

## PhD position on Vaccine development for warm water fish species

Interested in research for the development of innovative vaccination strategies? This interdisciplinary project will be at the interface of vaccine development, virology, microscopy, Comparative Immunology, and nanotechnology fields within the One Health concept. Curious and creative, you desire to integrate a **dynamic research field and develop yourself within an innovative and interdisciplinary project**? Then you might be interested in this PhD position.

### **Novel universal delivery systems for mucosal vaccination: a whole-body approach for application in warm water fish**

Aquaculture is the fastest growing food-producing sector worldwide. However, aquaculture has to face the impact of infectious diseases and establishing prophylactic and therapeutic strategies is of utmost importance, especially within One Health context<sup>1</sup>.

Currently, most effective vaccines for aquaculture species are delivered by injection. However, injection is associated with handling stress and local side effects. Although, mucosal vaccination of farmed fish, e.g. *via* immersion, would be preferred, it generally triggers only weak and/or short-lasting protection. The problem is that mucosal surfaces (skin, gills, intestine), have an intrinsic irresponsiveness referred to as 'mucosal tolerance'. The mechanisms underlining mucosal tolerance in fish and the conditions required to overcome tolerance are largely unknown. In humans and veterinary species, live recombinant viral vectors are very effective, representing the latest generation of mucosal vaccines.

Our interdisciplinary project combines **novel vaccine technology** never used in fish before with **whole-body advanced high-resolution microscopy** in the context of a long-standing collaboration between the laboratories of the involved Partners. This will allow us to **1)** develop novel mucosal vaccines against warm-water fish pathogens, and **2)** provide a whole-body analysis of vaccine delivery and **mucosal responses** to immersion vaccination in an adult fish.

For the *in vivo* selection of promising candidates and detailed analysis of mucosal response, we will use transgenic *zebrafish* marking relevant leukocyte subpopulations. Their small size and transparency, combined with high-resolution real-time microscopy, will allow visualization of antigen capture, leukocyte recruitment, antigen presentation, and cell-cell interactions at mucosal sites after vaccination. Finally, we will provide the proof-of-principle of the efficacy of selected candidates in a commercially relevant warm water species, common carp.

**Conditions of employment:** Full time position for an initial period of 15 months with the possibility of extension to 4 years. Gross salary per month € 2325,- in the first year rising up to € 2972,- per month in the fourth year.

In addition, we offer:

- 8% holiday allowance;
- a structural year-end bonus of 8.3%;
- excellent training opportunities and secondary employment conditions;
- excellent pension plan through ABP;

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<sup>1</sup> <https://www.frontiersin.org/articles/10.3389/fvets.2018.00014/full>

- 232 vacation hours, the option to purchase extra and good supplementary leave schemes;
- a flexible working time: the possibility to work a maximum of 2 hours per week extra and thereby to build up extra leave;
- a choice model to put together part of your employment conditions yourself, such as a bicycle plan;
- a lively workplace where you can easily make contacts and where many activities take place on the Wageningen Campus. A place where education, research and business are represented;
- use the sports facilities at reduced prices on campus

We offer a versatile job in an international environment with varied activities in a pleasant and open working atmosphere.

**How to apply:** You can only apply via the website of Wageningen University & Research <https://www.wur.nl/en/Jobs/Vacancies.htm> or <https://www.academictransfer.com/en/>. Please include a **cover letter** (max. 1 A4) with a statement of research interests, explanation of your motivation and suitability for the project, **a CV**, and names and contact information of at least **two professional references** who can document the applicant is self-motivated and can work independently.

For additional questions regarding the project, you can contact Dr. Maria Forlenza: [maria.forlenza@wur.nl](mailto:maria.forlenza@wur.nl). Applications via e-mails are not eligible.

Applications will be open until the **30<sup>th</sup> of August 2019**. The candidate should be available to start preferably by the **1<sup>st</sup> of December 2019**.

#### **Your main tasks:**

- Synthesis of antigens and nucleic acids vaccines using molecular biology and virology approaches applied to live viral vectors and/or replicon particles.
- Development and optimisation of delivery strategies in larval and adult zebrafish
- Selection and characterization of promising vaccine candidates using advanced microscopy approaches in transgenic zebrafish lines marking immune cells.
- Description of antigen, vaccine biodistribution and associated immune response (ie Antigen capture, leukocyte recruitment and cell-cell interactions with APC) in targeted mucosal tissues using real-time imaging combined with 3D deep imaging on cleared tissue post vaccination.
- Establishment of proof-of-principle of the efficacy of selected candidates in common carp used as a commercially relevant warm water species.

#### **We require:**

- an MSc in (Medical) Biotechnology, Molecular Life Sciences, Biology or equivalent.
- good proficiency of written and spoken English language (fulfilment of the IELTS test is a prerequisite to start in the PhD program).
- excellent presentation and communication skills
- excellent project and time management skills
- an interest in working with *in vivo* animal models and microscopy.
- enthusiasm in working in a very international team and in two countries (The Netherlands and France)

Preference will be given to candidates with demonstrated experience in (some of) the fields listed below

- Good background in Immunology and/or Virology
- Good background in molecular biology
- demonstrated experience with working with cell culture
- demonstrated experience with working with Viruses (Rhabdoviruses, Alphaviruses or similar)
- experience with reverse genetics or virus manipulation
- demonstrated experience with microscopy techniques including, but not limited to, fluorescent, confocal, spinning disk and/or two-photon microscopy.
- familiarity with working with zebrafish or common carp is appreciated but not a requirement.

**Research teams:** you will perform *approximately* 50% of your work at the **Cell Biology and Immunology Group** (CBI) of Wageningen University and Research (WUR, the best University of the Netherlands for 14 consecutive years) and 50% at the **Fish Infection and Immunity** team of INRA, Jouy-en-Josas (France, the top Agricultural Institute in France); the project is also in collaboration with the **Virology group** of the Wageningen Bioveterinary Research (WBVR) in Lelystad (the reference institute for animal health in the Netherlands, also equipped with unique BSLIII facilities).

Cell Biology and Immunology Group (WUR-NL):

Associate Professor Maria Forlenza (Project coordinator).

<https://www.wur.nl/en/Persons/Maria-dr.-M-Maria-Forlenza-PhD.htm>

Assistant Professor Sylvia Brugman

<https://www.wur.nl/en/Persons/Sylvia-dr.-S-Sylvia-Brugman.htm>

Fish Infection and Immunity, Molecular Virology and Immunology unit (INRA-FR)

[https://www6.jouy.inra.fr/vim\\_eng/Research-Groups/Fish-Infection-and-Immunity-Team/Members-of-the-team](https://www6.jouy.inra.fr/vim_eng/Research-Groups/Fish-Infection-and-Immunity-Team/Members-of-the-team)

Dr. Christelle Langevin

Dr. Pierre Boudinot

Virology (WBVR-NL)

Prof. Jeroen Kortekaas

<https://www.wur.nl/en/Persons/Jeroen-prof.dr.-JA-Jeroen-Kortekaas.htm>