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Prof. dr. Paul Griffiths
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Chairs

Chair UGent: Prof. dr. Piet Deprez
Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine, Ghent University

Chair UCL: Prof. dr. Jean-Marie Degryse
Institute of Health and Society, Université Catholique de Louvain and Departments of Public Health and Primary Care, Katholieke Universiteit Leuven

Curriculum Vitae

Suzanne Smit obtained her Master degree in Veterinary Medicine from Ghent University in 2009. This was followed by an equine veterinary traineeship at the Veterinary Centre Someren. In 2011, Suzanne started the Master of Science Nutrition and Rural Development at the faculty of Bioscience Engineering of Ghent University during which she conducted an Internship at Vétérinaires Sans Frontières. After finalization of this Master she worked for the Institute of Tropical Medicine (ITM) in Antwerp.

In 2014, Suzanne was granted a Research Foundation – Flanders (FWO Aspirant) PhD fellowship, which allowed her to pursue a joint PhD in Veterinary Sciences and Public Health. During her PhD, she conducted research on the public health impact of congenital toxoplasmosis and cytomegalovirus infection.

Furthermore, Suzanne has finalized some additional courses, worked on a DGD project studying the sero-epidemiological status and risk factors of toxoplasmosis in pregnant women in Northern Vietnam; conducted consultancy on the evaluation of the cost-effectiveness of tuberculosis screening policy in Flanders; participated in a SOFI project on *Taenia solium* elimination versus control; and joined the European Congenital Cytomegalovirus Initiative (ECCI) – an extensive network of European experts working on congenital cytomegalovirus. As a member of the ECCI scientific committee she took part in international expert meetings and had a leading role in the organization of the biennial ECCI conference.

UNIVERSITEIT GENT

INSTITUTE OF TROPICAL MEDICINE ANTWERP

INVITATION

Public defence of the doctoral thesis of

G. Suzanne A. Smit

21st March 2018

Ghent University,
Faculty of Veterinary Medicine

Institute of Tropical Medicine,
Department of Biomedical Sciences

Université catholique de Louvain,
Institute of Health and Society (IRSS)

UCLouvain

You are cordially invited to the public defence of the doctoral thesis of

G. Suzanne A. Smit

Title of the thesis:

The public health impact of congenital toxoplasmosis and cytomegalovirus infection: methods and applications

The defence will take place on
Thursday 21st March 2019
at 5pm

in Auditorium D (via Entrance 19)
Faculty of Veterinary Medicine
Ghent University
Salisburylaan 133, Merelbeke

You are also cordially invited to a reception that will be held after the defence

For catering purposes, if you are planning to attend the reception please advise by Monday 11th March 2019
(via email to suzanne.smit@ugent.be)

Summary of the thesis

Cytomegalovirus (CMV) and *Toxoplasma gondii* are able to infect the unborn child through the placenta. Such congenital infections can be asymptomatic but can also lead to morbidity, lifelong disabilities and mortality. In combination with an assumed significant incidence, congenital toxoplasmosis (CT) and cytomegalovirus (cCMV) might have an important impact on the lives of patients and their families.
There is an urgent need to boost awareness regarding both aforementioned congenital infections in the global population but also among clinicians and policy makers and for improved prevention and intervention strategies. Knowledge about the disease burden is prerequisite for every further step forward because it can boost this overall awareness and is essential for evidence-based health policy, monitoring trends, and prioritizing and evaluating the impact and cost-effectiveness of prevention and intervention strategies, including accurate diagnostic and prognostic methods and effective and safe therapeutics and vaccines. The main objective of this thesis was therefore to unravel the public health impact of both congenital infections in terms of Disability-Adjusted Life Years (DALYs). To reach this goal, we described data needs for burden assessment, focused on available evidence, identified data gaps, and developed an up-to-date methodological framework for assessing disease incidence and burden of disease, which allows routine monitoring of the public health impact of both congenital infections in time.

First we assessed the epidemiology and disease burden of (congenital) CMV in Belgium. The age group weighted overall CMV seroprevalence was 32% (95% confidence interval (CI): 31%–34%) in 2002 and 31% (95% CI: 30%–32%) in 2006. We demonstrated that the CMV epidemiology differs from that of an immunizing infection such as hepatitis A virus. These data may imply that the assumption of primary infection followed by life-long immunity, including IgG positive antibody levels, may not hold and that boosting through reactivation and reinfection is likely. The public health impact of cCMV in Belgium in 2013 was 1976 (95% Uncertainty Interval (UI): 757–4067) DALYs. To our knowledge this was the first ever estimation of the public health impact of cCMV in terms of DALYs. In this context, it seemed time to stimulate awareness and public health policy by conducting similar studies for other countries. Therefore, we continued with the estimation of the public health impact of cCMV in the European Union (EU). We estimated a cCMV burden of 68 595 (UI: 22 678–162 440) DALYs in the EU, which translated to 14 (UI: 4.5–32) DALYs per 100 000 population and 133 (UI: 44–315) DALYs per 10 000 live births. This burden was comparable to Down syndrome and much higher than other important congenital infections such as CT, congenital rubella and perinatal listeriosis. Noticeable is that approximately half of the cCMV burden was due to sequelae in children that were asymptomatic at birth and a scenario analysis showed that including data on foetal losses more than doubled the DALY estimate. Overall, the data showed that cCMV is an important but potentially under-recognized and underestimated clinical and public health problem in the EU and by extension worldwide.

As for cCMV, we estimated the disease burden of CT in Belgium in terms of DALYs. The estimated public health impact of CT was 188 (95%UI: 43–419) DALYs in Belgium in 2013. A scenario analysis showed important increases in years of life lost when the burden due to foetal losses was included and decreases in DALYs when comprehensive CT prevention measures were conducted. In this context, we may argue that prevention measures and focusing on the important risk factor, food contamination, might be important strategies for disease burden reduction. Since we observed a noticeable impact of primary prevention on the burden of CT, we estimated the sero-epidemiological status and risk factors of toxoplasmosis in pregnant women in Northern Vietnam, a region with an assumed low level of awareness and lack of prevention measures.

In conclusion, CT and especially cCMV infection are serious infections with an important impact on public health, although several data gaps remain resulting in a potential underestimation of the burden. The results, methodological framework, proposed applications, prioritized remaining gaps and recommendations may allow a leap forward in breaking the vicious circle of under-recognition and neglect and can support awareness, evidence based health policy and the development and evaluation of much needed prevention and intervention strategies. Similar studies in other countries may further stimulate breaking this vicious cycle.