PhD Studentship: Improving vaccines for poultry: targeted delivery of multivalent viral antigens to distinct immune cells of different avian species

Ref: 2020/10/MI
Anticipated Start Date: October 2020 **Duration:** 3.5 years full-time
Closing date to apply: 08.05.20

Eligibility:

- This studentship is open to science graduates (with, or who anticipate obtaining, at least a 2:1 or equivalent, in a relevant biological subject in their undergraduate degree, or a Masters degree - subject to university regulations)**.** You should be looking for a challenging, interdisciplinary research training environment and have an active interest in the control of infectious diseases.
- This is a fully-funded studentship only open to UK students and eligible EU students who qualify for home-rated fees, in line with Residential Guidelines for Research Council Studentships.
- Students without English as a first language must provide evidence that they meet the English language requirement, e.g. with an IELTS score of 7.0 and no less than 6.5 in any of the subsections.

Supervision:

Principal Supervisors: Prof Munir Iqbal (The Pirbright Institute), Prof Damer Blake (Royal Veterinary College)

Co-Supervisors: Dr Jean-Remy Sadeyen (The Pirbright Institute), Prof Fiona Tomley (Royal Veterinary College)

Project Details:

Avian influenza viruses (AIV) continue to be responsible for severe economic losses in poultry production in many parts of the world and remain a credible threat to food security and public health. Farmed ducks can serve as a silent reservoir for the maintenance and shuttle of AIV between domestic poultry and migratory birds for long distance spread. Vaccination of ducks against AIV can reduce and even halt the endemic cycle of the disease. However, we lack effective vaccines that can induce strong protective immunity and reduce shedding of infectious virus from infected ducks.

This PhD project proposes to develop a novel vaccine technology to deliver protective antigens directly to duck immune cells so that a strong protective immune response against AIV can be induced in vaccinated birds. This research will utilise advanced molecular virology, immunology and vaccinology approaches: these include *in silico* prediction-based antigen design (broader cross-protective immunity against heterologous viruses), viral vector and nanoparticle-based vaccine delivery systems, and selective and targeted *in situ* delivery of antigens to duck immune cells that capture, process and present antigens for initiation and regulation of protective immune responses.

The generated knowledge and technology of this proposed research would provide a platform for improvement of vaccines against other important poultry, livestock and human pathogens. Availability of these novel, highly protective and cost-effective disease control tools and strategies should minimise the impact of infectious diseases on farmed animal and offer substantial indirect economic, public health, environmental and social benefits to the UK as well as globally.

References for Background Reading:

1. Shrestha A, Sadeyen J-R, Iqbal M (2018). Enhancing protective efficacy of poultry vaccines through targeted delivery of antigens to antigen-presenting cells. Vaccines 6 (4), 75. https://doi.org/10.3390/vaccines6040075.
2. Lukosaityte D, Sadeyen J-R, Shrestha A, Sealy JE, Bhat S, Chang P, Digard P and Iqbal M (2020). Engineered Recombinant Single Chain Variable Fragment of Monoclonal Antibody Provides Protection to Chickens Infected with H9N2 Avian Influenza. Vaccines, 8, 118; doi:10.3390/vaccines8010118
3. Jáuregui-Zúñiga, D.; Pedraza-Escalona, M.; Espino-Solís, G. P.; Quintero-Hernández, V.; Olvera-Rodríguez, A.; Díaz-Salinas, M. A.; López, S.; Possani, L. D. (2017). Targeting Antigens to Dec-205 on Dendritic Cells Induces

a Higher Immune Response in Chickens: Hemagglutinin of Avian Influenza Virus Example. *Res. Vet. Sci. 111*, 55–62. https://doi.org/10.1016/j.rvsc.2016.12.002
4. LH, P.; K, V. (2016). Antibody-Mediated Delivery of Antigen to Dendritic Cells. *Immunother. 02* (02). https://doi.org/10.4172/2471-9552.1000119
5. Cheong, C.; Choi, J.; Vitale, L.; He, L.-Z.; Trumpfheller, C.; Bozzacco, L.; Do, Y.; Nchinda, G.; Park, S. H.; Dandamudi, D. B.; et al. (2010). Improved Cellular and Humoral Immune Responses in Vivo Following Targeting of HIV Gag to Dendritic Cells within Human Anti – Human DEC205 Monoclonal Antibody. *Blood, 116* (19), 3828–3838. https://doi.org/10.1182/blood-2010-06-288068

Registration, Training and Funding:

This is a Pirbright Institute/Royal Veterinary College (RVC) full funded project. The student will be based primarily at The Pirbright Institute and registered with the RVC. The student will visit the university to meet with their supervisors and undertake training or complete specific project tasks as required. Eligible students will receive a minimum annual stipend of £15,285. University registration fees will be paid. A full range of research and transferrable skills training will be made available to the student as appropriate.

Applications:

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Click here for details of how to apply

Essential documents:

- Application Form
- CV
- Two references sent directly by your referees

Please email your application to studentship@pirbright.ac.uk by the closing date.