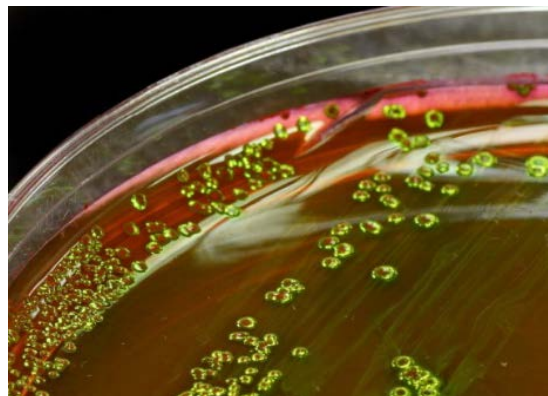## RECOMMENDATIONS FOR IMPROVED *E. COLI* TESTING

This science story examines the collaborative work to improve laboratory methods for the detection of Shiga toxin-producing *Escherichia coli* (STEC) in Canada. Strong public health surveillance systems are founded on the accurate identification of infectious pathogens. The recommendations will help public health laboratories improve detection and better distinguish between STEC serotypes. This work is an example of the national public health partnerships facilitated by the NML's Canadian Public Health Laboratory Network (CPHLN) for the development of public health laboratory best practices.

What was known about this area prior to your work, and why was the research done?

Some strains of *Escherichia coli* (*E. coli*) cause severe clinical symptoms, such as bloody diarrhea. Many of the most serious *E. coli* strains are classified as "STEC" meaning they produce Shiga toxin. In the past, a single serotype (O157:H7) was assumed to be the likely culprit despite being just one of many possible STEC serotypes. This presumption was so entrenched in clinical microbiology that diagnostic culturing methods often could not detect other disease-causing *E. coli* serotypes. This possibly led to underestimated infection rates of non-O157 STEC. In fact, many non-O157 strains have been associated with serious illness and major outbreaks (e.g. 2016 STEC O121 outbreak associated with contaminated flour). This guidance document charts a path to improve the detection and reporting of all STEC infections by public health laboratories.

What are your most significant findings from this work?

CPHLN struck a working group with representative membership across federal, provincial and territorial public health laboratories to determine what changes should be made to improve the STEC diagnostic algorithm. The working group considered several factors, such as technical and practical implications of the recommended changes. The resulting recommendations will advance our ability to detect all clinically significant *E. coli* infections, while balancing operational and financial realities. The recommendations

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outline the following general workflow: front-line laboratories should use either a culture method that does not exclude the growth of non-O157 *E. coli*, or a culture-independent diagnostic test (CIDT) that detects the toxin itself regardless of serotype. If a CIDT method is positive for possible STEC, laboratories must follow up and culture the STEC in order to support surveillance activities as well as inform outbreak investigations and response.

What are the implications or impact of the research?

These recommendations present challenges for both lab operations and surveillance activities. CIDTs can be quite costly and the maintenance of traditional culturing methods alongside the CIDT method is required. While this may create challenges by maintaining an assortment of assays, these methods are necessary to properly support pathogen surveillance programs. In addition, the detection of more and more non-O157 STEC will continue to challenge and change conventional knowledge of clinically relevant *E. coli* strains. Existing surveillance systems will need to evolve and adjust to the increased numbers and diversity of strains identified. These recommendations should result in improved detection of STEC in patients presenting with diarrhea, improved protection of the public via food safety measures, more accurate surveillance and improved outbreak detection and response.

* PHAC-NML researcher