



Instituto Nacional
de Salud Pública



Mexico-Japan Exchange Program for the Strategic Global Partnership

Information for applicants

1. Course Title

Viral vector-borne diseases: dengue and zika

2. Name of Mexican Organizations:

- Department of Infectomics and Molecular Pathogenesis, Center for Research and Advanced Studies of the National Polytechnic Institute (Cinvestav),
- Center for Research in Infectious Diseases, National Institute of Public Health (INSP)

3. Brief Profile of the Organization and the Department that will receive the Japanese trainees.

The Center for Research and Advanced Studies (Cinvestav) is a public institution, founded in 1961 by presidential decree. Its mission is to perform cutting edge basic and applied research, generate top level scientific and technological human resources, and develop technology for the solution of national problems. With 675 full-time researchers, Cinvestav offers 31 Masters and 30 Doctorate programs in four main research areas: social sciences, technology and engineering, exact and natural sciences, and biological and health sciences. Close to 3000 students were enrolled in 2015 in one of these graduate programs.

The Department of Infectomics and Molecular Pathogenesis integrates a multidisciplinary group of researchers in the biomedical area , which includes specialists in cell biology , pathology, molecular biology, immunology, virology and mucous membranes . Currently it has 17 professors who develop 7 main lines of high-level research in novel and sophisticated methodologies that are applied in the areas of genomics and proteomics, genetic engineering and immunobiology .

The National Institute of Public Health (INSP) is one of the youngest of 11 institutes that form part of the Research System within the Mexican Ministry of Health. Its faculty is at the same time professor and researcher, dedicated to develop research lines based on the national needs, while also preparing human resources at the Master and Doctorate levels.

The Center for Research in Infectious Diseases develops its diverse research activities in infectious diseases through simultaneous basic and applied approaches. One of the most relevant research lines is the "Prevention and Control of Vector-Borne Diseases", which is focused on studies of malaria, dengue and Chagas' disease. The facilities include an



insectary that houses mosquitoes such as *Anopheles albimanus* and *Aedes aegypti*, and a Triatomine insectary that contains *Triatoma infestans* and *T. dimidiata*. There are 5 laboratories working on cellular and molecular entomology focusing on parasite-vector interactions, including the characterization of molecules involved in the parasite recognition and invasion of mosquito's midgut and salivary gland cells, mosquito immunity, endocrinology and development of transgenic mosquitoes.

4. Course dates:

Arrival to Mexico: August 30th, 2016

Departure to Japan: September 14th, 2016

5. Field of the Training Program:

Viral vector-borne diseases

6. Course Objective:

To understand the impact of viral vector-borne diseases of medical importance by having an initial exposure to in vitro and in vivo research methodologies in a theory-and-practice integrative course. Specific objectives are:

1. To obtain basic knowledge of the biology of *Aedes aegypti* and of Zika and dengue virus replicative cycle
2. To obtain basic knowledge of mosquito and mammalian cell culture
3. To learn how to culture, propagate, quantify and detect viral infections in mosquito and mammalian cell lines
4. To acquire updated information on the strategies to prevent and control the infections of dengue and Zika in *Ae. aegypti* in a susceptible environment
5. To learn basic procedures to infect mosquitoes with dengue virus

7. Tentative Course Program.

IN VITRO ASPECTS (CINVESTAV, MEXICO CITY)

Day 1

Biol. Fernando Medina

Theory: Mosquito and mammalian cell culture.

Practice: Cultivation of both cell types



Day 2:

M. in Sc. Patricia Bautista and M. in Sc. Antonio Angel

Theory: Viral propagation

Practice: Infection of C6/36 and Vero cells with Dengue and Zika

Day 3:

M. in Sc. Patricia Bautista and M. in Sc. Antonio Angel

Theory: Virus detection

Practice: Viral genome detection by PCR and quantification of infected cells by flow cytometry

Day 4:

M. in Sc. Patricia Bautista and M. in Sc. Antonio Angel

Practice: Viral yield quantification by focus forming units and viral protein detection by Western blot

Day 5:

M. in Sc. Patricia Bautista and M. in Sc. Antonio Angel

Practice: Interpretation of results and wrap-up session

MOSQUITO-VIRUS INTERACTIONS (INSP, CUERNAVACA, MORELOS)

Day 6:

Dr. Salvador Hernández

Theory: *Ae. aegypti* biology. Dengue tropism and tissue barriers during mosquito infection.

Practice: Mosquito dissection and infection

Day 7:

Dr. Humberto Lanz Mendoza

Theory: Immune response in insects

Practice: Virus detection by immunofluorescence and ELISA

Day 8:

Dr. Veronica Valverde

Theory: Transcriptome and epigenetic analysis to study mosquito virus infection

Practice: Virus detection by PCR (Dr. Wendy Xolalpa)

Day 9:

Dr. Victoria Pando and Dr. Wendy Xolalpa

Theory: Virus-host cell interaction

Practice: Virus detection by RT-PCR (Dr. Wendy Xolalpa)



Day 10:

Dr. Raul Noguez and Dr. Renaud Conde

Theory: Vector control theory and practice

8. Tentative Schedule of the Training Program

IN VITRO ASPECTS

Day 1:

Biol. Fernando Medina

9:00-12:00 Theory: Mosquito and mammalian cell culture.

12:00-14:00 Practice: Cultivation of both cell types

14:00-16:00 LUNCH

Day 2:

M in Sc. Patricia Bautista and M. in Sc. Antonio Angel

10:00-12:00 Theory: Viral propagation

12:00-14:00 Practice: Infection of C6/36 and Vero cells with Dengue and Zika

Day 3:

M in Sc. Patricia Bautista and M. in Sc. Antonio Angel

10:00-12:00 Theory: Virus detection

12:00-14:00 Practice: Viral genome detection by PCR and quantification of infected cells by flow cytometry

Day 4:

M in Sc. Patricia Bautista and M. in Sc. Antonio Angel

10:00-14:00 Practice: Viral yield quantification by focus forming units and viral protein detection by Western blot

Day 5:

M in Sc. Patricia Bautista and M. in Sc. Antonio Angel

10:00-14:00 Practice: Interpretation of results and wrap-up session

COURSE: MOSQUITO-VIRUS INTERACTIONS

Day 6:

Dr Salvador Hernández

9:00- 13:00 Theory: Ae. aegypti biology. Dengue tropism and tissue barriers during mosquito infection.

13:00-14:00 LUNCH

14:00- 18:00 Practice: Mosquito dissection and infection



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Day 7:

Dr. Humberto Lanz Mendoza

9:00- 13:00 *Theory*: Immune response in insects

13:00-14:00 LUNCH

14:00- 18:00 *Practice*: Virus detection by immunofluorescence and ELISA

Day 8:

Dr. Veronica Valverde

9:00- 13:00 *Theory*: Transcriptome and epigenetic analysis to study mosquito virus infection

13:00-14:00 LUNCH

14:00-18:00 *Practice*: Virus detection by PCR (Dr. Wendy Xolalpa)

Day 9:

Dr. Victoria Pando and Dr. Wendy Xolalpa

9:00-13:00 *Theory*: Virus-host cell interaction

13:00- 18:00 *Practice*: Virus detection by RT-PCR (Dr. Wendy Xolalpa)

Day 10:

Dr. Raul Noguez and Dr. Renaud Conde

9:00-13:00 *Theory*: Vector control theory and practice

13:00-14:00 LUNCH

14:00-15:00 EVALUATION

15:00 END OF THE COURSE

9. Trainees profile (academic, professional, linguistic, others)

The program is directed to:

Academic Background.

- Masters degree in biomedical area desirable but not compulsory
- Background in infectious diseases

Work Experience.

- Basic knowledge of cellular and molecular biology techniques

Years of Experience

- At least 1 year



Language Proficiency

English Scores:

- TOEIC: 700 pts
- TOEFL PBT: 500
- TOEFL IBT: 90
- IELTS: 6

10. Dress code

Participants must wear lab coats in all practical sessions.