

Unpublished Data List (MHU-1)

The following data has been registered into the database by JAXA as private. The release date is set on Mar. 31, 2025. In order to publish paper using these data, please request the accession numbers to JAXA.

File format: paired-end fastq sequencing file

Please fill in “Data No.” and “Data name” on the Data Transfer Agreement form.

Data No.	Data name	Sample (Mouse) ID	Gravity condition	Data File ID
<u>1</u>	Gastrocnemius 腓腹筋	<u>1</u>	A1G	LAB_113_07
		<u>4</u>	A1G	LAB_113_08
		<u>5</u>	A1G	LAB_113_09
		<u>7</u>	Micro G	LAB_113_10
		<u>8</u>	Micro G	LAB_113_11
		<u>9</u>	Micro G	LAB_113_12
		<u>16</u>	1G	LAB_113_13
		<u>17</u>	1G	LAB_113_14
		<u>18</u>	1G	LAB_113_15
<u>2</u>	Liver 肝臓	<u>1</u>	A1G	LAB_164_08
		<u>4</u>	A1G	LAB_164_09
		<u>5</u>	A1G	LAB_164_10
		<u>7</u>	Micro G	LAB_164_11
		<u>8</u>	Micro G	LAB_164_12
		<u>9</u>	Micro G	LAB_164_13
		<u>16</u>	1G	LAB_164_14
		<u>17</u>	1G	LAB_164_15
		<u>18</u>	1G	LAB_164_16
<u>3</u>	Extensor digitorum longus (EDL) 長趾伸筋	<u>1</u>	A1G	LAB_219_17
		<u>4</u>	A1G	LAB_219_18
		<u>5</u>	A1G	LAB_219_19
		<u>7</u>	Micro G	LAB_219_20
		<u>8</u>	Micro G	LAB_219_21
		<u>9</u>	Micro G	LAB_219_22
		<u>16</u>	1G	LAB_219_23
		<u>17</u>	1G	LAB_219_24

		<u>18</u>	1G	LAB_219_25
<u>4</u>	Ventral hippocampus 腹側海馬	<u>1</u>	A1G	LAB_023_01
		<u>4</u>	A1G	LAB_023_02
		<u>5</u>	A1G	LAB_023_03
		<u>7</u>	Micro G	LAB_023_04
		<u>8</u>	Micro G	LAB_023_05
		<u>9</u>	Micro G	LAB_023_06
		<u>16</u>	1G	LAB_023_07
		<u>17</u>	1G	LAB_023_08
		<u>18</u>	1G	LAB_023_09
<u>5</u>	Cerebellum 小腦	<u>1</u>	A1G	LAB_100_09
		<u>4</u>	A1G	LAB_100_10
		<u>5</u>	A1G	LAB_100_11
		<u>7</u>	Micro G	LAB_100_12
		<u>8</u>	Micro G	LAB_100_13
		<u>9</u>	Micro G	LAB_100_14
		<u>16</u>	1G	LAB_100_15
		<u>17</u>	1G	LAB_100_16
		<u>18</u>	1G	LAB_100_18
<u>6</u>	Brown adipose tissue (BAT) 褐色脂肪細胞	<u>1</u>	A1G	LAB_057_01
		<u>2</u>	A1G	LAB_057_02
		<u>3</u>	A1G	LAB_057_03
		<u>4</u>	A1G	LAB_057_04
		<u>5</u>	A1G	LAB_057_05
		<u>6</u>	A1G	LAB_057_06
		<u>7</u>	Micro G	LAB_057_07
		<u>8</u>	Micro G	LAB_057_08
		<u>9</u>	Micro G	LAB_057_09
		<u>10</u>	Micro G	LAB_057_10
		<u>11</u>	Micro G	LAB_057_11
		<u>12</u>	Micro G	LAB_057_12
		<u>13</u>	1G	LAB_057_13
		<u>14</u>	1G	LAB_057_14
		<u>15</u>	1G	LAB_057_15
		<u>16</u>	1G	LAB_057_16

		<u>17</u>	1G	LAB_057_18
		<u>18</u>	1G	LAB_057_19
<u>7</u>	Inguinal white adipose tissue (iWAT) 鼠脰部白色脂肪 細胞	<u>1</u>	A1G	LAB_121_09
		<u>2</u>	A1G	LAB_121_10
		<u>3</u>	A1G	LAB_121_11
		<u>4</u>	A1G	LAB_121_12
		<u>5</u>	A1G	LAB_121_13
		<u>6</u>	A1G	LAB_121_14
		<u>7</u>	Micro G	LAB_121_15
		<u>8</u>	Micro G	LAB_121_16
		<u>9</u>	Micro G	LAB_121_18
		<u>10</u>	Micro G	LAB_121_19
		<u>11</u>	Micro G	LAB_121_20
		<u>12</u>	Micro G	LAB_121_21
		<u>13</u>	1G	LAB_121_22
		<u>14</u>	1G	LAB_121_23
		<u>15</u>	1G	LAB_121_25
		<u>16</u>	1G	LAB_121_27
		<u>17</u>	1G	LAB_123_25
		<u>18</u>	1G	LAB_123_27
<u>8</u>	Kidney 腎臟	<u>1</u>	A1G	LAB_047_01
		<u>4</u>	A1G	LAB_047_02
		<u>5</u>	A1G	LAB_047_03
		<u>7</u>	Micro G	LAB_047_04
		<u>8</u>	Micro G	LAB_047_05
		<u>9</u>	Micro G	LAB_047_06
		<u>16</u>	1G	LAB_047_07
		<u>17</u>	1G	LAB_047_08
		<u>18</u>	1G	LAB_047_09

[Abbreviations]

A1G: Artificial 1 G on ISS

Micro G: Microgravity on ISS

1G: Ground Control

Detail and References

1. Mission Overview; Habitation

The MHU-1 mission was the first space mouse project with onboard 1 g control in order to study various physiological changes that occur in adapting to microgravity. Twelve wild-type C57BL/6J male mice were launched to the International Space Station (ISS) and housed onboard under microgravity (Micro G) or artificial earth-gravity (A1G). After 35 days of habitation on the ISS, the mice splashed down in Pacific Ocean. The mice were transported to a laboratory for behavioral observations and the other analyses two days later. A ground control (1G) experiment precisely simulated the space experiment was conducted at JAXA Tsukuba in Japan. Six mice, which were individually housed in the same units as the flight experiment, were subjected to the analysis. The details were described in following paper;

Development of new experimental platform ‘MARS’—Multiple Artificial-gravity Research System—to elucidate the impacts of micro/partial gravity on mice

Sci Rep. 2017 Sep 7;7(1):10837. doi: 10.1038/s41598-017-10998-4.

2. Sample preparation tissues.

i. Muscles

The muscles were immediately frozen in isopentane cooled with liquid nitrogen. Briefly, total RNA was isolated using the TRIZOL reagent (Thermo Fisher Scientific). RNA quality was controlled using an RNA 6000 Pico kit (Agilent, Santa Clara, CA, USA) from 100 frozen sections (8 μm in thickness) of the muscle.

The details were described in following paper;

Transcriptome analysis of gravitational effects on mouse skeletal muscles under microgravity and artificial 1 g onboard environment

Sci Rep. 2021 Apr 28;11(1):9168. doi: 10.1038/s41598-021-88392-4.

ii. Brain Dissection

Under deep anesthesia using isoflurane, mice were decapitated, and their brains were removed quickly. Coronal slices at 2-mm thickness were made from the frontal pole of the cerebrum using Mouse Brain Matrix (Muromachi Kikai Co., Ltd), and the left hemisphere was used for the analysis. Noyes surgical scissors were used to dissect the ventral hippocampi and cerebellar vermis. Each brain region was quickly frozen in liquid nitrogen and stored at -80°C until use.

The details for Analyzed brain regions were described in following paper;

Effects of gravity changes on gene expression of BDNF and serotonin receptors in the mouse brain

3. Preparation for RNA sequencing.

RNA was extracted from the tissues of mice in each group: A1G, Micro G, and 1G. Briefly, total RNA was isolated using the TRIZOL reagent (Thermo Fisher Scientific). RNA quality was controlled using an RNA 6000 Pico kit (Agilent, Santa Clara, CA, USA) from frozen tissues.

4. RNA sequencing.

A total amount of 50 ng total RNA was used for RNAseq library preparation using the NEBNext rRNA Depletion Kit and NEBNext Ultra Directional RNA Library Prep Kit (New England Biolabs, Ipswich, MA, USA); 2×36 base paired-end sequencing was performed using NextSeq500 (Illumina, San Diego, CA) by Tsukuba i-Laboratory LLP (Tsukuba, Ibaraki, Japan).

The details were described in following paper;

Transcriptome analysis of gravitational effects on mouse skeletal muscles under microgravity and artificial 1 g onboard environment

Sci Rep. 2021 Apr 28;11(1):9168. doi: 10.1038/s41598-021-88392-4.