

Supplementary Report

The National Higher Education and Research System,
Nagoya University

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1. Introduction

The recent incident of research misconduct at the Institute of Transformative Bio-Molecules (ITbM), established as one of Japan's leading research centers as part of the World Premier International Research Center Initiative (WPI), has seriously undermined public trust in scientific research, damaged international confidence in Japan's scientific research, and had a negative impact on the community of researchers who are diligently engaged in research. As a WPI host institution, Nagoya University (NU) takes its responsibilities seriously. Recognizing that the goal of research is to seek truth and create new value, that research misconduct must not occur in these research activities, and that such misconduct hinders the advancement of science and society, NU has been implementing initiatives to prevent research misconduct. However, the fact that this research misconduct occurred indicates that these efforts are not satisfactory. With this recognition, since the revelation of this case of research misconduct, the NU Executives have taken the lead in responding to the situation. The Nagoya University Committee for Fair Research (CFR) and a Dedicated Investigation Committee (DIC) including external committee members thoroughly investigated the facts of the case and the causes of the misconduct, and on February 1, 2022, the DIC produced an investigative report.^{URL1} On March 16, 2022, NU held a press conference to announce the results of the investigation and published the investigative report on its website. NU then proceeded to formulate effective and concrete measures to prevent research misconduct, and on September 6, 2022, NU announced the "Nagoya University Research Misconduct Prevention Measures"^{URL3} (Appendix 1), which incorporate various suggestions received from both inside and outside NU, including those presented in the investigative report and in the WPI Program Committee's follow-up report.^{URL2}

This "Supplementary Report", which serves as a counterpart to the DIC's investigative report^{URL1}, summarizes the measures to prevent research misconduct that NU has taken in response to the report. We hereby express our determination to establish measures to prevent research misconduct, and ensure that research misconduct will never occur in the future. We also hope that this report will be useful in preventing future research misconduct in Japan.

2. Formulation of Research Misconduct Prevention Measures and Disciplinary Actions

(1) Process from the discovery of research misconduct to the establishment of research misconduct prevention measures

Prior to the DIC's final report issued as of February 1, 2022 and opened to the public on March 16, 2022, the NU Executives began formulating measures to prevent research misconduct based on the November 29, 2021 draft report issued by the CFR. Specifically, a working group (WG) consisting of members at the Director level was formed under the supervision of the vice president in charge of research, a rough draft was written, and after soliciting input from both inside and outside NU, a rough draft of the research misconduct prevention measures were prepared on April 7. Based on this draft, the University-wide Committee completed nine reviews. During the course of this review process, the draft was revised with an eye for whether it would provide a system that all NU members could comply with and that would contribute to advancing NU and its members' research activities, and hearings were conducted twice with each NU school/graduate school. Ultimately, the "Measures to Prevent Research Misconduct at Nagoya University" (Appendix 1) were adopted at the Education and Research Council meeting held on September 6, 2022.^{URL3} This initiative was disseminated to all NU members on the same day.

(2) Policy for establishing measures based on an analysis of the causes of this research misconduct case

After holding a discussion in response to suggestions from the DIC ^{URL1} (Appendix 2) and points and concerns raised by the WPI Program Committee in March 2022,^{URL2} the WG analyzed the background of this research misconduct case, taking a broad perspective to identify the factors that can potentially cause research misconduct at NU and in academia, and concluded that the keys to formulating concrete and effective measures to prevent research misconduct were:

- to develop more effective education on research ethics;
- to ensure that corresponding authors thoroughly check raw data and reproducibility when submitting papers;
- to implement strict and careful management of lab notes and raw data; and
- to ensure an open research environment throughout all of NU.

(3) About research misconduct prevention measures

The key points of the Measures to Prevent Research Misconduct at Nagoya University (Appendix 1) ^{URL3} are as follows:

i. Ensure education on research ethics: Research ethics education, which has been provided to graduate students and faculty members, will also be made mandatory for undergraduate students. It will be

thoroughly implemented such as by viewing of familiar cases, in consideration of the characteristics of each research field.

✓ For undergraduate students: research ethics education is provided in the form of the e-learning program being implemented for graduate students, as well as regular classes and information sessions. Each school sets the class year this education is to be implemented based on the unique characteristics of the school.

✓ For graduate students and faculty members: in addition to the e-learning program, classes, and information sessions that have been provided, NU is also striving to further improve research ethics education by preparing e-learning materials that present information about research misconduct cases that have occurred at NU and other institutions, NU's initiatives to prevent research misconduct, and penalties and losses that may be incurred if research misconduct is discovered.

ii. Corresponding authors of papers and their responsibilities: Reaffirm their responsibilities.

iii. Ensuring appropriate storage and management of research materials in accordance with the Nagoya University Rules on Handling Misconduct in Research: Corresponding authors are responsible for storing lab notes, lab data, data related to numerical analysis, etc. used in their papers on a server provided by NU. The Research Ethics Education Officer at each school/graduate school shall request that corresponding authors submit a pledge for each paper that they comply with the storage obligation, compile a list of files in the directory for one year each fiscal year, and report to the Chief Research Ethics Promotion Officer (Vice President).

✓ A "research data storage system" has been established to achieve the points listed above.

iv. Secure reproducibility of the research results of papers: Corresponding authors are responsible for securing the validity of research results before submitting the paper. If the results cannot be reproduced after the paper publication, it would be regarded as research misconduct, and the corresponding authors should immediately report to the Research Ethics Education Officer and the Chief Research Ethics Promotion Officer, and take necessary measures such as withdrawing the paper.

[Reminders to students]

Written pledge: At the time of degree examination, a written pledge of "no data fabrication, falsification, or plagiarism" in addition to "no plagiarism" will be requested.

✓ The pledge form has been changed to include "no data fabrication, falsification, or plagiarism." This new form is being used starting this academic year.

Revocation of degrees: In principle, an individual who earns a degree by fraudulent means will have the degree revoked.

✓ NU rules stipulate that if it is found that an individual engaged in research misconduct while preparing a thesis for a master's, doctoral, or professional degree, the degree will be revoked, and the degree revocation and the underlying facts will be publicly announced. The entirety of NU has been

informed of this rule.

[Improving Our Research Capabilities]

In order to foster an open research culture so that research activities can be conducted with confidence, the following measures have been implemented at each school/graduate school: (i) laboratory visit counseling that has been enhanced by increasing the number of counselors; (ii) a double mentoring system; (iii) installation of suggestion boxes (Meyasu-bako); (iv) a laboratory rotation system; and (v) a support system for students and young researchers to experience research abroad.

We recognize that fostering an open research culture requires not just one of the above, but instead a synergy of all five initiatives, and NU as a whole is committed to addressing these points in order to improve research capabilities.

3. ITbM's Response

Future plans for ITbM were discussed within ITbM and with the NU Executives, and it was decided that, as the Center Director's term would expire at the end of March 2022, a fresh start would be made by selecting a new Director as of April 2022. Under the newly installed Director Yoshimura, ITbM discussed measures to prevent research misconduct and further promote research activities, and based on the Measures to Prevent Research Misconduct at Nagoya University, the following initiatives were immediately established and implemented:

- Under the banner of "openness, transparency, and inclusion", raise awareness of the need to be a research organization that is open, transparent, and respectful of diverse values.
- In a shift away from a hierarchical structure focusing on the Center Director and PIs, ITbM Steering Committee meetings are now open to all faculty members so that all faculty members can participate in the management of ITbM equally.
- While ITbM has always strived to build equal relationships where anyone can express their opinions regardless of position or status, this has been reaffirmed and put into practice (e.g., call everyone by first name or "###-san").
- Implement a double mentoring system for all ITbM students: Each student is assigned a second mentor who can be consulted on any matters related to daily research life, and a system has been adopted to nurture students in multiple groups.
- Give graduate students the opportunity to learn about other lab cultures, including those abroad, and foster them to be able to play active roles on the world stage by promoting the dispatch of students to overseas institutions and the acceptance of international students.
- Reemphasize and reinforce education on research ethics: In light of the recent case, provide thorough education to once again impress upon students that research misconduct is an ultimately meaningless act that produces nothing but negative effects.
- Recognizing that there is a tendency for students in Japan to be overly fearful of failure and obsessed with success, cultivate a culture of understanding that experiments sometimes fail.
- Reaffirm and double-check lab note and data storage: Although it is mandatory to save data on the data server to be set up by NU when submitting a paper, each ITbM group stores all data and lab notes, regardless of whether or not the paper is published, and checks them as needed. For equipment that can connect to the internet, a system will be introduced whereby a copy of the raw data is automatically uploaded directly to the cloud after measurement to prevent data falsification.
- Promoting open science: insofar as it does not interfere with research, actively promote open science by registering raw data from experiments in public databases and making them available to the public.

4. References

URL1 Results of Investigation Regarding Misconduct in Research Activities

https://www.nagoya-u.ac.jp/info/20220316_jimu.html

https://en.nagoya-u.ac.jp/news/20220316_report.html

URL2 FY 2021 Follow-up of WPI Program: G-3 ITbM (P.17 – P.19)

https://www.jsps.go.jp/j-toplevel/data/08_followup/R3reports/220627_FY2021_FU_Report_J.pdf

[https://www.jsps.go.jp/english/e-](https://www.jsps.go.jp/english/e-toplevel/data/08_followup/FY2021/FY2021_Follow_up_Report_E.pdf)

[toplevel/data/08_followup/FY2021/FY2021_Follow_up_Report_E.pdf](https://www.jsps.go.jp/english/e-toplevel/data/08_followup/FY2021/FY2021_Follow_up_Report_E.pdf)

URL3 Measures to Prevent Research Misconduct at Nagoya University

https://www.nagoya-u.ac.jp/research/upload_images/2022_boushisaku.pdf

https://www.nagoya-u.ac.jp/research/upload_images/20221102_boushi.pdf

Appendix 1

Measures to Prevent Research Misconduct at Nagoya University

Approved by Education and Research Council on September 6, 2022

In 2008, Nagoya University established the “Nagoya University Rules on Handling Misconduct in Research,” which have been repeatedly revised in accordance with guidelines published by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Although these rules were thought to be adequate, in reality, the lack of concrete measures made them insufficient to eradicate research misconduct. A common factor in many cases of research misconduct, both in Japan and overseas, is the retention of source data. To protect our researchers and students from research misconduct, NU has established the following measures to prevent research misconduct.

1. Comprehensive research ethics education for all members of Nagoya University

- At the beginning of each academic year, the Research Ethics Education Officer at each department (the head of the department) will complete the Faculty Development (FD) program, which includes research ethics education, that is offered by NU's Chief Research Ethics Promotion Officer (Vice President).
- Every year, NU will offer an e-learning course to educate researchers in research ethics. Those who do not complete the e-learning course will be suspended from applying for competitive grants for that academic year. Research ethics education will also be made a compulsory subject for undergraduate students (class year to be determined by each department) and graduate students in the form of either an e-learning course or a lecture-based class, with each department setting its own requirements.
- Furthermore, the Research Ethics Education Officer will take advantage of opportunities such as faculty meetings to instruct faculty members in research ethics education, during which they will provide specific examples that are relevant to the unique characteristics of their department.
- For research conducted within University facilities such as research centers by students whom such facilities accept from the graduate schools, the directors of each facility will serve as Research Ethics Education Officers

2. Corresponding authors and their responsibilities

- For peer-reviewed papers for which NU is credited, the corresponding author(s) should be designated by the time the paper is submitted. Even if the corresponding author is not specified in the paper itself depending on the characteristics of each field, at least one corresponding author should be designated, who may be the first author or the leader of the research group (such as PI) of the published paper. The responsibilities of corresponding authors who are members of NU are described in items 3 and 4 below.
- The corresponding author is responsible for the appropriate preservation and storage of research materials. See item 3 for specific methods. If research materials are owned by another institution (e.g., a university or company), such as in the case of joint research, the corresponding author is responsible

for confirming that the materials are properly stored.

- The corresponding author is responsible for the validity of the peer-reviewed paper. See item 4 for details.
- If a student is designated as the corresponding author, the student's academic advisor should supervise the student in fulfilling his/her responsibilities as the corresponding author.

3. Achieving appropriate storage and management of research materials as mandated by the "Nagoya University Rules on Handling Misconduct in Research"

• In order to ensure that the research activities can be proved valid and to guarantee that they can be verified by third parties, experiment and observation records, experimental data, and other research materials (hereinafter referred to as "research materials") must be properly stored and managed, and they must be disclosed when deemed necessary and appropriate. To ensure that this is done effectively, it is important to comply with the following points:

(1) The corresponding author must store the research materials on a server provided by NU immediately after the paper is accepted.

(2) The research materials that should be stored are the experimental notes, experiment data, data related to numerical analysis, etc. that are used in the paper. If the raw data(*) is extremely large in size, it may be replaced by the processed data used in the paper; in this case, however, the corresponding author should store the raw data elsewhere, as well as store the data processing procedure (e.g., by self-made software) on the server together with the other research materials.

(*) Raw data means original data sufficient to confirm the reproducibility of the research results. It does not include books and published materials.

(3) The research materials that should be stored are not to be decided by a one-size-fits-all-rule, but rather may differ between fields. Therefore, the corresponding author must decide the research materials that should be stored. The corresponding author should store the research materials that they judge to provide sufficient evidence of the paper's validity. Clinical data containing personal information should be stored according to national regulations. If, in the academic field, it is deemed appropriate to store data in a manner not in accordance with these rules, such as for large-scale collaborative research or numerical simulations utilizing big data that are required to store data in an internationally recognized database, alternative methods of storing data may be approved upon consultation with the Research Ethics Education Officer.

(4) If there are collaborating researchers at other institutions, the corresponding author should ask the collaborating researchers to store their research materials at their own institutions. If the corresponding author of the paper is affiliated with another institution, the collaborating researchers affiliated with NU must, in the same manner as corresponding authors, store his or her research materials on a server provided by NU.

(5) It is the Research Ethics Education Officer's responsibility to have the corresponding author submit with each paper a declaration that he or she is in compliance with all research material storage obligations, to compile a list of files in the research paper directory each academic year, and, having done these, to report to the Chief Research Ethics Promotion Officer. The Research Ethics Education Officer has the authority to access data stored on the server by department members.

(6) All research materials related to published papers should be stored on the server for 10 years, even if the author of the paper is no longer affiliated with NU, such as due to graduation, resignation or retirement.

(7) Any research materials not directly used in the paper should be stored for 10 years, and this is the responsibility of the Principal Investigator (PI). If a PI ceases to be affiliated with NU, such as due to resignation or retirement, the PI should consult with Research Ethics Education Officer and preserve the research materials appropriately. In principle, samples and specimens related to published papers are to be stored for five years.

(8) NU provides electronic experiment notebooks (if they are practical and realistically useable) and software that can be used to check for research misconduct when submitting papers (e.g., iThenticate, which checks for plagiarism). The corresponding author may not submit a paper until he or she has confirmed using those software programs that there is no research misconduct. Specifically, the verification results from the fraud assessment software must also be stored on the server.

4. Ensuring the reproducibility of research results

- Research results that are obtained by a specific individual from among the authors of a paper must be checked for validity by the corresponding author before the paper is submitted. In particular, when an experiment is rerun in order to confirm the results, the experimental notebooks, experimental data, and other research materials related to the repeated experiment should also be stored on the server together with the research materials used in the paper. If, after the paper is published, the research results cannot be reproduced, it should be assumed that the suspicion of research misconduct cannot be ruled out. The issue should immediately reported to the Research Ethics Education Officer and the Chief Research Ethics Promotion Officer, and the corresponding author is responsible for taking necessary measures such as retracting the paper.

Note

- Ethics education

For the purpose of ethics education, NU Research Ethics Education Officers (heads of departments) will take up specific cases of research misconduct, prepare educational materials using data, figures, graphs, etc. to show what acts constitute research misconduct and how damaging research misconduct

can be, and make use of them in the department's research ethics education. Furthermore, each department's Research Ethics Education Officer is responsible for adding issues specific to his or her department to the abovementioned educational materials and using those materials to educate students and new faculty members. We recommend making use of online teaching materials, etc. in order to keep students engaged and interested.

- If research misconduct is suspected, do not attempt to cover it up. Contact the Chief Research Ethics Promotion Officer as soon as possible.

Reminders to students

Written Pledge: NU currently requires degree applicants to submit a written pledge that they have not plagiarized, but we will also require written pledges that they have not fabricated, tampered with, or plagiarized data.

Revocation of degree: In principle, an individual who earns a degree by fraudulent means will have the degree revoked.

Improving Our Research Capabilities

Fostering a culture of openness at laboratories and research groups is important to prevent research misconduct and further promote research activities. All NU departments will implement the following measures in ways that accommodate the needs of each department.

- **Laboratory visit counseling**

As Student Support's Student Counseling Center has done in the past, counselors will visit individual laboratories to interview students and researchers and provide counseling as necessary.

- **Double mentoring system**

Each student will be assigned a secondary faculty advisor, not as a formal sub-advisor but as a mentor outside the student's laboratory. Mentors will have regular meetings with their mentees to discuss topics such as research progress and any current concerns.

- **Suggestion box ("Meyasu-bako")**

Each department will set up an online "Suggestion Box" that will be personally read by the Dean of the graduate school. Anonymous submissions will also be accepted.

- **Laboratory rotation system**

Departments/programs will establish a system that allows undergraduate and master's students to experience several laboratories (or, if researchers in the department usually conduct research independently rather than conduct research at a laboratory or research group, to have opportunities to experience research with several researchers) during their first few months after enrollment. Ideally, this should occur before the student is assigned to a laboratory, but even for master's students who have already been assigned to a laboratory, temporarily engaging with another laboratory promises to inspire and motivate both the student and the host laboratory.

- **Support system for students/young researchers to experience research abroad**

NU will provide support for PhD students to temporarily join overseas laboratories and engage in research activities. Doing so will allow them to experience the diversity of research cultures and share good practices after their return.

Appendix 2.

Suggestions of the Dedicated Investigation Committee (DIC)

- NU has been working to prevent research misconduct by requiring all researchers to take e-Learning programs on research ethics and all students to undergo research ethics education in the form of e-Learning programs or classes. However, this case shines a light on the need for principal investigators to reaffirm the importance of researcher education and research ethics education, and to make further efforts to establish a sound and secure research environment that invigorates research activities, in order to prevent any recurrences. Going forward, NU should not only continue its prior efforts, but should also improve its researcher education and research ethics education programs by discussing actual cases of serious research misconduct such as this one and explaining the penalties that researchers will suffer if they engage in research misconduct. In addition, NU should again inform its members about the whistle-blowing desks to consult if they discover or suspect research misconduct.

- NU should once again emphasize the importance of the storage of research materials, such as producing and safekeeping lab notes, storing raw data, and managing samples. Each lab/research room should clearly establish this in written manuals and take every opportunity to inform students. Schools/graduate schools should have a firm grasp of the details of the rules made at each lab/research room and provide advice and guidance.

- Thoroughly checking the reproducibility of lab data should be made routine. When publishing a paper, the corresponding author should work with co-authors to check all the raw data and lab notes upon which the data being published are based to ensure the accuracy of the material they seek to publish. Professors, Associate Professors, graduate students, and students should communicate with each other by engaging in honest and open dialogue about their research.

- In order to ensure the conduct of fair research seeking to uncover scientific facts, the Research Ethics Education Officer at each school/graduate school should regularly check whether research materials are being properly stored and managed, and establish a system to report the results to the Chief Research Ethics Promotion Officer, in order to prevent any recurrences of misconduct.

- This case of research misconduct went undetected not only during the research paper peer review process, but also during the dissertation review process of the doctoral and master's theses. Assess whether there were any problems in these review methods and procedures, and if so, improve them.