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PhD position in bacterial host-pathogen interaction

The group of Prof. Horst Posthaus at the Vetsuisse-Faculty is looking for a fulltime PhD student in the field of bacterial host pathogen interaction.

Project Information

One of the most common and evolutionary conserved bacterial virulence mechanisms is the secretion of protein toxins that disrupt cellular membranes by pore-formation. Such pore-forming toxins (PFTs) are used by the pathogens to invade, survive and disseminate in their hosts. Understanding the molecular mechanisms underlying host-pathogen interactions, and in particular the knowledge about species and cell type specific attack mechanisms by PFTs, is crucial for developing novel therapeutic approaches against bacterial pathogens. Bacterial PFTs are secreted as water-soluble monomers and bind to target cells via membrane receptors. Receptor binding leads to oligomerization and integration of a stable pore into the cell membrane. Our group is working on the pathogenesis of *Clostridium perfringens* type C induced necrotizing enteritis in pigs and humans. The pathogen uses β -toxin, a small β -barrel-pore-forming toxin (β PFT), to target endothelial cells, platelets and leucocytes. We recently identified Platelet-endothelial Cell Adhesion Molecule 1 (PECAM1 or CD31) as the cellular receptor for the toxin. In collaboration with Prof. B. Zuber (Institute of Anatomy, Medical Faculty, University of Bern) we are investigating the structural basis for the toxin-receptor interaction. Using the combined expertise in both labs, we will now extend our research on related small β PFTs from other pathogenic clostridia. The project will focus on the molecular and structural basis of cell type specific damage caused by these important bacterial virulence factors. We will use state of the art research technology such as CRSIPR/CAS9 knockout screens and Cryo-EM to achieve your goals.

The work will be carried out in the group of Prof. H. Posthaus at the Institute of Animal Pathology (www.itpa.vetsuisse.unibe.ch) in close collaboration with Prof. B. Zuber (Institute of Anatomy, Medical Faculty). The student will be enrolled in the Graduate School of Cellular and Biomedical Sciences (<http://www.qcb.unibe.ch/>).

Selected reading

- Bruggisser, J., Tarek, B., Wyder, M., Witz, G., Enzmann, G., Deutsch, U., Engelhardt, B., **Posthaus, H.** (2020) CD31 (PECAM-1) serves as the endothelial cell-specific receptor of *Clostridium perfringens* β -toxin. *Cell Host & Microbe* 28, 69-78. See also media release: https://www.unibe.ch/aktuell/medien/media_relations/medienmitteilungen/2020/medienmitteilungen_2020/toedliche_bakterieninfektion_bei_schweinen_entschlueselt/index_ger.html

- Lencer, W. (2020) Everything illuminated - *Clostridium perfringens* β -toxin. *Cell Host & Microbe* 28, 5-6.
- Iacovache I, De Carlo S, Cirauqui N, Dal Peraro M, van der Goot FG, Zuber B: Cryo-EM structure of aerolysin variants reveals a novel protein fold and the pore-formation process. *Nature Communications* 2016:7:12062.
- Posthaus, Horst; Kittl, Sonja; Tarek, Basma; Bruggisser, Julia (2020). *Clostridium perfringens* type C necrotic enteritis in pigs: diagnosis, pathogenesis, and prevention. *Journal of Veterinary Diagnostic Investigation*, 32(2), pp. 203-212. <https://boris.unibe.ch/142184/>

We are looking for a highly motivated student with a strong interest in mechanisms of disease, molecular and cellular biology as well as biochemistry. The position requires a degree in biology, (veterinary) medicine, biomedical sciences, biochemistry or a related field.

We offer an enthusiastic, inspiring and highly collaborative research environment as well as state-of-the art research facilities at the attractive working location in Bern.

The position is available as of November 1st 2020 or by agreement. The temporary employment will be for 4 years. Salary and terms of employment will be in accordance with the Swiss National Science Foundation.

Interested?

Please send your application (letters / CV / contact information of two references) as single pdf document to Christine Herzig (christine.herzig@vetsuisse.unibe.ch).

Information

For further information on the project please contact Prof. Horst Posthaus, e-mail: horst.posthaus@vetsuisse.unibe.ch