of asymptomatic individuals who have undergone open-chest surgery is not warranted. These patients should be counseled regarding potential symptoms of invasive NTM (including *M. chimaera*) infection and to consult a healthcare provider should these develop.

Specimen and Testing Recommendations

Table 1. Clinical Testing for Identifying Potential Cases of NTM (including *Mycobacterium chimaera*) Following Cardiac Surgery

Clinical symptoms/exposure	Specimen and testing recommendations	Where to submit testing
<ul style="list-style-type: none"> • Open-chest surgery with implanted device between 3 months to 5 years* <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • Constitutional: recurrent or prolonged fever, fatigue, shortness of breath, weight loss • Cardiac: prosthetic valve endocarditis and/or prosthetic vascular graft infection • Extracardiac: bone infarction, sternotomy surgical wound infection, mediastinitis, hepatitis, bloodstream infection • Immunologic/embolic: splenomegaly, ocular, cytopenia 	<ul style="list-style-type: none"> • Routine investigation to identify common etiologic agent should first be performed <p>Mycobacterial blood culture:</p> <ul style="list-style-type: none"> • Collect blood in 10.0 ml SPS (yellow top tube) or 10.0 ml heparin (green top tube) or 10.0 ml isolator tube <p>Cardiac tissue:</p> <ul style="list-style-type: none"> • Aseptically collect and submit to PHOL in sterile container without fixative <p>Extracardiac tissue and fluid (if local infection suspected):</p> <ul style="list-style-type: none"> • Affected soft tissue, pus, fluid, bone, and/or bone marrow 	<ul style="list-style-type: none"> • Routine blood culture, wound, and tissue culture should be performed at a hospital or commercial laboratory. Routine bacterial cultures are not available at PHO <p>Blood for mycobacterial culture:</p> <ul style="list-style-type: none"> • Submit to PHO laboratory (PHOL) requesting mycobacterial blood culture** <p>Tissue, fluid, and/or bone:</p> <ul style="list-style-type: none"> • Submit tissue, fluid and/or bone for

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Clinical symptoms/exposure	Specimen and testing recommendations	Where to submit testing
<ul style="list-style-type: none"> Infants: febrile episodes and failure to thrive 		mycobacterial culture, and acid fast staining to PHOL **

* Risk of patients with *M. chimaera* infection is still evolving. Contact microbiologist at PHOL to discuss testing for NTM in patients who do not meet this criteria.

** For *M. chimaera* testing, all specimens sent to PHOL must be accompanied by a [PHO laboratory requisition](#) indicating history of cardiac surgery.

For further information:

- Specimen collection, submission, testing, and reporting information is available for [Mycobacterium – blood](#) and [Mycobacterium - tissue](#) at http://www.publichealthontario.ca/test_directory
- Contact our Customer Service Centre at 416-235-6556 or 1-877-604-4567 (toll-free), or by email at CustomerServiceCentre@oahpp.ca
- For PHO specimen collection information and previous Lababstracts, refer to <http://www.publichealthontario.ca/labs>
- The current version of the PHO General Test Requisition and other forms are available at <http://www.publichealthontario.ca/requisitions>
- To subscribe to future Lababstracts, email lababstracts@oahpp.ca
- To register for Autofax and receive laboratory reports by fax directly from our laboratory information system as soon as they are released, contact the Customer Service Centre.

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Sources/ references

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3. Tan, Nicholas, et al. "Disseminated *Mycobacterium chimaera* Infection After Cardiothoracic Surgery." *Open Forum Infectious Diseases*. 3(3). (2016).
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10. EU protocol for case detection, laboratory diagnosis and environmental testing of *Mycobacterium chimaera* infections potentially associated with heater-cooler units: case definition and environmental testing methodology – August 2015.