Annex 1

Overview of equipment used for analyzing metabolic physiology in mice and rats

【Major items to be analyzed and/or measured】

1) Energy intake and expenditure in free-moving animals
2) Body temperature, heart rate, and blood pressure in free-moving animals
3) Non-invasive 4-dimensional cardiac function and capillary blood flow imaging using anesthetized mice
4) Mouse temperature preference assays using a thermal gradient ring
5) Evaluation of behaviors related to emotions, leaning, and memories
6) Multicellular activity measurement and manipulation in vivo
7) Functional analysis of neuroimmune interactions in mouse models of diseases

【Equipment】

- Device for simultaneously measuring energy metabolism and activity of small animals using mass spectrometry (Arco System, Shinfactory, for mice)
- Brain wave–measuring apparatus (Nihon Kohden, AB611J)
- Electromyograph (Nihon Kohden, AB611J)
- Telemetry automatic measurement system for chronic experiments (Harvard Bioscience, mouse, rat, etc.)
- Olympus FV100, 4D ultrasound imaging device VEVO3100 (Primetech Corporation, for mice)
- Isolated heart perfusion system (Primetech Corporation, for mice and rats)
- Thermal Gradient Ring (Ugo Basile, for mice)
- Open field test analyzer (Section of Instrument Design Room of NIPS and other, for mice)
- Light/dark transition test device (O'HARA, for mice)
- Barnes circular maze test device (O'HARA, for mice)
- Elevated plus-maze test analyzer (Section of Instrument Design Room of NIPS and other, for mice)
- Forced swimming test analyzer (Section of Instrument Design Room of NIPS and other, for mice)
- Rotarod test analyzer (Ugo Basile, for mice RotaRod NG, 47650)
- Passive avoidance test analyzer (O'HARA, for mice)
- Fear conditioning test analyzer (O'HARA and other, for mice)
- Morris water maze pool (O'HARA and other, for mice)
- Nikon A1MP+holographic microscope (Nikon & Division of Multicellular Circuit Dynamics, for mice and rats)
- X-ray irradiation device (MediXtec, for mice and cells)

ANNEX 2

Overview of magnetic resonance imaging (MRI) scanners

Performance and features of the MRI scanner installed at the NIPS Supportive Center for Brain Research (two Verio scanners, 2009, Siemens Co.; one 7-T scanner, 2014, Siemens Co., Ltd.)

Verio

1. Superconducting magnet
   1) Magnetic field strength: 3 Tesla, magnet inner diameter 70 cm
   2) Magnetic field uniformity: 0.03 ppm or less (spherical range with a diameter of 20 cm, volume residual mean squared method)
   3) Shimming: Active + passive shimming, automatic shimming for each subject
   4) Liquid helium evaporation: 0.01 L/year or less

2. Imaging functions
   1) Nuclei: ^{1}H
   2) Pulse sequence: echo planar imaging, turbo spin echo imaging, etc.
   3) Slice direction: axial, sagittal, coronal, oblique
   4) Min. slice thickness: 1 mm (2-dimensional imaging), 0.3 mm (3-dimensional imaging)
   5) Gradient magnetic field: 45 mTesla/m, rise time 0.225 ms
   6) Probe: 32-channel head coil, circular polarized body coil, etc.
   7) Data processing device: Automatically saves obtained images in DICOM format via Windows network
   8) Other functions: T1, T2, T2*, proton density-weighted images, MR angiography, diffusion-weighted image, image statistical processing software, communication mediation relay system for simultaneously measuring neural activity during interaction between two individuals

7-T MRI

1. Superconducting magnet
   1) Magnetic field strength: 7 Tesla, magnet inner diameter 60 cm
   2) Magnetic field uniformity : 1 ppm or less (spherical range with a diameter of 25 cm, volume residual mean squared method)
   3) Shimming: Active + passive shimming, automatic shimming for each subject
   4) Liquid helium evaporation: 0.01 L/year or less

2. Imaging functions
   1) Nuclei: ^{1}H, ^{13}C, ^{17}O, ^{19}F, ^{23}Na, ^{31}P

2) Pulse sequence: echo planar imaging, turbo spin echo imaging etc.

3) Slice dimensions: axial, sagittal, coronal, oblique

4) Min. slice thickness: 0.5 mm (2-dimensional imaging), 0.05 mm (3-dimensional imaging)

5) Gradient magnetic field: 70 mTesla/m, rise time 0.350 ms

6) Probe: 32-channel receive-only head coil (^{1}H), circular polarized transmit/receive head coil (^{1}H, ^{23}Na, ^{31}P), transmit/receive surface coil (^{13}C, ^{17}O, ^{19}F), etc.

7) Data processing device: Automatically saves obtained images in DICOM format via Windows network

8) Other functions: T1, T2, T2*, proton density-weighted images, MR angiography, diffusion-weighted image, image statistical processing software