

## **Quantifying monkeypox virus infection dynamics**

### **1. Clinical research**

interdisciplinary Biology Laboratory, Division of Natural Science, Graduate School of Science, Nagoya University, received data from monkeypox patients participating in a clinical trial conducted by the United States Army Medical Research Institute of Infectious Diseases (USAMRIID) in the Republic of Congo from 2007–2011. The laboratory is using process-driven and data-driven approaches to quantify heterogeneity in the duration of viral shedding, optimize the duration of isolation in light of this heterogeneity, and identify causal relationships between isolation duration, clinical symptoms, and clinical outcomes. We are conducting research to clarify the causal relationship between isolation duration, clinical symptoms, and clinical outcomes. Permission to conduct this research has been granted by the head of the research institute after review by the Ethical Review Committee of the relevant department of Nagoya University Higashiyama Campus. The period during which this research is permitted is until 31, March 2024.

### **2. Purpose, significance and usefulness of the research**

On July 23, 2022, the World Health Organization (WHO) declared “monkeypox” a public health emergency of international concern. We are currently conducting interdisciplinary research combining drug repositioning (a method of finding a drug effective for one disease from an existing drug effective for another disease) and simulation, which has the potential to rapidly identify drugs with antiviral effects, in order to identify drugs that are expected to be effective against the monkeypox virus (MPXV). We have identified drugs that are expected to be effective against the monkeypox virus (MPXV). The simulations, which integrate pharmacokinetic (PK) information accumulated for each approved drug candidate, pharmacodynamic (PD) information obtained from viral infection experiments, and viral dynamics (VD) information obtained from past clinical data, suggest that Atovacon is the most effective drug for patients with monkeypox. In this study, we stratified the shedding patterns of MPXV-infected cases using data on viral shedding and other parameters, and conducted a factor analysis to determine the pattern of viral shedding by linking observation, examination, and assessment items for each case. We also aim to elucidate the mechanisms involved in the prevention of MPXV infection and the development and severity of the disease in MPXV-infected patients.

### **3. Research subjects**

The research will be conducted by the Human Use Committee of USAMRIID, the Institutional Review Board (IRB) of the U.S. Army Medical Research and Development Command, and the Ethics Committee of the University of Kinshasa School of Public Health (KSPH). Data obtained from "Clinical characterization of human monkeypox infections in the DRC (FY05-13)," which has been reviewed and approved by the U.S. Army Medical Research and Development Command Institutional Review Board (IRB) and the Ethics Committee of the University of Kinshasa School of Public Health (KSPH).

### **4. Methods of the study**

Data received from USARMIID in a non-personally identifiable form will be stored on an external hard disk with a password lock, kept on a locked shelf in interdisciplinary Biology Laboratory, Division of Natural Science, Graduate School of Science, Nagoya University, and not taken out of the laboratory. The data obtained in this research will not be used for any purpose other than research purposes. The acquired information will be analyzed using mathematical models and computer simulations to quantitatively clarify the infection dynamics.

[Information to be obtained]

Clinical information (not including personal information), patient information accompanying specimens for testing, results of quantitative MPXV DNA testing of blood, throat swabs, and crusts, and evaluation results using residual blood specimens.

### **5. Handling of personal information**

Data received from USARMIID in a non-personally identifiable form will be stored on an external hard disk with a password lock and kept on a locked shelf in interdisciplinary Biology Laboratory, Division of Natural Science, Graduate School of Science, Nagoya University. The data will not be personal information since the correspondence list will not be provided, but the data will be handled with care. Care will also be taken to ensure that the subjects are not identified in a small number of cases, etc. Data obtained in this research will not be used for any purpose other than for research purposes.

### **6. Ethical considerations**

The subject of the research is free to withdraw consent or not, and will not suffer any disadvantages. If the subject requests to withdraw consent, information obtained on the subject in the course of the research will be immediately discarded. However,

if the research results have already been published in a report or academic paper at the time of withdrawal of consent, it may not be possible to remove the information from the report or paper.

## 7. Storage of samples and information

[Regarding information]

In principle, the clinical trial information, etc. on research subjects obtained in this research will be used for this research, and after the research is completed, it will be stored for 10 years under the responsibility of Shingo Iwami, Professor, Department of Science, Graduate School of Science, Nagoya University, after which the research numbers, etc. will be deleted and destroyed. After 10 years, the research numbers, etc. will be deleted and discarded.

The information on research subjects obtained in this study may also be very valuable for other medical research planned and conducted in the future. Therefore, we would like to keep the information beyond the aforementioned period and use it for new medical research to be planned and conducted in the future. If such research is to be conducted, it will be done only after the research plan has been reviewed and approved by the Ethics Review Committee.

## 8. Publication of Research Results

The results of the research will be made public through presentations at academic conferences, publication of articles, and release in databases.

## 9. Disclosure of research and personal information

We will make available the research protocol and materials related to the research methodology to the extent that it does not interfere with the protection of the personal information of the participants in this research or with ensuring the originality of this research. Please contact us if you wish to view these materials.

## 10. Research Implementation Structure

This research will be conducted under the following structure.

Research	interdisciplinary Biology Laboratory (iBLab):
Location (Field, etc.)	Division of Natural Science, Graduate School of Science, Nagoya University, Japan
Research Director	Shingo Iwami, Professor, Division of Natural Science, Graduate School of Science, Nagoya University
Research	None

Assignee

## 1 1. Consultation Service

If you have any questions or concerns about this research (e.g., withdrawal of consent or refusal to use data), please contact the secretariat.

Secretariat      Contact person: Professor Shingo Iwami, Division of Natural  
Science, Graduate School of Science, Nagoya University  
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