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(Abroad • Domestic) Internship report form (Student)

2022/10/19

(Year/Month/Day)

Name	HANDABILE Chimuka
Laboratory	Laboratory of Biologics Development
Year (Grade)	D4
Internship institution	Shiga University of Medical Science
Internship period	Internship period: 8/09/2022 - 29/09/2022 (Departure Date from Sapporo: 07/09/2022, Arrival Date in Sapporo: 30/09/2022)
Purpose	Training in the use of non-human primates in experiments

- The reason why you chose this institute

Developing a vaccine for human or animal use involves a series of steps, from the selection of the antigen to animal experiments and finally clinical trials, after which a vaccine is reviewed and approved for public use.

Animal models such as rodents have been extensively used in the field of vaccinology to evaluate immunogenicity, protectivity, and safety of novel vaccines and improvement of classical formulations. Although rodents have provided evidence of vaccine efficacy, the results cannot always be extrapolated in human populations due to variations in physiology between species. On the other hand, non-human primates (NHPs) are closely related to humans, thus results can closely depict responses in humans.

As part of my research, I have been studying efficacy of vaccines in mice. Of main interest is the whole virus particle vaccine which has shown excellent potency and protection in the mouse model. To further investigate the immunogenicity and protection afforded by this vaccine, it is crucial to perform animal experiments in NHPs.

Currently, the International Institute for Zoonosis Control (IIZC) does not have a facility to house NHPs, therefore, our laboratory collaborated with Shiga University of Medical Science, (SUMS) Research Center for Animal Life Science (RCALS) to perform vaccine studies in macaques. As a young researcher specializing in zoonotic infectious disease vaccine studies, doing my internship at this institute will be a great opportunity to advance my practical skills in animal experiments and an improved understanding of immunological responses.

- Result of the activity (about 800 words, provide photos, tables and figures that clearly show the activities during the period)

### 1. Training in ethics and conduct during animal experimentation

Before the start of the internship, I had to take three courses namely: “Basics”, “Infection” (including handling of pathogens), and “Monkey”. Materials in form of DVDs and textbooks were sent from SUMS which I used to prepare for the examination. The first course was a general introduction to the classification of NHPs and ethics in animal experiments and the conduct at the SUMS, RCALS. In the second course I learned about biosafety and diseases that infect monkeys as well as zoonoses while the third course introduced me to criteria for the importation of NHPs and handling during experiments. At the end of each course, I took an exam that was necessary to get the license to gain access to RCALS at SUMS.

After arriving at SUMS, I took underwent theoretical training on biosafety, conduct, and regulations in the animal facility. After that, I had a tour of the housing facility and practical training in taking care of NHPs including daily routines such as feed preparation and cleaning the housing facilities along with other scheduled activities such as pregnancy diagnosis. I also had a chance to observe a surgery for the collection of 57-day-old fetuses for research purposes. The surgery was performed by trained personnel (veterinarians and human medical doctors) under aseptic conditions. After the training, I was awarded a license to perform NHP experiments including infection experiments in the bio-safety level 3 (BSL3) facility at SUMS.



**Figure 1.** Routine activities at RCALS. Left to right: Adult monkeys receive supplementary food. Feeding of young monkeys. Pregnancy diagnosis using ultrasound. Detection of hormonal-stimulated oocytes via laparoscopy.

## 2. Challenge experiment in NHPs

After the training, I had a chance to participate in a challenge experiment in which the effectiveness of combination therapy was being investigated against influenza virus. The monkeys were housed in the BSL3 facility. Before the challenge, the food intake was observed, the weight of the monkeys was measured, X-ray images were taken, and nasal, tracheal, and bronchial swabs and blood were collected. Following the challenge with influenza virus, the monkeys were subjected to respective treatment protocols administered daily. X-ray images, body weight measurements, and nasal and trachea swabs were collected every day after the infection while blood was collected every other day.



**Figure 2.** Monkey challenge experiment

Left to right: X-ray imaging of monkey after infection. Collection of nasal, oral, and tracheal swabs. Collection of bronchial swabs using a bronchoscope. Administering the drug orally. Euthanasia following anesthesia. Collection of tissue samples for analysis.

### 3. Processing of collected samples

I analyzed whole blood samples for blood cell count using VetScan HM5 hematology analyzer and for blood gases using VetScan iSTAT 1. Plasma samples were used to evaluate changes in blood biochemistry parameters using the VetScan VS2. Tissue samples were processed as required for further analyses including virus titration, gene expression levels, and histopathology. Furthermore, I had the opportunity to participate in the preparation of histopathology and immunohistochemistry slides. For histopathology, the tissues were paraffin-embedded, sectioned, and stained with hematoxylin and eosin (H&E)



**Figure 3.** Preparation of histopathology slides

Left to right: Paraffin embedding of tissues. Cutting and staining. Examination of slides via microscope

- What do you think the positive impact of the activity will have on your further career path?

- I obtained a license to perform experiments on NHP at SUMS. This license can be used for a lifetime.
- Through this training, I learned new practical skills in animal experimentation. This experience will also add to the enrichment of my resume, which will be advantageous when applying for research positions in my country where there are few people with expertise to conduct animal experiments in BSL3 facilities. Furthermore, it gave me an opportunity to work with different researchers in the field of immunology with the potential to create collaborations for future research.
- The relationships that were created during the internship will afford me

access to SUMS to perform animal experiments, even after graduating.

- Advice for your junior fellows

It's best to go to a place that would help you achieve your goals for your future career.

An internship is an opportunity to expand on your current research, use it to learn new skills.

Approval of supervisor	Institution · Official title · Name Laboratory of Biologics Development, Associate Professor, Masashi SHINGAI
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- ※1 Send the electronic file to the WISE Program Office
- ※2 Attach a copy certificate of the content of internship activity that is prepared by the counterpart at the internship institution (any form with a signature of the counterpart).
- ※3 The Steering Committee for the WISE Program will first confirm the content of this report and report will be forwarded to the Educational Affairs Committee for credits evaluation.

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