

### Summary of work activities

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Microbiology Training Programme (EUPHEM),  
second cohort

## Background

Public health microbiology (PHM) is a cross-cutting area that spans the fields of human, animal, food, water, and environmental microbiology, with a focus on human population health and disease. PHM laboratories play a central role in disease detection, disease monitoring, outbreak response, and the provision of scientific evidence to prevent and control infectious diseases. European preparedness for responding to new infectious disease threats requires a sustainable infrastructure capable of detecting, diagnosing, and controlling infectious disease problems. This includes the design of prevention strategies as well as treatment and infection control. A broad range of expertise is necessary to fulfil these requirements, for example epidemiology and public health microbiology. PHM is required to provide access to experts with expertise/experience of all relevant communicable diseases at the regional, national and international level in order to mount rapid responses to emerging health threats, plan appropriate prevention strategies, assess existing prevention disciplines, develop or assist in the development of microbiological guidelines, evaluate/develop new diagnostic tools, arbitrate on risks from microbes or their products, and provide pertinent information to policy makers related to the above issues from a microbiology perspective.

According to articles 5 and 9 of ECDC's founding regulation (EC No 851/2004) 'the Centre shall, encourage cooperation between expert and reference laboratories, foster the development of sufficient capacity within the community for the diagnosis, detection, identification and characterisation of infectious agents which may threaten public health' and 'as appropriate, support and coordinate training programmes in order to assist Member States and the Commission to have sufficient numbers of trained specialists, in particular in epidemiological surveillance and field investigations, and to have a capability to define health measures to control disease outbreaks'. Therefore, ECDC has initiated a two-year training programme (EUPHEM) which is closely linked to the European Programme for Intervention Epidemiology Training (EPIET). Both EUPHEM and EPIET are considered 'specialist pathways' of the two-year ECDC fellowship programme for applied disease prevention and control.

This report summarises the work activities undertaken by Camille Escadafal, the first EUPHEM fellow at Robert Koch Institute in Berlin, Germany.

All activities aim to address different aspects of public health microbiology and underline the various roles of public health laboratory scientists within public health systems.

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## Material and methods

This report accompanies a portfolio of the outcome of different activities conducted during the EUPHEM fellowship. Activities were comprised of specific projects and theoretical training modules (not summarised in this report). The specific projects included laboratory surveillance, risk assessments, outbreak investigations, quality management, research, summarising and communicating scientific evidence, and activities with a specific microbiological focus, such as biosafety or different laboratory techniques. The outcome included publications, presentations, posters, reports, and teaching materials prepared by the fellow. The portfolio presents a summary of all work activities conducted by the fellow, unless prohibited due to confidentiality regulations.

## Results

The specific projects and work activities are summarised below:

### Projects within the ENIVD-CLRN

(European Network for Diagnostics of 'Imported' Viral Diseases, Collaborative Laboratory Response Network)

#### *Laboratory survey on the current status of tick-borne encephalitis in Europe*

The aim was to gather data for a report from focal points in all European countries and Russia concerning the existing surveillance systems for TBE and numbers of cases in 2007–2009, prevalence of vectors and hosts, and climate-relevant data.

Educational outcome: conducted a questionnaire-based study, evaluated and described a surveillance system, drew conclusions and made recommendations.

#### *External quality assessment of Yellow Fever virus and Hantavirus diagnostic*

The purpose of the first external quality assurance (EQA) study was to assess the efficiency and accurateness of Yellow Fever virus molecular and serological diagnosis methods applied by international expert laboratories (37 participants). The second study conducted was an EQA for the serological diagnostic of hantavirus in Europe with 28 laboratories participating.

Educational outcome: prepared an EQA, analysed, interpreted and reported results.

#### *West Nile diagnostic review for ECDC*

In response to the 2010 outbreak of West Nile fever in Greece, ECDC has requested the ENIVD to review the presently available methods to achieve the laboratory diagnosis of West Nile infections in human. Most prominent advantages and disadvantages of each methods were discussed in the light of the results obtained by an external quality assessment scheme performed by the ENIVD with the participation of laboratories from Europe, the Middle East, the Americas and Africa.

Educational outcome: summarised and communicated evidence-based data for public health professionals.

### Projects within laboratories of the Robert Koch Institute

#### *Development on a new genotyping method of Giardia lamblia*

In this study, a PCR based strategy was developed to assess Giardia ADI/PAD sequence variability at the parasite population level. A PCR and sequence based protocol for Giardia ADI/PAD genotyping was developed and applied to determine sequence variation in human and animal isolates in order to start assessing the relevance of novel marker for pathotyping of Giardia. Educational outcome: design a research study, develop new methods and protocols, basic knowledge in parasitology, practice in molecular and fingerprint-based methods.

#### *Validation of serological diagnosis of cowpox virus*

The aim was to develop and evaluate various non-commercial diagnostic methods using recombinant proteins for cowpox virus (CPXV) detection. These recombinant protein ELISA methods were validated using a panel of over 1000 human sera by testing for correlation between the obtained results and the results of immunofluorescence assays, seroneutralisation tests, XCELLingence assays and standard ELISA. By comparing data from previous studies we could then develop new hypothesis on the immune response to CPXV infections.

Educational outcome: performed and evaluated a new diagnostic method, acquired knowledge on cell cultures and immunological methods.

### ***Evaluation of microbiological methods in outbreaks of fungal infections***

The aim was to develop and use different markers for the typing of opportunistic pathogenic fungi, especially the genotyping of fungi involved in a suspected outbreak. Genotyping results for three strains related to a *Scopulariopsis brevicaulis* outbreak were compared with isolates of the same species from the environment and patients from other hospitals.

Educational outcome: designed a new diagnostic method for epidemiological linking during outbreak investigation, improved knowledge in mycology, molecular and sequence-based methods.

### ***Establishment of a reference laboratory network for the diagnosis of diarrheal pathogens in Germany***

This pilot study aimed to establish a network of ten German reference laboratories for the diagnosis of common and not yet considered diarrhoeal pathogens. Data collection and analysis was performed for the first year of project (September 2009 to August 2010), followed by the evaluation and development of the project in the following year. The project included the writing of a literature review on enteropathogens associated with human diarrhoea and an introduction to the different bacteriology laboratories of the Robert Koch Institute branch in Wernigerode.

Educational outcome: set up a laboratory surveillance network, analysed data from pilot study, interpreted and proposed improvements, performed main bacteriology diagnostic techniques, and wrote a literature review.

### ***Norovirus and rotavirus infections during the winter season in Germany***

The aim was to acquire good laboratory practice in an accredited reference laboratory for norovirus and rotavirus diagnostics and collaborate with a PAE fellow (postgraduate training for applied epidemiology fellow) on a surveillance project on rotavirus infections in hospitalised children in the German federal state of Mecklenburg-Vorpommern.

Educational outcome: performed molecular diagnostic tests in an accredited laboratory, participated in a surveillance project with a fellow epidemiologist, and interpreted the results from a public health perspective.

### ***EHEC O104:H4 outbreak investigation in Germany in spring 2011***

Participation in the EHEC O104:H4 outbreak investigation in Germany in spring 2011 within the German national reference centre for salmonella and other enteric pathogens, Robert Koch Institute branch, Wernigerode, Germany. Role in linking the laboratory results with epidemiologic data from the outbreak team and improving the diagnostic rationale.

Educational outcome: actively participated in an outbreak investigation; analysed, regularly mapped and reported results; improved a diagnostic rationale; liaised between laboratory specialists and epidemiologists.

### ***Facilitator and lecturer: laboratory training modules for epidemiologists***

Organisation and facilitation of the laboratory modules addressed at epidemiologists (German EPIET, PAE fellows and external participants) at Robert Koch Institute in May 2010 and May 2011. Topics included public health microbiology, sampling, safety transport, diagnostic techniques, and a practical sampling exercise.

Educational outcome: planned and organised a training course, defined learning objectives, taught epidemiologists in laboratory and microbiology topics.

## **International mission**

### ***Setting up a communicable disease early warning system (EWS) for the migrant population at the Greek-Turkish border***

The objective of the mission was to establish, in close collaboration with the local Greek partners, a communicable disease EWS for the migrant population in the detention centres at the Greek-Turkish border. More specifically, my task was to set up the laboratory testing component of the EWS and contribute to the identification of which communicable diseases should be covered, develop the appropriate case definitions, and assess logistic and human resources available to support the system.

Educational outcome: understood and adapted quickly to an unfamiliar environment and new project within its political context, reviewed objectives considering the actual context of the mission, wrote an EWS protocol and a mission report for ECDC.

## **Publications**

Tick-borne encephalitis in Europe: current status through a laboratory survey, 2010.

Oliver Donoso Mantke, Camille Escadafal, Martin Pfeffer. (Published in Eurosurveillance, September 2011.)

The diagnosis of West Nile human infections: overview and proposal for diagnostic protocols in the light of an external quality assurance scheme.

Vittorio Sambri, Olivier Donoso Mantke, Camille Escadafal, Francesca Cavrini, Paolo Gaibani, Anna Maria Pierro, Giada Rossini, Caterina Vocale. (Under revision for publication in Eurosurveillance.)

First international external quality assessment study on molecular and serological methods for yellow fever diagnosis.

Cristina Domingo, Camille Escadafal, Leonid Rumer, Jairo A. Méndez, Paquita García Amadou Sall, Annette Teichman, Oliver Donoso-Mantke, Matthias Niedrig. (Under revision for publication in PLoS Neglected Tropical Diseases.)

Second external quality assurance study for the serological diagnosis of hantaviruses.

Camille Escadafal, Avšič-Županc T, Vapalahti O, Niklasson B, Teichmann A, Niedrig M, Donoso-Mantke O. (Submission for publication in PLoS Neglected Tropical Diseases.)

## Discussion

One of the main goals of the EUPHEM programme is to expose the fellows to different public health experiences and activities thus enabling them to work across disciplines in the field of public health. This report summarises the different activities and projects conducted by a EUPHEM fellow from cohort 2 and first fellow based at RKI in Germany. All activities were in line with the learning-by-doing approach of the EUPHEM programme, and all projects had a clear educational outcome contributing to the development of a wide range of experience and expertise. The activities provided the fellow with a variety of skills required in the field of public health microbiology and strengthened her ability to work in a multidisciplinary team, particularly with epidemiologists.

## Personal conclusion

This fellowship gave me a unique opportunity to work on most aspects of public health microbiology which is defined by National Microbiology Focal Points as a cross-cutting area including human, animal, food, water and environmental microbiology with a focus on human health and disease. Throughout the programme I have been able to participate and lead projects in several fields of microbiology (parasitology, bacteriology, mycology and virology) working in close collaboration with epidemiologists, statisticians, virologists, bacteriologists, immunologists, policy advisers, veterinarians and clinical microbiologists from different levels of the health system.

Learning and collaborating with epidemiologists from the EPIET and Postgraduate training in Applied Epidemiology (PAE) training programme has also been a great opportunity for me to bridge epidemiology and microbiology and therefore complete one of the main goals of the EUPHEM programme.

This two-year fellowship also gave me the possibility to discover a new European country, learn about its culture and language as well as getting familiarised with the German health system and working organisation.

This multidisciplinary approach and wide networking gave me the chance to be exposed to many different opinions, views and approaches in a way that is unique to this training. For this reason I am convinced that the EUPHEM programme is a wonderful initiative that will in the long term strengthen public health capacities within and outside of Europe and will hopefully produce leading public health specialists.

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