

Challenge M144-5

February 2015

Wound (breast): *Mycobacterium chelonae*

HISTORY

A simulated breast wound swab collected from a 34 year old female patient with breast implants was sent to category A laboratories.

Participants were expected to isolate and report *Mycobacterium chelonae*.

CMPT QA/QC / Statistics

The samples are assessed for homogeneity and stability using in-house quality control methods and random selection of samples before and during production, and post sample delivery. The number of random samples selected is 15% of the total production batch.

CMPT quality control yielded a pure growth of *M. chelonae*. The organism identification was confirmed by a reference laboratory.

The challenge sample lot was confirmed to be homogeneous and stable for at least 19 days.

All challenge components have in-house assigned values based on the most clinically appropriate result; the most clinically appropriate result is determined by expert committee evaluation. No further statistical analysis is performed on the results beyond that described under "Suitability for grading."

SURVEY RESULTS

Reference Laboratories: 4 laboratories reported *Mycobacterium* species with 3 of them stating it was a rapid growing *Mycobacterium* (RGM); five laboratories reported acid fast bacilli, refer; one laboratory each reported *Mycobacterium* (non-tuberculosis), *Mycobacterium abscessus*, aerobic *Actinomycetes*, *Corynebacterium pseudodiphtheriticum*, *Nocardia* species, and gram positive bacilli, beaded and branching.

Participants (Table 1) 21/69 participants identified or suggested *Mycobacterium* species. Table 1 shows the identification results reported by the laboratories. The table is given for information purposes only, this challenge was ungraded.

MAIN EDUCATIONAL POINTS from M144-5

1. Rapidly growing mycobacteria (RGM) are opportunistic pathogens and may cause a variety of soft-tissue infections.
2. RGM grow on basic culture media and should be suspected based upon their appearance in the Gram stain (see companion Gram stain challenge G-144).
3. Speciation of isolates is required in order to select optimal antimicrobial chemotherapy.

Suitability for Grading

A challenge is considered suitable for grading if agreement is reached by 80 percent of selected reference group and at least 50 percent of the participants.

Consensus on isolate identification was not achieved by 80 percent of reference laboratories and greater than 50 percent of all laboratories and was thus, determined to be NOT suitable for grading.

COMMENTS ON RESULTS

Twenty participants recovered *Mycobacterium* and most indicated that they would refer the isolate for further identification. Other participants that did not identify also indicated referral, which was an appropriate course of action.

ISOLATION and IDENTIFICATION

Non-tuberculous mycobacteria (NTM) are ubiquitous in nature, have a varied spectrum of pathogenicity for humans, and are often resistant to classical anti-tuberculous chemotherapy. Rapidly growing mycobacteria (RGM) are generally defined as nontuberculous *Mycobacterium* species that grow within 7 days on laboratory media ¹.

M. abscessus, *M. chelonae*, and *M. fortuitum* are RGM and are well recognised as opportunist pathogens that cause of skin and soft tissue infections ², often associated with comorbidities, including immunosuppressive medications and surgical procedures ³.

Grading

This challenge was ungraded.

Table 1. Reported results — Identification

Reported results	Total
<i>Mycobacterium chelonae</i>	1
<i>Mycobacterium</i> species, rapid grower, refer, ± presumptive ± not <i>M. tuberculosis</i>	10
<i>Mycobacterium</i> species, refer ± presumptive	6
<i>Mycobacterium</i> species, not tuberculosis, probable <i>Mycobacterium chelonae/abscessus</i> group, refer	1
<i>Mycobacteria</i> other than <i>Mycobacterium tuberculosis</i> complex	1
<i>Mycobacterium abscessus</i> , refer	1
presumptive <i>Mycobacterium</i> species or <i>Actinomyces</i> species, refer	1
acid fast bacilli , rapid grower, presumptive, refer	2
acid fast bacilli, refer ± referred to rule out atypical <i>Mycobacteria/Rhodococcus</i> species, refer	8
gram positive bacilli, refer ± aerobic ± beaded ± branching	9
<i>Actinomycetes</i> , aerobic, refer ± resembling <i>Nocardia</i> species, refer	2
aerobic gram positive bacilli- beaded, branching, suspicious for aerobic <i>Actinomycetes</i> , refer	1
gram positive bacilli, resembling <i>Corynebacterium</i> species, refer ± aerobic	3
gram positive bacilli	1
gram positive bacilli, (+/- branching) possible/resembling/suggestive of <i>Nocardia</i> species, refer	1
<i>Nocardia</i> species, refer ± presumptive	6
<i>Corynebacterium diphtheriae</i>	1
<i>Corynebacterium pseudodiphtheriticum</i>	1
<i>Corynebacterium</i> species, refer ± , possible	2
<i>Rhodococcus</i> species, refer	1
gram positive filaments with fragmentation, refer	1
gram variable bacilli, refer	1
Unable to identify, would refer out for identification	1
aerobic gram positive bacilli, refer	1
no growth, frozen on receipt (CMPT unable to send replacement due to lack of viability)	1
Sample not normally processed	5
Total	69

A definitive diagnosis of a clinically suspected NTM-related cutaneous/subcutaneous infection can be made by the culturing of organisms from drainage material, aspiration fluid, or tissue biopsy samples.

The presence of NTM in a specimen should be suspected if beaded gram positive bacilli are seen in Gram-stained smears (see critique for G-144). Addition of Ziehl-Neelsen or Kinyoun smears may be useful ¹. Isolation of RGM is enhanced by incubation of cultures at 28-30°C.

Identification based on the morphologic features of the colonies, growth characteristics,

and biochemical tests remain routine practice in some laboratories ⁴. Correct identification is important; *Mycobacterium* may be misidentified as *Corynebacterium* species leading to the death/mortality of patients ⁴. Conventional biochemical testing does not differentiate species of NTM.

Sequence based identification, using one of several targets, is the definitive approach for speciation ^{1,5}. MALDI-TOF MS provides a rapid means of identification for this important group of pathogens, however further validation is required and it is not yet widely available ².

ANTIMICROBIAL SUSCEPTIBILITY

Strains of *M. chelonae* and *M. abscessus* are resistant to standard anti-tuberculosis drugs. Resistance to amikacin, cycloserine, doxycycline, vancomycin, and sulfisoxazole has been reported ^{6,7}.

CLSI Guideline M24-A2 recommends antimicrobial agents that should be tested against RGM using the broth microdilution method ⁸. Drugs usually active against *M. chelonae* include amikacin, imipenem, tobramycin, clarithromycin and sometimes linezolid ⁹. Clarithromycin is generally the drug of choice for localized disease due to *M. chelonae* and treatment is protracted (4-6 months).

CLINICAL RELEVANCE

M. chelonae is known to contaminate injection solutions, along with *M. fortuitum* and cause soft tissue infections after cosmetic surgery and other medical procedures ⁶. It is resistant to routine disinfectants such as povidone iodine, formalin, glutaraldehyde, chlorine, and some detergents ¹⁰.

M. chelonae causes sporadic diseases, which include cellulitis, abscess, and disseminated disease; skin trauma may be the primary cause for cutaneous illness ^{7,11}.

Breast implant-associated bacterial infections occur in 2.0 to 2.5% of cosmetic cases and up to 20% of reconstructive cases ¹².

Infections caused by mycobacteria are uncommon although the real incidence could be much greater as mycobacterial cultures are not commonly requested ¹³.

REFERENCES

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