Objectives and Agenda

Block 2 Wave 3

GenEpi-BioTrain – Interdisciplinary training: Food and Waterborne Diseases

May 27th – June 7th 2024

1. Objectives

In this course, you will learn how to:

- Apply genomic epidemiology and bioinformatics for public health purposes;
- Use open-source tools for integrated analysis and visualisation of genomic and epidemiological data;
- Interpret genomic data in an interdisciplinary framework, to inform infectious disease prevention and control;
- Understand and operate within One Health-based national and European surveillance systems;
- Promote interdisciplinary collaborations within country teams and public health institutions.

Upon completion of the 2-week course, you should have a stronger understanding of genomic epidemiology and bioinformatics. You will have improved your ability to use open-source tools for integrated analysis and visualization of genomic and epidemiological data. You will gain insight into how interdisciplinary interpretation of integrated results can prevent and control infectious diseases. You will deepen your knowledge of One Health-based national and European surveillance systems.

2. Speakers

Lectures will be delivered by experts routinely using genomic epidemiology in public health.

Sylvain Brisse — Course Director

- Head of Biodiversity and Epidemiology of Bacterial Pathogens Unit
- Head of NRC Corynebacteria from Diptheriae complex
- Head of NRC Pertussis and other Bordetelloses
- Focus on population biology and emergence of pathogenic microbial strains, vaccine escape and antimicrobial resistance.
- Develop applications in diagnostics and public health, including universal strain subtype genotyping systems and nomenclatures

Chiara Crestani — Course co-Director

- Graduated in Veterinary Medicine at the University of Bologna in 2015
- Worked for the Italian public health institute for animal health and food safety (IZSVe).
- PhD in Infectious Diseases at the University of Glasgow in 2021
- Project manager of KlebNET-GSP at the BEBP unit at Institut Pasteur
- Research activities in the French NRC for Corynebacteria of the *diphtheriae* complex.
- Involved as organizer and instructor of multiple training courses on bacterial genomics and WGS

Carla Rodrigues — Practical Coordinator

- Graduated in Pharmaceutical Sciences at Faculdade de Farmácia da Universidade do Porto in 2010
- PhD degree in Pharmacy – Microbiology Specialty in the same institution in July 2017.
- Postdoctoral researcher on the MEDVETKLEBS project the BEBP Uunit at Institut Pasteur in 2018
- Deputy director of the NRC of whooping cough and other Bordetella infections in January 2023

2. Speakers

Lectures will be delivered by experts routinely using genomic epidemiology in public health.

Fabien Mareuil/Remi Planel — Team Galaxy Pasteur, Institut Pasteur, France

Nabil-Fareed Alikhan — Senior Bioinformatician, Pandemic Science Institute, University of Oxford, UK

Julien Guglielmini — Research Engineer, Hub of Bioinformatics and Biostatistics, Institut Pasteur, France

Martin Maiden — Head of Microbiology and Infectious Diseases Section, Department of Biology, University of Oxford, UK

Carolina Nodari — Deputy Director, French NRC for E. coli, Institut Pasteur, France

Alexandra Moura — Microbiologist and computational biologist, WHO-Collaborating Centre and French NRC Listeria, Institut Pasteur, France

José Delgado — Post-doctoral researcher, BEBP Unit, Institut Pasteur, France

François-Xavier Weill — Head of French NRC Salmonella, E. coli and Shigella, Institut Pasteur, France

Nathalie Jourdan — Researcher, Sorbonne University, France

François Lebreton — Director of bioinformatics within the Multidrug-resistant organism Repository & Surveillance Network (MRSN), Walter Reed Army Institute of Research, USA

Alessandra Carattoli — Professor, Sapienza University of Rome

Gabriele Arcari — Senior Research Fellow, University of Insubria

Marc Lecuit — Head of WHO-Collaborating Centre and French NRC Listeria, Institut Pasteur, France

Mathieu Tourdjman — Medical epidemiologist, Santé Publique France

3. Themes

Theme 1 Biodiversity	**Theme 2** DNA sequencing	**Theme 3** Genomic epidemiology	**Theme 4** Resistance elements	**Theme 5** Surveillance	**Theme 6** Applications
Classification methods	Sequencing technology	Gene-by-gene approach	Antibiotic resistance genes	Epidemiological investigation	*Salmonella*
Phylogeny	Galaxy platform	Visualisation and epidemiology	Mobile genetic elements: Plasmids	One Health perspectives	*Listeria*
	Raw data and Assembly	Visualisation and genomes		Surveillance on EU level	*E.coli* and *Shigella*
					Klebsiella

Networking and Collaboration

4. Agenda

	Monday 27-May-2024	Tuesday 28-May-2024	Wednesday 29-May-2024	Thursday 30-May-2024	Friday 31-May-2024
Morning	**Welcome by ECDC** (9:30 - 9:35) **Course Overview** (9:35 - 9:45) **Introduction of Trainers** (9:45 - 10:00) Sylvain Brisse and Chiara Crestani	**MODULE 2.** **DNA SEQUENCING** **Sequencing technology** (9:30 – 11:00) Chiara Crestani		**MODULE 1.** **BIODIVERSITY** **Phylogeny (theory)** (9:30 – 11:00) Julien Guglielmini	**MODULE 5.** **SURVEILLANCE** **Generalities on *Shigella*** (9:30 – 9:45) **Background on the biology of enteric *E.coli*** (9:45 – 11:00) Carolina Nodari
	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
	Participant Introduction *Each country team present themselves in 10 minutes* (10:10 - 12:10) **Pre-course evaluation** (12:10 - 12:40)	**MODULE 2.** **DNA SEQUENCING** **Galaxy platform** (11:10 – 12:00) Team Galaxy Pasteur (Fabien Mareuil, Remi Plantel)	**MODULE 3.** **GENOMIC EPIDEMIOLOGY** **Genomic epidemiology – visualization and practical applications** (10:40 – 12:30) Chiara Crestani	**MODULE 1.** **BIODIVERSITY** **Phylogeny (practical)** (11:10 – 12:40) Julien Guglielmini	**MODULE 5.** **SURVEILLANCE** **Case studies: enteric *E. coli* in a One Health perspective** (11:10 – 12:40) Carolina Nodari
Lunch	12:40 – 14:00	12:00 – 14:00	12:30 – 14:00	12:40 – 14:00	12:40 – 14:00
Afternoon	**MODULE 5.** **SURVEILLANCE** **Human surveillance on EU level** (14:00 - 15:30) Cecilia Jernberg	**MODULE 2.** **DNA SEQUENCING** **Raw data and Assembly** (14:00 – 15:30) Nabil Alikhan	**MODULE 3.** **GENOMIC EPIDEMIOLOGY** **Gene-by-gene approach I** (14:00 – 15:30) Sylvain Brisse	**MODULE 3.** **GENOMIC EPIDEMIOLOGY** **Molecular epidemiology & transmission** (14:00 – 15:30) Martin Maiden	**MODULE 3.** **GENOMIC EPIDEMIOLOGY** **Genomic Epidemiology applied to Listeria and cluster detection** (14:00 – 15:30) Alexandra Moura
	Coffee break and class picture	Coffee break	Coffee break	Coffee break	Coffee break
	MODULE 1. **BIODIVERSITY** **Biodiversity** (15:40 - 17:10) Sylvain Brisse	**MODULE 5.** **SURVEILLANCE** **Food-side investigation** (15:40 – 16:40) **EFSA-ECDC Q&A session** (16:40 – 17:10) Eleonora Sarno	**Speed Networking** (15:40 – 16:40) Sylvain Brisse	**MODULE 3.** **GENOMIC EPIDEMIOLOGY** **Gene-by-gene approach II** (15:40 – 17:10) Carolina Nodari	**Networking: Current methods for surveillance in countries and NRC in Institut Pasteur** *Each country team present FWD surveillance and outbreak investigation in their countries* (15:10 – 17:10) Sylvain Brisse
Evening	**Social Event (Food-court)** Food Society Paris 68 Av. du Maine, 75014 Paris				

4. Agenda

	Monday 3-Jun-2024	Tuesday 4-Jun-2024	Wednesday 5-Jun-2024	Thursday 6-Jun-2024	Friday 7-Jun-2024
Morning	**MODULE 4.** **RESISTANCE ELEMENTS** **Antibiotic resistance genes** (9:30 – 11:00) Carla Rodrigues	**MODULE 5.** **SURVEILLANCE** **Foodborne pathogens epidemiological investigations** (9:30 – 11:00) François-Xavier Weill and Nathalie Jourdan	**MODULE 4.** **RESISTANCE ELEMENTS** **MGE – Plasmids:** (9:30 – 11:00) Alessandra Carattoli		**MODULE 5.** **SURVEILLANCE** **Background of *Listeria*** (9:30 – 11:00) Marc Lecuit
	Coffee break	**Coffee break**	**Coffee break**	**Coffee break**	**Coffee break**
	MODULE 4. **RESISTANCE ELEMENTS** **Antibiotic resistance genes or mutations** (11:10 – 12:40) Carla Rodrigues	**MODULE 5.** **SURVEILLANCE** **Foodborne pathogens epidemiological investigations** (11:10 – 12:40) François-Xavier Weill and Nathalie Jourdan	**MODULE 4.** **RESISTANCE ELEMENTS** **MGE – Plasmids detection** (11:10 – 12:40) Gabriele Arcari	**MODULE 6.** **APPLICATIONS** **Analysis of data in groups** (10:30 – 12:30) Sylvain Brisse, Chiara Crestani and Carla Rodrigues	**MODULE 5.** **SURVEILLANCE** **Case-control studies on *Listeria*** (11:10 – 12:40) Mathieu Tourdjman
Lunch	**12:40 – 14:00**	**12:40 – 14:00**	**12:40 – 14:00**	**12:30 – 14:00**	**12:40 – 14:00**
Afternoon	**MODULE 5.** **SURVEILLANCE** **Case study: genomic surveillance and transmission of foodborne pathogens in a One Health perspective - Klebsiella** (14:00 – 15:30) Jose Delgado	**MODULE 5.** **SURVEILLANCE** **WGS systems for One Health** (14:00 – 15:00) Mirko Rossi and Priyanka Nannapaneni	**MODULE 4.** **RESISTANCE ELEMENTS** **Case study : plasmid outbreak** (14:00 – 15:30) Gabriele Arcari	**MODULE 6.** **APPLICATIONS** **Analysis of data in groups** (14:00 – 15:30) Sylvain Brisse, Chiara Crestani and Carla Rodrigues	**MODULE 6.** **APPLICATIONS** **Presentations of group analysis** (14:00 – 15:30) Sylvain Brisse, Chiara Crestani and Carla Rodrigues
	Coffee break	**Coffee break**	**Coffee break**	**Coffee break**	**Coffee break**
	MODULE 1. **BIODIVERSITY** **Bacterial strain nomenclature and epidemiological tracking** (15:40 - 16:40) Sylvain Brisse	**MODULE 3.** **GENOMIC EPIDEMIOLOGY** **Visualization & genomes** (15:10 – 16:40) François Lebreton	**MODULE 6.** **APPLICATIONS** **Introduction of group analysis** (15:40 – 16:25) Sylvain Brisse, Chiara Crestani and Carla Rodrigues	**MODULE 6.** **APPLICATIONS** **Analysis of data in groups** (15:40 – 17:00) Sylvain Brisse, Chiara Crestani and Carla Rodrigues	**QUIZZ and Farewell**
Evening		**Social Event (Food-court)** Food Society Paris 68 Av. du Maine, 75014 Paris			**Social Event (Food-court)** Food Society Paris 68 Av. du Maine, 75014 Paris