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PhD in Medical Sciences
2018-2019

INVITATION to the Public defence of

Klara DE RAUW

To obtain the academic degree of '**DOCTOR OF MEDICAL SCIENCES**'

Detection, characterization and epidemiology of Shiga toxin-producing *Escherichia coli* in human infections

Wednesday, 4 September 2019 at 5 p.m.

In Auditorium **Piet Brouwer**

Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussels

How to reach the campus Jette:

<http://www.vub.ac.be/english/infoabout/campuses>

Summary of the dissertation

Shiga toxin-producing *Escherichia coli* (STEC) are foodborne pathogens that cause outbreaks and sporadic cases of gastroenteritis, and sometimes the life-threatening hemolytic uremic syndrome (HUS). The aims of this research were to evaluate STEC detection methods, to study Belgian hybrid *E. coli* pathotypes, to conduct an isolate-based risk assessment for HUS development, and to gain insight in the epidemiology of STEC infections in the UZ Brussel.

Two rapid commercial assays were evaluated. The sensitivity of the SHIGA TOXIN QUIK CHEK enzyme immunoassay was too low to recommend direct fecal testing. The molecular multiplex BioFire FilmArray Gastrointestinal assay had a superior sensitivity, but misclassified certain pathogenic *E. coli*. Both assays could not detect Shiga toxin 2f (Stx2f).

Two hybrid O104:H4 isolates were closely related to the German 2011 outbreak strain, and came from Belgian patients who traveled to the Mediterranean sea area. Belgian hybrid O80:H2 *E. coli* isolated from humans and calves were similar to the pathotype that is currently emerging in France, indicating a role for diarrheic calves in its transmission.

The genes *stx2*, *stx2a* in particular, and *eae* were identified as significant risk determinants for HUS development. This led to a new risk classification and virulence typing algorithm.

STEC infections in the UZ Brussel were mainly sporadic, and a substantial portion of the patients was asymptomatic. As seen in other countries, Stx2f infection was quite prevalent and we reported the first Belgian STEC *stx2f* HUS case and *stx2f* positive *E. albertii* infection.

The work presented in this PhD thesis emphasizes the importance of the culturing of samples for surveillance, outbreak detection, and identification of emerging hybrid *E. coli* pathotypes.

Curriculum Vitae

Klara De Rauw was born on the 28th of August 1987. In secondary school she studied Latin Sciences at the Sint-Aloysius college in Ninove. In 2006 she started her studies in Biomedical Sciences at Ghent University, in which she obtained a master's degree magna cum laude, specialization Immunology and Infection, in 2011. She started working as a molecular biologist and researcher in the Laboratory of Microbiology and Infection Control at the university hospital UZ Brussel in 2012. In this function she combined routine molecular biology tasks with the scientific responsibility of the National Reference Centre for Shiga toxin-producing *Escherichia coli*. The research conducted during the latter resulted in a number of publications aiming to obtain a PhD degree at the Vrije Universiteit Brussel. In the beginning of 2019 she took on a new challenge and started working as Bioinformatics product specialist at Applied Maths, Biomérieux, while finishing the writing of her PhD thesis.