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CMPT Sample Selection and Management Information

As a requirement for ISO17043 certification, CMPT must have a clear process for sample selection and management. It is also required that this information is made available to our participant laboratories.

Selection of challenges

Challenges for all programs are not at the sole discretion of CMPT staff or management. Sample selections including appropriate microbial identification, susceptibility profile, concentration (where relevant), and clinical relevancy are performed annually by CMPT area committee members in Clinical Bacteriology, Mycology, and Enteric Parasitology.

In all programs for Water Bacteriology, challenge concentrations are selected by CMPT staff and management; concentrations may be affirmed by members of the Water Bacteriology committee.

Subcontracting of challenges

CMPT creates all its own samples and is responsible for all studies of microbial concentration, homogeneity and stability to ensure that all participants receive closely similar samples. In Clinical Bacteriology, Mycology, Mycology Plus, and Enteric Parasitology all relevant microbial identifications and antimicrobial susceptibilities are verified by CMPT's team of reference laboratories.

Grade Assessment of challenges

All grade assessed challenges need to meet the following criteria before being considered appropriate for assessment: In Clinical Bacteriology the assigned value must be correctly identified by at least 80 percent of reference laboratories and by at least 50 percent of the total group of participants. For Enteric Parasitology, lower threshold of 70 percent is required. Enteric Parasitology grading is predicated upon the reporting of accepted pathogens. Parasites of controversial pathogenicity may be included if the burden is large.

Challenges not meeting this threshold are treated as not suitable for grading and are thus, ungraded. Relevant educational materials will be included along with the informative critique that accompanies the report of results. In Water Bacteriology, grading is based on the degree of count deviance from challenge mean based on either normal or Poisson distribution. Remaining graded challenges are based on a Positive/Negative result.

Statistical Analysis of challenges

Aside from the analysis for grade appropriateness, CMPT does not perform statistical analysis on challenges in Clinical Bacteriology, Mycology, Mycology Plus, or Enteric Parasitology, with the exception of percent of challenge results that were deemed acceptable versus unacceptable.

For Water Bacteriology samples, the mean of reported bacterial enumeration (less gross outliers and non-measurable values) is calculated. As a measurement of distribution, CMPT provides two interpretations, one based on normal distribution, and one based on count being influenced by individual bacterial clumping. If distribution is deemed as normal, results can be interpreted by mean and Z-score. If distribution is deemed as non-normal results can be interpreted by Poisson probability distribution. Both calculations and interpretations are provided. Extreme (nonsense) outliers and non-numeric results are excluded from statistical calculations.

Report Confidentiality

CMPT respects the confidentiality of all reported results. Results are only sent to the specified laboratory contacts and the provincial accreditation body, as directed either by the laboratory or by provincial requirement.

Note: All CMPT samples should be considered as potentially containing live pathogenic microbes or their toxin products. Handling of samples should be done with caution. Routine hand hygiene and safety awareness are essential procedures with all samples.

Michael Noble, CMPT Chair

Heterotrophic Plate Count – Drinking Water

Early this year CMPT implemented a new Drinking Water – related program: the Heterotrophic Plate Count in Drinking Water. The first samples were sent in April 2015 to interested participants already enrolled in our Drinking Water program.

Heterotrophs are microorganisms that require organic carbon for growth. They include bacteria, yeasts, and moulds.

Although heterotrophic plate count (HPC) results are not an indicator of water safety, HPC measurement is useful for monitoring general bacteriological water quality throughout the treatment process and in the distribution system.

Drinking water systems have a baseline range of HPC bacteria levels that depends on the site-specific characteristics. Consistently low levels of HPC bacteria are an indicator that the treatment system is functioning properly.

When an unexpected increase in the HPC is observed, this could indicate a change in the treatment process such as contamination in the distribution system; this represents a change in the general bacteriological quality of the water therefore, the whole system then should be inspected and the cause determined.

In general, the HPC test is used in conjunction with tests that monitor for *Escherichia coli*, total coliforms, turbidity, and disinfectant residuals, all part of a multi-barrier approach to producing safe drinking water.

The main applications of the HPC measurements are:

· Monitor the effectiveness of water treatment processes (indication of pathogen removal).

· Monitoring of performance of filtration or disinfection processes.

Analytical methods

Samples for HPC testing should be stored and transported at a temperature of 5 ± 3°C to obtain meaningful results. Ideally, samples should be analyzed within 8 hours; if this is not possible, the time between collection and analysis must not exceed 24 hours.

Standard HPC tests are simple culture-based methods; these methods do not provide specific identification of organisms that are detected.

There is no single medium or method capable of recovering or enumerating all the bacteria in the water that is being analyzed. Many heterotrophic bacteria that are present in water do not grow on currently used media. The choice of culture medium, temperature, and incubation time are important selective factors that will affect the HPC results from any given water sample.

There are currently three methods - pour plate, spread plate, and membrane filtration- that are routinely used for HPC determinations.

Pour plate method

The pour plate method involves adding a small volume of sample (0.1-2.0 mL) to melted agar (44-46°C) and then pouring the mixture into plates and allowing it to solidify.

Pros: colonies are generally small and compact and therefore easier to count.

Cons: the bacterial sample is being added to tempered agar at between 43 and 46°C, which could result in secondary stress due to heat shock to the bacteria that would reduce viability.

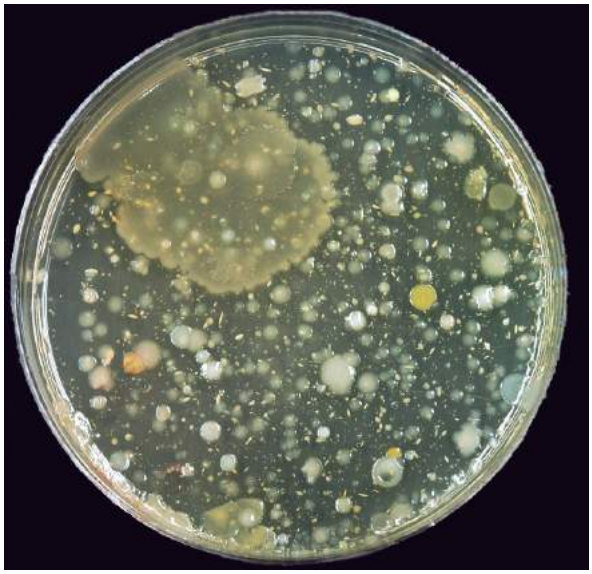

Figure 1. Pour plate method.

Spread plate method

The sample is spread on the surface of the agar with a clean sterile spreading rod and the plates are incubated.

Pros: generally yields higher bacterial counts than the pour plate method and the sample is not subjected to heat shock.

Cons: since the sample has to be absorbed into the agar surface, only a small sample volume (0.1-0.5 mL) can be used.

Heterotrophic Plate Count – Drinking Water

Figure 2. Spread plate method

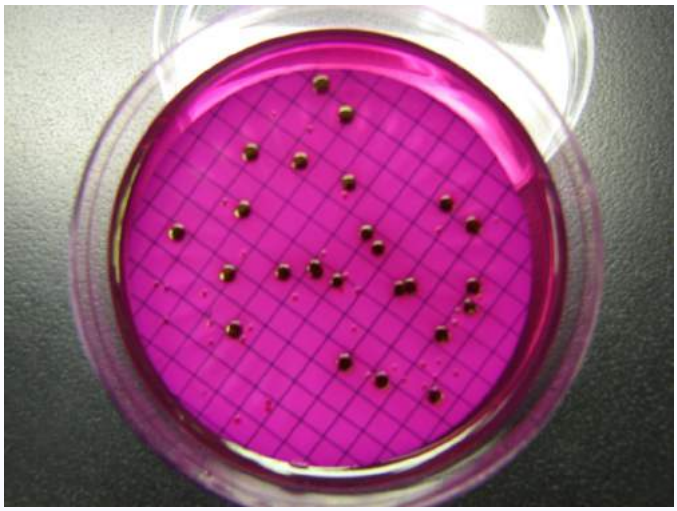

Figure 3. Membrane filtration method.

Membrane filtration method

A water sample is passed through a 0.45-µm filter, and the heterotrophic organisms are retained on the filter surface. The filter is then placed onto the culture media and incubated.

Pros: permits the analysis of sample volumes from less than 1.0 mL to as much as 10 L This method also eliminates the possibility of heat shock.

Cons: the filter area is small and makes it difficult to properly count the colonies.

Enzyme Substrate Technology

A popular method for HPC testing involves inoculating the sample into a medium that contains multiple unique enzyme substrates, each targeting a different bacterial enzyme.

When metabolized, these substrates produce the same signal (fluorescence under 365 nm UV light.) The sample and the medium are added to a plate with wells; the wells then fill automatically as the user swirls the plate.

The plates are incubated for 48 hours and then observed under UV light. The number of wells that fluoresce is converted to a Most Probable Number (MPN) using the table provided with the product.

References:

Allen MJ, Edberg SC, Reasoner DJ. Heterotrophic plate count bacteria—what is their significance in drinking water? *Int J Food Microbiol*. 2004;92:265-274.

WHO. Heterotrophic Plate Count Measurement in Drinking Water Safety Management. 2002 Report of an Expert meeting. Available at: http://www.who.int/water_sanitation_health/dwq/WSH02.10.pdf Accessed April, 2015.

Health Canada. Guidance on the Use of Heterotrophic Plate Counts in Canadian Drinking Water Supplies. 2012 Available at: http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/heterotrophic-heterotrophes/index-eng.php Accessed April, 2015

IDEXX. SimPlate® for HPC. Product information. Available at: https://www.idexx.com/water/products/simplate.html

For more information on CMPT's HPC program please contact us at info@cmpt.ca

Professional Development Opportunity

A Professional Development Opportunity is coming up this fall for CMPT participants' laboratory staff.

Earlier this year CMPT submitted the "CMPT Professional Development course" to be evaluated for Canadian Society for Medical Laboratory Science (CSMLS) PEP hours or Credits.

CMPT has taken this initiative as a result of requests from laboratory directors who understand the benefits that reading CMPT challenge critiques would bring to laboratory staff.

CMPT is pleased to announce that the course has been assigned PEP (Professional Enhancement Program) hours and CPS (Continual Professional Studies) Credits.

The CMPT Professional Development course is a year-long course comprised of three different categories: Clinical Bacteriology, Mycology, and Enteric Parasitology. Each category has 3 to 4 modules.

The requirements for the course are: reading the challenge critiques for each category and completing an online assessment or Quiz.

Although the critiques are available to all participants, not all participants will have experience with all disciplines, and thus, participants working in parasitology may choose to complete only the Enteric Parasitology modules, participants working in mycology may choose to complete only the Mycology modules.

CSMLS has assigned PEP hours and CPS credits as follows:

	PEP Hours	CPS Credits
All modules	24	1.6
All Clinical Bacteriology modules	15	1.0
All Mycology modules	4.5	0.3
All Enteric Parasitology modules	4.5	0.3

Survey Critiques are part of the CMPT educational component and are directly related to clinical microbiology laboratory practises. The critiques are developed for each Proficiency Testing (PT) challenge sent by CMPT, on the following categories or programs: Clinical Bacteriology, Enteric Parasitology, and Mycology.

Each critique is composed of tables with the summary of the performance of each participant laboratory together with grades assigned to each report. An educational component addresses issues encountered with the specific challenge and general information about the organism/clinical scenario of the challenge. Participants can also compare their own laboratory practices with those in other laboratories or provinces.

Critiques are also used to alert participants of new guidelines, reporting practices, methods, or emerging organisms and ways of detecting them. One important point of each critique is that they are written by members of a committee of experts for each discipline and reviewed by the whole committee. Recommendations and grading are reached in consensus.

Stay tuned for more news on this great opportunity.

If you want more information, please e-mail us, attention Veronica Restelli (restelli@mail.ubc.ca) RE: CMPT Professional Development course.

NOTE: CMPT will be running a pilot test on its Professional Development Site. Please register at http://pd.cmpt.ca/ and complete the sample quizzes.

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Upcoming Events

May 2015

LABCON CSMLS' National Conference of Medical Laboratory Science

May 22 - 24,2015; Montreal, QC

More info: http://labcon.csmls.org/en/

JUNE 2015

2nd Annual Microbiology and Infectious Diseases Asia Congress

23 & 24 June 2015, Singapore

More info: http://www.microbiologyasia-congress.com/

65th Annual CSM Conference,

June 15 – 18 2015; University of Regina, SK

More info: http://www.csmregina2015.ca/

July 2015

Infectious Diseases World Summit

July 8-10 2015; Boston, MA.

More info: https://www.gtcbio.com/conferences/infectious-diseases-summit-overview

September 2015

ICAAC/ICC 2015

September 17 – 21 2015; San Diego, CA

More info: http://www.icaac.org/

October 2015

Laboratory Quality Management Conference

October 28 – 30 2015; Vancouver, BC

More info: http://polqm.ca/conference_2015/home.html

ABOUT CONNECTIONS

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