

# World Premier International Research Center Initiative (WPI) Activities Report of the WPI Academy Center (FY 2021 – FY 2024)

Host Institution	University of Tsukuba	Host Institution Head	Kyosuke Nagata
Research Center	International Institute for Integrative Sleep Medicine (IIIS)		
Center Director	Masashi Yanagisawa	Administrative Director	Takatoshi Mochizuki

Common Instructions:

- \* Unless otherwise specified, prepare this report based on the current (31 March 2025) situation of your Center.
- \* Use yen (¥) when writing monetary amounts in the report. If an exchange rate is used to calculate the yen amount, give the rate.
- \* Prepare this report within 10 pages (excluding the appendices, and including "Summary of State of WPI Academy Center Progress" (within 2 pages)).

## **Summary of WPI Academy Center's Activities** (write within 2 pages)

International Institute for Integrative Sleep Medicine (IIIS) was established in University of Tsukuba in 2012 as a WPI center for sleep science, aiming to solve the medical and social issues related to sleep by studying neuronal mechanism of sleep/wake regulation and molecular pathogenesis of sleep disorders, and developing applied studies such as novel compounds, devices and diagnostic methods for treatment of sleep disorders. In 2020, IIIS discovered a novel group of hypothalamic neurons inducing hibernation-like low metabolism state in non-hibernating mammals, and currently leads the research field of both sleep and hibernation studies in the world.

Since 2021, IIIS has shifted to WPI Academy, and we have done successful transition to keep the top-level research activity with the same or even more numbers of researchers and foundations. The budget of IIIS in FY2024 has been increased by 5.9% over the last 4 years, supported by Commissioned research projects, including AMED Moonshot project (JP21zf0127005). IIIS researchers have also been successful to get Grant-in-Aid for Scientific Research (KAKEN), and the University of Tsukuba has provided the personnel expenses of many faculty members and some university staffs. In IIIS, we pursue the aims below as the major research goals;

- 1. To fully understand the fundamental mechanisms of sleep/wake regulation in the brain**
- 2. To elucidate molecular pathogenesis of sleep disorders and related mental illness**
- 3. To develop novel compounds, devices and diagnostic methods for treatment of sleep disorders**
- 4. To uncover the neurocircuit regulating hibernation-like low metabolism state**

Over the last 4 years, IIIS has published 270 original articles, 30 review articles, 14 proceedings, and 26 other articles in the high-standard international journals. SciVal publication analysis indicates that Outputs in Top 10% Citation Percentiles over the period is 31 (9.5% of all IIIS publications), and Publications in Top 10% Journal Percentiles is 108 (35.4% of all IIIS publications), with Field-Weighted Citation Impact of 1.21. These indices are superb considering the size of research organization with 23 PIs.

Successful outcome (publications) of interdisciplinary research has been achieved by having new PIs of various background and research field. During the last 4 years, 6 new PIs have been appointed to IIIS, including 2 data scientist, 1 physical analyst, 1 pharmaceutical scientist, 1 molecular biologist, and 1 clinical psychologist. Together with many basic researchers of IIIS, these new scientists have accelerated the inter-laboratory collaborations and elevated the research activity.

The overseas PIs also actively participate in the research of IIIS. We have 2 new satellite PIs at Harvard and Oxford, collaborating with us through AMED Moonshot project. In 2022, we have also started a new KAKEN project (International Leading Research, 22K21351) and have sent 5 postdoctoral researchers to the top-level neuroscience/sleep laboratories, such as University of Toronto, University of Wisconsin, Stanford University, University of Oxford, and Charité University Hospital (Germany) for a long-term collaboration.

IIIS hosts International Symposium every year since the establishment in 2012. During the last 4 years, we hosted/co-hosted 7 International Symposium; one was the Joint Congress of Japanese Society of Sleep Research and Japanese Society for Chronobiology 2023 (President: Masashi Yanagisawa). We also host the institutional WPI-IIIS Seminars, and during the last 4 years, we hosted 55 seminars (223 times from the establishment). These continuous efforts of international activity provide us opportunities of exchanging research ideas and expanding international network. To maintain these events, we have 6 bilingual staff in the administrative office; 3 with Ph.D. in medicine/pharmacy. We often welcome visitors of other university/academic organizations from overseas and provide an introductory lecture and lab tour to demonstrate the top level research activity/environment as a WPI center.

During the transition period of IIIS to WPI Academy, University of Tsukuba has proceeded the shift of 7 IIIS PIs to the tenure positions in the graduate school programs. Since 2022, University of Tsukuba has been reforming the management system of research centers, then in 2024, the new research organization named "Tsukuba Institute for Advanced Research (TIAR)" has been launched and IIIS was assigned as one of the featured research centers. For these reforming, IIIS helped establishing the university's re-organization strategy/design, KPI, etc., and also negotiated to have 3 tenure positions of IIIS in the TIAR. Another tenure positions of IIIS will be set through the reform plan for the School of Integrative and Global Majors and Ph.D. Program in Humanics, possibly in 2025, thus, the employment of nearly all PIs will be secured financially.

IIIS has received hundreds of requests for lectures from schools, companies and general public. We have also accepted many visits of junior high/high school students for education purpose, as well as the staff education programs of our/other university, visits of the government officers and academic organizations of foreign countries. Considering the number of media exposure, we believe that IIIS may have a top visibility or public appeal among the WPI centers, contributing a lot to the branding of the WPI Program.

We have increased the internal grant opportunity for young researchers of IIIS over the last 4 years. In 2024, we spent about one thirds of the WPI Academy budget for those grants; 1) Start-up grant, 2) WPI Academy Research Assistant, 3) Travel grant, and 4) Female Researcher grant.

\* Describe clearly and concisely the progress being made by the Center from the viewpoints below.

- In addressing the below-listed 1-8 viewpoints, place emphasis on the following:

- (1) Whether research standards and operation of the Center is maintaining a "world premier" status.
- (2) Whether the Center participate and cooperate to the activities to advance the overall development of the WPI Program and to promulgate its achievements.

## 1. Overall Image of Your Center

- Describe the Center's current identity and overall image.
- List the Principal Investigators in Appendix 2, diagram the Center's management system in Appendix 3-1, enter the number of center personnel in Appendix 3-1a, and enter center funding in Appendix 3-2.

Sleep is a fundamental behavior that everyone experiences daily, and it takes up as much as one third of one's entire lifetime. However, detailed regulation mechanisms and physiological roles of sleep remain still unclear today. While sleep has been a black box stubbornly resisting scientists' challenges, its medical and social importance is very obvious. Lack of sound sleep not only causes a reduction in higher brain functions including alertness, memory and decision making, but also increases the risk of mood disorders such as depression as well as cardiovascular diseases, metabolic syndrome, etc. Furthermore, the deficiencies in healthy sleep, which are linked to decrease in working efficiency and increase in accidents due to excessive sleepiness, causes significant social or economic losses as well.

International Institute for Integrative Sleep Medicine (IIIS) was established in University of Tsukuba in 2012 as the WPI center for sleep science, aiming to solve the above medical and social issues related to sleep. The director, Dr. Masashi Yanagisawa, who discovered orexin neuropeptides in 1998, assembled the sleep research groups and founded IIIS, and IIIS has made huge progress in the basic research field of sleep over the decade. Orexin is a key molecule to maintain wakefulness in the brain, and lack of orexin signals causes a hypersomnolent disease, narcolepsy-cataplexy. Since then, Dr. Yanagisawa and IIIS have been leading the basic and applied studies of sleep science, and Dr. Yanagisawa is well recognized as one of the top scientists in the world. In addition, Dr. Takeshi Sakurai, the vice director of IIIS, discovered a brand-new group of hypothalamic neurons, which induce hibernation-like low metabolism state in non-hibernating mammals in 2020. Thus, IIIS expands the study targets to multiple mode control of rest state in the brain. Therefore, in IIIS, we pursue the aims below as the major research goals;

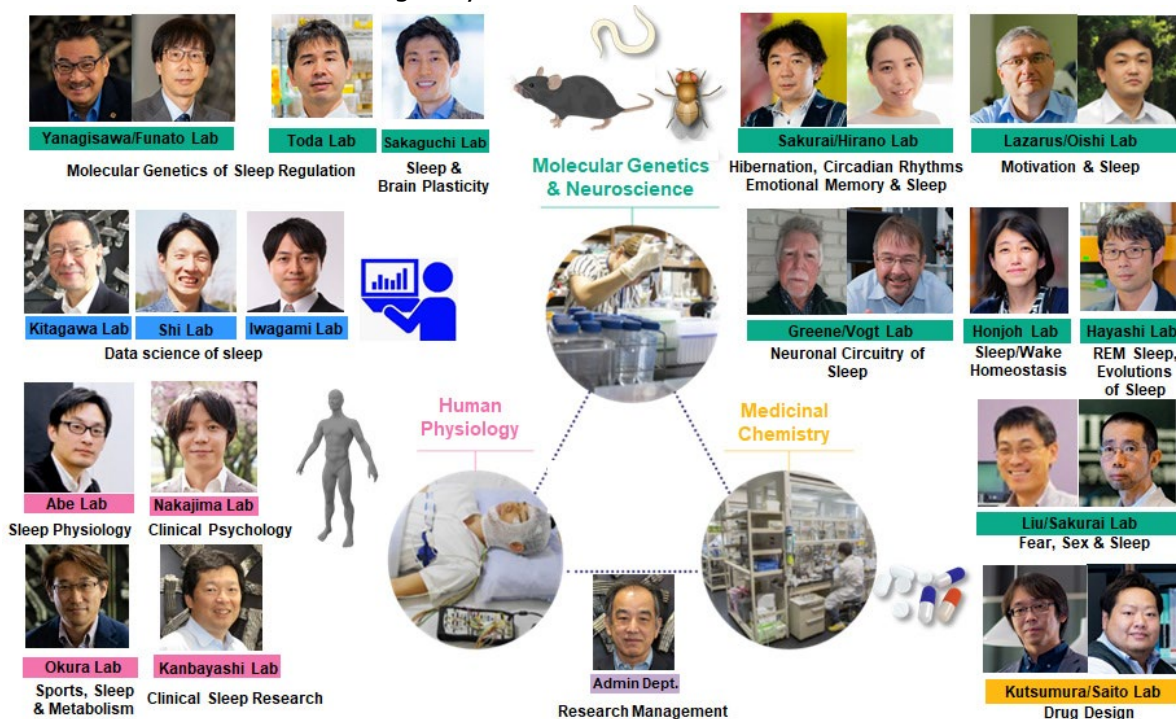
- 1. To fully understand the fundamental mechanisms of sleep/wake regulation in the brain**
- 2. To elucidate molecular pathogenesis of sleep disorders and related mental illness**
- 3. To develop novel compounds, devices and diagnostic methods for treatment of sleep disorders**
- 4. To uncover the neurocircuit regulating hibernation-like low metabolism state**

To achieve these goals, we have been challenging a wide-range of sleep studies, covering fields of a) basic research such as biochemistry, physiology, neuroscience, molecular genetics and molecular cell biology, b) pharmaceutical science and structural biology, and c) psychology, psychiatry, and experimental medicine, and d) data science. Currently IIIS has 23 Principal Investigators (PI) and runs 17 research laboratories (Figure 1). There are 14 basic neuroscience researchers (highlighted in green), 4 human/clinical researchers (pink), 3 data scientists (blue), and 2 chemists/structural biologists (yellow), working together to perform interdisciplinary research of "sleep science" or "integrated sleep medicine". Also, several groups work together to understand the neuronal basis of circadian rhythm, energy metabolism, and hibernation-like behavior.

In IIIS, some laboratories have Co-PI style, as the director recommends it based on the previous experience in University of Texas Southwestern Medical Center (UTSW) at Dallas, where he worked before starting IIIS projects in Tsukuba. We have 4 foreign PIs, and 2 of them have their own lab in overseas satellite institutions; Dr. Green at UTSW, and Dr. Liu at National Institute of Biological Science (NIBS), Beijing (see Appendix 2, Appendix 3-1). In addition, we have 6 collaborative PIs in the partner institutions, and 2 of them are located overseas; Dr. Saper at Harvard Medical School/Beth Israel Deaconess Medical

Center, Boston, and Dr. Vyazovsky at Oxford University, Oxford. One PI works at the IIIS originated start-up company, S'UIMIN, which closely works with IIIS in the collaboration research of at home sleep EEG recording projects using InSomnograf system (<https://www.suimin.co.jp>).

The basic concepts of IIIS policy and its operation style have been the same as the original ideas; a US style open research center with flat organization, flexible and timely appointment of PIs regardless of their age and career stage, and flexible/dynamic allocation of the floor space and other resources including major facilities and equipment. The PI meeting chaired by the director is held every month and serves as the official decision-making body in IIIS.



**Figure 1. Members of PIs and research laboratories of IIIS 2024.**

Non-PI faculty members are 16, including 5 from overseas, and the postdoctoral researchers are 41, including 12 from overseas (see Appendix 3-1a). Overall percentage of overseas researchers (faculties and postdocs) is 28%, and the percentage of female researchers are 29% in FY2024. Other research support staffs are 110, including the doctor-course students (41, Appendix 3-1a), master-course student, undergraduate students, visiting researchers and technical staffs. The administrative staffs are 28, and totally 224 people work in FY2024.

IIIS has been successful financially over the decade, and acquired enough external funding as well as the operational support from the university (see Appendix 3-2). The large part of IIIS budget in FY2024 comes from Commissioned research projects, including AMED Moonshot project (PD: Masashi Yanagisawa, JP21zf0127005). Grant-in-Aid for Scientific Research (KAKEN) of individual IIIS researchers, and other Government Subsidies also contribute to the research activities. In addition, IIIS runs several Joint research projects with companies and the total project budget has been increased in FY2024. University of Tsukuba also supports IIIS greatly and provides personnel expenses of tenure faculty members and other university staffs. IIIS successfully overcomes the transition phase of WPI Center to WPI Academy so far, having 5.9% increase in annual budget in FY2024 vs FY2021.

## 2. Advancing Research of the Highest Global Level

- Describe what's been accomplished in the Center's research objectives and plans.
- In Appendix 1, list the papers underscoring those research achievement and list the Center's research papers published in 2021-2024 in a manner prescribed in Appendix A.

Over the last 4 years of WPI Academy period, IIIS has published 270 original articles, 30 review articles, 14 proceedings, and 26 other articles in the international journals (see Appendix A). According to SciVal publication analysis, Outputs in Top Citation Percentiles over the period is 31 (number of publications in the top 10% most cited publications worldwide, 9.5% of all IIIS publications), and Publications in Top Journal Percentiles is 108 (number of publications in the top 10% journals by CiteScore, 35.4% of all IIIS publications), with Field-Weighted Citation Impact of 1.21 (average Field-Weighted Citation Impact of all IIIS publications). These indices are superb considering the size of research organization with 23 PIs. The representative 20 original articles are listed in Appendix 1, and here we align the papers with the 4 research goals mentioned in the section 1.

## **Aim 1. To fully understand the fundamental mechanisms of sleep/wake regulation in the brain**

### **Neural SIK3 pathway plays a crucial role in the regulation of sleep**

Previous forward genetic screening in mice demonstrated that loss of a PKA phosphorylation site enhances NREM sleep, implicating **protein kinase SIK3** as a potential neural regulator of sleep. We showed that the mice expressing PKA-site-deficient SIK3 increased NREM sleep (19). In the mouse brain, SIK3 affects sleep quantity through **LKB1-SIK3-HDAC4/5-CREB signaling pathway** for transcriptional regulation of NREM sleep amount (14).

The duration and depth of sleep serve as indicators of sleep health. Region-specific manipulation of SIK3 in the mouse brain revealed that **SIK3 in forebrain excitatory neurons regulates EEG delta power during NREM sleep**, whereas **SIK3 in hypothalamic excitatory neurons controls NREM sleep duration** (13). Furthermore, SIK3 regulates the temporal dynamics of sleep-wake transitions, shaping not only the amount and quality but also the rhythmic pattern of sleep-wake behavior. The suprachiasmatic nucleus is the master clock of circadian rhythm in mammals, and **mice lacking SIK3 in the suprachiasmatic nucleus show a delayed awakening response** during the early dark phase, despite having a normal daily sleep/wake amount (9). These results demonstrate that SIK3 signals are a key mechanism in the brain **to regulate sleepiness and sleep-wake transition**.

9. Asano F, et al., (2023) *Proc. Natl. Acad. Sci. U.S.A.* **120**(11): e2218209120.
13. Kim SJ, et al., (2022) *Nature* **612**(7940): 512-518.
14. Zhou R, et al., (2022) *Nature* **612**(7940):519-527.
19. Iwasaki K, et al., (2021) *J. Neurosci.* **41**(12): 2733-2746.

### **Molecular and neuronal basis of homeostatic control of sleep**

During wakefulness, the brain accumulates sleepiness and causes sleep in animals, but molecular basis of such homeostatic control of sleep/wake is still an open question. We developed a theoretical model predicting how synaptic potentiation drives sleep need, then created a novel chemogenetic tool to selectively potentiate synapses both in vitro and in vivo systems. We found that **synaptic potentiation induces sleep**, and that sleep, in turn, **promotes synaptic downscaling** (6). The synaptic plasticity is dependent on the intracellular  $Ca^{2+}$  signaling, and we found that calcineurin, a  $Ca^{2+}$ /calmodulin-dependent phosphatase, acts as an important regulator of daily sleep amount and homeostatic sleep response in the mouse brain (1).

Sleep-wake behavior is fundamentally regulated via hypothalamic and basal forebrain neurons in the brain. We investigated the anatomical and functional connectivity between the ventrolateral preoptic area (VLPO) and the lateral hypothalamus (LHA), two brain regions critically involved in sleep-wake regulation. Using viral tracing, electrophysiology, and behavioral analyses, we identified specific **GABAergic VLPO neurons** that project to and inhibit wake-promoting orexin neurons in the LHA. Conversely, **LHA neurons can modulate VLPO activity** via reciprocal projections, indicating a **bidirectional circuit** that balances arousal and sleep for homeostatic control (11).

Adenosine is one of the endogenous sleep substances and supposed to help homeostatic control of sleep. Adenosine  $A_{2A}$  receptors in the nucleus accumbens, a newly identified sleep center in the basal forebrain, are crucial for regulating sleep and motivation. We developed a novel **light-activated**

**allosteric modulator of A<sub>2A</sub> receptor**, and successfully **induced sleep** in mice through targeted light irradiation in the brain. This compound/method may be useful for the future application of optochemical medicine (8).

1. Yin X, et al., (2025) *Proc. Natl. Acad. Sci. U.S.A.* **122**(4): e2418317122.
6. Sawada T, et al., (2024) *Science* **385**(6716): 1459-1465.
8. Roy K, et al., (2024) *Nat. Commun.* **15**: 3661.
11. Prokofeva K, et al., (2023) *J. Neurosci.* **43**(22): 4075-4092.

### **Cerebral blood flow changes across sleep/wake states**

Cerebral blood flow (CBF) is closely associated with neuronal activity, but the detailed dynamics of CBF across sleep/wake states is not well examined. We directly observed red blood cells within capillaries, where the actual substance exchange between the blood and neurons/glia occurs, and found that capillary **CBF is largely increased during REM sleep** compared to wakefulness and non-REM sleep. We also found that signaling via **adenosine A<sub>2a</sub> receptors is crucial for the elevated CBF** during REM sleep, suggesting that REM sleep might be a state crucial for recovery of the cerebral cortex (18).

18. Tsai CJ, et al., (2021) *Cell Reports* **36**(7): 109558.

### **Identification of a new peripheral factor for sleep control**

For the first time, we conducted a forward genetic screening for mutants with abnormal sleep in the nematode *C. elegans*, and found that loss of function of SEL-11 leads to extreme long-sleep. Loss of function of the mammalian homolog also resulted in drastically-increased sleep in mice. We found that **SEL-11 functions in non-neuronal peripheral tissues** and that ER stress-response pathways act downstream to generate a non-cell autonomous signal that promotes sleep, suggesting that **sleep is an individual-level response to ER stress** (10).

10. Kawano T, et al., (2023) *Cell Reports* **42**(3):112267.

## **Aim 2. To elucidate molecular pathogenesis of sleep disorders and related mental illness** **Mechanisms of REM sleep, muscle atonia, cataplexy, and REM sleep behavior disorder**

REM sleep is thought to be regulated by a discrete neurocircuit through the hypothalamus and the limbic system to the brain stem, causing complete muscle atonia. We demonstrated that **REM sleep is initiated by a transient increase in dopamine release in the basolateral amygdala (BLA)** during NREM sleep (15). By using a combination of in vivo imaging, optogenetics, and pharmacological approaches, we found that this dopamine surge serves as a critical trigger for the transition from NREM to REM sleep. Furthermore, using a narcolepsy model mouse, we showed that the same **dopamine surge in the BLA precedes the onset of cataplexy**, a pathological REM sleep-like state. These findings uncover a novel neurocircuit by which the brain initiates REM sleep and suggest that dysregulation of this circuit may underlie the pathophysiology of narcolepsy. We also identified a specific population of **glycinergic neurons in the ventromedial medulla (VMM)** that plays a crucial role in **inducing muscle atonia during REM sleep and also cataplexy-like episodes** in the narcolepsy model mouse (20).

We also identified a neurocircuit within the brainstem **pons and medulla** that is crucial for executing REM sleep. Activation of this circuit led to **direct transitions from wake to REM sleep** and increase in REM sleep amount. Within this circuit, **pontine neurons expressing corticotropin-releasing hormone-binding protein** (Crhbp+ neurons) were **crucial for muscle atonia** during REM sleep. In humans, impaired muscle atonia during REM sleep results in **REM sleep behavior disorder (RBD)**, which is a hallmark of **prodromal Parkinson's disease**, and the post-mortem brains showed a **large loss of Crhbp+ neurons** in Parkinson's disease patients with RBD, providing insight into the mechanisms underlying the sleep deficits of this disease (5).

5. Kashiwagi M, et al., (2024) *Cell* **187**(22): 6272-6289.e21.
15. Hasegawa E, et al., (2022) *Science* **375**(6584):994-1000.

20. Uchida S, et al., (2021) *J. Neurosci.* **41**(7):1582-1596.

### **Aim 3. To develop novel compounds, devices and diagnostic methods for treatment of sleep disorders**

#### **InSomnograf studies to assess sleep EEG at home**

In collaboration with the start-up company S'UIMIN and a newly developed handy EEG recording device "InSomnograf", we conducted a comprehensive study with detailed health examinations and EEG measurements to assess sleep quality at the participants' home. We found that **individuals with poor objective sleep quality exhibited a tendency toward unfavorable physical health indicators**, particularly **elevated systolic blood pressure** (12). We also found **significant discrepancies between subjective and objective assessments of sleep**; 66% of individuals who perceived their sleep as poor showed no objective sleep problems, while 45% of those who considered their sleep adequate were objectively sleep-deprived. These findings underscore the **inadequacy of subjective sleep assessments** for early diagnosis and effective intervention of sleep disorders, highlighting a **benefit of objective tools such as InSomnograf system** (3).

3. Masaki M, et al., (2025) *Proc. Natl. Acad. Sci. U.S.A.* **122**(3): e2412895121.

12. Iwagami M, et al., (2023) *Sci Rep.* **13**(1):21545.

#### **Smartphone applications related to diet management and sleep**

In collaboration with Pokemon and Asken companies, we conducted a large-scale study utilizing 4,825 data recorded in **smartphone applications** related to diet management and sleep, and found that the **food ingredients, such as proteins, dietary fibers, and fats, affect total sleep time and sleep profiles**, indicating that daily sleep is closely associated with healthy diet intake (4).

4. Seol J, et al., (2025) *J. Med. Internet Res.* **27**: e64749.

#### **Cognitive Behavioral Therapy for Chronic Insomnia**

Cognitive behavioral therapy for insomnia (**CBT-I**) is widely recommended as the first-line treatment for chronic insomnia over medications. We conducted a network meta-analysis of 241 randomized controlled trials involving over 31,000 individuals with insomnia to evaluate each component's effectiveness of CBT-I, and found that **sleep restriction, stimulus control, and third-wave interventions were particularly effective**. These findings help improve efficiency, support personalization, and enable more scalable delivery models of CBT-I (7).

7. Furukawa Y, et al., (2024) *Jama Psychiatry* **81**(4):357-365.

### **Aim 4. To uncover the neurocircuit regulating hibernation-like low metabolism state**

#### **Improvement of optogenetic induction of hibernation-like state**

**Qrfp-expressing neurons (Q neurons)** in the hypothalamus are discovered by IIIS to promote a hibernation-like hypothermic/hypometabolic state (QIH) in mice (**Takahashi TM et al., Nature 2020**). To further investigate the neurocircuit of QIH with high time-resolution, we developed a **new optogenetic method** using modified human opsin4. The improved method enabled QIH occur with **similar kinetics** of the physiological changes **to natural hibernation**, and suggested future applications for studying different neural mechanisms underlying sleep, daily torpor, and hibernation (16).

16. Takahashi TM, et al., (2022) *Cell Reports Methods* **2**(11): 100336.

### **Others**

#### **Neuronal system to regulate innate/instinctive behavior**

**Sexual behavior** is an instinctive behavior controlled by neurons in the basal forebrain, the hypothalamus, etc. We examined the extracellular levels of **acetylcholine (ACh)** and **dopamine (DA)** in the ventral shell of the **nucleus accumbens (vsNAc)** and found that both ACh and DA serve to orchestrate

the sequential transitions of male sexual behaviors in mice, indicating that the reciprocal signaling via cholinergic and dopaminergic receptors facilitate these behaviors (2).

2. Miyasaka A, et al., (2025) *Neuron* **113**(8):1240-1258.

**Core body temperature** changes in response to various factors, including circadian rhythm, stress stimuli, etc. We demonstrated that the **posterior subthalamic nucleus (PSTh)** plays a central role in mediating innate **fear-induced hypothermia** in mice, triggered by a predator odor analog. We found a PBel–PSTh–NTS excitatory circuit that drives hypothermia and tail vasodilation, highlighting PSTh as a key thermoregulatory hub linking fear perception to autonomic output (17).

17. Liu C, et al., (2021) *Nat. Commun.* **12**(1): 2648.

### 3. Facilitating Interdisciplinary Research Activities

- Describe the content of measures taken by the Center to facilitate interdisciplinary research activities. For example, measures that create an environment that will facilitate doing joint research by researchers in differing fields.
- Describe the contents and results of interdisciplinary research activities yielded by the measures described above.

Successful outcome (publications) of interdisciplinary research has been achieved by having new PIs of various background and research field. During the last 4 years, **6 new PIs** have been appointed to IIIS and accelerated the inter-laboratory collaborations.

**Dr. Hiroyuki Kitagawa** is a professor of the Center for Computational Sciences, University of Tsukuba, and joined IIIS in 2021. He is a data scientist and performs sleep science from the perspectives of data science and engineering. He works with other labs to establish the machine learning system for automatic scoring of sleep EEG. The representative papers include (see Attachment A-1-A);

23. Horie K, et al, (2024) *Sci. Rep.* **14**: 21894.

47. Shaikh SA, et al., (2024) *IEEE Access* **12**: 159426-159444. (and 33 more)

**Dr. Tomohiro Okura** is a professor of the Faculty of Health and Sport Sciences, University of Tsukuba, and also joined IIIS in 2021. He studies the assessment of physical performance and sleep in older adults, and development of exercise programs. His expertise helps studying the human metabolism and aging effects on sleep quantity and quality.

30. Nagata K, et al., (2024) *Geriatrics & Gerontology International* **24**(11): 1173-1180.

129. Seol J, et al, (2023) *Sci Rep.* **13**(1): 10416. (and 7 more)

**Dr. Tsuyoshi Saitoh** has been promoted to an associate professor and PI of IIIS in 2022. He is a pharmaceutical chemist and structural biologist, leading the drug design for GPCRs, including orexin receptors, opioid receptors, etc. He is also challenging optochemical approach together with other PIs.

26. Roy K, et al., (2024) *Nat. Commun.* **15**: 3661.

52. Yoshioka T, et al., (2024) *Mol. Psychiatry.* **30**, 2038–2048. (and 27 more)

**Dr. Shoi Shi** moved from the University of Tokyo and joined IIIS in 2022 as an assistant professor and PI. He is a data scientist and biologist, and interested in sleep physiology of not only mammals but ants, a social arthropod, to understand genetically conserved property and evolutionary significance of sleep over species.

17. Sawada T, et al., (2024) *Science* **385**(6716): 1459-1465.

92. Asano F, et al., (2023) *Proc. Natl. Acad. Sci. U.S.A.* **120**: e2218209120. (and 4 more)

**Dr. Shun Nakajima** moved from National Center of Neurology and Psychiatry and joined IIIS in 2023 as an associated professor and PI. He is a clinical psychologist, studying sleep problems of children and adults, and establishing new psychotherapy methods by using digital technology.

9. Sato N, et al., (2024) *Sleep Biol. Rhythms* **23**: 137–144.

27. Furukawa Y, et al., (2024) *Jama Psychiatry* **81**(4):357-365. (and 5 more)

**Dr. Masao Iwagami** is a professor of the Institute of Medicine, University of Tsukuba, and joined IIIS in 2023. He is a data scientist, studying sleep epidemiology using InSomnograf device and smartphone apps. He is interested in real-world data analysis of sleep EEG, combined with health/disease records or dietary components.

4. Seol J, et al., (2025) *J. Med. Internet Res.* **27**: e64749.

101. Iwagami M, et al., (2023) *Sci Rep.* **13**(1):21545. (and 1 more)

Collaborative research among labs in IIIS is crucial to perform the interdisciplinary research of "sleep science." For this purpose, we have whole IIIS meeting series, such as Work in Progress (WIP) meeting and Dojo journal club, regularly once a week. In these meetings, all PIs, researchers and students listen to the talk of one group on duty, and discuss the research progress, new ideas and technologies, etc. These open discussions help promote the inter-laboratory collaborations and interdisciplinary studies. In addition, these meetings are open to members and students of other research centers and schools in the university, so the opportunity of finding collaborators is not limited to IIIS but widespread Tsukuba area.

#### **4. Maintaining an International Research Environment**

- Describe what's been accomplished in the efforts to raise the Center's recognition as a genuine globally visible research institute, along with innovative efforts proactively being taken, including the following points, for example:
  - Efforts being developed to maintain an international research environment based on the analysis of number and state of world-leading, frontline researchers; exchanges with overseas entities
  - Proactive efforts to raise the level of the Center's international recognition
  - Efforts to make the Center into one that attracts excellent researchers from around the world (such as creating of an environment in which researchers can concentrate on their research, providing startup research funding, supporting efforts that will foster young researchers and contribute to advancing their career paths, and arranging support system for the research activities of overseas researchers.)
  - Consolidation of the administrative structures to support implementing the efforts described above
- In Appendix 3-1, describe the state of cooperation with overseas satellites, and list the main international research meetings held by the Center.

The overseas PIs have actively participated in the research activities of IIIS. As mentioned in the section 1, Dr. Liu and Dr. Greene are Co-PIs and regularly participate in the PI meeting. Together with them, Dr. Saper (Harvard) and Dr. Vyazovsky (Oxford) also contribute to IIIS through AMED Moonshot project (2021-2025) as the overseas satellite members.

In 2022, we have also started KAKEN project of "Deciphering the mysteries of sleep: creating a global network of sleep neurobiologists" supported by Fund for the Promotion of Joint International Research (RECONNECT: International Leading Research, 22K21351). This fund supports the salary of visiting researchers at overseas collaborative laboratory for a few years, as well as travel expenses. So far, we have sent 5 postdoctoral researchers to the top-level neuroscience/sleep laboratories, such as Dr. Frankland (University of Toronto), Dr. Tononi (University of Wisconsin), Dr. Soderling (Duke University), Dr. Shah (Stanford University), and Dr. Pentzel (Charité University Hospital, Germany) for a long-term collaboration. We also financially support other young researchers to visit overseas laboratories for a short-term, to prepare for the future collaborations.

IIIS hosts International Symposium every year since the establishment in 2012. About 200 of researchers and students participate each time, and enjoy lectures of 5-8 overseas guest speakers with active discussions. This is also a chance to find an opportunity of collaboration/job offer. During the last 4 years, we hosted/co-hosted 7 International Symposium (see Appendix 3-1); one was the Joint Congress of Japanese Society of Sleep Research and Japanese Society for Chronobiology 2023 (President: Masashi Yanagisawa).

We also host the institutional WPI-IIIS Seminars, where we invited domestic or foreign researchers of sleep/neuroscience fields 1-2 times per month. During the last 4 years, we hosted 55 seminars (223 times from the establishment). Besides the talk, each speaker is scheduled to spend a whole day to meet all PIs available, and this post-talk event further provides PIs opportunities of exchanging research ideas and expanding international network.

To perform the above international activities along with daily support of non-Japanese researchers and graduate students, we have 6 bilingual staff in the administrative office; 3 with Ph.D. in medicine/pharmacy. The secretaries of all laboratories have no problem of communication in English. All administrative documents, including e-mails and the meeting minutes, are prepared in both Japanese and English. We often welcome visitors of other university/academic organizations from overseas and provide an introductory lecture and lab tour to demonstrate the top level research activity/environment as a WPI center (see Appendix 4a).

## 5. Making Organizational Reforms

- Describe distinctive effort in managing research operation and administrative organization, such as the strong leadership that the director is giving on the Center's operation, strong performance by the administrative director who provides the center director with strong administrative and managerial support, and division of roles and authority between the Center and its host institution.
- Describe the ripple effects that activities to disseminate experience and know-how accumulated by the Center, such as the followings, have/had on the host institution (or other research institutes, if any):
  - System reforms made through the Center's leading activities to its research operation and administrative organization
  - Experience and know-how accumulated by the Center as it have worked to establish itself as top world-level research institutes.
- Other than the above, give examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

Since 2022, IIIS has been re-positioned in "the Organization for the Promotion of Strategic Research Initiatives", University of Tsukuba, and ranked as the top Advanced Research Center (RS) among others. In 2024, the new research organization named "Tsukuba Institute for Advanced Research (TIAR)" has been launched, and IIIS was assigned as one of the featured research centers. Along these reforms of the university organizations together with the transition of IIIS from WPI center to WPI Academy, we have cooperated establishing the university's re-organization strategy/design, KPI, etc., and also negotiated to have tenure positions of IIIS in the RS/TIAR. The administrative director of IIIS (2021-2023: Dr. Mayumi Kimura; 2024-present: Dr. Takatoshi Mochizuki) has been in charge of these reforming process and discussed with the university headquarter to provide the previous/ongoing experience of IIIS as the WPI center, so that to help them making the reform plans. As the results, RS center and TIAR have been successfully launched with similar WPI style/concept of administration, outreach, etc. To date, the new tenure positions are being assigned to IIIS (1 for RS center PI, 2 for TIAR PI and fellow). In addition, another tenure position will be assigned to IIIS through the reform plan for "the School of Integrative and Global Majors" and "the Ph.D. Program in Humanics", possibly in 2025. The administrative director of IIIS is always asked for an opinion for such organizational reforms, in WPI manner.

## 6. Efforts expected to WPI Academy Center to Enhance and Amplify the Visibility and Brand of the Overall WPI Program

- Describe how the Center's outreach activities have contributed to enhancing and amplifying the visibility and brand of the WPI program. Describe the successful cases of the Center's outreach activities in Appendix 4, and enter the number of activities in Appendix 4a.
- Other than the above, describe, if any, the activities and their concrete contents that have contributed to the enhancement and amplification of the visibility and brand of the WPI program (such as holding a large international research meeting, collaborative activities with multiple WPI centers). If you have already provided this information, please indicate where in the report.
- Describe the Center's efforts in making it a place that expands and accelerates the international circulation of the world's best brains. Give their success cases and describe their concrete contents and effect in narrative.
- Describe examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

IIIS is now well recognized as one of the top research centers for "sleep science", and many neuroscientists and sleep researchers of the world come to IIIS for a visit. In addition to the scholars, as shown in Appendix 4 and 4a, IIIS has received hundreds of requests for lectures from schools, companies and general public (126 times in FY2023 and 148 in FY2024). We have also accepted many visits of junior high/high school students for education purpose (up to 30 times in FY2024). Furthermore, we have accepted the staff education programs of our/other university, visits of the government officers and academic organizations of foreign countries. Considering the number of media exposure, especially those by the director Dr. Yanagisawa, we believe that IIIS may have a top visibility or public appeal among the WPI centers, contributing a lot to the branding of the WPI Program.

One of the important purpose of such media exposure, for IIIS, is to appeal the academic and

industrial success of InSomnograf system, our product of handy sleep EEG recording device/service. We need a mass data of sleep EEG combined together with health/disease records and genetic information, to achieve the next-generation biomedical database study claimed in AMED Moonshot project. This may provide us lots of advantages, potentially a great, life-style changing impact on both academic and industrial world. We have started this study as a collaboration project with Tsukuba city government, Toshiba Corporation, and some high schools (preparing).

## **7. Effort to Secure the Center's Future Development over the Mid- to Long-term**

- Address each of the following items that have been done to secure mid- to long-term center development:
  - Contents of the measures taken by the host institution to support maintaining the activities of the Center (such as securing financial and personnel resources, coordination among host institution to bring together in-house researchers, in-kind provision and/or facilities afforded in terms of usage of building, lab space and other equipment, new management reform carried out after the funding period ends).
  - Actions and measures taken to sustain the Center as a world premier international research center.

We appreciate the help and support of the president and university headquarter for IIIS in these years. During the transition period of IIIS to WPI Academy, University of Tsukuba has proceeded the shift of 7 IIIS PIs to the tenure positions in the graduate school programs, thus, the employment of these members are secured financially (see Appendix 3-2). As mentioned in the section 5, IIIS and University of Tsukuba have also been negotiating in reforming the new, top-level research organization TIAR, and 3 more PIs are planned to be on the tenure-track. However, many of non-PI researchers are employed by the grant money, as well as the administrative staff and technical staff. This may certainly be a future financial problem when the current main grant, such as AMED Moonshot, runs out.

Another potential problem is that the floor space of IIIS building is nearly full due to the increase of researchers and graduate students, and may need more space near future. We already moved the research space of 3 PI groups (studying human sleep) out to another building nearby IIIS, but the main building is still crowded now. We may ask the university for help.

## **8. Others**

- In addition to the above 1-7, note any of the Center's notable efforts and activities.

### **Multiple internal grants for supporting young researches**

We have increased the internal grant opportunity for young researchers of IIIS over the last 4 years. In 2024, we spent about one thirds of the WPI Academy budget for the following grants;

- 1) Start-up grant: for newly positioned postdoctoral researchers.
- 2) WPI Academy Research Assistant: financial support for master-course students, and also unfunded doctor-course students by JSPS or other foundation.
- 3) Travel grant: for young researchers participating conference overseas plus lab visit and talk in future collaborators' laboratory.
- 4) Female Researcher grant: for unfunded female researchers by KAKEN or other foundation.

All applicants submit the application form, then have an interview session in English. Three administrative staff with Ph.D. serve as reviewers and evaluate the research/travel plan, then report the results to the PI meeting for the final decision.

## Appendix 1 List of Center's Major Research Achievements

### 1. List of Major Refereed Papers

\*List up to 20 papers representative of the Center's research activities during the period between FY 2021 and FY 2024, and give brief descriptions (within 5 to 10 lines) of them.

\*For each, write the author name(s); year of publication; journal name, volume, page(s) (or DOI number), and article title. Any listing order may be used as long as format is the same. If a paper has many authors, underline those affiliated with the Center.

\*If a paper has many authors (say, more than 10), all of their names do not need to be listed.

1. Yin X, Zhang Z, Zhou R, Zuo P, Sang D, Zhou S, Shi B, Chen L, Wu C, Guo Y, Wang F, Zhang EE, Li Q, Yanagisawa M, Liu Q (2025) Calcineurin governs baseline and homeostatic regulations of non-rapid eye movement sleep in mice. *Proc. Natl. Acad. Sci. U.S.A.* **122**(4): e2418317122. doi: 10.1073/pnas.2418317122.
  - The sleep regulatory functions of protein phosphatases have not been characterized in mice. Calcineurin, also known as PP2B or PPP3, is a conserved Ca<sup>2+</sup>/calmodulin-dependent phosphatase that removes phosphorylation from serine/threonine (Ser/Thr) residues of substrate proteins to modulate their functions. In mice, gain or loss of calcineurin activity in the mouse brain neurons dramatically increase or decrease daily sleep amount, respectively. Moreover, depletion of calcineurin in the adult mouse brain prevents the homeostatic sleep response—the increased amount and intensity of homeostatic recovery sleep—following sleep deprivation. Thus, calcineurin acts as an important regulator of daily sleep amount and homeostatic sleep response in the mouse brain.
2. Miyasaka A, Kanda T, Nonaka N, Terakoshi Y, Cherasse Y, Ishikawa Y, Li Y, Takizawa H, Hirano A, Seita J, Yanagisawa M, Sakurai T, Sakurai K, Liu Q (2025) Sequential transitions of male sexual behaviors driven by dual acetylcholine-dopamine dynamics. *Neuron* **113**(8): 1240-1258. doi: 10.1016/j.neuron.2025.01.032.
  - This paper reports that dual acetylcholine (ACh) and dopamine (DA) rhythms in the ventral shell of the nucleus accumbens (vsNAC) orchestrate the sequential transitions of male sexual behaviors in mice, particularly from intromission to ejaculation. The study reveals that these rhythms are locally generated through reciprocal signaling between cholinergic and dopaminergic neurons, and that disrupting ACh or D2R signaling in the vsNAC impairs these behaviors.
3. Masaki M, Tsumoto S, Tani A, Tominaga M, Seol J, Chiba S, Miyanishi K, Nishida K, Kawana F, Amemiya T, Hiei T, Kanbayashi T, Yanagisawa M (2025) Discrepancies between subjective and objective sleep assessments revealed by in- home electroencephalography during real- world sleep. *Proc. Natl. Acad. Sci. U.S.A.* **122**(3): e2412895121. doi:10.1073/pnas.2412895121
  - We have identified significant discrepancies between subjective and objective assessments of sleep. The study revealed that 66% of individuals who perceived their sleep as poor showed no objective sleep problems, while 45% of those who considered their sleep adequate were objectively sleep-deprived. These findings underscore the inadequacy of subjective sleep assessments for early diagnosis and effective intervention of sleep disorders, highlighting the critical role of objective tools such as sleep electroencephalography.
4. Seol J, Iwagami M, Kayamare MCT, Yanagisawa M (2025) Relationship Among Macronutrients, Dietary Components, and Objective Sleep Variables Measured by Smartphone Apps:Real-World Cross-Sectional Study. *J. Med. Internet Res.* **27**: e64749. doi:10.2196/64749
  - We conducted a large-scale study utilizing 4,825 data recorded in smartphone applications related to diet management and sleep, and found that individuals with higher protein intake had longer total sleep time than those with lower protein intake. Moreover, individuals who consumed more dietary fibers had longer total sleep time but shorter sleep latency (time taken to fall asleep) and wakefulness after sleep onset.
5. Kashiwagi M, Beck G, Kanuka M, Arai Y, Tanaka K, Tatsuzawa C, Koga Y, Saito YC, Takagi M, Oishi Y, Sakaguchi M, Baba K, Ikuno M, Yamakado H, Takahashi R, Yanagisawa M, Murayama S, Sakurai T, Sakai K, Nakagawa Y, Watanabe M, Mochizuki H, Hayashi Y (2024) A pontine-medullary loop crucial for REM sleep and its deficit in Parkinson's disease. *Cell* **187**(22): 6272-6289.e21. doi:10.1016/j.cell.2024.08.046
  - The central circuit controlling REM sleep was not well understood. In this study, we identified a neuronal circuit within the brainstem pons and medulla that is crucial for executing REM sleep. Artificial activation of this circuit led to direct transitions from wake to REM sleep and a subsequent drastic increase in REM sleep amount. Within this circuit, pontine neurons that express corticotropin-releasing hormone-binding protein (Crhbp+ neurons) were crucial for muscle atonia during REM sleep. In humans, impaired muscle atonia during REM sleep results in REM sleep behavior disorder (RBD), which is a hallmark of prodromal Parkinson's disease. Indeed, in human post-mortem brains, we found that Crhbp+ neurons were largely lost in Parkinson's disease patients with RBD, providing insight into the mechanisms underlying the sleep deficits of this disease.

6. Sawada T, Iino Y, Yoshida K, Okazaki H, Nomura S, Shimizu C, Arima T, Juichi M, Zhou S, Kurabayashi N, Sakurai T, Yagishita S, Yanagisawa M, Toyozumi T, Kasai H, Shi S (2024) Prefrontal synaptic regulation of homeostatic sleep pressure revealed through synaptic chemogenetics. *Science* **385**(6716): 1459-1465. doi:10.1126/Science.adl3043
  - We developed a theoretical model predicting how synaptic potentiation drives sleep need, created a novel chemogenetic tool to selectively potentiate synapses, and established an in vitro sleep system using cultured neurons. By integrating in vitro and in vivo approaches, we provided the first causal evidence that synaptic potentiation induces sleep, and that sleep, in turn, promotes synaptic downscaling.
7. Furukawa Y, Sakata M, Yamamoto R, Nakajima S, Kikuchi S, Inoue M, Ito M, Noma H, Takashina HN, Funada S, Ostinelli EG, Furukawa TA, Efthimiou O, Perlis M (2024) Components and Delivery Formats of Cognitive Behavioral Therapy for Chronic Insomnia in Adults A Systematic Review and Component Network Meta-Analysis. *Jama Psychiatry* **81**(4): 357-365. doi:10.1001/jamapsychiatry.2023.5060
  - Cognitive behavioral therapy for insomnia (CBT-I) is widely recommended as the first-line treatment for chronic insomnia, but the efficacy of its individual components remains unclear. This study conducted a network meta-analysis of 241 randomized controlled trials involving over 31,000 individuals with insomnia to evaluate each component's effectiveness. The results showed that sleep restriction, stimulus control, and third-wave interventions (e.g., mindfulness) were particularly effective. In contrast, commonly used elements like sleep hygiene and relaxation were less effective. These findings offer key insights for refining CBT-I by focusing on the most effective components, helping improve efficiency, support personalization, and enable more scalable delivery models.
8. Roy K, Zhou XZ, Otani R, Yuan PC, Ioka S, Vogt KE, Kondo T, Farag NHT, Ijiri H, Wu ZF, Chitose Y, Amezawa M, Uygun DS, Cherasse Y, Nagase H, Li YL, Yanagisawa M, Abe M, Basheer R, Wang YQ, Saitoh T, Lazarus M (2024) Optochemical control of slow-wave sleep in the nucleus accumbens of male mice by a photoactivatable allosteric modulator of adenosine A<sub>2A</sub> receptors. *Nat. Commun.* **15**(1): 3661. doi:10.1038/s41467-024-47964-4
  - Adenosine A<sub>2A</sub> receptors in the nucleus accumbens are crucial for regulating sleep and motivation. Until now, no drugs have been able to selectively modulate these receptors without impacting other organs. The Lazarus lab has developed a light-activated allosteric modulator of the adenosine A<sub>2A</sub> receptor, successfully inducing sleep in mice through targeted light irradiation of the nucleus accumbens.
9. Asano F, Kim SJ, Fujiyama T, Miyoshi C, Hotta-Hirashima N, Asama N, Iwasaki K, Kakizaki M, Mizuno S, Mieda M, Sugiyama F, Takahashi S, Shi S, Hirano A, Funato H, Yanagisawa M (2023) SIK3-HDAC4 in the suprachiasmatic nucleus regulates the timing of arousal at the dark onset and circadian period in mice. *Proc. Natl. Acad. Sci. U.S.A.* **120**(11): e2218209120. doi:10.1073/pnas.2218209120
  - Although rapid awakening after sleep is essential for animal survival and human daily productivity, its molecular mechanism remains unclear. C57BL/6J mice exhibit rapid and sustained wakefulness immediately after the onset of the dark phase. In contrast, mice lacking protein kinase SIK3 in the suprachiasmatic nucleus show a delayed awakening response during the early dark phase, despite having a total daily wake time comparable to that of wild-type mice. These findings suggest that SIK3 regulates the temporal dynamics of sleep-wake transitions, shaping not only the amount and quality but also the rhythmic pattern of wakefulness.
10. Kawano T, Kashiwagi M, Kanuka M, Chen C, Yasugaki S, Hatori S, Miyazaki S, Tanaka K, Fujita H, Nakajima T, Yanagisawa M, Nakagawa Y, Hayashi Y (2023) ER proteostasis regulators cell-non-autonomously control sleep. *Cell Reports* **42**(3): 112267. doi:10.1016/j.celrep.2023.112267
  - For the first time, we conducted a forward genetic screening for mutants with abnormal sleep using the nematode *C. elegans*. As a result, we found that loss of function of SEL-11 leads to an extreme long-sleeper phenotype. Moreover, loss of function of the mammalian homolog also resulted in drastically-increased sleep in mice. We found that SEL-11 functions in non-neuronal peripheral tissues and that ER stress-response pathways act downstream to generate a non-cell autonomous signal that promotes sleep. Our results suggest that sleep is an individual-level response to ER stress.
11. Prokofeva K, Saito YC, Niwa Y, Mizuno S, Takahashi S, Hirano A, Sakurai T (2023) Structure and function of neuronal circuits linking ventrolateral preoptic nucleus and lateral hypothalamic area. *J. Neurosci.* **43**(22): 4075-4092. doi:10.1523/JNEUROSCI.1913-22.2023
  - In this study, we investigated the anatomical and functional connectivity between the ventrolateral preoptic area (VLPO) and the lateral hypothalamus (LHA), two brain regions critically involved in sleep-wake regulation. Using viral tracing, electrophysiology, and behavioral analyses, we identified specific GABAergic VLPO neurons that project to and inhibit wake-promoting orexin neurons in the LHA. Conversely, we found that LHA neurons can modulate VLPO activity via reciprocal projections. Optogenetic activation of VLPO-LHA projections promoted sleep, while inhibition disrupted normal sleep architecture. Our findings elucidate a bidirectional circuit that balances arousal and sleep, offering insights into the neural mechanisms governing sleep homeostasis.

12. Iwagami M, Seol J, Hiei T, Tani A, Chiba S, Kanbayashi T, Kondo H, Tanaka T, Yanagisawa M (2023) Association between electroencephalogram-based sleep characteristics and physical health in the general adult population. *Sci Rep.* **13**(1): 21545. doi:10.1038/s41598-023-47979-9  
 · We conducted a comprehensive study involving 100 adults aged 30-59 years, with detailed health examinations and electroencephalogram (EEG) measurements to assess sleep quality for five nights at the participants' homes. Exploring the relationship between sleep quality and various physical health parameters, we found that individuals with poor objective sleep quality exhibited a tendency toward unfavorable physical health indicators, particularly elevated systolic blood pressure.
13. Kim SJ, Hotta-Hirashima N, Asano F, Kitazono T, Iwasaki K, Nakata S, Komiya H, Asama N, Matsuoka T, Fujiyama T, Ikkyu A, Kakizaki M, Kanno S, Choi J, Kumar D, Tsukamoto T, Elhosainy A, Mizuno S, Miyazaki, S, Tsuneoka, Y, Sugiyama, F, Takahashi, S, Hayashi Y, Muratani M, Liu Q, Miyoshi C, Yanagisawa M, Funato H (2022) Kinase signalling in excitatory neurons regulates sleep quantity and depth. *Nature* **612**(7940): 512-518. doi:10.1038/s41586-022-05450-1  
 · The duration and depth of sleep serve as indicators of sleep health. However, the neural mechanisms that regulate these sleep parameters remain unclear. Neuron-type- and brain region-specific manipulation of protein kinase SIK3 revealed that SIK3 in forebrain excitatory neurons regulates EEG delta power during NREM sleep, whereas SIK3 in hypothalamic excitatory neurons controls NREM sleep duration. Furthermore, this study demonstrated that the LKB1-SIK3-HDAC4/5 pathway constitutes an intracellular signaling cascade that regulates NREM sleep, potentially functioning in a phylogenetically conserved manner.
14. Zhou R, Wang GD, Li Q, Meng FX, Liu C, Gan R, Ju DP, Liao MM, Xu JJ, Sang D, Gao X, Zhou S, Wu KJ, Sun QZ, Guo Y, Wu CY, Chen ZY, Chen L, Shi BH, Wang HY, Wang X, Li HY, Cai T, Li B, Wang FC, Funato H, Yanagisawa M, Zhang EE, Liu Q (2022) A signalling pathway for transcriptional regulation of sleep amount in mice. *Nature* **612**(7940): 519-527. doi:10.1038/s41586-022-05510-6  
 · In mammals, sleep quantity is also governed by genetic factors and exhibit age-dependent variations. However, the core molecular pathways and effector mechanisms that regulate sleep quantity remain unclear. This study characterizes LKB1-SIK3-HDAC4/5-CREB as the first signaling pathway for transcriptional regulation of sleep amount in mice by AAV-mediated somatic genetics analysis. These findings introduce the concept of signaling pathways targeting transcription modulators to regulate sleep amount and further demonstrate utility of somatic genetics in mouse sleep research.
15. Hasegawa E, Miyasaka A, Sakurai K, Cherasse Y, Li YL, Sakurai T (2022) Rapid eye movement sleep is initiated by basolateral amygdala dopamine signaling in mice. *Science* **375**(6584): 994-1000. doi:10.1126/science.abl6618  
 · In this study, we demonstrated that rapid eye movement (REM) sleep is initiated by a transient increase in dopamine release in the basolateral amygdala (BLA) during non-REM (NREM) sleep. Using a combination of in vivo imaging, optogenetics, and pharmacological approaches, we found that this dopamine surge serves as a critical trigger for the transition from NREM to REM sleep. By selectively manipulating dopaminergic input to the BLA, we were able to either promote or suppress REM sleep episodes. Furthermore, using a narcolepsy model mouse, we showed that the same dopamine surge in the BLA precedes the onset of cataplexy, a pathological REM sleep-like state. These findings uncover a previously unrecognized mechanism by which the brain initiates REM sleep and suggest that dysregulation of this circuit may underlie the pathophysiology of narcolepsy.
16. Takahashi TM, Hirano A, Kanda T, Saito VM, Ashitomi H, Tanaka KZ, Yokoshiki Y, Masuda K, Yanagisawa M, Vogt KE, Tokuda T, Sakurai T (2022) Optogenetic induction of hibernation-like state with modified human Opsin4 in mice. *Cell Reports Methods* **2**(11): 100336. doi:10.1016/j.crmeth.2022.100336  
 · We previously reported that the excitatory manipulation of *Qrfp*-expressing neurons in the hypothalamus (quiescence-inducing neurons [Q neurons]) induced a hibernation-like hypothermic/hypometabolic state (QIH) in mice. To control the QIH with a higher time resolution, we developed an optogenetic method using modified human opsin4 (OPN4). C-terminally truncated OPN4 (OPN4dC) stably and reproducibly induces QIH for at least 24 h by illumination with low-power light (3  $\mu$ W, 473 nm laser) with high temporal resolution. The high sensitivity of OPN4dC allows us to transcranially stimulate Q neurons with blue-light-emitting diodes and non-invasively induce the QIH, potentially leading to clinical applications in humans. OPN4dC-mediated QIH recapitulates the kinetics of the physiological changes observed in natural hibernation, revealing that Q neurons concurrently contribute to thermoregulation and cardiovascular function. This optogenetic method can facilitate the identification of the neural mechanisms underlying long-term dormancy states such as sleep, daily torpor, and hibernation.
17. Liu C, Lee CY, Asher G, Cao LQ, Terakoshi Y, Cao P, Kobayakawa R, Kobayakawa K, Sakurai K, Liu Q (2021) Posterior subthalamic nucleus (PSTh) mediates innate fear-associated hypothermia in mice.

*Nat. Commun.* **12**(1): 2648. doi:10.1038/s41467-021-22914-6

- This study demonstrates that the posterior subthalamic nucleus (PSTh) plays a central role in mediating innate fear-induced hypothermia in mice, triggered by the predator odor analog 2MT. In this paper, we identify a PBel–PSTh–NTS excitatory circuit that drives hypothermia and tail vasodilation, highlighting PSTh as a key thermoregulatory hub linking fear perception to autonomic output.

18. Tsai CJ, Nagata T, Liu CY, Suganuma T, Kanda T, Miyazaki T, Liu K, Saitoh T, Nagase H, Lazarus M, Vogt V, Yanagisawa M, Hayashi Y (2021) Cerebral capillary blood flow upsurge during REM sleep is mediated by A2a receptors. *Cell Reports* **36**(7): 109558. doi:10.1016/j.celrep.2021.109558
  - How the cerebral blood flow (CBF) changes across sleep/wake states was unclear, with different conclusions drawn between PET, NIRS, or doppler studies. In this study, to reach a definite conclusion, we directly observed red blood cells within capillaries, where the actual substance exchange between the blood and neurons/glia occurs, by two-photon microscopy. As a result, we found that capillary CBF is largely increased during REM sleep compared wakefulness and non-REM sleep. Moreover, we found that signaling via adenosine A2a receptors is crucial for the elevated CBF during REM sleep. These results provided definite conclusions regarding the dynamics of CBF across sleep/wake states and insights to the underlying mechanisms. Based on these findings, REM sleep might be a state crucial for recovery of the cerebral cortex.
  
19. Iwasaki K, Fujiyama T, Nakata S, Park M, Miyoshi C, Hotta-Hirashima N, Ikkyu A, Kakizaki M, Sugiyama F, Mizuno S, Abe M, Sakimura K, Takahashi S, Funato H, Yanagisawa M (2021) Induction of mutant *Sik3*(Sleepy) allele in neurons in late infancy increases sleep need. *J. Neurosci.* **41**(12): 2733-2746. doi:10.1523/JNEUROSCI.1004-20.2020
  - Previous forward genetic screening in mice demonstrated that loss of a PKA phosphorylation site enhances NREM sleep, implicating protein kinase SIK3 as a potential neural regulator of sleep. By generating gene-modified mice that allow for temporally and neuron-specific expression of SIK3 lacking the PKA site, we showed that expression of the PKA-site-deficient SIK3 in young adult mice increased NREM sleep. These findings indicate that the neural SIK3 pathway plays a crucial role in the regulation of sleep.
  
20. Uchida S, Soya S, Saito YC, Hirano A, Koga K, Tsuda M, Abe M, Sakimura K, Sakurai T (2021) A discrete glycinergic neuronal population in the ventromedial medulla that induces muscle atonia during REM sleep and cataplexy in mice. *J. Neurosci.* **41**(7): 1582-1596. doi:10.1523/JNEUROSCI.0688-20.2020
  - In this study, we identified a specific population of glycinergic neurons in the ventromedial medulla (VMM) that plays a crucial role in inducing muscle atonia during REM sleep. Using viral vector-mediated tracing in GlyT2-Cre mice, we found that these neurons receive direct excitatory inputs from glutamatergic neurons in the sublateral tegmental nucleus (SLD). Selective silencing of this pathway via tetanus toxin light chain expression led to REM sleep without atonia. Furthermore, in orexin-ataxin-3 narcoleptic mice, this manipulation significantly reduced the occurrence of cataplexy-like episodes. Our findings demonstrate that this glycinergic VMM neuronal population is essential for both REM sleep atonia and the expression of cataplexy, providing insights into the shared neural mechanisms underlying these phenomena.

## 2. Major Invited Lectures, Plenary Addresses (etc.)

\*List up to 10 main presentations made between FY 2021 and FY 2024 in order from most recent.

\*For each, write the date(s), lecturer/presenter's name, presentation title and conference name.

Date(s)	Lecturer/Presenter's name	Presentation title	Conference name
2024/10/22	Masashi Yanagisawa	Deciphering the mysteries of sleep: toward the molecular substrate for "sleepiness"	Burdon Sanderson Award Lecture 2024, University of Oxford
2024/09/30-10/5	Masashi Yanagisawa	Deciphering the mysteries of sleep: toward the molecular substrate for "sleepiness"	KVA-JSPS Seminar, U of Helsinki/ U of Uppsala/ Karolinska Institutet
2024/09/11	Takeshi Sakurai	Dopamine-mediated mechanisms underlying REM Sleep initiation and regulation	2024 Cold Spring Harbor Asia Conference
2024/09/17	Masashi Yanagisawa	Deciphering the mysteries of sleep: toward the molecular substrate for "sleepiness"	InCor-JSPS Joint International Symposium, University of Sao Paulo
2023/03/31	Yu Hayashi	Analyses of the function and regulation of REM sleep	The 10th Congress of Asian Sleep Research Society (ASRS 2023)
2023/09/16	Masashi Yanagisawa	Searching for the molecular substrate for "sleepiness"	The 45th Annual Meeting of Japanese Society of Sleep Research
2023/05/17	Masashi Yanagisawa	Deciphering the mysteries of sleep: toward the molecular substrate for "sleepiness"	The American Society for Clinical Investigation Scientific Sessions
2022/06/30	Takeshi Sakurai	Special lecture - Rapid eye movement sleep is initiated by basolateral amygdala dopamine signaling in mice	NEURO2022
2022/07/03	Masashi Yanagisawa	Award lecture - Deciphering the mysteries of sleep: toward the molecular substrate for "sleepiness"	NEURO2022
2021/11/09	Masashi Yanagisawa	Special Lecture - The Mysteries of Sleep - Toward the Molecular Substrate for "Sleepiness"	50th Annual Meeting of the Society for Neuroscience 2021

### 3. Major Awards

\*List main awards received between FY 2021 and FY 2024 in order from the most recent (within 10 awards)..

\*For each, write the date issued, recipient's name and the name of award. In case of multiple recipients, underline those affiliated with the Center.

Date	Recipient's name	Name of award
2025/02	Arisa Hirano	FY2024 Tsukuba Encouragement Prize
2024/10	Masashi Yanagisawa	Burdon Sanderson Prize 2024
2024/05	Masashi Yanagisawa	Fellows of IUPS Academy
2023/09	Masashi Yanagisawa	Clarivate Citation Laureates
2023/04	Emi Hasegawa	FY2023 Young scientist's prize, commendation for science and technology by MEXT
2022/12	Masashi Yanagisawa	Honorary doctorate from University of Bern
2022/09	<u>Masashi Yanagisawa</u> , Emmanuel Mignot	Breakthrough Prize in Life Sciences 2023
2022/07	Masashi Yanagisawa	Toshihiko Tokizane Memorial Award
2022/02	Takeshi Sakurai	FY2021 Tsukuba Prize
2021/04	Arisa Hirano	FY2021 Young scientist's prize, commendation for science and technology by MEXT

## Appendix 2 FY 2024 List of Principal Investigators

NOTE:

\*Underline names of principal investigators who belong to an overseas research institution.

\*Indicate newly added researchers for FY 2021-2024 in the "Notes" column.

<Principal Investigators at the end of FY 2024>								Principal Investigators Total: 29
Name	Age	Affiliation (Position title, department, organization)	Academic degree, Specialty	Effort (%)*	Starting date of participation	Status of participation (Describe in concrete terms)	Note	
Center director								
Masashi Yanagisawa	64	Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	M.D., Ph.D. ; Neuroscience, Pharmacology	95	December 2012	Usually stays at the center		
Takeshi Sakurai	60	Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Professor, Faculty of Medicine, University of Tsukuba	M.D., Ph.D.; Neuroscience	80	April 2013	Usually stays at the center		
Hiromasa Funato	55	Visiting Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba Professor, Toho University	M.D., Ph.D.; Neuroscience	40	December 2012	a) Stays at the center twice a week b) Attends PI meeting 1X/month (by Zoom or in person)		
<u>Robert Greene</u>	74	Professor, Department of Psychiatry, University of Texas Southwestern Medical Center	M.D., Ph.D.; Neuroscience	10	December 2013	a) Usually stays at the satellite center (In FY2022, visited IIIS on the occasion of the annual symposium for 16 days) b) Online meeting with lab 1X/week c) Attends PI meeting 1X/month (by Zoom) d) Participates in the annual IIIS symposium (in person)		
<u>Qinghua Liu</u>	53	Investigator, National Institute of Biological Sciences (NIBS), Tsinghua University, China	Ph.D. ; Genetics, Molecular Biology, Biochemistry	10	April 2013	a) Usually stays at the satellite center (In FY2022, visited IIIS on the occasion of the annual symposium for 3 days) b) Online meeting with lab 1X/week c) Attends PI meeting 1X/month (by Zoom) d) Participates in the annual IIIS symposium (in person)		
Noriki Kutsumura	47	Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Professor, Faculty of Pure and Applied Sciences, University of Tsukuba	Ph.D.; Organic Chemistry, Medicinal Chemistry	80	April 2013	Usually stays at the center		
Takashi Kanbayashi	61	Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Physician, Ibaraki Prefectural Medical Center of Psychiatry	M.D., Ph.D.; Sleep Medicine, Psychiatry	80	April 2019	Stays 2 days or more/week at the center when free from clinical duties		
Hiroyuki Kitagawa	69	Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	Ph.D.; Computer Science, Intelligent Informatics	100	April 2021	Usually stays at the center	April 2021 ~ new member	
Michael Lazarus	55	Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Professor, Faculty of Medicine, University of Tsukuba	Ph.D.; Neuroscience	80	April 2013	Usually stays at the center		
Yu Hayashi	44	Visiting Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba Professor, School of Science, The University of Tokyo Professor, Graduate School of Medicine, Kyoto University	Ph.D.; Neuroscience	20	April 2013	a) Stays at the center twice a week b) Attends PI meeting 1X/month (by Zoom or in person)		
Kaspar Vogt	58	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba Associate Professor, Faculty of Life and Environmental Sciences, University of Tsukuba	M.D., Ph.D.; Physiology, Pharmacology, Neurobiology	80	February 2014	Usually stays at the center		

Masanori Sakaguchi	48	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Associate Professor, Faculty of Medicine, University of Tsukuba	M.D., Ph.D.; Neuroscience	80	January 2013	Usually stays at the center	
Takashi Abe	45	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	Ph.D.; Behavioral Science, Psychophysiology	100	November 2017	Usually stays at the center	
Katsuyasu Sakurai	46	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Associate Professor, Faculty of Medicine, University of Tsukuba	Ph.D.; Neuroscience	25	July 2017	Usually stays at the center	
Tsuyoshi Saito	40	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Associate Professor, Faculty of Medicine, University of Tsukuba	Ph.D.; Chemical Biology, Medicinal Chemistry	80	April 2022	Usually stay at the center	April 2022 ~ new member
Shun Nakajima	40	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	Ph.D.; Sleep Medicine	100	July 2023	Usually stay at the center	July 2023~ new member
Sakiko Honjoh	44	Assistant Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	Ph.D.; Molecular Biology, Genetics, Neuroscience	100	September 2017	Usually stays at the center	
Yo Oishi	44	Associate Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Associate Professor, Faculty of Medicine, University of Tsukuba	Ph.D.; Neuroscience	80	April 2013	Usually stays at the center	
Arisa Hirano	39	Assistant Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba; Assistant Professor, Faculty of Medicine, University of Tsukuba	Ph.D.; Molecular Biology, Genetics, Neuroscience	80	April 2019	Usually stays at the center	
Hirofumi Toda	46	Assistant Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	Ph.D.; Genetics	100	July 2019	Usually stay at the center	
Shoi Shi	36	Assistant Professor, International Institute for Integrative Sleep Medicine, University of Tsukuba	Ph.D.; Neuroscience, Systems Genomics, Data Science	100	March 2022	Usually stay at the center	March 2022 ~ new member
Tomohiro Okura	52	Professor, Faculty of Health and Sport Sciences, University of Tsukuba	Ph.D.; Health and Sports Sciences	20	November 2021	a) Usually stays at Faculty of Health and Sport Sciences b) Attends PI meeting once a month in person	November 2021~ new member
Masao Iwagami	41	Professor, Faculty of Medicine, University of Tsukuba	Ph.D.; Epidemiology and Population Health	20	September 2023	a) Usually stays at Faculty of Medicine b) Attends PI meeting once a month in person	September 2023~ new member
Genshiro Sunagawa	48	Team Leader, Laboratory for Hibernation Biology, RIKEN	M.D., Ph.D.; Physiology	10	April 2022	Usually stays at the partner institution	April 2022 ~ new member
<u>Clifford B. Saper</u>	72	Professor, Beth Israel Deaconess Medical Center, Harvard University	M.D., Ph.D.; Neurobiology	10	April 2022	Usually stays at the partner institution	April 2022 ~ new member
<u>Vladyslav Vyazovsky</u>	49	Professor, Sleep Physiology, Oxford University	Ph.D.; Zoology	10	April 2022	Usually stays at the partner institution	April 2022 ~ new member
Hiroyasu Ando	46	Professor, Center of Mathematical Sciences for Open Innovation, WPI-AIMR Tohoku University	Ph.D.; Information Science and Engineering	10	April 2022	Usually stays at the partner institution	April 2022 ~ new member
Morimitsu Kurino	51	Professor, Faculty of Economics, Keio University	Ph.D.; Economics	10	April 2022	Usually stays at the partner institution	April 2022 ~ new member
Shuji Nakamura	41	Research Support Division Manager, S'UIMIN Inc.	B.S.; Medical Science	10	April 2022	Usually stays at the partner institution	April 2022 ~ new member

\*Percentage of time that the principal investigator devotes to his/her work for the Academy center vis-à-vis his/her total working hours.

**Principal Investigators resigned since FY 2021**

Name	Next Affiliation (Position title, department, organization)	Period of participation
Makoto Satoh	Physician, Internal (Sleep) Medicine, Moriya Keiyu Hospital/Retired at the end of March in 2020	April 1st 2015 - March 31st 2022
Joseph Takahashi	University of Texas Southwestern Medical Center, USA (Professor & Chair, Department of Neuroscience)	December 1st 2012 - March 31st 2023
Carla Green	University of Texas Southwestern Medical Center, USA (Professor, Department of Neuroscience)	March 1st 2013 - March 31st 2023
Yang Dan	University of California, Berkeley, USA (Professor, Dept of Molecular & Cell Biology)	April 1st 2014 - March 31st 2023
Kazuo Mishima	Akita University Graduate School of Medicine, Japan (Professor, Doctorial Course in Medicine Bioregulatory Medicine Department of Neuropsychiatry)	October 1st 2018 - March 31st 2023
Yves Dauvilliers	Professor, Gui de Chauliac Hospital, University of Montpellier, INSERM Institute for Neurosciences Montpellier	April 1st 2022 - March 31st 2024
Kumpei Tokuyama	Professor Emeritus, University of Tsukuba	April 1st 2015 - March 31st 2024
Mayumi Kimura	Professor, International Research Center for Neurointelligence, The University of Tokyo	January 1st 2022 - March 31st 2024

## Appendix 3-1 Record of Center Activities (FY 2021-FY 2024)

### 1. Researchers and Center Staffs, Satellites, Partner Institutions

#### 1-1. Researchers and Center Staffs Participated in the Center's Activities

- Enter the number of researchers and center staffs affiliated with the Center in the table in Appendix 3-1a.

##### Special mention

- Describe the Center's concrete plans for the future and already-established schedules for employing researchers, particularly principal investigators.
- As background to how the Center is working on the global circulation of world's best brains, give good examples, if any, of how career paths are being established for the Center's researchers; that is, from which top-world research institutions do researchers come to the Center and to which research institutions do the Center's researchers go, and how long are their stays at those institutions.
- In Appendix 3-1b, describe the positions that postdoctoral researchers acquire upon leaving the Center.

#### 1-2. Satellites and Partner Institutions

- List the satellite and partner institutions, both domestic and overseas, in the table below.
- Indicate newly added and deleted institutions in the "Notes" column.

##### <Satellite institutions>

Institution name	Principal Investigator(s), if any	Notes
University of Texas Southwestern Medical Center, USA	Robert Greene	
National Institute of Biological Sciences, China	Qinghua Liu	

##### < Partner institutions >

Institution name	Principal Investigator(s), if any	Notes
RIKEN, Japan	Genshiro Sunagawa	
Oxford University, UK	Vladyslav Vyazovsky	
Tohoku University, Japan	Hiroyasu Ando	
Keio University, Japan	Morimitsu Kurino	
S'UIMIN Inc., Japan	Shuji Nakamura	
Harvard University, USA	Clifford B. Saper	New
Toho University, Japan	Hiromasa Funato	New
Kyoto University, Japan		New
National Center of Neurology and Psychiatry, Japan		New

## 2. Status of Collaboration with Overseas Satellites

### 2-1. Coauthored Papers

- List the refereed papers published between FY 2021 and FY 2024 that were coauthored between the Center's researcher(s) in domestic institution(s) (include satellite institutions) and overseas satellite institution(s). List them by overseas satellite institution in the below blocks.
- Transcribe data in same format as in Appendix 1. Italicize the names of authors affiliated with overseas satellite institutions.

Overseas Satellite 1      University of Texas Southwestern Medical Center (Total: 5 papers)

- 1) Vogt KE, Kulkarni A, Pandi R, Dehnad M, Konopka G, *Greene RW* (2025) Sleep need driven oscillation of glutamate synaptic phenotype. *Elife* 13. doi:10.7554/eLife.98280; 10.7554/eLife.98280.4.sa1; 10.7554/eLife.98280.4.sa2
- 2) Bjorness TE, *Greene RW* (2024) Orexin-mediated motivated arousal and reward seeking. *Peptides* 180. doi:10.1016/j.peptides.2024.171280
- 3) Han G, Matsumoto S, Diaz J, *Greene RW*, Vogt KE (2022) Dihydropyridine calcium blockers do not interfere with non-rapid eye movement sleep. *Front. Neurosci.* 16. doi:10.3389/fnins.2022.969712
- 4) Bjorness TE, *Greene RW* (2021) Interaction between cocaine use and sleep behavior: A comprehensive review of cocaine's disrupting influence on sleep behavior and sleep disruptions influence on reward seeking. *Pharmacol Biochem Behav* 206, 173194. 10.1016/j.pbb.2021.173194 (71)
- 5) Sonneborn A, *Greene RW* (2021) Norepinephrine transporter antagonism prevents dopamine-dependent synaptic plasticity in the mouse dorsal hippocampus. *Neurosci Lett* 740, 135450. 10.1016/j.neulet.2020.135450 (79)

Overseas Satellite 2      National Institute of Biological Sciences (Total: 6 papers)

- 1) Yin X, Zhang Z, Zhou R, Zuo P, Sang D, Zhou S, Shi B, Chen L, Wu C, Guo Y, Wang F, Zhang EE, Li Q, Yanagisawa M, *Liu Q* (2025) Calcineurin governs baseline and homeostatic regulations of non-rapid eye movement sleep in mice. *Proc. Natl. Acad. Sci. U.S.A.* 122(4):e2418317122. doi: 10.1073/pnas.2418317122.
- 2) Miyasaka A, Kanda T, Nonaka N, Terakoshi Y, Cherasse Y, Ishikawa Y, Li Y, Takizawa H, Hirano A, Seita J, Yanagisawa M, Sakurai T, Sakurai K, *Liu Q* (2025) Sequential transitions of male sexual behaviors driven by dual acetylcholine-dopamine dynamics. *Neuron* 113(8):1240-1258. doi: 10.1016/j.neuron.2025.01.032.
- 3) Zhou R, Wang GD, Li Q, Meng FX, Liu C, Gan R, Ju DP, Liao MM, Xu JJ, Sang D, Gao X, Zhou S, Wu KJ, Sun QZ, Guo Y, Wu CY, Chen ZY, Chen L, Shi BH, Wang HY, Wang X, Li HY, Cai T, Li B, Wang FC, Funato H, Yanagisawa M, Zhang EE, *Liu Q* (2022) A signalling pathway for transcriptional regulation of sleep amount in mice. *Nature* 612(7940):519-527. doi:10.1038/s41586-022-05510-62)
- 4) Kim SJ, Hotta-Hirashima N, Asano F, Kitazono T, Iwasaki K, Nakata S, Komiya H, Asama N, Matsuoka T, Fujiyama T, Ikkyu A, Kakizaki M, Kanno S, Choi J, Kumar D, Tsukamoto T, Elhosainy A, Mizuno S, Miyazaki, S, Tsuneoka, Y, Sugiyama, F, Takahashi, S, Hayashi, Y, Muratani, M, *Liu Q*, Miyoshi, C, Yanagisawa M, Funato H (2022) Kinase signalling in excitatory neurons regulates sleep quantity and depth. *Nature* 612 (7940):512-518. doi:10.1038/s41586-022-05450-1
- 5) Liu C, Lee CY, Asher G, Cao LQ, Terakoshi Y, Cao P, Kobayakawa R, Kobayakawa K, Sakurai K, *Liu Q* (2021) Posterior subthalamic nucleus (PSTh) mediates innate fear-associated hypothermia in mice. *Nature Communications* 12:2648 (28)
- 6) Matsuo T, Isosaka T, Hayashi Y, Tang LJ, Doi A, Yasuda A, Hayashi M, Lee CY, Cao LQ, Kutsuna N, Matsunaga S, Matsuda T, Yao I, Setou M, Kanagawa D, Higasa K, Ikawa M, *Liu Q*, Kobayakawa R, Kobayakawa K (2021) Thiazaline-related innate fear stimuli orchestrate hypothermia and anti-hypoxia via sensory TRPA1 activation. *Nature Communications* 12:2074 (36)

## 2-2. Status of Researcher Exchanges

- Using the below tables, indicate the number of researcher exchanges between the Center (include domestic satellite institutions) and overseas satellite institutions during the period of FY 2021-FY 2024. Enter by institution and fiscal year.
- Write the number of principal investigator visits in the upper space and the number of other researcher visits in the lower space.

### Overseas Satellite 1:

<To overseas satellite>

	FY 2021	FY 2022	FY 2023	FY 2024	Total
Principal investigators	0	0	3	0	3
Other researchers	0	0	337	344	681
Total	0	0	340	344	684

<From overseas satellite>

	FY 2021	FY 2022	FY 2023	FY 2024	Total
Principal investigators	0	1	0	0	1
Other researchers	0	0	0	0	0
Total	0	1	0	0	1

### Overseas Satellite 2:

<To overseas satellite>

	FY 2021	FY 2022	FY 2023	FY 2024	Total
Principal investigators	0	0	2	4	6
Other researchers	0	0	0	0	0
Total	0	0	2	4	6

<From overseas satellite>

	FY 2021	FY 2022	FY 2023	FY 2024	Total
Principal investigators	0	1	0	0	1
Other researchers	0	1	0	274	275
Total	0	2	0	274	276

### 3. Holding and Participating in International Research Meetings

#### 3-1. Holding international Research Meetings

- Indicate the number of international research conferences or symposiums held between FY 2021 and FY 2024, and give up to **five examples** of the most representative ones using the table below.

FY 2021: 3 meetings	FY 2022: 1 meeting	FY 2023: 2 meetings	FY 2024: 1meeting
Major examples (meeting titles, places and dates held)		Number of participants	
2021 Title: JST-CREST "Opt Bio" / The 10th WPI-IIIS Joint Symposium ~Deciphering the Brain through "Opt Bio" Tools~ Place: Online Date: Friday, March 18, 2022. 8:30-16:00 (JST)		From domestic institutions: 271 From overseas institutions: 29	
2022 The 11th WPI-IIIS Symposium ~Deciphering the Mysteries of Instinctive Behaviors~ Place: IIIS Building, University of Tsukuba Date: Wednesday, February 22, 2023. 8:30-18:00 (JST)		From domestic institutions: 125 From overseas institutions: 57	
2023 Joint Congress of the 45th Annual Meeting of Japanese Society of Sleep Research, the 30th Annual Meeting of Japanese Society for Chronobiology ~Sleepless in Somnology and Chronobiology~ Place: Pacifico Yokohama North Minato Mirai, Yokohama, JAPAN Date: September 15 (Fri) to 17 (Sun), 2023 (JST)		From domestic institutions: 3,100 From overseas institutions: 10	
2023 Senri Life Science / The 12th WPI-IIIS Joint International Symposium ~Science of Behaving and Sleeping Brains~ Place: "Yuichi Yamamura Memorial Life Hall" Senri Life Science Center Building, Osaka, JAPAN Date: March 1 (Fri), 2024, 10:30-16:30 (JST)		From domestic institutions: 430 From overseas institutions: 10	
2024 The 13th WPI-IIIS International Symposium ~Science of Behaving and Sleeping Brains~ Place: "Tokyo Conference center Shinagawa", Tokyo, JAPAN Date: November 25 (Mon), 2024, 10:00-18:00 (JST)		From domestic institutions: 206 From overseas institutions: 7	

### 3-2. Participating in International Research Meetings

- Give up to five examples of the most representative case in which the Center, not individual researchers, participated in international research meetings to enhance the visibility and brand of the Center or of the overall WPI Program

Meeting titles, places, dates held and number of participants	Form of participation (e.g. operating a booth)	Number of participants from the Center
2021 The 46th Annual Meeting of Japanese Society of Sleep Research Place: FUKUOKA CONVENTION CENTER / Online Date: September 23-24, 2021 Participant: 600 (Onsite) / 800(Online)	Holding a symposium titled "Frontiers of Sleep and Biological Clock Research at WPI"	Onsite: 72 Online: 154
2022 The NEURO 2022 Place: Okinawa Convention Center Date: Thursday~Sunday, June 30~July 3, 2022 Participants:N/A	-Plenary Lecture -Tokizane Prize Lecture	Onsite: 57 Online: 17
2023 Neuroscience 2023 Place: Walter E. Washington Convention Center, US Date: November 11-15, 2023 Participants: N/A	-Attending the meeting and poster -Presenting posters	Onsite: 8 Online: 35
2024 The 48th Annual Meeting of Japanese Society of Sleep Research Place: Pacifico Yokohama North Date: July 18-19, 2024 Participants: N/A	-Plenary Lecture	Onsite: 23
2024 The NEURO 2024 Place: Fukuoka Convention Center/Online Date: July 24-27,2024 Participants: N/A	-Plenary Lecture	Onsite: 22

#### **4. List of the Cooperative Research Agreements with Overseas Institutions**

- Indicate the number of agreements concluded with overseas institutions still in effect as of the end of FY 2024 (March 31, 2025).  
Give five examples of the most representative agreements.

Number of effective agreements (as of March 31, 2025): 1

Five examples of the most representative agreements:

1. Name of an Agreement: Collaboration Research Agreement  
Dates of an Agreement: February 1, 2023-March 31, 2025  
Counterpart of an Agreement: The University of Texas Southwestern Medical Center  
Summary of an Agreement: Collaboration Research between Dr. Robert Greene and Dr. Kaspar Vogt, and research for the roles of the family of Forkhead box P in sleep. University of Tsukuba will employ a postdoc at Tsukuba and send her UT Southwestern for this collaboration

## 5. Postdoctoral Positions through Open International Solicitations

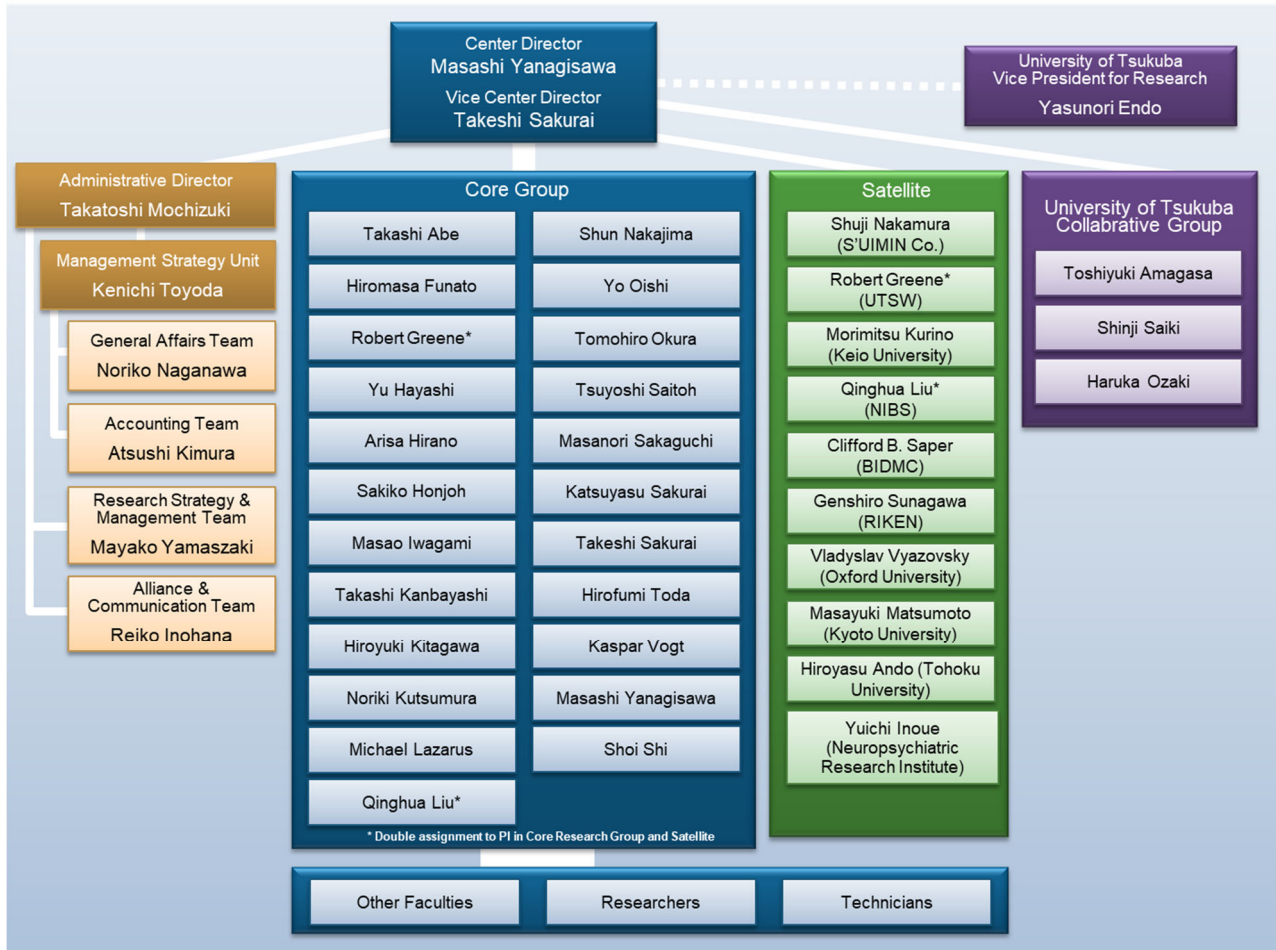
- In the columns "number of applications" and "number of selections," put the total number (upper) and the number and percentage of overseas researchers in the < > brackets (lower).
- In Appendix 3b, describe the status of employment of postdoctoral researchers.

Fiscal year	Number of applications	Number of selections
FY 2021	14	8
	< 6 , 43 %>	< 3 , 38 %>
FY 2022	4	2
	< 0 , 0 %>	< 0 , 0 %>
FY 2023	35	18
	< 21 , 60 %>	< 8 , 44 %>
FY 2024	29	15
	< 11 , 38 %>	< 3 , 20 %>

## 6. Diagram of Management System

### 6-1.

- Diagram the Center's management system within the Center in an easily understood manner.
- If any changes have been made in the Center's management system vis-à-vis that stated in the application for WPI Academy center certification, describe them. Especially describe any important changes made in such as the center director, administrative director, head of host institution, and officer(s) in charge at the host institution (e.g., executive vice president for research).



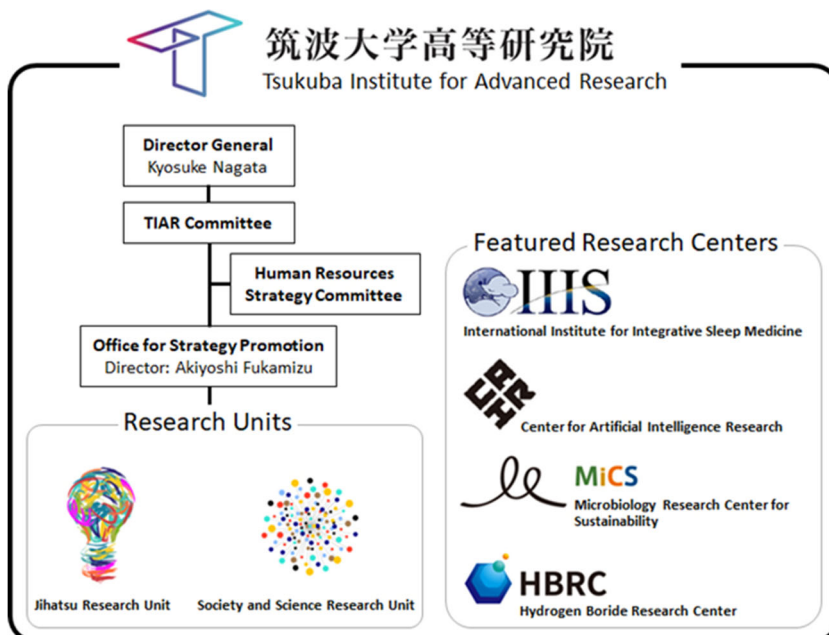
- Change of Vice President for Research (Hiroshi Wada to Yasunori Endo).
- Change of Administrative Director (Dr. Mayumi Kimura to Dr. Takatoshi Mochizuki).
- 3 more members added to Core Group (Dr. Masao Iwakami, Dr. Shun Nakajima and Dr. Tomohiro Okura).
- Remove 1 person from Core Group (Dr. Kumpei Tokuyama).

6-2.

- Make a diagram of the organizational chart to show Center's position **within the host institution**.



Since 2022, IIS has been re-positioned in “the Organization for the Promotion of Strategic Research Initiatives”, and ranked as the top Advanced Research Center (RS) among others.



On December 2024, a new research organization, Tsukuba Institute for Advanced Research (TIAR) has been established, and IIS is recruited to a member of the Featured Research Centers, thus all IIS researchers are affiliates of TIAR as well.

## 7. Campus Map

- Draw a simple map of the campus showing where the main office and principal investigator(s) are located.

### Tsukuba Campus



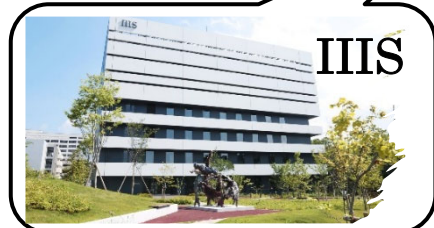
#### Tsukuba Campus

Area Name	Name of Facility
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East Area	1 Stabile
Agricultural and Forestry Research Center Area (Farm)	7 Tsukuba Plant Innovation Research Center (T-PIRC Farm)
Ichinoya	3 Ichinoya Residence Hall
Residence Area	4 Ichinoya Community Center
Research Center Area	5 Center for Research in Radiation, Isotopes, and Earth System Sciences (CRIES)
	6 Life Science Center for Survival Dynamics, Tsukuba Advanced Research Alliance (TARA)
	7 Tsukuba Industrial Liaison and Cooperative Research Center
	8 Plant-based Material Production Research Building
	9 Plasma Research Center/Earth System Sciences (CRIES)
	10 Algae Biomass and Energy System Research Unit
	11 Empowerment Studio
	12 Research Facility Center for Science and Technology (Engineering Workshop Division)
	13 Research Facility Center for Science and Technology (Cryogenics Division)
	14 Center for Research in Radiation, Isotopes, and Earth System Sciences (CRIES) (Tandem Accelerator Complex)
	15 Cooperative Research Building C
	16 Research Facility Center for Science and Technology (Chemical Analysis Division)
	17 Project and Research Building
	18 Center for Research in Radiation, Isotopes, and Earth System Sciences (CRIES) (Radioisotope Research Section)
	19 University of Tsukuba Archives / Energy Plant
Area 3	20 Third Gymnasium
	21 3A-3D-G, 3K, 3L Buildings / Academic Service Office for the Systems and Information Engineering Area
	22 Institutes of Engineering Sciences
	23 Natural Sciences Building
	24 Cooperative Research Building D
	25 Laboratory of Advanced Research B
	26 Cybernetics Research Building
Area 2	27 Tsukuba-Plant Innovation Research Center (T-PIRC) (Gene Research Center)
	28 Institutes of Biological and Agricultural Sciences
	29 First Gymnasium
	30 Laboratory of Advanced Research A
	31 2A-2E, 2G, 2H Buildings / Academic Service Office for the Life and Environmental Sciences Area, Academic Service Office for the Human Sciences Area
	32 Master's Programs in Humanities and Social Sciences
	33 Institutes of Human Sciences
	34 Laboratory for Environmental Disaster Prevention Research / Mountain Science Center
Area 1	35 Central Library
	36 Institutes of Humanities and Social Sciences
	37 Joint Use Facility Building A
	38 Cooperative Research Building A
	39 Joint Use Facility Building D
	40 1D-1G Buildings / Student Plaza
	41 1A-1C, 1H Buildings / Academic Service Office for the Humanities and Social Sciences Area, Academic Service Office for the Pure and Applied Sciences Area, Student Commons, Academic Support Center for the School of Comprehensive Studies
	42 Students' Club House (Cultural)
	43 Institutes of Natural Sciences
	44 Center for Computational Sciences (CCS)
	45 Administration Center, Annex Building
Administration Center Area	46 Auditorium
University Hall Area	47 University Hall / University of Tsukuba Gallery / University of Tsukuba Art Space
	48 University of Tsukuba 30th Anniversary Hall
	49 University Hall B
	50 Academic Computing and Communications Center
	51 Center for Education of Global Communication (EGLOEC)
	52 University Health Center
	53 International Lecture Building
Art and Physical Education Area	54 Institute of Art and Design
	55 SC Building/Academic Service Office for the Art and Sport Sciences Area
	56 Cooperative Research Building B
	57 Institute of Health and Sport Sciences
	58 Sport Performance and Clinic Laboratory
	59 6A, 6B Buildings
	60 Workshop (Art and Design)
	61 Practice Rooms for Art & Design
	62 Art and Physical Education Library
	63 Central Gymnasium
	64 T-Dome
	65 Sport Field Engineering Laboratory
	66 Cafeteria for Art and Physical Education
	67 Global Sport Innovation Building
	68 Sport and Physical Education Center / Sport and Physical Student's Club House
	69 Indoor Swimming Pool
	70 Gymnasium (Marital Arts)
	71 Gymnasium (Volleyball)
	72 Kambara Hall
	73 Laboratory of Advanced Research D
Athletic Fields Area	74 Japanese Archery Training Hall
	75 Tsukuba Training Lodge
	76 Club House
	77 Building for Extra-curricular Activities

Area Name	Name of Facility
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Medical Area	78 Energy Plant
	79 IIS
	80 4B, 4C, 4D Buildings
	81 Laboratory Animal Resource Center
	82 4E Building
	83 Joint Use Facility Building B
	84 Medical Radioisotope Research Institutes
	85 Institute of Medicine
	86 University of Tsukuba Hospital
	87 4A Building / Academic Service Office for the Medical Sciences Area
	88 Medical Sciences Building
	89 Medical Library / Clinical Lecture Rooms
	90 Cafeteria for Medical Sciences
	91 Second Gymnasium
	92 Proton Medical Research Center
	93 Health and Medical Science Innovation Laboratory
	94 Tsukuba Medical Laboratory of Education and Research
	95 Advanced Imaging Center
	96 Disease Prevention and Infection Control Building
Hirasuna Residence Area	97 Hirasuna Community Center
	98 Hirasuna Residence Hall
	99 Global Village
	100 Medical Residences
Dikoshi Residence Area	101 Dikoshi Community Center / Yurinoiki Day-care Center
	102 Dikoshi Residence Hall
	103 Foreign Scholars' Residence
Kasuga Area	104 7A Building
	105 Kasuga Residence Hall Buildings 1, 2
	106 Innovative Medical Research Institute
	107 Kasuga Auditorium
	108 7B, 7C Buildings / Academic Service Office for the Library, Information and Media Sciences Area
	109 Library on Library and Information Science
	110 7D Building
	111 Fourth Gymnasium
	112 Kasuga Japanese Archery Training Hall
	113 Union of Library and Information-media Studies
	114 Kasuga Residence Hall Building 3
	115 Kasuga Welfare Facilities
	116 Global Guest House



Facilities	Information Center
Pedestrian Deck	Campus Bus Stop
Sidewalk	Parking Area
Facilities for Physical Education	Heliport
Farm	Hospital Heliport
	Convenience Store



### Appendix3-1a Number of Center Personnel FY 2021-FY 2024

	FY 2021		FY 2022		FY 2023		FY 2024	
	Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
Researchers	77	/	75	/	83	/	86	/
Overseas researchers	27	35	28	37	27	33	24	28
Female researchers	27	35	22	29	19	23	25	29
Principal investigators (PIs)	32	/	30	/	32	/	29	/
Overseas PIs	9	28	8	27	8	25	7	24
Female PIs	5	16	3	10	3	9	2	7
Other researchers	12	/	11	/	10	/	16	/
Overseas researchers	2	17	3	27	3	30	5	31
Female researchers	4	33	4	36	2	20	4	25
Postdocs	33	/	34	/	41	/	41	/
Overseas Postdocs	16	48	17	50	16	39	12	29
Female Postdocs	18	55	15	44	14	34	19	46
Research support staffs	78	/	90	/	102	/	110	/
Administrative staffs	25	/	22	/	28	/	28	/
<b>TOTAL</b>	<b>180</b>		<b>187</b>		<b>213</b>		<b>224</b>	

Number of persons who were/have been paid using the host institution's operating budget (excluding indirect funding) among the above persons.

	FY 2021	FY 2022	FY 2023	FY 2024
Principal investigators (PIs)	5	10	13	13
Other researchers	4	2	2	4
Postdocs	1	0	0	0
Research support staffs	0	0	0	0
Administrative staffs	2	4	3	3

※ Make consistent with the number of persons reported in Appendix 3-2.

	FY 2021		FY 2022		FY 2023		FY 2024	
	Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
Doctoral students	36	/	32	/	39	/	41	/
Employed	12	33.3	10	31.3	7	17.9	7	17.1

※ The number of doctoral students indicated in the lower table can also include those in the upper table of Total numbers.

#### Changes vis-à-vis the Center's application for academy center certification

※ If changes have been made vis-à-vis the Center's application for academy center certification, describe the main changes and the reasons for them.

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### Appendix 3-1b Career Path of WPI Postdocs

Enter the information below during the period from the start of the center through the end of FY 2024.

\* For each person, fill in the spaces to the right. More spaces may be added.

\* Leave "Position as of April 2025" blank if unknown.

#### Japanese Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2025*	
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located
2022.4.1~ 2022.9.30	Doshisha University/Graduate Student	Japan	ICON Japan/Clinical Research Associate	Japan		
2012.2.1~ 2023.3.31	University of Tsukuba/Technical Official	Japan	National Agriculture and Food Research Organization/Research fellow	Japan	University of Tsukuba/Researcher	Japan
2013.4.1~ 2023.3.31	National Institute of Advanced Industrial Science and Technology/contact official	Japan	University of Tsukuba/Visiting Researcher	Japan	University of Tsukuba/Researcher	Japan
2022.4.1~ 2023.3.31	Chuo University/Assistant Professor	Japan	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Assistant Professor	Japan
2022.4.1~ 2023.9.30	University of Tsukuba/Graduate Student	Japan	Stanford University/Postdoctoral Scholar	United States of America	Stanford University/Postdoctoral Scholar	United States of America
2023.4.1~ 2023.12.31	University of Tsukuba/Graduate Student	Japan	Tokyo Medical and Dental University/Assistant Professor	Japan	Institute of Science Tokyo/Assistant Professor	Japan
2023.4.1~ 2024.3.31	University of Tsukuba/Graduate Student	Japan	Hokkaido University/JSPS Research Fellowship for Young Scientists	Japan	Hokkaido University/JSPS Research Fellowship for Young Scientists	Japan
2014.4.1~ 2024.3.31	Terumo Corporation/Employee	Japan	The University of Tokyo/Junior Researcher	Japan	University of Tsukuba/Researcher	Japan
2023.10.1~ 2024.3.31	National Center of Neurology and Psychiatry/KAKENHI research assistant	Japan	University of Tsukuba/Graduate Student	Japan	University of Tsukuba/Graduate Student	Japan
2012.3.1~ 2024.3.31	National Cancer Center Japan/postdoc	Japan	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan
2018.1.1~ 2024.3.31	Kyushu University/Graduate Student	Japan	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan
2021.4.1~ 2024.4.30	University of Tsukuba/Graduate Student	Japan	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Assistant Professor	Japan
2021.4.1~ 2024.9.30	University of Tsukuba Department of Collaborative Research/Manager of Technology Transfer	Japan	N/A		N/A	
2023.4.1~ 2024.11.30	University of Tsukuba/Graduate Student	Japan	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan
2024.10.1~ 2025.3.31	University of Tsukuba/Graduate Student	Japan	Takeda Pharmaceutical Company Limited/Medical Science Liaison	Japan	Takeda Pharmaceutical Company Limited/Medical Science Liaison	Japan

2018.4.1~ 2024.3.31	University of Tsukuba/Graduate Student	Japan	Stanford University/Postdoctoral Scholar	United States of America	Stanford University/Postdoctoral Scholar	United States of America
2021.6.1~ 2025.3.31	Osaka Prefecture University/postdoc	Japan	Institute for Life and Medical Sciences, Kyoto University/Researcher	Japan	Institute for Life and Medical Sciences, Kyoto University/Researcher	Japan

## Overseas Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2025*		Nationality
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	
2021.1.1~ 2022.11.30	Norwegian University of Science and Technology/Professor	Norway	Norwegian University of Science and Technology/Professor	Norway			Norway
2017.10.1~ 2022.12.31	Max Planck Institute of Psychiatry/postdoc	Germany	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan	India
2013.7.1~ 2023.3.31	Osaka Bioscience Institute/JSPS Research Fellowship for Young Scientists	Japan	University of Tsukuba/Visiting Researcher	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan	France
2018.12.1~ 2023.8.5	Sigillum Reg Universitat Compostellan/Associated Researcher	Spain	Sigillum Reg Universitat Compostellan/Associated Researcher	Spain	University of Tsukuba/Researcher	Japan	Spain
2014.4.1~ 2023.8.15	Osaka University/postdoc	Japan	Allergan Advantage Japan/Technical staff	Japan	Allergan Advantage Japan/Technical staff	Japan	Russian Federation
2020.12.1~ 2023.12.31	University of Regensburg Institute of Zoology/postdoc	Germany	N/A				China
2014.2.16~ 2024.2.15	University of Basel/Head of the Transgenic Mouse Core Facility	Switzerland	N/A				Germany
2019.4.1~ 2024.2.29	University of Tsukuba/Graduate Student	Japan	Korea Advanced Institute of Science and Technology/Assistant Professor	Republic of Korea	Korea Advanced Institute of Science and Technology/Assistant Professor	Republic of Korea	United States of America
2017.7.1~ 2024.3.31	University of Tsukuba/Graduate Student	Japan	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan	Republic of Korea
2023.4.1~ 2024.6.30	University of Tsukuba/Graduate Student	Japan	Korea Advanced Institute of Science and Technology/Researcher	Republic of Korea	Korea Advanced Institute of Science and Technology/Researcher	Republic of Korea	Republic of Korea
2021.9.30~ 2024.9.30	University of Tsukuba/Graduate Student	Japan	University of Yamanashi/Assistant Professor	Japan	University of Yamanashi/Assistant Professor	Japan	Chile
2020.2.1~ 2024.9.30	Bharathiar University/Graduate Student	India	University of Tsukuba/Assistant Professor	Japan	University of Tsukuba/Specially Appointed Assistant Professor	Japan	India
2022.11.1~ 2025.1.31	Uit the arctic university of norway/Researcher	Norway	Eriksholm Research Centre/ Scientist	Denmark	Eriksholm Research Centre /Scientist	Denmark	Mexico
2023.2.1~ 2025.2.28	University of Tsukuba/Graduate Student	Japan	Unknown				Republic of Korea
2024.8.1~ 2025.3.31	Shanghai Medical College/Visiting scholar	China	University of Tsukuba/Graduate Student	Japan	University of Tsukuba/Graduate Student	Japan	China

Project Expenditures FY2021

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others		
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	
Personnel	163,776 378,417	Operational subsidies to National University Corporations/Incorporated Administrative Agency Funding by WPI Academy - Government Subsidies except Funding from WPI Academy - Donations - Indirect funding - Joint research projects - Competitive funding - Others		Center director Administrative director Principal investigator 5 Full-time/Japan 5 Concurrent/Japanese Full-time/Overseas Concurrent/Overseas Other researchers 4 Associate professor /Assistant professor Others Postdocs 10 Research support staffs 24 Administrative staffs 2	25,792 13,857 108,418 78,162 6,540 23,716 65,830 65,830 97,297 17,572 49,651	Center director 1 Administrative director 1 Principal investigator 13 Full-time/Japan 8 Concurrent/Japan 2 Full-time/Overseas 3 Concurrent/Overseas Other researchers 11 Associate professor /Assistant professor 11 Others Postdocs 23 Research support staffs 8 Administrative staffs 17													
Subtotal	542,193		163,776	45	378,417	74	0	0	0	0	0	0	0	0	0	0	0	0	0
Project activities	120,326 135,264	Operational subsidies to National University Corporations/Incorporated Administrative Agency Funding by WPI Academy - Government Subsidies except Funding from WPI Academy - Donations - Indirect funding - Joint research projects - Competitive funding - Others		Rental fees for facilities Consumables Startup Utilities Other costs	60,044 21 17,077 14,284 10,579 33,259	Rental fees for facilities Outreach Consumables Startup Satellite organizations Other costs													
Subtotal	255,590		120,326		135,264														
Travel	137 514	Operational subsidies to National University Corporations/Incorporated Administrative Agency Funding by WPI Academy - Government Subsidies except Funding from WPI Academy - Donations - Indirect funding - Joint research projects - Competitive funding - Others		Domestic travel Overseas travel Transfer expenses	429 85	Domestic travel Overseas travel Transfer expenses													
Subtotal	651		137		514														
Equipment	22,133 25,347	Operational subsidies to National University Corporations/Incorporated Administrative Agency Funding by WPI Academy - Government Subsidies except Funding from WPI Academy - Donations - Indirect funding - Joint research projects - Competitive funding - Others		Equipments	1,960 2,684 2,013 1,969 594 3,597 8,973 3,557	Automated cell counters Ultrapure Water Producer Milli-QR High-spec CPU machine High-spec GPU machine Electric Microinjector Chamber for sleep analysis Individual ventilation cage system Sleep data recorder for mice													
Subtotal	47,480		22,133		25,347														
Research projects		Operational subsidies to National University Corporations/Incorporated Administrative Agency Funding by WPI Academy - Government Subsidies except Funding from WPI Academy - Donations - Indirect funding - Joint research projects - Competitive funding - Others							45,600	Donations					131,900 374,990 56,530	KAKENHI Commissioned research projects Joint research projects			
Subtotal	609,020								45,600					563,420					
Others		Operational subsidies to National University Corporations/Incorporated Administrative Agency Funding by WPI Academy - Government Subsidies except Funding from WPI Academy - Donations - Indirect funding - Joint research projects - Competitive funding - Others																	
Subtotal																			
Total	1,454,934		306,372		539,542				45,600					563,420					

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金(WPIアカデミー国際脳循環の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2022

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others		
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs
Personnel	155,919	Operational subsidies to National University Corporations/Incorporated Administrative Agency	25,819	Center director 1															
	9,469	Funding by WPI Academy		Administrative director 1	1,158	Administrative direct 1													
		Government Subsidies except Funding from WPI Academy	84,455	Principal investigator 9		Principal investigator 0													
		Donations	73,453	Full-time/Japanese 8		Full-time/Japanese													
		Indirect funding		Concurrent/Japanese		Concurrent/Japanese													
		Joint research projects	11,002	Full-time/Overseas 1		Full-time/Overseas													
		Competitive funding		Concurrent/Overseas		Concurrent/Overseas													
		Others	17,614	Other researchers 3		Other researchers 0													
			17,614	Associate professor 3		Associate professor													
				Assistant professor		Assistant professor													
				Others		Others													
				Postdocs		Postdocs													
				Research support staffs		Research support staffs													
				Administrative staffs 4	8,311	Administrative staffs 3													
Subtotal	165,388		155,919	17	9,469	4													
Project activities	105,545	Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
	18,377	Funding by WPI Academy	105,545	Utilities	1,467	Consumables													
		Government Subsidies except Funding from WPI Academy			410	IIIS seminar													
		Donations			1,516	Symposium													
		Indirect funding			2,496	Startup													
		Joint research projects			3,300	RA													
		Competitive funding			5,685	Outreach													
		Others			3,503	Other costs													
Subtotal	123,922		105,545		18,377														
Travel	8,517	Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy			376	Domestic travel													
		Government Subsidies except Funding from WPI Academy			8,141	Overseas travel													
		Donations																	
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal	8,517				8,517														
Equipment		Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy																	
		Government Subsidies except Funding from WPI Academy																	
		Donations																	
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal																			
Research projects	67,105	Operational subsidies to National University Corporations/Incorporated Administrative Agency	67,105	Operational subsidies to National University Corporations/Incorporated Administrative Agency															
		Funding by WPI Academy																	
		Government Subsidies except Funding from WPI Academy						8,150	Government Subsidies except Funding from WPI Academy										
		Donations								650	Donations								
		Indirect funding																	
		Joint research projects										77,142	Joint research projects						
		Competitive funding																	
		Others																	
Subtotal	962,906		67,105					8,150		650		77,142							
Others	1,665	Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy																	
		Government Subsidies except Funding from WPI Academy																	
		Donations																	
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal	1,665																		
Total	1,262,398		328,569		36,363			8,150		650		77,142							

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際顕微鏡の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金(WPIアカデミー国際顕微鏡の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2023

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others		
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs
Personnel	175,682	Operational subsidies to National University Corporations/Incorporated Administrative Agency	25,819	Center director 1															
	17,785	Funding by WPI Academy		Administrative director															
	-	Government Subsidies except Funding from WPI Academy	110,947	Principal investigator 12	-	Principal investigator 0	-	Principal investigator 0	-	Principal investigator 0	-	Principal investigator 0	-	Principal investigator 0	-	Principal investigator 0	-	Principal investigator 0	-
	-	Donations	79,674	Full-time/Japan 8		Full-time/Japanese		Full-time/Japanese		Full-time/Japanese		Full-time/Japanese		Full-time/Japanese		Full-time/Japanese		Full-time/Japanese	
	-	Indirect funding	18,885	Concurrent/Japan 2		Concurrent/Japanese		Concurrent/Japanese		Concurrent/Japanese		Concurrent/Japanese		Concurrent/Japanese		Concurrent/Japanese		Concurrent/Japanese	
	-	Joint research projects	12,388	Full-time/Overseas 2		Full-time/Overseas		Full-time/Overseas		Full-time/Overseas		Full-time/Overseas		Full-time/Overseas		Full-time/Overseas		Full-time/Overseas	
	-	Competitive funding		Concurrent/Overseas		Concurrent/Overseas		Concurrent/Overseas		Concurrent/Overseas		Concurrent/Overseas		Concurrent/Overseas		Concurrent/Overseas		Concurrent/Overseas	
	-	Others	15,038	Other researchers 2	-	Other researchers 0	-	Other researchers 0	-	Other researchers 0	-	Other researchers 0	-	Other researchers 0	-	Other researchers 0	-	Other researchers 0	-
			15,038	Associate professor /Assistant professor /Others 2		Associate professor /Assistant professor /Others		Associate professor /Assistant professor /Others		Associate professor /Assistant professor /Others		Associate professor /Assistant professor /Others		Associate professor /Assistant professor /Others		Associate professor /Assistant professor /Others		Associate professor /Assistant professor /Others	
				Postdocs		Postdocs		Postdocs		Postdocs		Postdocs		Postdocs		Postdocs		Postdocs	
				Research support staffs	4,340	Research support staffs 8		Research support staffs		Research support staffs		Research support staffs		Research support staffs		Research support staffs		Research support staffs	
				Administrative staffs 3	13,445	Administrative staffs 5		Administrative staffs		Administrative staffs		Administrative staffs		Administrative staffs		Administrative staffs		Administrative staffs	
Subtotal	193,467		175,682	18	17,785	13		0		0		0		0		0		0	
Project activities	188,451	Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
	11,451	Funding by WPI Academy	188,451	Utilities	4,444	Consumables													
	-	Government Subsidies except Funding from WPI Academy			593	IIIS seminar (honorarium)													
	-	Donations			1,384	Outreach													
	-	Indirect funding			5,030	Other costs													
	-	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	199,902		188,451		11,451														
Travel	6,850	Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy			3,999	Domestic travel													
	-	Government Subsidies except Funding from WPI Academy			2,851	Overseas travel													
	-	Donations																	
	-	Indirect funding																	
	-	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	6,850				6,850														
Equipment	778	Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy			778	Monitor for web meeting													
	-	Government Subsidies except Funding from WPI Academy																	
	-	Donations																	
	-	Indirect funding																	
	-	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	778				778														
Research projects	80,436	Operational subsidies to National University Corporations/Incorporated Administrative Agency	80,436	Operational subsidies to National University Corporations/Incorporated Administrative Agency															
		Funding by WPI Academy																	
	-	Government Subsidies except Funding from WPI Academy					8,000	Government Subsidies except Funding from WPI Academy											
	-	Donations							1,145	Donations									
	-	Indirect funding																	
	-	Joint research projects										38,055	Joint research projects						
	-	Competitive funding												278,667	Grant-in-Aid for Scientific Research				
	-	Others												517,784	Commissioned research projects	24,115	Research grant		
Subtotal	949,202		80,436				8,000		1,145			38,055		796,451		24,115			
Others		Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy																	
	-	Government Subsidies except Funding from WPI Academy																	
	-	Donations																	
	-	Indirect funding																	
	-	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal																			
Total	1,349,199		444,569		36,864		8,000		1,145			38,055		796,451		24,115			

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際顕微鏡の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金(WPIアカデミー国際顕微鏡の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2024

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others		
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs
Personnel	204,288	Operational subsidies to National University Corporations/Incorporated Administrative Agency	25,850	Center director 1															
	19,166	Funding by WPI Academy		Administrative director															
		Government Subsidies except Funding from WPI Academy	132,487	Principal investigator 12		Principal investigator 0													
		Donations	85,022	Full-time/Japan 8		Full-time/Japanese													
		Indirect funding	23,381	Concurrent/Japan 2		Concurrent/Japanese													
		Joint research projects	24,084	Full-time/Overseas 2		Full-time/Overseas													
		Competitive funding		Concurrent/Overseas		Concurrent/Overseas													
		Others	21,227	Other researchers 4		Other researchers 0													
			21,227	Associate professor 4		Associate professor													
				Associate professor		Associate professor													
				Others		Others													
				Postdocs		Postdocs													
				Research support staffs	5,100	Research support staffs	9	Research support staffs											
				Administrative staffs	14,066	Administrative staffs	5	Administrative staffs											
Subtotal	223,454		204,288	20	19,166	14	0	0	0	0	0	0	0	0	0	0	0	0	0
Project activities	155,037	Operational subsidies to National University Corporations/Incorporated Administrative Agency			2,664	Consumables													
	13,755	Funding by WPI Academy	155,037	Utilities	804	IIIS seminar (honorarium)													
		Government Subsidies except Funding from WPI Academy			2,798	Outreach													
		Donations			7,489	Other costs													
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal	168,792		155,037		13,755														
Travel	2,221	Operational subsidies to National University Corporations/Incorporated Administrative Agency			1,035	Domestic travel													
		Funding by WPI Academy			1,186	Overseas travel													
		Government Subsidies except Funding from WPI Academy																	
		Donations																	
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal	2,221				2,221														
Equipment	1,222	Operational subsidies to National University Corporations/Incorporated Administrative Agency			1,222	PC													
		Funding by WPI Academy																	
		Government Subsidies except Funding from WPI Academy																	
		Donations																	
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal	1,222				1,222														
Research projects	181,242	Operational subsidies to National University Corporations/Incorporated Administrative Agency	181,242	Operational subsidies to National University Corporations/Incorporated Administrative Agency															
		Funding by WPI Academy																	
		Government Subsidies except Funding from WPI Academy					75,094	Government Subsidies except Funding from WPI Academy											
		Donations						29	Donations										
		Indirect funding																	
		Joint research projects										39,559	Joint research projects						
		Competitive funding												263,478	Grant-in-Aid for Scientific Research				
		Others												576,374	Commissioned research projects	9,879	Research grant		
Subtotal	1,145,655		181,242				75,094		29			39,559		839,852		9,879			
Others		Operational subsidies to National University Corporations/Incorporated Administrative Agency																	
		Funding by WPI Academy																	
		Government Subsidies except Funding from WPI Academy																	
		Donations																	
		Indirect funding																	
		Joint research projects																	
		Competitive funding																	
		Others																	
Subtotal																			
Total	1,541,344		540,567		36,364		75,094		29			39,559		839,852		9,879			

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際顕微鏡の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金(WPIアカデミー国際顕微鏡の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

## Appendix 4 Outreach Activities and Their Results

List up to three of the Center's outreach activities carried out during the period between FY 2021 and 2024 that have contributed to enhancing the brand or recognition of your Center and/or the brand of the overall WPI program, and describe its concrete contents and effect in narrative style. (Where possible, indicate the results in concrete numbers.)

Examples:

- As a result of using a new OO press-release method, a 00% increase in media coverage was obtained over the previous year.
- By holding seminars for the public that include people from industry, requests for joint research were received from companies.
- We changed our public relations media. As a result of using OO to disseminate information, a 00% increase in inquiries from researchers was obtained over the previous year.
- As a result of vigorously carrying out OO outreach activity, ¥00 in external funding was acquired.

Enter a list of your outreach activities in Attachment 4a.

### 1) Increase of appearance on TV programs and internet broadcastings

IIIS PIs, especially the Director Dr. Yanagisawa, have accepted many offers of TV programs and internet broadcastings. As shown in Appendix 4a, the PIs accepted 131 offers, 2.1-fold increase compared to FY 2021 (61). The program contents include science programs, educational programs, cultural shows, news programs, etc., targeting non-scholar, common audience. Access number of all the internet broadcasting programs, particularly on YouTube, reaches approximately 10 million views in total, and the name of "WPI-IIIS" is always credited on the shows. Now a days, we often see the words "the importance of sleep", "problems of sleep", on TV shows and magazines, and these trends have been made, at least in part, by the active media exposure of IIIS PIs. We believe that IIIS can be one of the most well-known WPI centers to the general public, contributing a lot to the branding of the WPI program.

### 2) Increase of school visits and social media access

IIIS has accepted many visits of junior high/high school students for education purpose (up to 30 times in FY2024, 82 times over the last 4 years). Some of those schools run the "Super Science High school" program, and the students may find IIIS by internet search. Others may find IIIS by a variety of internet tools and social media, such as X, Facebook and Instagram. IIIS constantly updates the home page and those social media pages, providing the recent news of research outputs and event announcement. The number of followers of IIIS social media pages are approximately 4,000 in total.

One of our motivation to perform the school education events is to inspire young students to be science-oriented, and join IIIS or other WPI centers in the near future as a postgraduate student. Actually, we have such a Ph.D.-course student, who visited IIIS several years ago as a high school student, and now a member of Hayashi lab aiming to be a neuroscientist.

### 3) Increase of lecture requests from general public/industry

Besides the above school visits, IIIS has also received hundreds of requests for lectures from business companies and general public (126 times in FY2023 and 148 in FY2024). Some of these companies have an idea of joint research project with IIIS, or others for healthcare purpose of their employees. We have been aware that many of these industry people are interested in our product, "InSomnograf," the portable sleep EEG recording device/service developed by our start-up company S'UIMIN. Especially after we published the paper on the misperception of sleepiness between subjective and objective assessments of sleep using InSomnograf (Masaki M, et al., *Proc. Natl. Acad. Sci. U.S.A.*, 2025), we have received many inquiries about the study and the device/service.

Indeed, we recently started joint research projects with Tsukuba city government, Toshiba Corporation, and some other companies for sleep EEG analysis at home. These collaborations based on the real life-style may provide us lots of advantages in sleep hygiene studies associated with health/medical checks and disease records.

## Appendix 4a State of Outreach Activities from FY 2021 to FY 2024

\* For each activity, enter the number of times that the activity was held each fiscal year.

Activities	FY 2021	FY 2022	FY 2023	FY 2024
	(number of activities, times held)	(number of activities, times held)	(number of activities, times held)	(number of activities, times held)
PR brochure, pamphlet	3	3	3	1
Lectures, seminars for general public	25	30	126	148
Teaching, experiments, training for elementary, secondary and high school students	16	21	15	30
Science café	1	1	1	4
Open house	0	0	7	30
Participating, exhibiting in events	2	3	3	2
Press releases	13	19	20	36
Publications of popular science books	13	11	6	20
Others (Newspaper, TV, Radio, Internet broadcast)	61	127	104	131

\*If there are activities that the center hasn't implemented, delete those lines. If you have other activities, list them in the space between parentheses after "Others" and state the number of times they were held in the spaces on the right. Another line under "Others" can be added, if needed.

<Notes>

# 1. Refereed Papers published from 2021 to 2024

## A) WPI papers

2024

### (1) Original Articles

1. Kumar D, Yanagisawa M, Funato H (2024) Sleep-dependent memory consolidation in young and aged brains. *Aging Brain* **6**. doi:10.1016/j.nbas.2024.100124
2. Hayano J, Yamamoto H, Tanaka H, Yuda E (2024) Piezoelectric rubber sheet sensor: a promising tool for home sleep apnea testing. *Sleep Breathing*. **28**(3):1273-1283. doi:10.1007/s11325-024-02991-9
3. Moridera A, Fujihara H, Cherasse Y, Mugishima G, Fujiki N (2024) Effects of sleep deprivation on sleep and sleep electroencephalogram in secretin-receptor knockout mice. *Neurosci. Res.* **200**:41-47. doi:10.1016/j.neures.2023.09.008
4. Hasegawa E, Li YL, Sakurai T (2024) Regulation of REM sleep in mice: The role of dopamine and serotonin function in the basolateral amygdala. *Neurosci. Res.* **200**:28-33. doi:10.1016/j.neures.2023.09.003
5. Miyanishi K, Hotta-Hirashima N, Miyoshi C, Hayakawa S, Kakizaki M, Kanno S, Ikkyu A, Funato H, Yanagisawa M (2024) Microglia modulate sleep/wakefulness under baseline conditions and under acute social defeat stress in adult mice. *Neurosci. Res.* **202**:8-19. doi:10.1016/j.neures.2023.11.010
6. Moctezuma LA, Suzuki Y, Furuki J, Molinas M, Abe T (2024) GRU-powered sleep stage classification with permutation-based EEG channel selection. *Sci. Rep.* **14**(1). doi:10.1038/s41598-024-68978-4
7. Nakata S, Iwasaki K, Funato H, Yanagisawa M, Ozaki H (2024) Neuronal subtype-specific transcriptomic changes in the cerebral neocortex associated with sleep pressure. *Neurosci. Res.* **207** 13-25. doi:10.1016/j.neures.2024.03.004
8. Nakai A, Kashiwagi M, Fujiyama T, Iwasaki K, Hirano A, Funato H, Yanagisawa M, Sakurai T, Hayashi Y (2024) Crucial role of TFAP2B in the nervous system for regulating NREM sleep. *Mol. Brain.* **17**(1). doi:10.1186/s13041-024-01084-8
9. Sato N, Inada N, Miyazaki Y, Oi H, Inoue M, Kikuchi S, Nakajima S (2024) Maternal depression and its association with sleep problems and emotional and behavioral problems in preschool children. *Sleep Biol. Rhythms*. doi:10.1007/s41105-024-00557-6
10. Fan ZW, Zhu YY, Suzuki C, Suzuki Y, Watanabe Y, Watanabe T, Abe T (2024) Binaural beats at 0.25 Hz shorten the latency to slow-wave sleep during daytime naps. *Sci. Rep.* **14**(1). doi:10.1038/s41598-024-76059-9
11. Hama Y, Yamada S, Nishimura R, Yoshida M, Tsuga K, Morita E, Tamada Y, Kato Y, Kubo Y, Okada R, Nagayoshi M, Tamura T, Hishida A, Wakai K, Naito M (2024) Association between dysphagia risk and sleep quality in community-dwelling older adults: A cross-sectional study. *Heliyon* **10**(11). doi:10.1016/j.Heliyon.2024.e32028
12. Nakata S, Fujiyama T, Asano F, Komiya H, Hotta-Hirashima N, Juichi M, Komine D, Kakizaki M, Ikkyu A, Mizuno S, Takahashi S, Miyoshi C, Funato H, Yanagisawa M (2024) Partial activation of salt-inducible kinase 3 delays the onset of wakefulness and alleviates hypersomnia due to the lack of protein kinase A-phosphorylation site. *Sleep* **48**(2). doi:10.1093/sleep/zsae279
13. Inoue M, Nakajima S, Inada N, Oi H, Sato N, Miyazaki Y, Takashina H, Tagaya H, Adachi Y, Kuga H (2024) Development of the Parenting Behavior Checklist to Promote Preschoolers' Sleep (PCPP). *Behav. Sleep Med.* **22**(3):275-284. doi:10.1080/15402002.2023.2241590

14. Park I, Yoshitake R, Kioka K, Ishihara A, Yajima K, Kawana F, Kokubo T, Matsuzaki I, Kanbayashi T, Yanagisawa M, Tokuyama K (2024) Orexin receptor antagonist increases fat catabolism during sleep in humans. *IScience* **27**(7). doi:10.1016/j.isci.2024.110212
15. Nakatsuka D, Kanda T, Sato M, Ishikawa Y, Cherasse Y, Yanagisawa M (2024) A novel GABAergic population in the medial vestibular nucleus maintains wakefulness and gates rapid eye movement sleep. *IScience* **27**(3). doi:10.1016/j.isci.2024.109289
16. Seol J, Chiba S, Kawana F, Tsumoto S, Masaki M, Tominaga M, Amemiya T, Tani A, Hiei T, Yoshimine H, Kondo H, Yanagisawa M (2024) Validation of sleep-staging accuracy for an in-home sleep electroencephalography device compared with simultaneous polysomnography in patients with obstructive sleep apnea. *Sci. Rep.* **14**(1). doi:10.1038/s41598-024-53827-1
17. Sawada T, Iino Y, Yoshida K, Okazaki H, Nomura S, Shimizu C, Arima T, Juichi M, Zhou S, Kurabayashi N, Sakurai T, Yagishita S, Yanagisawa M, Toyozumi T, Kasai H, Shi S (2024) Prefrontal synaptic regulation of homeostatic sleep pressure revealed through synaptic chemogenetics. *Science* **385**(6716):1459-1465. doi:10.1126/Science.adl3043
18. Kashiwagi M, Beck G, Kanuka M, Arai Y, Tanaka K, Tatsuzawa C, Koga Y, Saito YC, Takagi M, Oishi Y, Sakaguchi M, Baba K, Ikuno M, Yamakado H, Takahashi R, Yanagisawa M, Murayama S, Sakurai T, Sakai K, Nakagawa Y, Watanabe M, Mochizuki H, Hayashi Y (2024) A pontine-medullary loop crucial for REM sleep and its deficit in Parkinson's disease. *Cell* **187** (22). doi:10.1016/j.cell.2024.08.046
19. Wang YM, Cao SY, Tone D, Fujishima H, Yamada RG, Ohno R, Shi S, Matsuzawa K, Yada S, Kaneko M, Sakamoto H, Onishi T, Ukai-Tadenuma M, Ukai H, Hanashima C, Hirose K, Kiyonari H, Sumiyama K, Ode KL, Ueda HR (2024) Postsynaptic competition between calcineurin and PKA regulates mammalian sleep-wake cycles. *Nature* **636**(8042):412. doi:10.1038/s41586-024-08132-2
20. Kon K, Ode KL, Mano T, Fujishima H, Takahashi RR, Tone D, Shimizu C, Shiono S, Yada S, Matsuzawa K, Yoshida SY, Garçon JY, Kaneko M, Shinohara Y, Yamada RG, Shi S, Miyamichi K, Sumiyama K, Kiyonari H, Susaki EA, Ueda HR (2024) Cortical parvalbumin neurons are responsible for homeostatic sleep rebound through CaMKII activation. *Nat. Commun.* **15**(1). doi:10.1038/s41467-024-50168-5
21. Asaga T, Hashimoto K, Kawamura Y, Fujita N, Kimata M, Sekizawa A, Ono Y, Obuchi Y, Kobayashi N, Hirasawa H, Kanbayashi T, Tanaka Y (2024) Idiopathic hypersomnia with a video recording of a spontaneous sleep attack: A case report. *Medicine* **103**(7). doi:10.1097/MD.00000000000036782
22. Suzuki Y, Ding N, Sato K, Wang ZS, Suzuki Y, Oiwa Y, Kanbayashi T, Abe T (2024) Effects of Slow Oscillation Enhancement during NREM Sleep Using Closed-Loop Auditory Stimulation on Anxiety. *Sleep* **47**. doi:10.1093/sleep/zsae067.0138
23. Horie K, Miyamoto R, Ota L, Abe T, Suzuki Y, Kawana F, Kokubo T, Yanagisawa M, Kitagawa H (2024) An ensemble method for improving robustness against the electrode contact problems in automated sleep stage scoring. *Sci. Rep.* **14**(1). doi:10.1038/s41598-024-72612-8
24. Cherasse Y, Taira Y, Rassa AL, Barateau L, Evangelista E, Muratani M, Funato H, Yanagisawa M, Dauvilliers Y (2024) Association between idiopathic hypersomnia and a genetic variant in the PER3 gene. *J. Sleep Res.* **33**(5). doi:10.1111/jsr.14146
25. Bjorness TE, Greene RW (2024) Orexin-mediated motivated arousal and reward seeking. *Peptides* **180**. doi:10.1016/j.peptides.2024.171280
26. Roy K, Zhou XZ, Otani R, Yuan PC, Ioka S, Vogt KE, Kondo T, Farag NHT, Ijiri H, Wu ZF, Chitose Y, Amezawa M, Uygun DS, Cherasse Y, Nagase H, Li YL, Yanagisawa M, Abe M, Basheer R, Wang YQ, Saitoh T, Lazarus M (2024) Optochemical control of slow-wave sleep in the nucleus accumbens of male mice by a photoactivatable allosteric modulator of adenosine A2A receptors. *Nat. Commun.* **15**

(1). doi:10.1038/s41467-024-47964-4

27. Furukawa Y, Nagaoka D, Sato S, Toyomoto R, Takashina HN, Kobayashi K, Sakata M, Nakajima S, Ito M, Yamamoto R, Hara S, Sakakibara E, Perlis M, Kasai K (2024) Cognitive behavioral therapy for insomnia to treat major depressive disorder with comorbid insomnia: A systematic review and meta-analysis. *Journal of Affective Disorders* **367** 359-366. doi:10.1016/j.jad.2024.09.017
28. Futagawa A, Tsuneoka Y, Lazarus M, Oishi Y (2024) Comprehensive mapping of histamine H1 receptor mRNA in the mouse brain. *J. Comp. Neurol* **532**(5). doi:10.1002/cne.25622
29. Naganuma F, Girgin B, Agu ABS, Hirano K, Nakamura T, Yanai K, Vetrivelan R, Mochizuki T, Yanagisawa M, Yoshikawa T (2025) Pharmacological inhibition of histamine N-methyltransferase extends wakefulness and suppresses cataplexy in a mouse model of narcolepsy. *Sleep* **48**(1). doi:10.1093/sleep/zsae244
30. Nagata K, Shibuya K, Fujii Y, Seol J, Jindo T, Okura T (2024) Cross-sectional study of the optimal types of physical exercise for cognitive function in older Japanese adults. *Geriatrics & Gerontology International* **24**(11):1173-1180. doi:10.1111/ggi.14991
31. Suzuki Y, Suzuki C, Abe T (2024) Examination of post—arousal hypersynchrony in the first—night effect. *Sleep* **47**. doi:10.1093/sleep/zsae067.0089
32. Mizuno Y, Uehara T, Nakamura Y, Okadome T, Mukaino T, Koh K, Takiyama Y, Kanbayashi T, Isobe N, Kira JI, Murai H, Shigeto H (2024) A case of monozygotic twins with hereditary spastic paraplegia type 4 and epilepsy of whom only one developed narcolepsy type 1. *J. Sleep Res.* **33**(4). doi:10.1111/jsr.14102
33. Abe T, Suzuki Y, Suzuki C, Ohigashi T, Maruo K, Watanabe Y, Endo J, Watanabe T (2024) Effects of Optimal-timed automatic awakening from a short daytime nap on cognitive performance and fatigue. *Sleep* **47**. doi:10.1093/sleep/zsae067.0143
34. Li YD, Luo YJ, Su WK, Ge J, Crowther A, Chen ZK, Wang L, Lazarus M, Liu ZL, Qu WM, Huang ZL (2024) Anterior cingulate cortex projections to the dorsal medial striatum underlie insomnia associated with chronic pain. *Neuron* **112**(8). doi:10.1016/j.neuron.2024.01.014
35. Lim N, Tsunoda K, Nagata K, Asano Y, Seol J, Jindo T, Tsuji T, Okura T (2024) Developing a battery of physical performance tests to predict functional disability in Japanese older adults: A longitudinal study from the Kasama study. *Geriatrics & Gerontology International* **24**(12):1343-1349. doi:10.1111/ggi.15008
36. Yajima K, Chiba S, Park I, Ogata H, Kayaba M, Ishihara A, Tanaka Y, Simeng Z, Jaehoon S, Katakura M, Tokuyama K (2024) Dietary palmitic acid to oleic acid ratio modulates energy metabolism and biological rhythms in young healthy Japanese males. *Br. J. Nutr.* **131**(3):447-460. doi:10.1017/S0007114523001770
37. Tagawa N, Mori K, Koebis M, Aiba A, Iino Y, Tsuneoka Y, Funato H (2024) Activation of lateral preoptic neurons is associated with nest-building in male mice. *Sci. Rep.* **14**(1). doi:10.1038/s41598-024-59061-z
38. Tsuneoka Y, Funato H (2024) Whole Brain Mapping of Orexin Receptor mRNA Expression Visualized by Branched in Situ Hybridization Chain Reaction. *Eneuro* **11**(2). doi:10.1523/ENEURO.0474-23.2024
39. Nishiyama S, Sekine A, Masuyama T, Nagatomo K, Kanbayashi T, Sanui M (2025) Orexin concentrations and diurnal variation in the cerebrospinal fluid of intensive care unit patients undergoing aortic surgery with spinal drainage. *Neuropsychopharmacol. Rep.* **45**(1). doi:10.1002/npr2.12504

40. Furukawa Y, Sakata M, Yamamoto R, Nakajima S, Kikuchi S, Inoue M, Ito M, Noma H, Takashina HN, Funada S, Ostinelli EG, Furukawa TA, Efthimiou O, Perlis M (2024) Components and Delivery Formats of Cognitive Behavioral Therapy for Chronic Insomnia in Adults A Systematic Review and Component Network Meta-Analysis. *Jama Psychiatry* **81**(4):357-365. doi:10.1001/jamapsychiatry.2023.5060
41. Kawakami C, Naoi T, Sakaguchi M (2024) Spaced conditioned stimulus presentation facilitates the extinction of strong fear memory in mice. *Biochem. Biophys. Res. Commun.* **718**. doi:10.1016/j.bbrc.2024.150071
42. Masuda K, Sakurai T, Hirano A (2024) A coupled model between circadian cell-cycle and redox rhythms reveals their regulation of oxidative stress. *Sci. Rep.* **14**(1). doi:10.1038/s41598-024-66347-9
43. Masuda K, Tokuda IT, Fukuda H (2024) Recovering detailed shape of phase response curves from the higher harmonics of singularity response. *Phys. Rev. Res.* **6**(4). doi:10.1103/PhysRevResearch.6.043174
44. Bou S, Amagasa T, Kitagawa H (2024) Finformer: Fast Incremental and General Time Series Data Prediction. *IEICE Trans. Inf. Syst.* **E107D**(5):625-637. doi:10.1587/transinf.2023DAP0003
45. Li KZ, Koukoutselos K, Sakaguchi M, Ciochi S (2024) Distinct ventral hippocampal inhibitory microcircuits regulating anxiety and fear behaviors. *Nat. Commun.* **15**(1). doi:10.1038/s41467-024-52466-4
46. Suzuki Y, Ramadhiani R, Ryanto GR, Musthafa A, Hara T, Yanagisawa M, Emoto N (2024) Endothelin-2 specifically expressed in the pulmonary neuroendocrine cells plays a novel and crucial role in the development of hypoxia- induced pulmonary hypertension. *Clin. Sci.* **138** A106-A106.
47. Shaikh SA, Kitagawa H, Matono A, Kim KS (2024) A Distributed and Scalable Framework for Low-Latency Continuous Trajectory Stream Processing. *IEEE Access* **12** 159426-159444. doi:10.1109/ACCESS.2024.3484433
48. Seol J, So R, Murai F, Matsuo T (2024) Relationship between rest-activity rhythms and cardiorespiratory fitness in middle-aged workers: a cross-sectional study with non-parametric analysis using accelerometers worn on the thigh. *Bmc Public Health* **24**(1). doi:10.1186/s12889-023-17580-w
49. Okabe Y, Murakoshi N, Kurebayashi N, Inoue H, Ito Y, Murayama T, Miyoshi C, Funato H, Ishii K, Xu DZ, Tajiri K, Qin RJ, Aonuma K, Murakata Y, Song ZH, Wakana S, Yokoyama U, Sakurai T, Aonuma K, Ieda M, Yanagisawa M (2024) An inherited life- threatening arrhythmia model established by screening randomly mutagenized mice. *Proc. Natl. Acad. Sci. U.S.A.* **121**(17). doi:10.1073/pnas.2218204121
50. Martino P, Sunkara R, Heitman N, Rangl M, Brown A, Saxena N, Grisanti L, Kohan D, Yanagisawa M, Rendl M (2024) Progenitor-derived endothelin controls dermal sheath contraction for hair follicle regression. *Clin. Sci.* **138** A16-A16.
51. Tsunoda R, Kume K, Kagawa R, Sanuki M, Kitagawa H, Mase K, Yamagata K (2024) Machine-learning-based identification of patients with IgA nephropathy using a computerized medical billing database. *PLoS One* **19**(12). doi:10.1371/journal.pone.0312915
52. Yoshioka T, Yamada D, Hagiwara A, Kajino K, Iio K, Saitoh T, Nagase H, Saitoh A (2024) Delta opioid receptor agonists activate PI3K-mTORC1 signaling in parvalbumin-positive interneurons in mouse infralimbic prefrontal cortex to exert acute antidepressant-like effects. *Mol. Psychiatry.* doi:10.1038/s41380-024-02814-z
53. Kawaminami A, Yamada D, Yoshioka T, Hatakeyama A, Nishida M, Kajino K, Saitoh T, Nagase H,

- Saitoh A (2024) The delta opioid receptor agonist KNT-127 relieves innate anxiety-like behavior in mice by suppressing transmission from the prelimbic cortex to basolateral amygdala. *Neuropsychopharmacol. Rep.* **44**(1):256-261. doi:10.1002/npr2.12406
54. Ryanto GRT, Fujiyama T, Suzuki Y, Hara T, Nagai T, Yanagisawa M, Emoto N (2024) Evaluation of ET-2 physiology in the lung via the generation of a novel Edn-2 luminescent reporter mice. *Clin. Sci.* **138** A105-A105.
55. Bou S, Amagasa T, Kitagawa H (2024) O(1)-Time Complexity for Fixed Sliding-Window Aggregation Over Out-of-Order Data Streams. *IEEE Trans. Knowl. Data Eng.* **36**(11):6745-6757. doi:10.1109/TKDE.2024.3419566
56. Aida K, Hirao M, Saitoh T, Yamamoto T, Einaga Y, Ota E, Yamaguchi J (2024) Selective C-N Bond Cleavage in Unstrained Pyrrolidines Enabled by Lewis Acid and Photoredox Catalysis. *JACS* **146**(44):30698-30707. doi:10.1021/jacs.4c13210
57. Maeda K, Sugai T, Tokuda A, Kajino K, Saitoh T, Nagase H, Kutsumura N (2024) Design and synthesis of unique morphinan-type molecules: Their application to the search for the unexplored binding domain between opioid receptors and morphinan ligands. *Bioorganic & Medicinal Chemistry Letters* **99**. doi:10.1016/j.bmcl.2024.129611
58. Okamoto M, Shimoda R, Amaya Y, Soya S, Soya M, Koizumi H, Nakamura K, Hiraga T, Torma F, Soya H (2024) Accelerated Fear Extinction by Regular Light-Intensity Exercise: A Possible Role of Hippocampal BDNF-TrkB Signaling. *Med. Sci. Sports Exercise* **56**(2):221-229. doi:10.1249/MSS.0000000000003312
59. Yoshida N, Miyajima M, Suzuki Y, Matsushima E, Watanabe T, Omoya R, Fujiwara M, Nakamura M, Takahashi H, Takeuchi T (2024) Heart rate variability in schizophrenia: A comparative analysis before and after electroconvulsive therapy. *Psychiatry And Clinical NeuroSciences Reports* **3**(4). doi:10.1002/pcn5.70030
60. Murakami Y, Ando M, Imamura A, Oketani R, Leproux P, Honjoh S, Kano H (2024) Molecular Fingerprinting of Mouse Brain Using Ultrabroadband Coherent Anti-Stokes Raman Scattering (CARS) Microspectroscopy Empowered by Multivariate Curve Resolution-Alternating Least Squares (MCR-ALS). *Chem. Biomed. Imaging* **2**(10):689-697. doi:10.1021/cbmi.4c00034
61. Suganuma T, Hatori S, Chen CK, Hori S, Kanuka M, Liu CY, Tatsuzawa C, Yanagisawa M, Hayashi Y (2024) Caffeoylquinic Acid Mitigates Neuronal Loss and Cognitive Decline in 5XFAD Mice Without Reducing the Amyloid- $\beta$  Plaque Burden. *J. Alzheimers Dis.* **99**(4):1285-1301. doi:10.3233/JAD-240033
62. Nomura S, Terada SI, Ebina T, Uemura M, Masamizu Y, Ohki K, Matsuzaki M (2024) ARViS: a bleed-free multi-site automated injection robot for accurate fast and dense delivery of virus to mouse and marmoset cerebral cortex. *Nat. Commun.* **15**(1). doi:10.1038/s41467-024-51986-3
63. Hiraga T, Hata T, Soya S, Shimoda R, Takahashi K, Soya M, Inoue K, Johansen JP, Okamoto M, Soya H (2024) Light-exercise-induced dopaminergic and noradrenergic stimulation in the dorsal hippocampus: Using a rat physiological exercise model. *FASEB J.* **38**(24). doi:10.1096/fj.202400418RRR
64. Arai K, Ono Y, Hirai N, Sugiura Y, Kaneko K, Matsuda S, Iio K, Kajino K, Saitoh T, Wei FY, Katagiri H, Inoue A (2024) Chemogenetic activation of hepatic G12 signaling ameliorates hepatic steatosis and obesity. *Biochim Biophys Acta Mol Basis Dis.* **1871**(2):167566. doi:10.1016/j.bbdis.2024.167566
65. Seol J, So R, Murai F, Matsuo T (2024) Association between physical activity patterns of working-age adults and social jetlag depressive symptoms and presenteeism. *Journal of Occupational Health* **66**(1). doi:10.1093/jocuh/uiae068

66. Arai M, Suzuki E, Kitamura S, Otaki M, Kanai K, Yamasaki M, Watanabe M, Kambe Y, Murata K, Takada Y, Arisawa T, Kobayashi K, Tajika R, Miyazaki T, Yamaguchi M, Lazarus M, Hayashi Y, Itohara S, d'Exaerde AD, Nawa H, Kim R, Bito H, Momiyama T, Masukawa D, Goshima Y (2024) Enhancement of Haloperidol-Induced Catalepsy by GPR143 an L-Dopa Receptor in Striatal Cholinergic Interneurons. *J. Neurosci.* **44**(11). doi:10.1523/JNEUROSCI.1504-23.2024
67. Hario S, Le GNT, Sugimoto H, Takahashi-Yamashiro K, Nishinami S, Toda H, Li SLE, Marvin JS, Kuroda S, Drobizhev M, Terai T, Nasu Y, Campbell RE (2024) High-Performance Genetically Encoded Green Fluorescent Biosensors for Intracellular L-Lactate. *ACS Cent. Sci.* **10**(2):402-416. doi:10.1021/acscentsci.3c01250
68. He Z, Vergara P, Tezuka T, Sakaguchi M (2024) Real-Time Detection of Motifs from semi-Synthetic Calcium Imaging Data with Various Noise Types. *IEEE EMBC 2024*. doi:10.1109/EMBC53108.2024.10782461
69. Yamada M, Kitagawa H, Shaikh S A, Amagasa T, Matono A (2024) Research on traceability for complex stream processing. *DBSJ Data-Driven Studies.* **2**(1):Article 1
70. Suzuki Y, Zhiwei F, Abe T (2024) A preliminary study of factors influencing the occurrence of post-arousal hypersynchrony. *Sleep Science and Practice* **8** 3. doi:org/10.1186/s41606-024-00098-4
71. Wang Y, Vergara P, Hasegawa S, Tomita N, Cherasse Y, Naoi T, Sakurai T, Sugaya Y, Kano M, Sakaguchi M (2024) T-scope V4: miniaturized microscope for optogenetic tagging in freely behaving animals. *bioRxiv*. doi:10.1101/2024.10.07.616920

## (2) Review articles

72. Hasegawa E, Lazarus M (2024) Mental health: The REM sleep paradox in depression. *Curr. Biol.* **34** (15). doi:10.1016/j.cub.2024.06.053
73. Horie K, Miyamoto R, Ota L, Abe T, Suzuki Y, Kawana F, Kokubo T, Yanagisawa M, Kitagawa H (2024) An ensemble method for improving robustness against the electrode contact problems in automated sleep stage scoring (vol 14 21894 2024). *Sci. Rep.* **15**(1). doi:10.1038/s41598-025-85854-x
74. Kumar D (2024) Sleep-memory relationships during brain aging. *Aging Brain* **6**. doi:10.1016/j.nbas.2024.100127
75. Sakurai K (2024) Rethinking c-Fos for understanding drug action in the brain. *J. Biochem.* **175**(4): 377-381. doi:10.1093/jb/mvad110
76. Kajino K, Tokuda A, Saitoh T (2024) Morphinan Evolution: The Impact of Advances in Biochemistry and Molecular Biology. *J. Biochem.* **175**(4):337-355. doi:10.1093/jb/mvae021
77. Omichi C, Kaminishi Y, Kadotani H, Sumi Y, Ubara A, Nishikawa K, Matsuda A, Ozeki Y (2024) Limited (vol 10 981592 2022). *Front. Public Health* **12**. doi:10.3389/fpubh.2024.1449081
78. Iwayama T, Matsumoto A, Saneyoshi A, Oi H, Yanagida A, Noma H, Nakajima S, Nakamura-Taira N (2024) How Can Near-Infrared Spectroscopy (NIRS) Help Understanding of the Psychotherapy Process? A Scoping Review of Therapeutic Interactions. *Japanese Psychological Research* **67**(2):175-194 doi:org/10.1111/jpr.12561
79. Kashihara J, Sugawara D, Kunisato Y, Takebayashi Y, Nakajima S, Ito M (2024) Possible Futures for the Psychological Network Approach: Agenda for Clinical Scientists. *Japanese Psychological Research* **67**(2):132-146. doi:org/10.1111/jpr.12538

## (3) Proceedings

80. Tsumoto S, Masaki M, Seol J, Hiei T, Morishima A, Kawana F, Nishida K, Tominaga M, Tani A, Kitagawa H, Horie K, Miyanishi K, Amemiya T, Matsubara M, Yanagisawa M (2024) Automated Generation of Narrative Sleep Reports Utilizing Portable Electroencephalogram Data through ChatGPT. *IEEE12Th International Conference on Healthcare Informatics Ichi 2024* 376-385. doi:10.1109/ICHI61247.2024.00055
81. Almanza JCN, Ota L, Horie K, Kawana F, Kokubo T, Yanagisawa M, Kitagawa H (2024) Sleep and Arousal Scoring for In-home EEG Signals: A Multitask Learning Approach. *IEEE12Th International Conference on Healthcare Informatics Ichi 2024* 147-156. doi:10.1109/ICHI61247.2024.00027
82. Koyama K, Sakaguchi M, Ohnishi T (2024) A noise-robust approach to estimate dimension of sleep EEG in mice using permutation entropy. *IEEE International Conference on Fuzzy Systems Fuzz-IEEE 2024*. doi:10.1109/FUZZ-IEEE60900.2024.10611847
83. Shaikh SA, Kitagawa H, Matono A (2024) Distributed Continuous and Real-time Trajectory Similarity Search. *23rd International Symposium on Parallel and Distributed Computing Ispdc 2024*. doi:10.1109/ISPDC62236.2024.10705397
84. Murakami Y, Oketani R, Leproux P, Nuriya M, Honjoh S, Kano H (2024) Molecular identification of second harmonic generation (SHG) sources in mouse brain by multimodal imaging with ultra-broadband multiplex coherent anti Stokes Raman scattering (CARS). *Advanced Chemical Microscopy for Life Science and Translational Medicine* 12855. doi:10.1117/12.2692336
85. Khalique V, Kitagawa H, Amagasa T (2024) Boundary point detection combining gravity and outlier detection methods. *The DASFAA Workshop on Emerging Results in Data Science and Engineering* **14667**:147-162. doi:10.1007/978-981-96-0914-7\_10
86. Moctezuma LA, Suzuki Y, Furuki J, Molinas M, Abe T (2024) Enhancing Sleep Stage Classification with 2-Class Stratification and permutation-Based Channel Selection. *46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2024* 1-4. doi: 10.1109/EMBC53108.2024.10781882.

#### **(4) Other English Articles**

87. Kanbayashi T, Li R, Burhani OT, Konno Y, Nemoto T, Chiba S, Park I, Anegawa E, Hirano A, Sakurai T (2024) Aripiprazole as a new treatment for circadian rhythm sleep-wake disorders and its mechanism of action. *J. Sleep Res.* **33**.
88. Suzuki Y, Ding N, Sato K, Wang ZS, Suzuki Y, Oiwa Y, Kanbayashi T, Abe T (2024) Slow-oscillation enhancement during non-rapid eye movement sleep using closed-loop auditory stimulation in healthy adults with high anxiety may improve cardiac health after sleep. *J. Sleep Res.* **33**.
89. Chiba S, Honaga T, Konno Y, Anegawa E, Ishido H, Nemoto T, Irukayama Y, Takahashi S, Kanbayashi T, Kimura M (2024) Pathophysiology and treatment of young patients with prolonged nocturnal sleep after COVID-19 infection. *J. Sleep Res.* **33**
90. Park I, Yoshitake R, Kioka K, Ishihara A, Yajima K, Kawana F, Kokubo T, Matsuzaki I, Yanagisawa M, Kanbayashi T, Tokuyama K (2024) Orexin receptor antagonist modulates sleeping energy metabolism in humans. *J. Sleep Res.* **33**

## **2023**

### **(1) Original Articles**

91. Amezawa M, Yamamoto N, Nagumo Y, Kutsumura N, Ishikawa Y, Yanagisawa M, Nagase H, Saitoh T (2023) Design and synthesis of novel orexin 2 receptor agonists with a 1,3,5-trioxazatriquinane skeleton. *Bioorg. Med. Chem. Lett.* 82129151. doi:10.1016/j.bmcl.2023.129151
92. Asano F, Kim SJ, Fujiyama T, Miyoshi C, Hotta-Hirashima N, Asama N, Iwasaki K, Kakizaki M, Mizuno S, Mieda M, Sugiyama F, Takahashi S, Shi S, Hirano A, Funato H, Yanagisawa M (2023) SIK3-HDAC4

in the suprachiasmatic nucleus regulates the timing of arousal at the dark onset and circadian period in mice. *Proc. Natl. Acad. Sci. U.S.A.* **120**(11):e2218209120. doi:10.1073/pnas.2218209120

93. Chen C, Kawano T, Yanagisawa M, Hayashi Y (2023) Forward genetic screen of caenorhabditis elegans mutants with impaired sleep reveals a crucial role of neuronal diacylglycerol kinase DGK-1 in regulating sleep. *Genetics*. **225**(2). doi:10.1093/genetics/iyad140
94. Elhosainy A, Suzuki-Abe H, Kaushik MK, Kim SJ, Saitoh T, Ishikawa Y, Hotta-Hirashima N, Miyoshi C, Funato H, Yanagisawa M (2023) Face validation and pharmacologic analysis of Sik3Sleepy mutant mouse as a possible model of idiopathic hypersomnia. *Eur. J. Pharmacol.* 954175877. doi:10.1016/j.ejphar.2023.175877
95. Fan Z, Suzuki Y, Jiang L, Okabe S, Honda S, Endo J, Watanabe T, Abe T (2023) Peripheral blood flow estimated by laser doppler flowmetry provides additional information about sleep state beyond that provided by pulse rate variability. *Front. Physiol.* 141040425. doi:10.3389/fphys.2023.1040425
96. Fifel K, Yanagisawa M, Deboer T (2023) Mechanisms of sleep/wake regulation under hypodopaminergic state: Insights from MitoPark mouse model of parkinson's disease. *Adv. Sci.* **10**(5):doi:10.1002/advs.202203170
97. Guo H, Jiang J, Xu W, Zhang M, Chen H, Shi H, Wang L, He M, Lazarus M, Li S, Huang Z, Qu W (2023) Parasubthalamic calretinin neurons modulate wakefulness associated with exploration in male mice. *Nat. Commun.* **14**(1):2346. doi:10.1038/s41467-023-37797-y
98. Iio K, Hashimoto K, Nagumo Y, Amezawa M, Hasegawa T, Yamamoto N, Kutsumura N, Takeuchi K, Ishikawa Y, Yamamoto H, Tokuda A, Sato T, Uchida Y, Inoue A, Tanimura R, Yanagisawa M, Nagase H, Saitoh T (2023) Design and synthesis of orexin 1 receptor-selective agonists. *J. Med. Chem.* **66**(8):5453-5464. doi:10.1021/acs.jmedchem.2c01773
99. Inoue M, Nakajima S, Inada N, Oi H, Sato N, Miyazaki Y, Takashina H, Tagaya H, Adachi Y, Kuga H (2023) Development of the parenting behavior checklist to promote preschoolers' sleep (PCPP). *Behav. Sleep Med.* doi:10.1080/15402002.2023.2241590
100. Ishido H, Chiba S, Takahashi H, Isa M, Ogawa Y, Kubota H, Imanishi A, Omori Y, Ono T, Tsutsui K, Han G, Kondo H, Tsuji H, Nakamagoe K, Ishii A, Tanaka K, Tamaoka A, Shimizu T, Nishino S, Miyamoto T, Kanbayashi T (2023) Characteristics of hypersomnia due to inflammatory demyelinating diseases of the central nervous system. *BMJ Neurol Open.* **5**(1):e000428. doi:10.1136/bmjno-2023-000428
101. Iwagami M, Seol J, Hiei T, Tani A, Chiba S, Kanbayashi T, Kondo H, Tanaka T, Yanagisawa M (2023) Association between electroencephalogram-based sleep characteristics and physical health in the general adult population. *Sci Rep.* **13**(1):21545. doi:10.1038/s41598-023-47979-9
102. Kawaminami A, Yamada D, Yoshioka T, Hatakeyama A, Nishida M, Kajino K, Saitoh T, Nagase H, Saitoh A (2023) The delta opioid receptor agonist KNT-127 relieves innate anxiety-like behavior in mice by suppressing transmission from the prelimbic cortex to basolateral amygdala. *Neuropsychopharmacol. Rep.* doi:10.1002/npr2.12406
103. Kawano T, Kashiwagi M, Kanuka M, Chen C, Yasugaki S, Hatori S, Miyazaki S, Tanaka K, Fujita H, Nakajima T, Yanagisawa M, Nakagawa Y, Hayashi Y (2023) ER proteostasis regulators cell-non-autonomously control sleep. *Cell Reports.* **42**(3):112267. doi:10.1016/j.celrep.2023.112267
104. Khalique V, Kitagawa H, Amagasa T (2023) BPF: A novel cluster boundary points detection method for static and streaming data. *Knowl. Inf. Syst.* **65**(7):2991-3022. doi:10.1007/s10115-023-01854-1
105. Kobayashi R, Nakane S, Tomita J, Funato H, Yanagisawa M, Kume K (2023) A phosphorylation-deficient mutant of Sik3, a homolog of sleepy, alters circadian sleep regulation by PDF neurons in drosophila. *Front. Neurosci.* 171181555. doi:10.3389/fnins.2023.1181555

106. Korkutata M, Lazarus M (2023) Adenosine A2A receptors and sleep. *Int. Rev. Neurobiol.* 170155-178. doi:10.1016/bs.irn.2023.04.007
107. Koutsoumparis A, Busack I, Chen C, Hayashi Y, Braeckman BP, Meierhofer D, Bringmann H (2023) Reverse genetic screening during L1 arrest reveals a role of the diacylglycerol kinase 1 gene *dgk-1* and sphingolipid metabolism genes in sleep regulation. *Genetics.* **225**(2). doi:10.1093/genetics/iyad124
108. Koyanagi I, Tezuka T, Yu J, Srinivasan S, Naoi T, Yasugaki S, Nakai A, Taniguchi S, Hayashi Y, Nakano Y, Sakaguchi M (2023) Fully automatic REM sleep stage-specific intervention systems using single EEG in mice. *Neurosci. Res.* 18651-58. doi:10.1016/j.neures.2022.10.001
109. Li R, Masuda K, Ono D, Kanbayashi T, Hirano A, Sakurai T (2023) Aripiprazole disrupts cellular synchrony in the suprachiasmatic nucleus and enhances entrainment to environmental light-dark cycles in mice. *Front. Neurosci.* 171201137. doi:10.3389/fnins.2023.1201137
110. Lin Y, Roy K, Ioka S, Otani R, Amezawa M, Ishikawa Y, Cherasse Y, Kaushik MK, Klewe-Nebenius D, Zhou L, Yanagisawa M, Oishi Y, Saitoh T, Lazarus M (2023) Positive allosteric adenosine A2A receptor modulation suppresses insomnia associated with mania- and schizophrenia-like behaviors in mice. *Front. Pharmacol.* 141138666. doi:10.3389/fphar.2023.1138666
111. Luo Y, Ge J, Chen Z, Liu Z, Lazarus M, Qu W, Hang Z, Li Y (2023) Ventral pallidal glutamatergic neurons regulate wakefulness and emotion through separated projections. *iScience.* **26**(8):107385. doi:10.1016/j.isci.2023.107385
112. Maeda K, Ohruji S, Tokuda A, Nagumo Y, Yamamoto N, Tanimura R, Saitoh T, Kutsumura N, Nagase H (2023) Unexpected rearrangement reactions of the 14-aminonaltrexone skeleton. *Org. Lett.* **25**(19):3407-3411. doi:10.1021/acs.orglett.3c00956
113. Martino P, Sunkara R, Heitman N, Rangl M, Brown A, Saxena N, Grisanti L, Kohan D, Yanagisawa M, Rendl M (2023) Progenitor-derived endothelin controls dermal sheath contraction for hair follicle regression. *Nat. Cell Biol.* **25**(2):222-+. doi:10.1038/s41556-022-01065-w
114. Masuda K, Katsuda Y, Niwa Y, Sakurai T, Hirano A (2023) Analysis of circadian rhythm components in EEG/EMG data of aged mice. *Front. Neurosci.* 171173537. doi:10.3389/fnins.2023.1173537
115. Masuda K, Kon N, Iizuka K, Fukada Y, Sakurai T, Hirano A (2023) Singularity response reveals entrainment properties in mammalian circadian clock. *Nat. Commun.* **14**(1):2819. doi:10.1038/s41467-023-38392-x
116. Mizuno Y, Uehara T, Nakamura Y, Okadome T, Mukaino T, Koh K, Takiyama Y, Kanbayashi T, Isobe N, Kira J, Murai H, Shigeto H (2023) A case of monozygotic twins with hereditary spastic paraplegia type 4 and epilepsy, of whom only one developed narcolepsy type 1. *J. Sleep Res.* doi:10.1111/jsr.14102
117. Monma T, Matsui T, Inoue K, Masuchi K, Okada T, Tamura M, Ishii T, Satoh M, Tokuyama K, Takeda F (2023) Prevalence and risk factors of poor subjective sleep quality in elite judo athletes. *Sleep Biol. Rhythms.* **21**(3):289-297. doi:10.1007/s41105-023-00444-6
118. Moriya Y, Kasahara Y, Shimada M, Sakakibara Y, Fujii H, Nagase H, Ide S, Ikeda K, Hall FS, Uhl GR, Sora I (2023) Role for  $\mu$ -opioid receptor in antidepressant effects of  $\delta$ -opioid receptor agonist KNT-127. *J. Pharmacol. Sci.* **151**(3):135-141. doi:10.1016/j.jphs.2022.12.008
119. Mukai Y, Okubo TS, Lazarus M, Ono D, Tanaka KF, Yamanaka A (2023) Prostaglandin E2 induces long-lasting inhibition of noradrenergic neurons in the locus coeruleus and moderates the behavioral response to stressors. *J. Neurosci.* **43**(47):7982-7999. doi:10.1523/JNEUROSCI.0353-23.2023

120. Murakami Y, Yoshimura M, Klement WJ, Oda A, Sakamoto R, Yakabe M, Matsumoto A, Oketani R, Leproux P, Ikenouchi J, Browne WR, Kano H (2023) Backward multiplex coherent anti-stokes raman (CARS) spectroscopic imaging with electron CCD camera. *Opt. Continuum*. **2**(9):2044-2054. doi:10.1364/OPTCON.497869
121. Nasu Y, Aggarwal A, Le GNT, Vo CT, Kambe Y, Wang X, Beinlich FRM, Lee AB, Ram TR, Wang F, Gorzo KA, Kamijo Y, Boisvert M, Nishinami S, Kawamura G, Ozawa T, Toda H, Gordon GR, Ge S, Hirase H, Nedergaard M, Paquet ME, Drobizhev M, Podgorski K, Campbell RE (2023) Lactate biosensors for spectrally and spatially multiplexed fluorescence imaging. *Nat. Commun*. **14**(1):6598. doi:10.1038/s41467-023-42230-5
122. Nishioka T, Attachaipanich S, Hamaguchi K, Lazarus M, d'Exaerde Ad'K, Macpherson T, Hikida T (2023) Error-related signaling in nucleus accumbens D2 receptor-expressing neurons guides inhibition-based choice behavior in mice. *Nat. Commun*. **14**(1):2284. doi:10.1038/s41467-023-38025-3
123. Oda S, Funato H (2023) D1-and D2-type dopamine receptors are immunolocalized in pial and layer I astrocytes in the rat cerebral cortex. *Front. Neuroanat*. 171111008. doi:10.3389/fnana.2023.1111008
124. Okabe S, Abe T (2023) Subjectively intense odor does not affect dream emotions during rapid eye movement sleep. *Sci Rep*. **13**(1):10442. doi:10.1038/s41598-023-37151-8
125. Ollila HM, et al. (2023) Narcolepsy risk loci outline role of T cell autoimmunity and infectious triggers in narcolepsy. *Nat. Commun*. **14**(1):2709. doi:10.1038/s41467-023-36120-z
126. Ono Y, Ito R, Arai K, Singh G, Saitoh T, Russell RB, Raimondi F, Aoki J, Sakai J, Inoue A (2023) Chemogenetic activation of G12 signaling enhances adipose tissue browning. *Signal Transduct. Target. Ther*. **8**(1):307. doi:10.1038/s41392-023-01524-2
127. Prokofeva K, Saito YC, Niwa Y, Mizuno S, Takahashi S, Hirano A, Sakurai T (2023) Structure and function of neuronal circuits linking ventrolateral preoptic nucleus and lateral hypothalamic area. *J. Neurosci*. **43**(22):4075-4092. doi:10.1523/JNEUROSCI.1913-22.2023
128. Saitoh T, Sakurai T (2023) The present and future of synthetic orexin receptor agonists. *Peptides*. 167171051. doi:10.1016/j.peptides.2023.171051
129. Seol J, Kokudo C, Park I, Zhang S, Yajima K, Okura T, Tokuyama K (2023) Energy metabolism and thermoregulation during sleep in young and old females. *Sci Rep*. **13**(1):10416. doi:10.1038/s41598-023-37407-3
130. Seol J, Lim N, Nagata K, Okura T (2023) Effects of home-based manual dexterity training on cognitive function among older adults: A randomized controlled trial. *Eur. Rev. Aging Phys. Act*. **20**(1):9. doi:10.1186/s11556-023-00319-2
131. Takahashi TM, Sakurai T, Hirano A (2023) Measuring body temperature of freely moving mice under an optogenetics-induced long-term hypothermic state. *STAR Protoc*. **4**(2):102321. doi:10.1016/j.xpro.2023.102321
132. Takenawa S, Nagasawa Y, Go K, Cherasse Y, Mizuno S, Sano K, Ogawa S (2023) Activity of estrogen receptor  $\beta$  expressing neurons in the medial amygdala regulates preference toward receptive females in male mice. *Proc. Natl. Acad. Sci. U.S.A.* **120**(42):e2305950120. doi:10.1073/pnas.2305950120
133. Tsuneoka Y, Nishikawa T, Furube E, Okamoto K, Yoshimura R, Funato H, Miyata S (2023) Characterization of TRPM8-expressing neurons in the adult mouse hypothalamus. *Neurosci. Lett*. 814137463. doi:10.1016/j.neulet.2023.137463

134. Yada Y, Matsumoto M, Inoue T, Baba A, Higuchi R, Kawai C, Yanagisawa M, Kitamura D, Ohga S, Kurosaki T, Baba Y (2023) STIM-mediated calcium influx regulates maintenance and selection of germinal center B cells. *J. Exp. Med.* **221**(1):e20222178. doi:10.1084/jem.20222178
135. Yajima K, Chiba S, Park I, Ogata H, Kayaba M, Ishihara A, Tanaka Y, Simeng Z, Jaehoon S, Katakura M, Tokuyama K (2023) Dietary palmitic acid to oleic acid ratio modulates energy metabolism and biological rhythms in young healthy Japanese males. *Br. J. Nutr.* doi:10.1017/S0007114523001770
136. Yamada M, Kitagawa H, Amagasa T, Matono A (2023) Augmented lineage: Traceability of data analysis including complex UDF processing. *Vldb J.* **32**(5):963-983. doi:10.1007/s00778-022-00769-7
137. Yoshioka T, Yamada D, Segi-Nishida E, Nagase H, Saitoh A (2023) KNT-127, a selective delta opioid receptor agonist, shows beneficial effects in the hippocampal dentate gyrus of a chronic vicarious social defeat stress mouse model. *Neuropharmacology.* 232109511. doi:10.1016/j.neuropharm.2023.109511
138. Yun R, Hong E, Kim J, Park B, Kim S J, Lee B, Song YS, Kim S, Park S, Kang JM (2023) N-linked glycosylation is essential for anti-tumor activities of KIAA1324 in gastric cancer. *Cell Death Dis.* **14**(8):546. doi:10.1038/s41419-023-06083-6
139. Miyanishi K, Hotta-Hirashima N, Miyoshi C, Hayakawa S, Kakizaki M, Kanno S, Ikkyu A, Funato H, Yanagisawa M. (2023) Microglia modulate sleep/wakefulness under baseline conditions and under acute social defeat stress in adult mice. *Neurosci. Res.* doi:10.1016/j.neures.2023.11.010
140. Kanda T, Aritake T, Ohyama K, Vogt KE, Makino Y, McHugh T, Hino H, Akaho S, Murata N (2023) Hawkes process modeling quantifies complicated firing behaviors of cortical neurons during sleep and wakefulness. *bioRxiv.* doi:10.1101/2023.07.29.550297
141. Díaz J, Ando H, Han G, Malyshevskaya O, Hayashi X, Letelier J, Yanagisawa M, Vogt KE (2023) Recovering arrhythmic EEG transients from their stochastic interference. *arXiv.* arXiv:2303.07683doi:arXiv:2303.07683 2023
142. Bou S, Amagasa T, Kitagawa H, Shaikh SA, Matono A (2023) Efficient missing value imputation by maximum distance likelihood. *Proc. IEEE BigData 2023.* 331-338. doi:10.1109/BigData59044.2023.10386584
143. Trisminingsih R, Shaikh SA, Amagasa T, Kitagawa H, Matono A (2023) Trapm: A framework for online pattern matching over trajectory streams. *Proc. iiWAS 2023.* 510-525. doi:10.1007/978-3-031-48316-5\_45
144. Ohmori Y, Kitagawa H, Amagasa T, Matono A (2023) Integration of knowledge bases and external information sources via magic properties and query-driven entity linking. *Proc. iiWAS 2023.* 309-324. doi:10.1007/978-3-031-48316-5\_30
145. Bou S, Kitagawa H, Amagasa T (2023) Cpix: Real-time analytics over out-of-order data streams by incremental sliding-window aggregation. *Proc. ICDE 2023.* 3759-3760. doi:10.1109/ICDE55515.2023.00310
146. Hasegawa E, Li Y, Sakurai T (2023) Regulation of REM sleep in mice: The role of dopamine and serotonin function in the basolateral amygdala. *Neurosci. Res.* S0168-0102(23):168. doi:10.1016/j.neures.2023.09.003

## (2) Review articles

147. Ma W, Yuan P, Zhang H, Kong L, Lazarus M, Qu W, Wang Y, Huang Z (2023) Adenosine and P1 receptors: Key targets in the regulation of sleep, torpor, and hibernation. *Front. Pharmacol.* 141098976. doi:10.3389/fphar.2023.1098976

148. Oishi Y, Saito YC, Sakurai T (2023) GABAergic modulation of sleep-wake states. *Pharmacol. Ther.* 249108505. doi:10.1016/j.pharmthera.2023.108505
149. Sakurai K (2023) Rethinking c-fos for understanding drug action in the brain. *J. Biochem.* doi:10.1093/jb/mvad110
150. Yoshitake R, Park I, Ogata H, Omi N (2023) Meal timing and sleeping energy metabolism. *Nutrients.* **15**(3):763. doi:10.3390/nu15030763

#### (4) Other English Articles

151. Fan Z, Abe T (2023) Sleep deprivation enhances theta fluctuations in time perception. *Sleep.* 46A97.
152. Hasegawa E, Oishi Y, Kroeger D, Tsunematsu T, Dauvilliers Y (2023) Editorial: Neurobiology of sleeping behaviors. *Front. Behav. Neurosci.* 171131920. doi:10.3389/fnbeh.2023.1131920
153. Iwagami M (2023) Post hoc analysis of the SONAR trial: Potential analgesic effects of atrasentan? *Kidney Int.* **104**(6):1062-1064. doi:10.1016/j.kint.2023.09.018
154. Moriya H, Fujieda Y, Amengual O, Kanbayashi T, Atsumi T (2023) Hypothalamic lesion in a neuropsychiatric lupus patient with narcolepsy. *Scand. J. Rheumatol.* **52**(4):444-446. doi:10.1080/03009742.2023.2177432
155. Sakurai T, Hasegawa E (2023) Connecting the amygdala and dopamine: Exploring the mysteries of rapid-eye movement sleep. *Sleep.* **46**(8):doi:10.1093/sleep/zsad157
156. Yanagisawa M (2023) Deciphering the mystery of sleep: Toward the molecular substrate for sleepiness. *J. Hypertens.* 41E2.

## 2022

### (1) Original Articles

157. Ikeda Y, Morita E, Muroi K, Arai Y, Ikeda T, Takahashi T, Shiraki N, Doki S, Hori D, Oi Y, Sasahara S, Ishihara A, Matsumoto S, Yanagisawa M, Satoh M, Matsuzaki I (2022) Relationships between sleep efficiency and lifestyle evaluated by objective sleep assessment: Sleep Epidemiology Project at University of Tsukuba. *Nagoya J. Med. Sci.* **84**(3):554-569. doi:10.18999/nagjms.84.3.554
158. Fifel K, Deboer T (2022) Heterogenous electrophysiological responses of functionally distinct striatal subregions to circadian and sleep-related homeostatic processes. *Sleep* **45**(1). doi:10.1093/sleep/zsab230
159. Park I, Kokudo C, Seol J, Ishihara A, Zhang SM, Uchizawa A, Osumi H, Miyamoto R, Horie K, Suzuki C, Suzuki Y, Okura T, Diaz J, Vogt KE, Tokuyama K (2022) Instability of non-REM sleep in older women evaluated by sleep-stage transition and envelope analyses. *Front. Aging Neurosci.* **14**. doi:10.3389/fnagi.2022.1050648
160. Hori D, Arai Y, Morita E, Ikeda Y, Muroi K, Ishitsuka M, Ikeda T, Takahashi T, Doki S, Oi Y, Sasahara S, Ishihara A, Matsumoto S, Kanbayashi T, Yanagisawa M, Satoh M (2022) Morning preference is associated with subjective happiness among Japanese female workers: A moderation analysis by sleep characteristics from the SLEPT study. *Chronobiol. Int.* **39**(5):690-703. doi:10.1080/07420528.2022.2028801
161. Nemoto T, Irukayama-Tomobe Y, Hirose Y, Tanaka H, Takahashi G, Takahashi S, Yanagisawa M, Kanbayashi T (2022) Effect of sevoflurane preconditioning on sleep reintegration after alteration by lipopolysaccharide. *J. Sleep Res.* **31**(5). doi:10.1002/advs.202203170
162. Fifel K, Yanagisawa M, Deboer T (2022) Mechanisms of sleep/wake regulation under hypodopaminergic state: Insights from MitoPark mouse model of Parkinson's disease. *Adv. Sci.* **10**(5). doi:10.1002/advs.202203170

163. Fujiyama T, Takenaka H, Asano F, Miyanishi K, Hotta-Hirashima N, Ishikawa Y, Kanno S, Seoane-Collazo P, Miwa H, Hoshino M, Yanagisawa M, Funato H (2022) Mice lacking cerebellar cortex and related structures show a decrease in slow-wave activity with normal non-REM sleep amount and sleep homeostasis. *Front. Behav. Neurosci.* **16**. doi:10.3389/fnbeh.2022.910461
164. Fifel K, El Farissi A, Cherasse Y, Yanagisawa M (2022) Motivational and valence-related modulation of sleep/wake behavior are mediated by midbrain dopamine and uncoupled from the homeostatic and circadian processes. *Adv. Sci.* **9**(24). doi:10.1002/advs.202200640
165. Han G, Matsumoto S, Diaz J, Greene RW, Vogt KE (2022) Dihydropyridine calcium blockers do not interfere with non-rapid eye movement sleep. *Front. Neurosci.* **16**. doi:10.3389/fnins.2022.969712
166. Suzuki-Abe H, Sonomura K, Nakata S, Miyanishi K, Mahmoud A, Hotta-Hirashima N, Miyoshi C, Sato TA, Funato H, Yanagisawa M (2022) Metabolomic and pharmacologic analyses of brain substances associated with sleep pressure in mice. *Neurosci. Res.* **177**:16-24. doi:10.1016/j.neures.2021.11.008
167. Bjorness TE, Greene RW (2022) Arousal-mediated sleep disturbance persists during cocaine abstinence in male mice. *Front. Neurosci.* **16**. doi:10.3389/fnins.2022.868049
168. Xu JJ, Zhou R, Wang GD, Guo Y, Gao X, Zhou S, Ma CY, Chen L, Shi BH, Wang HY, Wang FC, Liu, Q (2022) Regulation of sleep quantity and intensity by long and short isoforms of SLEEPY kinas5. *Sleep* **45**(11). doi:10.1093/sleep/zsac198
169. Wang GD, Li Q, Xu JJ, Zhao S, Zhou R, Chen ZK, Jiang WT, Gao X, Zhou S, Chen ZY, Sun QZ, Ma CY, Chen L, Shi BH, Guo Y, Wang HY, Wang X, Li HY, Cai T, Wang YB, Chen ZN, Wang FC, Liu Q (2022) Somatic genetics analysis of sleep in adult mice. *J. Neurosci.* **42**(28):5617-5640. doi:10.1523/JNEUROSCI.0089-22.2022
170. Adachi M, Nagaura Y, Eto H, Kondo H, Kato C (2022) The impact of sleep-wake problems on health-related quality of life among Japanese nursing college students: a cross sectional survey. *Health Qual. Life Outcomes* **20**(1). doi:10.1186/s12955-022-02063-0
171. Miyazaki S, Kawano T, Yanagisawa M, Hayashi Y (2022) Intracellular Ca<sup>2+</sup> dynamics in the ALA neuron reflect sleep pressure and regulate sleep in *Caenorhabditis elegans*. *iScience* **25**(6). doi:10.1016/j.isci.2022.104452
172. Hasegawa E, Miyasaka A, Sakurai K, Cherasse Y, Li YL, Sakurai T (2022) Rapid eye movement sleep is initiated by basolateral amygdala dopamine signaling in mice. *Science* **375**(6584):994-1000. doi:10.1126/science.abl6618
173. Kim M, Seol J, Sato T, Fukamizu Y, Sakurai T, Okura T (2022) Effect of 12-week intake of nicotinamide mononucleotide on sleep quality, fatigue, and physical performance in older Japanese adults: A randomized, double-blind placebo-controlled study. *Nutrients* **14**(4). doi:10.3390/nu14040755
174. Zhou R, Wang GD, Li Q, Meng FX, Liu C, Gan R, Ju DP, Liao MM, Xu JJ, Sang D, Gao X, Zhou S, Wu KJ, Sun QZ, Guo Y, Wu CY, Chen ZY, Chen L, Shi BH, Wang HY, Wang X, Li HY, Cai T, Li B, Wang FC, Funato H, Yanagisawa M, Zhang EE, Liu Q (2022) A signalling pathway for transcriptional regulation of sleep amount in mice. *Nature* **612**(7940):519-527. doi:10.1038/s41586-022-05510-6
175. Kim SJ, Hotta-Hirashima N, Asano F, Kitazono T, Iwasaki K, Nakata S, Komiya H, Asama N, Matsuoka T, Fujiyama T, Ikkyu A, Kakizaki M, Kanno S, Choi J, Kumar D, Tsukamoto T, Elhosainy A, Mizuno S, Miyazaki, S, Tsuneoka, Y, Sugiyama, F, Takahashi, S, Hayashi Y, Muratani M, Liu Q, Miyoshi C, Yanagisawa M, Funato H (2022) Kinase signalling in excitatory neurons regulates sleep quantity and depth. *Nature* **612**(7940):512-518. doi:10.1038/s41586-022-05450-1
176. Chen ZK, Dong H, Liu CW, Liu WY, Zhao YN, Xu W, Sun X, Xiong YY, Liu YY, Yuan XS, Wang B,

- Lazarus M, Cherasse Y, Li YD, Han F, Qu WM, Ding FF, Huang ZL (2022) A cluster of mesopontine GABAergic neurons suppresses REM sleep and curbs cataplexy. *Cell Discov.* **8**(1):115. doi:10.1038/s41421-022-00456-5
177. Tone D, Ode KL, Zhang QH, Fujishima H, Yamada RG, Nagashima Y, Matsumoto K, Wen ZQ, Yoshida SY, Mitani TT, Arisato Y, Ohno R, Ukai-Tadenuma M, Garcon JY, Kaneko M, Shi, S, Ukai H, Miyamichi K, Okada T, Sumiyama K, Kiyonari H, Ueda HR (2022) Distinct phosphorylation states of mammalian CaMKII beta control the induction and maintenance of sleep. *PLoS Biol.* **20**(10). doi:10.1371/journal.pbio.3001813
178. Uemura SI, Imanishi A, Terui Y, Park I, Satake M, Han G, Shioya T, Kanbayashi T, Nishino S (2022) Residual effects of low dose of suvorexant, zolpidem, and ramelteon in healthy elderly subjects: A randomized double-blind study. *Neuropsychopharmacol. Rep.* **42**(3):288-298. doi:10.1002/npr2.12262
179. Ogawa T, Kajiyama Y, Ishido H, Chiba S, Revankar GS, Nakano T, Taniguchi S, Kanbayashi T, Ikenaka K, Mochizuki H (2022) Decreased cerebrospinal fluid orexin levels not associated with clinical sleep disturbance in Parkinson's disease: A retrospective study. *PLoS One* **17**(12). doi:10.1371/journal.pone.0279747
180. Yamamoto H, Nagumo Y, Ishikawa Y, Irukayama-Tomobe Y, Namekawa Y, Nemoto T, Tanaka H, Takahashi G, Tokuda A, Saitoh T, Nagase H, Funato H, Yanagisawa M (2022) OX2R-selective orexin agonism is sufficient to ameliorate cataplexy and sleep/wake fragmentation without inducing drug-seeking behavior in mouse model of narcolepsy. *PLoS One* **17**(7). doi:10.1371/journal.pone.0271901
181. Korkutata M, Agrawal L, Lazarus M (2022) Allosteric modulation of adenosine A(2A) receptors as a new therapeutic avenue. *Int. J. Mol. Sci.* **23**(4):128-130. doi:10.3390/ijms23042101
182. Tanida K, Shimada M, Khor SS, Toyoda H, Kato K, Kotorii N, Kotorii T, Ariyoshi Y, Kato T, Hiejima H, Ozone M, Uchimura N, Ikegami A, Kume K, Kanbayashi T, Imanishi A, Kamei Y, Hida A, Wada Y, Kuroda K, Miyamoto M, Hirata K, Takami M, Yamada N, Okawa M, Omata N, Kondo H, Kodama T, Inoue Y, Mishima K, Honda M, Tokunaga K, Miyagawa T (2022) Genome-wide association study of idiopathic hypersomnia in a Japanese population. *Sleep Biol. Rhythms* **20**(1):137-148. doi:10.1007/s41105-021-00349-2
183. Choi YJ, Nakamura Y, Akazawa N, Park, I, Kwak HB, Tokuyama K, Maeda S (2022) Effects of nocturnal light exposure on circadian rhythm and energy metabolism in healthy adults: A randomized crossover trial. *Chronobiol. Int.* **39**(4):602-612. doi:10.1080/07420528.2021.2014517
184. Takahashi TM, Hirano A, Kanda T, Saito VM, Ashitomi H, Tanaka KZ, Yokoshiki Y, Masuda K, Yanagisawa M, Vogt KE, Tokuda T, Sakurai T (2022) Optogenetic induction of hibernation-like state with modified human Opsin4 in mice. *Cell Reports Methods* **2**(11). doi:10.1016/j.crmeth.2022.100336
185. Nagayama M, Aritake T, Hino H, Kanda T, Miyazaki T, Yanagisawa M, Akah, S, Murata N (2022) Detecting cell assemblies by NMF-based clustering from calcium imaging data. *Neural Netw.* **149**:29-39. doi:10.1016/j.neunet.2022.01.023
186. Saitoh T, Amezawa M, Horiuchi J, Nagumo Y, Yamamoto N, Kutsumura N, Ohshita R, Tokuda A, Irukayama-Tomobe Y, Ogawa Y, Ishikawa Y, Hasegawa E, Sakurai T, Uchida Y, Sato T, Gouda H, Tanimura R, Yangisawa M, Nagase H (2022) Discovery of novel orexin receptor antagonists using a 1,3,5-trioxazatri-quinane bearing multiple effective residues (TriMER) library. *Eur. J. Med. Chem.* **240**. doi:10.1016/j.ejmech.2022.114505
187. Miyagawa T, Tanaka S, Shimada M, Sakai N, Tanida K, Kotorii N, Kotorii T, Ariyoshi Y, Hashizume Y, Ogi K, Hiejima H, Kanbayashi T, Imanishi A, Ikegami A, Kamei Y, Hida A, Wada Y, Miyamoto M, Takami M, Kondo H, Tamura Y, Taniyama Y, Omata N, Mizuno T, Moriya S, Furuya H, Kato M, Kato K, Ishigooka J, Tsuruta K, Chiba S, Yamada N, Okawa M, Hirata K, Kuroda K, Kume K, Uchimura N,

- Kitada M, Kodama T, Inoue Y, Nishino S, Mishima K, Tokunaga K, Honda M (2022) A rare genetic variant in the cleavage site of prepro-orexin is associated with idiopathic hypersomnia. *npj Genom. Med.* **7**(1). doi:10.1038/s41525-022-00298-w
188. Iio K, Saitoh T, Ohshita R, Hino T, Amezawa M, Takayama Y, Nagumo Y, Yamamoto N, Kutsumura N, Irukayama-Tomobe Y, Ishikawa Y, Tanimura R, Yanagisawa M, Nagase H (2022) Discovery of orexin 2 receptor selective and dual orexin receptor agonists based on the tetralin structure: Switching of receptor selectivity by chirality on the tetralin ring. *Bioorg. Med. Chem. Lett.* **60**. doi:10.1016/j.bmcl.2022.128555
189. Tsuneoka Y, Atsumi Y, Makanae A, Yashiro M, Funato H (2022) Fluorescence quenching by high-power LEDs for highly sensitive fluorescence in situ hybridization. *Front. Molec. Neurosci.* **15**. doi:10.3389/fnmol.2022.976349
190. Yamada T, Shi S (2022) Estimating infection-related human mobility networks based on time series data of COVID-19 infection in Japan. *Appl. Sci.-Basel* **12**(18). doi:10.3390/app12189236
191. Iio K, Kutsumura N, Nagumo Y, Saitoh T, Tokuda A, Hashimoto K, Yamamoto N, Kise R, Inoue A, Mizoguchi H, Nagase H (2022) Synthesis of unnatural morphinan compounds to induce itch-like behaviors in mice: Towards the development of MRGPRX2 selective ligands. *Bioorg. Med. Chem. Lett.* **56**. doi:10.1016/j.bmcl.2021.128485
192. Hino T, Saitoh T, Nagumo Y, Yamamoto N, Kutsumura N, Irukayama-Tomobe Y, Ishikawa Y, Tanimura R, Yanagisawa M, Nagase H (2022) Design and synthesis of novel orexin 2 receptor agonists based on naphthalene skeleton. *Bioorg. Med. Chem. Lett.* **59**. doi:10.1016/j.bmcl.2022.128530
193. Katoh K, Kutsumura N, Yamamoto N, Nagumo Y, Saitoh T, Ishikawa Y, Irukayama-Tomobe Y, Tanimura R, Yanagisawa M, Nagase H (2022) Essential structure of orexin 1 receptor antagonist YNT-707: Conversion of the 16-cyclopropylmethyl group to the 16-sulfonamide group in D-nor-nalfurafine derivatives. *Bioorg. Med. Chem. Lett.* **59**. doi:10.1016/j.bmcl.2022.128550
194. Moctezuma LA, Abe T, Molinas M (2022) Two-dimensional CNN-based distinction of human emotions from EEG channels selected by multi-objective evolutionary algorithm. *Sci. Rep* **12**(1). doi:10.1038/s41598-022-07517-5
195. Shimazaki K, Sugimoto T, Toda H, Takahashi H (2022) A polyimide film-based simple force plate for measuring the body mass of tiny insects. *Sensors* **22**(21). doi:10.3390/s22218352
196. Takeshita Y, Teramura C, Kamoshita K, Takayama H, Nakagawa H, Enyama Y, Ishii KA, Tanaka T, Goto H, Nakano Y, Osada S, Tanaka Y, Tokuyama K, Takamura T (2022) Effects of eicosapentaenoic acid on serum levels of selenoprotein P and organ-specific insulin sensitivity in humans with dyslipidemia and type 2 diabetes. *J. Diabetes Investig.* **13**(3):532-542. doi:10.1111/jdi.13699
197. Kawaminami A, Yamada D, Yanagisawa S, Shirakata M, Iio K, Nagase H, Saitoh A (2022) Selective delta-opioid receptor agonist, KNT-127, facilitates contextual fear extinction via infralimbic cortex and amygdala in mice. *Front. Behav. Neurosci.* **16**. doi:10.3389/fnbeh.2022.808232
198. Omichi C, Kaminishi Y, Kadotani H, Sumi Y, Ubara A, Nishikawa K, Matsuda A, Ozeki Y (2022) Limited social support is associated with depression, anxiety, and insomnia in a Japanese working population. *Front. Public Health* **10**. doi:10.3389/fpubh.2022.981592
199. Kitano M, Saitoh T, Nishiyama S, Einaga Y, Yamamoto T (2022) Electro-conversion of cumene into acetophenone using boron-doped diamond electrodes. *Beilstein J. Org. Chem.* **18**:1154-1158. doi:10.3762/bjoc.18.119
200. Uenohara Y, Tsumura S, Hirayama S, Higashi E, Watanabe Y, Gouda H, Nagase H, Fujii H (2022) Morphinan derivatives with an oxabicyclo[3.2.1]octane structure as dual agonists toward delta and

Kappa opioid receptors. *Bioorg. Med. Chem.* **53**. doi:10.1016/j.bmc.2021.116552

201. Okamura H, Yasugaki S, Suzuki-Abe H, Arai Y, Sakurai K, Yanagisawa M, Takizawa H, Hayashi Y (2022) Long-term effects of repeated social defeat stress on brain activity during social interaction in BALB/c mice. *eNeuro* **9**(3). doi:10.1523/ENEURO.0068-22.2022
202. Shaikh SA, Kitagawa H, Matono A, Mariam K, Kim KS (2022) GeoFlink: An efficient and scalable spatial data stream management system. *IEEE Access* **10**:24909-24935. doi:10.1109/ACCESS.2022.3154063
203. Tao XX, Zhang R, Du RL, Yu TT, Yang H, Li JW, Wang YH, Liu Q, Zuo SK, Wang X, Lazarus M, Zhou L, Wang BM, Yu Y, Shen YJ (2022) EP3 enhances adhesion and cytotoxicity of NK cells toward hepatic stellate cells in a murine liver fibrosis model. *J. Exp. Med.* **219**(5). doi:10.1084/jem.20212414
204. Sugimoto T, Kawasaki Y, Toda H, Takahashi H (2022) Measurement method of a microspring-supported force plate with an external laser displacement meter. *Meas. Sci. Technol.* **33**(10). doi:10.1088/1361-6501/ac7b12
205. Nakauchi Y, Nishinami S, Murakami Y, Ogura T, Kano H, Shiraki K (2022) Opalescence arising from network assembly in antibody solution. *Mol. Pharm.* **19**(4):1160-1167. doi:10.1021/acs.molpharmaceut.1c00929
206. Katoh K, Yamamoto N, Ishikawa Y, Irukayama-Tomobe Y, Tanimura R, Saitoh T, Nagumo Y, Kutsumura N, Yanagisawa M, Nagase H (2022) Effect of removal of the 14-hydroxy group on the affinity of the 4,5-epoxy-morphinan derivatives for orexin and opioid receptors. *Bioorg. Med. Chem. Lett.* **59**. doi:10.1016/j.bmcl.2022.128527
207. Okamoto S, Takaki M, Hinotsu K, Kawai H, Sakamoto S, Okahisa Y, Takao S, Tsutsui K, Kanbayashi T, Tanaka K, Yamada N (2022) Impairment of early neuronal maturation in anti-NMDA-receptor encephalitis. *Psychopharmacology* **239**(2):525-531. doi:10.1007/s00213-021-06036-x
208. Murakami Y, Masaki M, Miyazaki S, Oketani R, Hayashi Y, Yanagisawa M, Honjoh S, Kano H (2022) Spectroscopic second and third harmonic generation microscopy using a femtosecond laser source in the third near-infrared (NIR-III) optical window. *Biomed. Opt. Express* **13**(2):694-708 doi:10.1364/BOE.446273
209. Hinotsu K, Miyaji C, Yada Y, Kawai H, Sakamoto S, Okahisa Y, Tsutsui K, Kanbayashi T, Tanaka K, Takao S, Kishi Y, Takaki M, Yamada N (2022) The validity of atypical psychosis diagnostic criteria to detect anti-NMDA receptor encephalitis with psychiatric symptoms. *Schizophr. Res.* **248**:292-299. doi:10.1016/j.schres.2022.08.024
210. Yamada M, Kitagawa H, Amagasa T, Matono A (2022) Augmented lineage: traceability of data analysis including complex UDF processing. *VLDB J.* doi:10.1007/s00778-022-00769-7
211. Yamauchi T, Yoshioka T, Yamada D, Hamano T, Ohashi M, Matsumoto M, Iio K, Ikeda M, Kamei M, Otsuki T, Sato Y, Nii K, Suzuki M, Ichikawa H, Nagase H, Iriyama S, Yoshizawa K, Nishino S, Miyazaki S, Saitoh A (2022) Cold-restraint stress-induced ultrasonic vocalization as a novel tool to measure anxiety in mice. *Biol. Pharm. Bull.* **45**(3):268-275.
212. Li YD, Luo YJ, Chen ZK, Quintanilla L, Cherasse Y, Zhang LB, Lazarus M, Huang ZL, Song J (2022) Hypothalamic modulation of adult hippocampal neurogenesis in mice confers activity-dependent regulation of memory and anxiety-like behavior. *Nat. Neurosci.* **25**(5):630-645. doi:10.1038/s41593-022-01065-x
213. Yamazaki S, Inohara N, Ohmuraya M, Tsuneoka Y, Yagita H, Katagiri T, Nishina T, Mikami T, Funato H, Araki K, Nakano H (2022) I kappa B zeta controls IL-17-triggered gene expression program in intestinal epithelial cells that restricts colonization of SFB and prevents Th17-associated pathologies.

*Mucosal Immunol.* **15**(8):1321-1337. doi:10.1038/s41385-022-00554-3

214. Tao XX, Du RL, Guo SM, Feng XL, Yu TT, OuYang Q, Chen QL, Fan XT, Wang XQ, Guo C, Li XZ, Xue FX, Chen S, Tong MH, Lazarus M, Zuo SK, Yu Y, Shen YJ (2022) PGE(2)-EP3 axis promotes brown adipose tissue formation through stabilization of WTAP RNA methyltransferase. *Embo J.* **41**(16). doi:10.15252/embj.2021110439
215. Takahashi A, Durand-de Cuttoli R, Flanigan ME, Hasegawa E, Tsunematsu T, Aleyasin H, Cherasse Y, Miya K, Okada T, Keino-Masu K, Mitsui K, Li L, Patel V, Blitzer RD, Lazarus M, Tanaka KF, Yamanaka A, Sakurai T, Ogawa S, Russo SJ (2022) Lateral habenula glutamatergic neurons projecting to the dorsal raphe nucleus promote aggressive arousal in mice. *Nat. Commun.* **13**(1):4089. doi:10.1038/s41467-022-31728-z
216. Horie K, Ota L, Miyamoto R, Abe T, Suzuki Y, Kawana F, Kokubo T, Yanagisawa M, Kitagawa H (2022) Automated sleep stage scoring employing a reasoning mechanism and evaluation of its explainability. *Sci. Rep.* **12**(1):12799. doi:10.1038/s41598-022-16334-9
217. Bou S, Kitagawa H, Amagasa T (2022) CPiX: Real-time analytics over out-of-order data streams by incremental sliding-window aggregation. *IEEE Transactions on Knowledge and Data Engineering* **34**(11):5239-5250. doi:10.1109/TKDE.2021.3054898
218. Miura K, Kobayashi R, Amagasa T, Kitagawa H, Fujita N, Boku T (2022) An FPGA-based accelerator for regular path queries over edge-labeled graphs. *Proc. IEEE BigData 2022*:415-422. doi:10.1109/BigData55660.2022.10020406
219. Takdir, Kitagawa H, Amagasa T (2022) Region-based sub-snapshot (RegSnap): Enhanced fault tolerance in distributed stream processing with partial snapshot. *Proc. 7th Workshop on Real-time Stream Analytics, Stream Mining, CER/CEP & Stream Data Management in Big Data*:3374-3382. doi:10.1109/BigData55660.2022.10020607
220. Shaikh S A, Kitagawa H, Matono A, Kim K S (2022) TStream: A framework for real-time and scalable trajectory stream processing and analysis. *Proc. ACM SIGSPATIAL 2022*:30. doi:10.1145/3557915.3560964
221. Seol J, Lee J, Park I, Tokuyama K, Fukusumi S, Kokubo T, Yanagisawa M, Okura T (2022) Bidirectional associations between physical activity and sleep in older adults: a multilevel analysis using polysomnography. *Sci. Rep.* **12**(1):15399. doi:10.1038/s41598-022-19841-x
222. Uchizawa A, Funayama A, Osumi H, Enomoto Y, Zhang S, Tokuyama K, Omi N, Sagayama H (2022) Food quotient assessments using one-week dietary records and food frequency questionnaires of young Japanese runners. *J. Nutr. Sci. Vitaminol.* **68**(1):47-54. doi: 10.3177/jnsv.68.47
223. Koyama K, Ito MK, Sakaguchi M, Ohnishi T (2022) Classification of power spectra of EEG by non-negative matrix factorization. *Technical Report of IEICE* **121**:111-116.
224. Koyanagi I, Tezuka T, Yu J, Srinivasan S, Naoi T, Yasugaki S, Nakai A, Taniguchi S, Hayashi Y, Nakano Y, Sakaguchi M (2022) Fully automatic REM sleep stage-specific intervention systems using single EEG in mice. *Neurosci. Res.* **186**:51-58. doi:10.1016/j.neures.2022.10.001
225. Funato H, Yanagisawa M (2022) Hunt for mammalian sleep-regulation genes. *Brain Sci. Adv.* **8**(3):173-182. doi:10.26599/BSA.2022.9050012
226. Ando T, Wakai M, Kanbayashi T, Katsuno M (2022) Status cataplecticus with rapid eye movement sleep excess in late-onset narcolepsy type 1. *Intern. Med.* **61**(19):2951-2955. doi:10.2169/internalmedicine.8465-21

## (2) Review articles

227. Nagase H (2022) Research and development of morphinan derivatives for drug. *THE CHEMICAL University of Tsukuba* -17

*TIMES* **264**(2):2-8.

228.Saitoh T (2022) Discovery of OX1R specific antagonists bearing morphinan skeleton. *THE CHEMICAL TIMES* **264**(2):9-15.

229.Nagumo Y (2022) Creation of a novel  $\kappa$  opioid analgesic based on an active conformation of nalfurafine. *THE CHEMICAL TIMES* **264**(2):16-19.

230.Kumar VM, Kumar D, Mallick HN, Gulia KK (2022) Capsaicin receptors in sleep regulation. *Sleep and Vigilance* **6**:41-49. doi:https://doi.org/10.1007/s41782-022-00193-5

### (3) Proceedings

231.Bou S, Amagasa T, Kitagawa H (2022) InTrans: Fast incremental transformer for time series data prediction. *Lecture Notes in Computer Science* **13427**:47-61. doi:10.1007/978-3-031-12426-6\_4

232.Khalique, V, Kitagawa, H (2022) BPF: An effective cluster boundary points detection technique. *Lecture Notes in Computer Science* **13426**:404-416. doi:10.1007/978-3-031-12423-5\_31

233.Bou S, Amagasa T, Kitagawa H, Shaikh S A (2022) PR-MVI: Efficient missing value imputation over data streams by distance likelihood. *Lecture Notes in Computer Science* **13635**:338-351. doi:10.1007/978-3-031-12423-5\_31

234.Yamada M, Kitagawa H, Shaikh S A, Amagasa T, Matono A (2022) Streaming augmented lineage: traceability of complex stream data analysis. *Proc. iiWAS 2022. Lecture Notes in Computer Science* **13635**:224-236. doi:10.1007/978-3-031-21047-1\_20

235.Stenwig H, Soler A, Furuki J, Suzuki Y, Abe T, Molinas M (2022) Automatic sleep stage classification with optimized selection of EEG channels," *21st IEEE International Conference on Machine Learning and Applications (ICMLA)* :1708-1715. doi:10.1109/ICMLA55696.2022.00262.

### (4) Other English Articles

236.Shoi Shi (2022) Social sleep alteration in ants. *J. Sleep Res.* **31**.

237.Nemoto T, Irukayama-Tomobe Y, Hirose Y, Takahashi S, Takahashi G, Tanaka H, Yanagisawa M, Kanbayashi T (2022) Sevoflurane preconditioning promotes sleep reintegration from lipopolysaccharide induced shattered sleep. *Sleep* **45**:A66-A67.

238.Tsujino, N, Ikeda, M, Hirano, A, Sakurai, T (2022) Editorial: The role of neuropeptides in sleep/wakefulness states and the circadian clock. *Front. Neurosci.* **16**. doi:10.3389/fnins.2022.913371

239.Miyazaki S, Yoshizawa K, Kodama T, Ishido H, Imanishi A, Kashiwagi M, Sasajima T, Shimizu S, Chiba S, Han G, Fukusumi S, Kondo H, Hayashi Y, Kanbayashi T, Kimura M (2022) Relationships among sleep regulatory neuropeptides in cerebrospinal fluid of patients with hypersomnia. *J. Sleep Res.* **31**.

240.Ohba A, Sakaguchi M (2022) Contribution of adult-born neurons to memory consolidation during rapid eye movement sleep. *Neural Regen. Res.* **17**(2):307-308. doi:10.4103/1673-5374.317966

241.Chiba S, Han G, Kanbayashi T (2022) Large arachnoid cysts and hypersomnolence: Symptomatic or not? *Neural Regen. Res.* **45**:A364-A364.

242.Uchida T, Matsuzawa D, Sawada D, Kanbayashi T, Fujii K (2022) Two cases of Kleine-Levin syndrome with good responses to lithium treatment at low serum levels. *Pediatr. Int.* **64**(1). doi:10.1111/ped.15103

243.Komagamine T, Kanbayashi T, Suzuki K, Hirata K, Nishino S (2022) Atypical psychoses and anti-NMDA receptor encephalitis: A review of literature in the mid-twentieth century. *Psychiatry Clin.*

*Neurosci.* **76**(2):62-63. doi:10.1111/pcn.13317

244. Sugimoto T, Toda H, Takahashi H (2022) 3D printed micro force plate for measuring the ground reaction force of a fruit fly. *IEEE 35th International Conference on Micro Electro Mechanical Systems*. doi:10.1109/MEMS51670.2022.9699472
245. Miyazaki T, Williams JA, Toda H (2022) Measuring sleep in drosophila. *Behavioral Neurogenetics* :39-56. doi:10.1007/978-1-0716-2321-3\_4
246. Lazarus M, Oishi Y, Landolt HP (2022) Chapter 45 - Adenosinergic control of sleep. In: Principles and practice of sleep medicine (seventh edition), eds. M. Kryger, T. Roth & W.C. Dement. *Elsevier*:452-459.
247. Yamamoto T, Saitoh T (2022) Electro-organic synthesis. Einaga Y (ed.), Diamond electrodes. *Springer Nature Singapore Pte Ltd.*:177-195.

## 2021

### (1) Original Articles

248. Suzuki Y, Kawana F, Satoh M, Abe T (2021) The abrupt shift to slower frequencies after arousal from sleep in healthy young adults. *Journal of Clinical Sleep Medicine* **17**(12):2373-2381. doi:10.5664/jcsm.9434
249. Koyanagi I, Sonomura K, Naoi T, Ohnishi T, Kaneko N, Sawamoto K, Sato TA, Sakaguchi M (2021) Metabolic fingerprints of fear memory consolidation during sleep. *Molecular Brain* **14**(1). doi:10.1186/s13041-021-00733-6
250. Iwasaki K, Fujiyama T, Nakata S, Park M, Miyoshi C, Hotta-Hirashima N, Ikkyu A, Kakizaki M, Sugiyama F, Mizuno S, Abe M, Sakimura K, Takahashi S, Funato H, Yanagisawa M (2021) Induction of mutant *Sik3*(Sleepy) allele in neurons in late infancy increases sleep need. *J. Neurosci.* **41**(12):2733-2746. doi:10.1523/JNEUROSCI.1004-20.2020
251. Choi J, Kim SJ, Fujiyama T, Miyoshi C, Park M, Suzuki-Abe H, Yanagisawa M, Funato H (2021) The role of reproductive hormones in sex differences in sleep homeostasis and arousal response in mice. *Frontiers in Neuroscience* **15**. doi:10.3389/fnins.2021.739236
252. Kashiwagi M, Kanuka M, Tanaka K, Fujita M, Nakai A, Tatsuzawa C, Kobayashi K, Ikeda K, Hayashi Y (2021) Impaired wakefulness and rapid eye movement sleep in dopamine-deficient mice. *Molecular Brain* **14**(1). doi:10.1186/s13041-021-00879-3
253. Gao TX, Li JY, Watanabe Y, Hung CJ, Yamanaka A, Horie K, Yanagisawa M, Ohsawa M, Kume K (2021) GI-SleepNet: A highly versatile image-based sleep classification using a deep learning algorithm. *Clocks & Sleep* **3**(4):581-597. doi:10.3390/clockssleep3040041
254. Zhang SM, Tanaka Y, Ishihara A, Uchizawa A, Park I, Iwayama K, Ogata H, Yajima K, Omi N, Satoh M, Yanagisawa M, Sagayama H, Tokuyama K (2021) Metabolic flexibility during sleep. *Scientific Reports* **11**(1). doi:10.1038/s41598-021-97301-8
255. Uchida S, Soya S, Saito YC, Hirano A, Koga K, Tsuda M, Abe M, Sakimura K, Sakurai T (2021) A discrete glycinergic neuronal population in the ventromedial medulla that induces muscle atonia during REM sleep and cataplexy in mice. *J. Neurosci.* **41**(7):1582-1596. doi:10.1523/JNEUROSCI.0688-20.2020
256. Tezuka T, Kumar D, Singh S, Koyanagi I, Naoi T, Sakaguchi M (2021) Real-time, automatic, open-source sleep stage classification system using single EEG for mice. *Scientific Reports* **11**(1). doi:10.1038/s41598-021-90332-1

257. Liu CY, Tsai CJ, Yasugaki S, Nagata N, Morita M, Isotani A, Yanagisawa M, Hayashi Y (2021) Copine-7 is required for REM sleep regulation following cage change or water immersion and restraint stress in mice. *Neuroscience Research* 14-25. doi:10.1016/j.neures.2020.04.002
258. Park I, Diaz J, Matsumoto S, Iwayama K, Nabekura Y, Ogata H, Kayaba M, Aoyagi A, Yajima K, Satoh M, Tokuyama K, Vogt KE (2021) Exercise improves the quality of slow-wave sleep by increasing slow-wave stability. *Scientific reports* **11**(1). doi:10.1038/s41598-021-83817-6
259. Kaushik MK, Aritake K, Cherasse Y, Imanishi A, Kanbayashi T, Urade Y, Yanagisawa M (2021) Induction of narcolepsy-like symptoms by orexin receptor antagonists in mice. *Sleep* **44**(8). doi:10.1093/sleep/zsab043
260. Uchizawa A, Hibi M, Sagayama H, Zhang SM, Osumi H, Tanaka Y, Park I, Tokuyama K, Omi N (2021) Novel equations to estimate resting energy expenditure during sitting and sleeping. *Annals of Nutrition and Metabolism* **77**(3):159-167. doi:10.1159/000516174
261. Seol J, Park I, Kokudo C, Zhang SM, Suzuki C, Yajima K, Satoh M, Tokuyama K, Okura T (2021) Distinct effects of low-intensity physical activity in the evening on sleep quality in older women: A comparison of exercise and housework. *Experimental Gerontology* **143**. doi:10.1016/j.exger.2020.111165
262. Suzuki F, Morita E, Miyagi S, Tsujiguchi H, Hara A, Nguyen TTT, Shimizu Y, Hayashi K, Suzuki K, Kannon T, Tajima A, Matsumoto S, Ishihara A, Hori D, Doki S, Oi Y, Sasahara S, Satoh M, Matsuzaki I, Yanagisawa M, Ikaga T, Nakamura H (2021) Protein intake in inhabitants with regular exercise is associated with sleep quality: Results of the Shika study. *PLOS ONE* **16**(2). doi:10.1371/journal.pone.0247926
263. Seol J, Lee J, Nagata K, Fujii Y, Joho K, Tateoka K, Inoue T, Liu J, Okura T (2021) Combined effect of daily physical activity and social relationships on sleep disorder among older adults: cross-sectional and longitudinal study based on data from the Kasama study. *BMC Geriatrics* **21**(1). doi:10.1186/s12877-021-02589-w
264. Yang YF, Dong H, Shen Y, Li L, Lazarus M, Qu WM, Huang ZL (2021) Mesencephalic dopamine neurons are essential for modafinil-induced arousal. *British Journal of Pharmacology* **178**(24):4808-4825. doi:10.1111/bph.15660
265. Tanida K, Shimada M, Khor SS, Toyoda H, Kato K, Kotorii N, Kotorii T, Ariyoshi Y, Kato T, Hiejima H, Ozone M, Uchimura N, Ikegami A, Kume K, Kanbayashi T, Imanishi A, Kamei Y, Hida A, Wada Y, Kuroda K, Miyamoto M, Hirata K, Takami M, Yamada N, Okawa M, Omata N, Kondo H, Kodama T, Inoue Y, Mishima K, Honda M, Tokunaga K, Miyagawa T (2022) Genome-wide association study of idiopathic hypersomnia in a Japanese population. *Sleep and Biological Rhythms* **20**(1):137-148. doi:10.1007/s41105-021-00349-2
266. Kaneko Y, Inoue Y, Fujiki N, Han G, Nishino S, Shimizu T, Kanbayashi T, Kondo H (2021) The anticataplectic and REM suppression effect of milnacipran, an SNRI, on human and canine narcolepsy. *Sleep and Biological Rhythms* **19**(2):137-143. doi:10.1007/s41105-020-00298-2
267. Ishihara A, Park I, Suzuki Y, Yajima K, Cui H, Yanagisawa M, Sano T, Kido J, Tokuyama K (2021) Metabolic responses to polychromatic LED and OLED light at night. *Scientific reports* **11**(1). doi:10.1038/s41598-021-91828-6
268. Saito R, Miyoshi C, Koebis M, Kushima I, Nakao K, Mori D, Ozaki N, Funato H, Yanagisawa M, Aiba A (2021) Two novel mouse models mimicking minor deletions in 22q11.2 deletion syndrome revealed the contribution of each deleted region to psychiatric disorders. *Molecular Brain* **14**(1). doi:10.1186/s13041-021-00778-7
269. Choi YJ, Nakamura Y, Akazawa N, Park I, Kwak HB, Tokuyama K, Maeda S (2022) Effects of nocturnal light exposure on circadian rhythm and energy metabolism in healthy adults: A randomized crossover

trial. *Chronobiology International* **39**(4):602-612. doi:10.1080/07420528.2021.2014517

270. Vergara P, Kumar D, Srinivasan S, Koyanagi I, Naoi T, Singh S, Sakaguchi M (2021) Remapping of adult-born neuron activity during fear memory consolidation in mice. *International Journal of Molecular Sciences* **22**(6). doi:10.3390/ijms22062874
271. Xu Q, Wang DR, Dong H, Chen L, Lu J, Lazarus M, Cherasse Y, Chen GH, Qu WM, Huang ZL (2021) Medial parabrachial nucleus is essential in controlling wakefulness in rats. *Frontiers in Neuroscience* **15**. doi:10.3389/fnins.2021.645877
272. Inagawa Y, Shimizu S, Takenoshita n, Tsugawa A, Hirose D, Kanbayashi T, Imanishi A, Sakurai H, Hanyu H, Kanetaka H, Hirao K (2021) Association between cerebrospinal fluid Orexin A level and severity of rapid eye movement sleep behaviour disorder in dementia with Lewy bodies. *Psychogeriatrics* **21**(1):128-130. doi:10.1111/psyg.12618
273. Li YD, Luo YJ, Xu W, Ge J, Cherasse Y, Wang YQ, Lazarus M, Qu WM, Huang ZL (2021) Ventral pallidal GABAergic neurons control wakefulness associated with motivation through the ventral tegmental pathway. *Molecular Psychiatry* **26**(7):2912-2928. doi:10.1038/s41380-020-00906-0
274. Miyanishi K, Sato A, Kihara N, Utsunomiya R, Tanaka J (2021) Synaptic elimination by microglia and disturbed higher brain functions. *Neurochemistry International* **142**. doi:10.1016/j.neuint.2020.104901
275. Yu JH, Naoi T, Sakaguchi M (2021) Fear generalization immediately after contextual fear memory consolidation in mice. *Biochemical and Biophysical Research Communications* 102-106. doi:10.1016/j.bbrc.2021.04.072
276. Tanaka Y, Ogata H, Park I, Ando A, Ishihara A, Kayaba M, Yajima K, Suzuki C, Araki A, Osumi H, Zhang SM, Seol J, Takahashi K, Nabekura Y, Satoh M, Tokuyama K (2021) Effect of a single bout of morning or afternoon exercise on glucose fluctuation in young healthy men. *Physiological Reports* **9**(7). doi:10.14814/phy2.14784
277. Liu C, Lee CY, Asher G, Cao LQ, Terakoshi Y, Cao P, Kobayakawa R, Kobayakawa K, Sakurai K, Liu Q (2021) Posterior subthalamic nucleus (PSTh) mediates innate fear-associated hypothermia in mice. *Nat. Commun.* **12**(1). doi:10.1038/s41467-021-22914-6
278. Takeshita Y, Teramura C, Kamoshita K, Takayama H, Nakagawa H, Enyama Y, Ishii KA, Tanaka T, Goto H, Nakano Y, Osada S, Tanaka Y, Tokuyama K, Takamura T (2022) Effects of eicosapentaenoic acid on serum levels of selenoprotein P and organ-specific insulin sensitivity in humans with dyslipidemia and type 2 diabetes. *Journal of Diabetes Investigation* **13**(3):532-542. doi:10.1111/jdi.13699
279. Yamamoto T, Saitoh T, Einaga Y, Nishiyama S (2021) Anodic oxidation of phenols: A key step for the synthesis of natural products. *Chemical Record* **21**(9):2254-2268. doi:10.1002/tcr.202100032
280. Noorani SK, Hojati V, Akbari E, Ehsani S, Sakurai T, Ardeshiri MR (2021) The role of interaction between orexin receptors and beta 2 adrenergic receptors in basolateral amygdala in dentate gyrus synaptic plasticity in male rats. *Brain Research Bulletin* 164-171. doi:10.1016/j.brainresbull.2021.09.020
281. Maejima T, Tsuno Y, Miyazaki S, Tsuneoka Y, Hasegawa E, Islam MT, Enoki R, Nakamura TJ, Mieda M (2021) GABA from vasopressin neurons regulates the time at which suprachiasmatic nucleus molecular clocks enable circadian behavior. *Proc. Natl. Acad. Sci. U.S.A.* **118**(6). doi:10.1073/pnas.2010168118
282. Yamada D, Takahashi J, Iio K, Nagase H, Saitoh A (2021) Modulation of glutamatergic synaptic transmission and neuronal excitability in the prelimbic medial prefrontal cortex via delta-opioid receptors in mice. *Biochemical and Biophysical Research Communications* 192-198.

doi:10.1016/j.bbrc.2021.05.002

283. Bittar TP, Pelaez MC, Silva JCH, Quessy F, Lavigne AA, Morency D, Blanchette LJ, Arsenault E, Cherasse Y, Seigneur J, Timofeev I, Sephton CF, Proulx CD, Labonte B (2021) Chronic stress induces sex-specific functional and morphological alterations in corticoaccumbal and corticostriatal pathways. *Biological Psychiatry* **90**(3):194-205. doi:10.1016/j.biopsych.2021.02.014
284. Sakamoto K, Yamada D, Yamanaka N, Nishida M, Iio K, Nagase H, Saitoh A (2021) A selective delta opioid receptor agonist SNC80, but not KNT-127, induced tremor-like behaviors via hippocampal glutamatergic system in mice. *Brain Research* **1757**. doi:10.1016/j.brainres.2021.147297
285. Ambati A, Hillary R, Leu-Semenescu S, Ollila HM, Lin L, During EH, Farber N, Rico TJ, Faraco J, Leary E, Goldstein-Piekarski AN, Huang YS, Han F, Sivan Y, Lecendreau M, Dodet P, Honda M, Gadoth N, Nevsimalova S, Pizza F, Kanbayashi T, Peraita-Adrados R, Leschziner GD, Hasan R, Canellas F, Kume K, Daniilidou M, Bourgin P, Rye D, Vicario JL, Hogg B, Hong SC, Plazzi G, Mayer G, Landtblom AM, Dauvilliers Y, Arnulf I, Mignot EJM (2021) Kleine-Levin syndrome is associated with birth difficulties and genetic variants in the TRANK1 gene loci. *Proc. Natl. Acad. Sci. U.S.A.* **118**(12). doi:10.1073/pnas.2005753118
286. Matsuo T, Isosaka T, Hayashi Y, Tang LJ, Doi A, Yasuda A, Hayashi M, Lee CY, Cao LQ, Kutsuna N, Matsunaga S, Matsuda T, Yao I, Setou M, Kanagawa D, Higasa K, Ikawa M, Liu QH, Kobayakawa R, Kobayakawa K (2021) Thiazoline-related innate fear stimuli orchestrate hypothermia and anti-hypoxia via sensory TRPA1 activation. *Nat. Commun.* **12**(1). doi:10.1038/s41467-021-22205-0
287. Nagata K, Nagase H, Okuzumi A, Nishiyama C (2021) Delta opioid receptor agonists ameliorate colonic inflammation by modulating immune responses. *Frontiers in Immunology* **12**. doi:10.3389/fimmu.2021.730706
288. Ohru S, Irukayama-Tomobe Y, Ishikawa Y, Yanagisawa M, Nagase H (2021) Design and synthesis of novel orexin antagonists via structural simplification of the morphinan skeleton. *Heterocycles* **103**(2):929-951. doi:10.3987/COM-20-S(K)63
289. Hino T, Kutsumura N, Saitoh T, Yamamoto N, Nagumo Y, Mogi Y, Watanabe Y, Nagase H (2021) Novel Baeyer-Villiger-type oxidation of 4,5-epoxymorphinan derivatives. *Tetrahedron Letters* **63**. doi:10.1016/j.tetlet.2020.152714
290. Yu LY, Tseng TJ, Lin HC, Hsu CL, Lu TX, Tsai CJ, Lin YC, Chu I, Peng CT, Chen HJ, Tsai FC (2021) Synthetic dysmobility screen unveils an integrated STK40-YAP-MAPK system driving cell migration. *Science Advances* **7**(31). doi:10.1126/sciadv.abg2106
291. Okamoto S, Takaki M, Hinotsu K, Kawai H, Sakamoto S, Okahisa Y, Takao S, Tsutsui K, Kanbayashi T, Tanaka K, Yamada N (2022) Impairment of early neuronal maturation in anti-NMDA-receptor encephalitis. *Psychopharmacology* **239**(2) 525-531. doi:10.1007/s00213-021-06036-x
292. Nakagawa Y, Wang YN, Han S, Okuda K, Oishi A, Yagishita Y, Kumagai K, Ohno H, Osaki Y, Mizunoe Y, Araki M, Murayama Y, Iwasaki H, Konishi M, Itoh N, Matsuzaka T, Sone H, Yamada N, Shimano H (2021) Enterohepatic transcription factor CREB3L3 protects atherosclerosis via SREBP competitive inhibition. *Cellular and Molecular Gastroenterology and Hepatology* **11**(4):949-971. doi:10.1016/j.jcmgh.2020.11.004
293. Mizunoe Y, Kobayashi M, Saito H, Goto A, Migitaka R, Miura K, Okita N, Sudo Y, Tagawa R, Yoshida M, Umemori A, Nakagawa Y, Shimano H, Higami Y (2021) Prolonged caloric restriction ameliorates age-related atrophy in slow and fast muscle fibers of rat soleus muscle. *Experimental Gerontology* **154**. doi:10.1016/j.exger.2021.111519
294. Ryanto GRT, Ikeda K, Miyagawa K, Tu L, Guignabert C, Humbert M, Fujiyama T, Yanagisawa M, Hirata K, Emoto N (2021) An endothelial activin A-bone morphogenetic protein receptor type 2 link is overdriven in pulmonary hypertension. *Nat. Commun.* **12**(1). doi:10.1038/s41467-021-21961-3

295. Shimamoto S, Nakagawa Y, Hidaka Y, Maruno T, Kobayashi Y, Kawahara K, Yoshida T, Ohkubo T, Aritake K, Kaushik MK, Urade Y (2021) Substrate-induced product-release mechanism of lipocalin-type prostaglandin D synthase. *Biochemical and biophysical research communications* 66-71. doi:10.1016/j.bbrc.2021.06.092
296. Omoya R, Miyajima M, Ohta K, Suzuki Y, Aoki A, Fujiwara M, Watanabe T, Yoshida N, Suwa H, Kawara T, Takahashi H, Matsushima E, Takeuchi T (2021) Heart rate response to orthostatic challenge in patients with dementia with Lewy bodies and Alzheimer's disease. *Psychogeriatrics* **21**(1):62-70. doi:10.1111/psyg.12625
297. Murata K, Mimura A, Suzuki H, Mikami N, Hamada Y, Kato K, Iki N, Ishida M, Daitoku Y, Tanimoto Y, Okiyoneda T, Fujiyama T, Dinh TTH, Mizuno S, Sugiyama F (2021) Efficient induction of proximity-dependent labelling by biotin feeding in BMAL1-BioID knock-in mice. *Journal of Biochemistry* **170**(4): 453-461. doi:10.1093/jb/mvab059
298. Nakagawa Y, Kumagai K, Han SI, Mizunoe Y, Araki M, Mizuno S, Ohno H, Matsuo K, Yamada Y, Kim JD, Miyamoto T, Sekiya M, Konishi M, Itoh N, Matsuzaka T, Takahashi S, Sone H, Shimano H (2021) Starvation-induced transcription factor CREBH negatively governs body growth by controlling GH signaling. *FASEB Journal* **35**(6). doi:10.1096/fj.202002784RR
299. Shokirova H, Inomata T, Saitoh T, Zhu J, Fujio K, Okumura Y, Yanagawa A, Fujimoto K, Sung J, Eguchi A, Miura M, Nagino K, Hirosawa K, Kuwahara M, Akasaki Y, Nagase H, Murakami A (2021) Topical administration of the kappa opioid receptor agonist nalfurafine suppresses corneal neovascularization and inflammation. *Scientific Reports* **11**(1). doi:10.1038/s41598-021-88118-6
300. Dinh TTH, Iseki H, Mizuno S, Iijima-Mizuno S, Tanimoto Y, Daitoku Y, Kato K, Hamada Y, Hasan ASH, Suzuki H, Murata K, Muratani M, Ema M, Kim JD, Ishida J, Fukamizu A, Kato M, Takahashi S, Yagami K, Wilson V, Arkell RM, Sugiyama F (2021) Disruption of entire Cables2 locus leads to embryonic lethality by diminished Rps21 gene expression and enhanced p53 pathway. *Elife* **10**. doi:10.7554/eLife.50346
301. Takei Y, Hirai R, Fukuda A, Miyazaki S, Shimada R, Okamatsu-Ogura Y, Saito M, Leproux P, Hisatake K, Kano H (2021) Visualization of intracellular lipid metabolism in brown adipocytes by time-lapse ultra-multiplex CARS microspectroscopy with an onstage incubator. *Journal of Chemical Physics* **155**(12). doi:10.1063/5.0063250
302. Aso T, Amagasa T, Kitagawa H (2021) A system for relation-oriented faceted search over knowledge bases. *International Journal of Web Information Systems* **17**(6):698-713. doi:10.1108/IJWIS-03-2021-0035
303. Takagi H, Chen H, Furuse K, Kitagawa H (2021) Aggregate nearest neighborhood queries. Proc. FICC 2021. *Advances in Intelligent Systems and Computing* **1364**:396-414. doi:10.1007/978-3-030-73103-8\_28
304. Kato Y, Chen H, Furuse K, Kitagawa H (2021) Unifying spatial keyword indexing in continuous search on dynamic objects. Proc. FICC 2021. *Advances in Intelligent Systems and Computing* **1364**:415-430. doi:10.1007/978-3-030-73103-8\_29
305. Khalique V, Kitagawa H (2021) VOA\*: Fast angle-based outlier detection over high-dimensional data streams. Proc. PAKDD 2021. *Lecture Notes in Computer Science* **12712**:44-52. doi:10.1007/978-3-030-75762-5\_4
306. Yoshimura C, Kitagawa H (2021) TLV-Bandit: Bandit method for collecting topic-related local tweets. Proc. 2021. *IEEE 4th International Conference on Multimedia Information Processing and Retrieval (MIPR)* 56-62. doi:1109/MIPR51284.2021.00016
307. Yamada M, Kitagawa H, Amagasa T, Matono A (2021) Augmented lineage: Traceability of data

analysis including complex UDFs. Proc. DEXA 2021. *Lecture Notes in Computer Science* **12923**:65–77. doi:10.1007/978-3-030-86472-9\_6

308. Aso T, Amagasa T, Kitagawa H (2021) A method for searching documents using knowledge bases. *Proc. iiWAS 2021* 250-258. doi:10.1145/3487664.3487699
309. Carrier-Ruiz A, Sugaya Y, Kumar D, Vergara P, Koyanagi I, Srinivasan S, Naoi T, Kano M, Sakaguchi M (2021) Calcium imaging of adult-born neurons in freely moving mice, *STAR Protocols* **2**(1):100328, 2021Mar19. doi/10.1016/j.xpro.2020.100238
310. Tsai CJ, Nagata T, Liu CY, Sukanuma T, Kanda T, Miyazaki T, Liu K, Saitoh T, Nagase H, Lazarus M, Vogt V, Yanagisawa M, Hayashi Y (2021) Cerebral capillary blood flow upsurge during REM sleep is mediated by A2a receptors. *Cell Reports* **36**(7). doi:10.1016/j.celrep.2021.109558
311. Sakamoto K, Morikuni K, Sakurai T, Matsumoto S, Vogt K (2021) Online spectral classification for long-term spike sorting. 2021 *5th International Conference on Medical and Health Informatics* Pages 89-97
312. Park I, Díaz J, Matsumoto S, Iwayama K, Nabekura Y, Ogata H, Kayaba M, Aoyagi A, Yajima K, Satoh M, Tokuyama K, Vogt K (2021) Exercise improves the quality of slow-wave sleep by increasing slow-wave stability. *Scientific Reports* **11**(1). doi:10.1038/s41598-021-83817-6
313. Park I, Suzuki C, Suzuki Y, Kawana F, Yajima K, Fukusumi S, Kokubo T, Tokuyama K, Yanagisawa M, Satoh M (2021) Effects of body pillow use on sleeping posture and sleep architecture in healthy young adults. *Sleep Medicine Research* **12**(1):57-63.
314. Ikeda T, Hori D, Arai Y, Muroi K, Ikeda Y, Takahashi K, Shiraki N, Doki S, Oi Y, Sasahara S, Morita E, Matsuzaki I (2021) Association between forest and greenspace walking and stress-coping skills among workers of Tsukuba Science City, Japan: a cross-sectional study. *Public Health in Practice*. 2021; 2: 100074
315. Sakurai T, Saito Y, Yanagisawa M (2021) Interaction between orexin neurons and monoaminergic systems. *Front Neurol Neurosci* **45**:11-21. doi:10.1159/000514955
316. Suzuki Y, Abe T, Kawana F, Okabe S, Kokubo T, Hoshino K, Baba M, Fujiyama M, Yanagisawa M (2021) O-EG004. Comparing the accuracy of sleep staging data from a new wearable sleep electroencephalography device versus the Fitbit Charge 3 with polysomnography as reference. *Clinical Neurophysiology* **132**(8):67. doi:10.1016/j.clinph.2021.02.125
317. Suzuki-Abe H, Sonomura K, Nakata S, Miyanishi K, Mahmoud A, Hotta-Hirashima N, Miyoshi C, Sato T, Funato H, Yanagisawa M (2021) Metabolomic and pharmacologic analyses of brain substances associated with sleep pressure in mice. *Journal of Neuroscience Research* **177** 16-24. doi:10.1016/j.neures.2021.11.008
318. Iwasaki K, Hotta-Hirashima N, Funato H, Yanagisawa M (2021) Protocol for sleep analysis in the brain of genetically modified adult mice. *STAR Protocols* **2**(4):100982. doi: 10.106/j.xpro.2021.100982
319. Murakami Y, Masaki M, Miyazaki S, Oketani R, Hayashi Y, Yanagisawa M, Honjoh S, Kano H (2021) Spectroscopic second and third harmonic generation microscopy using a femtosecond laser source in the third near-infrared (NIR-III) optical window. *Biomedical Optics Express* **13**(2):694-708. doi: 10.1364/BOE.446273
320. Liu S, Fu S, Wang G, Cao Y, Li L, Li X, Yang J, Li N, Shan Y, Cao Y, Ma Y, Dong M, Liu Q, Jiang H (2021) Glycerol-3-phosphate biosynthesis regenerates cytosolic NAD<sup>+</sup> to alleviate mitochondria disease. *Cell Metabolism* **33**:1974-1987. doi: 10.1016/j.cmet.2021.06.013

## (2) Review articles

321. Fifel K, Videnovic A (2021) Circadian and sleep dysfunctions in neurodegenerative disorders-an update. *Frontiers in Neuroscience* **14**. doi:10.3389/fnins.2020.627330
322. Bjorness ET, Greene WR (2021) Interaction between cocaine use and sleep behavior: A comprehensive review of cocaine's disrupting influence on sleep behavior and sleep disruptions influence on reward seeking. *Pharmacology Biochemistry and Behavior* **206**. doi:10.1016/j.pbb.2021.173194
323. Tsuneoka Y, Funato H (2021) Cellular composition of the preoptic area regulating sleep, parental, and sexual behavior. *Frontiers in Neuroscience* **15**. doi:10.3389/fnins.2021.649159
324. Choudhury ME, Miyanishi K, Takeda H, Tanaka J (2021) Microglia and the aging brain: Are geriatric microglia linked to poor sleep quality?. *International Journal of Molecular Sciences* **22**(15). doi:10.3390/ijms22157824
325. Yoshida S, Funato H (2021) Physical contact in parent-infant relationship and its effect on fostering a feeling of safety. *Iscience* **24**(7). doi:10.1016/j.isci.2021.102721
326. Kikuchi JK, Nagashima Y, Mano T, Ishiura H, Hayashi T, Shimizu J, Matsukawa T, Ichikawa Y, Takahashi Y, Karino S, Kanbayashi T, Kira J, Goto J, Tsuji S (2021) Cerebellar ataxia as a common clinical presentation associated with DNMT1 p.Y511H and a review of the literature. *Journal of Molecular Neuroscience* **71**(9):1796-1801. doi:10.1007/s12031-020-01784-5
327. Nakagawa Y, Araki M, Han SI, Mizunoe Y, Shimano H (2021) CREBH systemically regulates lipid metabolism by modulating and integrating cellular functions. *Nutrients* **13**(9). doi:10.3390/nu13093204
328. Shibata T, Kawai H, Sakamoto S, Tsutsui K, Kanbayashi T, Tanaka K, Takaki M (2021) Rituximab was effective for treatment of Anti-N-Methyl-d-Aspartate receptor encephalitis in early adolescence in initially suspected dissociative disorder. *Clinical Neuropharmacology* **44**(3):99-100. doi:10.1097/WNF.0000000000000443
329. Soares LC, Al-Dalahmah O, Hillis J, Young CC, Asbed I, Sakaguchi M, O'Neill E, Szele FG (2021) Novel Galectin-3 roles in neurogenesis, inflammation and neurological diseases. *Cells* **10**(11). doi:10.3390/cells10113047
330. Sonneborn A, Greene, R.W (2021) Norepinephrine transporter antagonism prevents dopamine-dependent synaptic plasticity in the mouse dorsal hippocampus. *Neuroscience Letters* **740**:135450. doi:10.1016/j.neulet.2020.135450
331. Yasugaki S, Hayashi Y, Lazarus M (2021) NREM-REM sleep regulation. *Reference Module in Neuroscience and Biobehavioral Psychology*. doi:10.1016/B978-0-12-822963-7.00229-2
332. Fifel K, De Boer T (2021) The circadian system in Parkinson's disease, multiple system atrophy, and progressive supranuclear palsy. *Handbook of Clinical Neurology* **179**:301-313. doi:10.1016/B978-0-12-819975-6.00019-4
333. Lazarus M, Oishi Y, Landolt HP (2021) Adenosinergic control of sleep. *Principles and Practice of Sleep Medicine Seventh Edition, Elsevier*, pp.452-459
334. Ohba A, Sakaguchi M (2021) Contribution of adult-born neurons to memory consolidation during REM sleep. *Neural Regeneration Research* **17**(2):307-308. doi:10.4103/1673-5374.317966
- (3) Proceedings**
335. Soler A, Drange O, Furuki J, Abe T, Molinas M (2021) Automatic onset detection of rapid eye movements in REM sleep EEG data. *IFAC-Papers OnLine* **54**(15):257-262. doi:10.1016/j.ifacol.2021.10.265

336. Taniguchi M, Tezuka T, Vergara P, Srinivasan S, Hosokawa T, Cherasse Y, Naoi T, Sakurai T, Sakaguchi M (2021) Open-source software for real-time calcium imaging and synchronized neuron firing detection. *2021 43rd annual international conference of the IEEE Engineering in Medicine & Biology Society (EMBC)* 2997-3003. doi:10.1109/EMBC46164.2021.9629611

#### **(4) Other English Articles**

337. Imanishi A, Omori Y, Ishido H, Sagawa Y, Han G, Mishima K, Kanbayashi T, Kondo H (2021) Aripiprazole as a new treatment for the prolonged nocturnal sleep of patient with idiopathic hypersomnia. *Psychiatry and Clinical Neurosciences* **75**(10):320-322. doi:10.1111/pcn.13290

338. Nagase H (2021) Encounter leading to Success. *Journal of Synthetic Organic Chemistry Japan* **79**(2): 162-165.

339. Komagamine T, Kanbayashi T, Suzuki K, Hirata K, Nishino S (2022) Atypical psychoses and anti-NMDA receptor encephalitis: A review of literature in the mid-twentieth century. *Psychiatry and Clinical Neurosciences* **76**(2):62-63. doi:10.1111/pcn.13317

340. Lazarus M, Oishi Y, Landolt HP (2021) Chapter 45 - Adenosinergic control of sleep. In: Principles and Practice of Sleep Medicine (7th Edition), eds. M. Kryger, T. Roth & W.C. Dement. *Elsevier*, pp. 452-459, 2021

# 1. Refereed Papers published from 2021 to 2024

## B: WPI-related papers

### (1) Original Articles

#### 2024

1. Ishitsuka M, Muroi K, Hachisuka T, Shibata I, Hori D, Doki S, Takahashi T, Sasahara S, Matsuzaki I (2024) Sense of coherence on the relationship between COVID-19-related stress and sleep quality among nurses. *Japan Journal of Nursing Science* **21**(4). doi:10.1111/jjns.12618
2. Iwagami M, Odani K, Saito T (2024) Estimating and Predicting the Rate of Kidney Function Decline over 10 Years in the General Population. *Kidney* 360 **5**(12):1862-1870. doi:10.34067/KID.0000000608
3. Motomura K, Matsuzaka T, Shichino S, Ogawa T, Pan H, Nakajima T, Asano Y, Okayama T, Takeuchi T, Ohno H, Han Si, Miyamoto T, Takeuchi Y, Sekiya M, Sone H, Yahagi N, Nakagawa Y, Oda T, Ueha S, Ikeo K, Ogura A, Matsushima K, Shimano H (2024) Single-Cell Transcriptome Profiling of Pancreatic Islets From Early Diabetic Mice Identifies Anxa10 for Ca<sup>2+</sup> Allostasis Toward  $\beta$ -Cell Failure. *Diabetes* **73**(1):75-92. doi:10.2337/db23-0212
4. Yonemochi N, Nagase H, Waddington JL, Ikeda H (2024) Stimulation of kappa opioid receptors in the nucleus accumbens promotes feeding behavior in mice: Acute restoration of feeding during anorexia induced by 5-fluorouracil. *Eur. J. Pharmacol.* **984**: 177023. doi:10.1016/j.ejphar.2024.177023
5. Yadav MK, Ishida M, Gogoleva N, Liao CW, Salim FN, Kanai M, Kuno A, Hayashi T, Shahri ZJ, Kulathunga K, Samir O, Lyu WX, Olivia O, Mbanefo EC, Takahashi S, Hamada M (2024) MAFB in macrophages regulates cold-induced neuronal density in brown adipose tissue. *Cell Rep.* **43**(4). doi:10.1016/j.celrep.2024.113978
6. Doki S, Hori D, Takahashi T, Muroi K, Ishitsuka M, Matsuura A, Tsukada H, Migaki W, Kanai N, Ikeda Y, Takao S, Matsuzaki I, Sasahara SI (2024) Designing a test battery for workers' well-being the first wave of the Tsukuba Salutogenic Occupational Cohort Study. *Environ. Health Preventative Med.* **29**. doi:10.1265/ehpm.23-00372
7. Diercks AH, Podolskaia IS, Murray TA, Jahn AN, Mai D, Liu D, Amon LM, Nakagawa Y, Shimano H, Aderem A, Gold ES (2024) Oxysterol binding protein regulates the resolution of TLR- induced cytokine production in macrophages. *PNAS* **121**(33). doi:10.1073/pnas.2406492121
8. Takashima S, Okamura E, Ichiyama Y, Nishi K, Shimizu A, Watanabe C, Muto M, Matsumoto S, Tsukiyama-fujii S, Tsukiyama T, Ogita H, Nishi E, Ohji M, Sugiyama F, Takahashi S, Mizuno S, Mizutani KI, Ema M (2024) Null mutation of exocyst complex component 3-like does not affect vascular development in mice. *Exp. Anim.* **73**(1):93-100. doi:10.1538/expanim.23-0105
9. Cao Y, Araki M, Nakagawa Y, Deisen L, Lundsgaard A, Kanta JM, Holm S, Johann K, Jacobsen JCB, Jähnert M, Schürmann A, Kiens B, Clemmensen C, Shimano H, Fritzen AM, Kleinert M (2024) Dietary medium-chain fatty acids reduce hepatic fat accumulation via activation of a CREBH-FGF21 axis. *Mol. Metab.* **87**. doi:10.1016/j.molmet.2024.101991
10. Lim N, Tsunoda K, Nagata K, Asano Y, Seol J, Jindo T, Tsuji T, Okura T (2024) Developing a battery of physical performance tests to predict functional disability in Japanese older adults: A longitudinal study from the Kasama study. *Geriatr Gerontol Int.* **24**(12):1343-1349. doi:10.1111/ggi.15008
11. Nagata K, Shibuya K, Fujii Y, Seol J, Jindo T, Okura T (2024) Cross-sectional study of the optimal types of physical exercise for cognitive function in older Japanese adults. *Geriatr Gerontol Int.* **24**(11):1173-1180. doi:10.1111/ggi.14991
12. Shoji T, Kogure K, Toda N, Hakoshima M, Katsuyama H, Yanai H, Tokunaga S, Tateoka K, Tsuji T,

Okura T (2024) Association between comorbidities associated with diabetes and higher-level functional status in older patients with type 2 diabetes mellitus: a cross sectional study. *Eur Geriatr Med.* **18**(4):1101-1110. doi:10.1007/s41999-024-00937-8

## 2023

### (1) Original Articles

13. Fujino M, Morito N, Hayashi T, Ojima M, Ishibashi S, Kuno A, Koshiba S, Yamagata K, Takahashi S (2023) Transcription factor c-maf deletion improves streptozotocin-induced diabetic nephropathy by directly regulating Sglt2 and Glut2. *JCI Insight.* **8**(6):e163306. doi:10.1172/jci.insight.163306
14. Fujino M, Ojima M, Ishibashi S, Mizuno S, Takahashi S (2023) Generation and mutational analysis of a transgenic murine model of the human MAF mutation. *Am. J. Med. Genet. A.* **191**(7):1878-1888. doi:10.1002/ajmg.a.63220
15. Gogoleva N, Shahri Z J, Noda A, Liao C, Wakimoto A, Inoue Y, Jeon H, Takahashi S, Hamada M (2023) Intraplacental injection of AAV9-CMV-iCre results in the widespread transduction of multiple organs in double-reporter mouse embryos. *Exp. Anim.* **72**(4):460-467. doi:10.1538/expanim.23-0044
16. Han S, Nakakuki M, Nakagawa Y, Wang Y, Araki M, Yamamoto Y, Tokiwa H, Takeda H, Mizunoe Y, Motomura K, Ohno H, Kainoh K, Murayama Y, Aita Y, Takeuchi Y, Osaki Y, Miyamoto T, Sekiya M, Matsuzaka T, Yahagi N, Sone H, Daitoku H, Sato R, Kawano H, Shimano H (2023) Rhomboid protease RHBDL4/RHBDD1 cleaves SREBP-1c at endoplasmic reticulum monitoring and regulating fatty acids. *PNAS Nexus.* **2**(11):pgad351. doi:10.1093/pnasnexus/pgad351
17. Kim J, Kwon C, Nakamura K, Muromachi N, Mori H, Muroi S, Yamada Y, Saito H, Nakagawa Y, Fukamizu A (2023) Increased angiotensin II coupled with decreased Adra1a expression enhances cardiac hypertrophy in pregnancy-associated hypertensive mice. *J. Biol. Chem.* **299**(3):102964. doi:10.1016/j.jbc.2023.102964
18. Muroi K, Ishitsuka M, Hachisuka T, Shibata I, Ikeda T, Hori D, Doki S, Takahashi T, Sasahara S, Matsuzaki I (2023) Factors associated with work engagement of nurses during the fifth wave of the COVID-19 pandemic in japan: Web-based cross-sectional study. *JMIR Form. Res.* **7**e45830. doi:10.2196/45830
19. Uemura SI, Kanbayashi T, Ito W, Terui Y, Satake M, Han GE, Shioya T, Nishino S. (2023) Changes in sleep profile on exposure to sodium chloride and artificially carbonated springs: A pilot study. *J Phys Ther Sci.* **35**(5):330-339. doi:10.1589/jpts.35.330
20. Yun R, Hong E, Kim J, Park B, Kim S J, Lee B, Song Y S, Kim S, Park S, Kang JM (2023) N-linked glycosylation is essential for anti-tumor activities of KIAA1324 in gastric cancer. *Cell Death Differ.* **30**:14546. doi:10.1038/s41419-023-06083-6

### (2) Review articles

21. Fujino M, Ojima M, Takahashi S (2023) Exploring large MAF transcription factors: Functions, pathology, and mouse models with point mutations. *Genes.* **14**(10):1883. doi:10.3390/genes14101883

## 2022

### (1) Original Articles

22. Zamarbide M, Martinez-Pinilla E, Gil-Bea F, Yanagisawa M, Franco R, Perez-Mediavilla A (2022) Genetic inactivation of free fatty acid receptor 3 impedes behavioral deficits and pathological hallmarks in the APP(swe) Alzheimer's disease mouse model. *Int. J. Mol. Sci.* **23**(7). doi:10.3390/ijms23073533

23. Inoue Y, Liao CW, Tsunakawa Y, Tsai IL, Takahashi S, Hamada M (2022) Macrophage-specific, Mafb-deficient mice showed delayed skin wound healing. *Int. J. Mol. Sci.* **23**(16). doi:10.3390/ijms23169346
24. Deng ZB, Kuno A, Ojima M, Takahashi S (2022) MafB maintains beta-Cell identity under MafA-deficient conditions. *Mol. Cell. Biol.* **42**(8). doi:10.1128/mcb.00541-21
25. Samir O, Kobayashi N, Nishino T, Siyam M, Yadav MK, Inoue Y, Takahashi S, Hamada M (2022) Transcription factor MAFB as a prognostic biomarker for the lung adenocarcinoma. *Int. J. Mol. Sci.* **23**(17). doi:10.3390/ijms23179945
26. Araki M, Nakagawa Y, Saito H, Yamada Y, Han SI, Mizunoe Y, Ohno H, Miyamoto T, Sekiya M, Matsuzaka T, Sone H, Shimano H (2022) Hepatocyte- or macrophage-specific SREBP-1a deficiency in mice exacerbates methionine- and choline-deficient diet-induced nonalcoholic fatty liver disease. *Am. J. Physiol.-Gastroint. Liver Physiol.* **323**(6):G627-G639. doi:10.1152/ajpgi.00090.2022
27. Furuta Y, Yatoh S, Iwasaki H, Sugano Y, Sekiya M, Suzuki H, Shimano H (2022) L-asparaginase-induced continuous hyperglycemia with type 1 diabetes-related antibodies and HLA genotypes: A case study. *Cureus. J. Med. Sci.* **14**(10). doi:10.7759/cureus.30067
28. Hashimoto M, Takeichi K, Murata K, Kozakai A, Yagi A, Ishikawa K, Suzuki-Nakagawa C, Kasuya Y, Fukamizu A, Nakagawa T (2022) Regulation of neural stem cell proliferation and survival by protein arginine methyltransferase 1. *Front. Neurosci.* **16**. doi:10.3389/fnins.2022.948517
29. Suzuki Y, Suzuki H, Ishikawa T, Yamada Y, Yatoh S, Sugano Y, Iwasaki H, Sekiya M, Yahagi N, Hada Y, Shimano H (2022) Exploratory analysis using machine learning of predictive factors for falls in type 2 diabetes. *Sci. Rep.* **12**(1). doi:10.1038/s41598-022-15224-4
30. Ikeda T, Hori D, Sasaki H, Komase Y, Doki S, Takahashi T, Oi Y, Ikeda Y, Arai Y, Muroi K, Ishitsuka M, Matsuura A, Go W, Matsuzaki I, Sasahara S (2022) Prevalence, characteristics, and psychological outcomes of workplace cyberbullying during the COVID-19 pandemic in Japan: a cross-sectional online survey. *BMC Public Health* **12**(1). doi:10.1186/s12889-022-13481-6
31. Hori D, Oi Y, Doki S, Takahashi T, Ikeda T, Ikeda Y, Arai Y, Muroi K, Sasaki H, Ishitsuka M, Matsuura A, Go W, Matsuzaki I, Sasahara S (2022) Ibaraki's Amabie-chan usage and its association with infection prevention behavior and fear of COVID-19: a cross-sectional preliminary survey of the Tsukuba Salutogenic Occupational Cohort Study. *Environ. Health Prev.* **27**. doi:10.1265/ehpm.22-00052
32. Yamada Y, Saito H, Araki M, Tsuchimoto Y, Muroi S, Suzuki K, Toume K, Kim JD, Matsuzaka T, Sone H, Shimano H, Nakagawa Y (2022) Wogonin, a compound in scutellaria baicalensis, activates ATF4-FGF21 signaling in mouse hepatocyte AML12 cells. *Nutrients* **14**(19). doi:10.3390/nu14193920
33. Okajima Y, Matsuzaka T, Miyazaki S, Motomura K, Ohno H, Sharma R, Shimura T, Istiqamah N, Han SI, Mizunoe Y, Osaki Y, Iwasaki H, Yatoh S, Suzuki H, Sone H, Miyamoto T, Aita Y, Takeuchi Y, Sekiya M, Yahagi N, Nakagawa Y, Tomita T, Shimano H (2022) Morphological and functional adaptation of pancreatic islet blood vessels to insulin resistance is impaired in diabetic db/db mice. *Biochim. Biophys. Acta-Mol. Basis Dis.* **1868**(4). doi:10.1016/j.bbdis.2022.166339
34. Watanabe C, Shibuya H, Ichiyama Y, Okamura E, Tsukiyama-Fujii S, Tsukiyama T, Matsumoto S, Matsushita J, Azami T, Kubota Y, Ohji M, Sugiyama F, Takahashi S, Mizuno S, Tamura M, Mizutani KI, Ema M (2022) Essential roles of exocyst complex component 3-like 2 on cardiovascular development in mice. *Life-Basel* **12**(11). doi:10.3390/life12111730
35. Okuda S, Nakayama T, Uemura N, Hikawa R, Ikuno M, Yamakado H, Inoue H, Tachibana N, Hayashi Y, Takahashi R, Egawa N (2022) Striatal-inoculation of  $\alpha$ -synuclein preformed fibrils aggravated the phenotypes of REM sleep without atonia in A53T BAC-SNCA transgenic mice. *Int. J. Mol. Sci.* **23**(21):13390. doi:10.3390/ijms232113390

36. Li F, Matsumori S, Egawa N, Yoshimoto S, Yamashiro K, Mizutani H, Uchida N, Kokuryu A, Kuzuya A, Kojima R, Hayashi Y, Takahashi R (2022) Predictive diagnostic approach to dementia and dementia subtypes using wireless and mobile electroencephalography-A pilot study. *Bioelectricity*. doi.org/10.1089/bioe.2021.0030
37. Tsuneki H, Maeda T, Takata S, Sugiyama M, Otsuka K, Ishizuka H, Onogi Y, Tokai E, Koshida C, Kon K, Takasaki I, Hamashima T, Sasahara M, Rudich A, Koya D, Sakurai T, Yanagisawa M, Yamanaka A, Wada T, Sasaoka T (2022) Hypothalamic orexin prevents non-alcoholic steatohepatitis and hepatocellular carcinoma in obesity. *Cell Rep*. **41**(3):111497. doi: 10.1016/j.celrep.2022.111497
38. Islam Md Tarikul, Rump F, Tsuno Y, Kodani S, Sakurai T, Matsui A, Maejima T, Mieda M (2022) Vasopressin neurons in the paraventricular hypothalamus promote wakefulness via lateral hypothalamic orexin neurons. *Curr. Biol*. S0960-9822(22)01121-6. doi:10.1016/j.cub.2022.07.020
39. Xu J, Zhou R, Wang G, Guo Y, Gao X, Zhou S, Ma C, Chen L, Shi B, Wang H, Wang F, Liu Q (2022) Regulation of sleep quantity and intensity by long and short isoforms of SLEEPY kinase. *Sleep* **45**(11):zsac198 doi:10.1093/sleep/zsac198
40. He B, Yu H, Liu S, Wan H, Fu S, Liu S, Yang J, Zhang Z, Huang H, Li Q, Wang F, Jiang Z, Liu Q, Jiang H (2022) Mitochondrial cristae architecture projects against mtDNA release and inflammation. *Cell Rep*. **41**(10):111774. doi:10.1016/j.celrep.2022.111774
41. Liu J, Fujii Y, Fujii K, Seol J, Kim M, Tateoka K, Nagata K, Zhang H, Okura T (2022) Pre-frailty associated with traffic crashes in Japanese community-dwelling older drivers. *Traffic Inj. Prev*. **23**(2):73-78. doi:10.1080/15389588.2022.2030473
42. Nagata K, Tsunoda K, Fujii Y, Tsuji T, Okura T (2022) Physical activity intensity and suspected dementia in older Japanese adults: a dose-response analysis based on an 8-year longitudinal study. *Journal of Alzheimer's Disease* **87**(3):1055-1064. doi:10.3233/JAD-220104
43. Gan SR, Low K, Okura T, Kawabata M (2022) Short-term effects of square stepping exercise on cognitive and social functions in sedentary older adults: A home-based online trial. *ACPES Journal of Physical Education, Sport, and Health* **2**(2):70-77. doi:10.15294/ajpesh.v2i2.62184
44. Fujii K, Fujii Y, Kubo Y, Tateoka K, Liu J, Nagata K, Nakashima D, Okura T (2022) Frail older adults without occupational dysfunction maintain good subjective well-being: a cross-sectional study. *Healthcare* **10**(10):1922. doi:10.3390/healthcare10101922
45. Shoji T, Fujii Y, Tateoka K, Tsuji T, Okura (2022) The association of the Japan Science and Technology Agency Index of Competence with physical and cognitive function in community-dwelling older adults. *Geriatrics & Gerontology International*, **22**(9):753-758.
46. Yoon J, Isoda H, Ueda T, Okura T (2022) Cognitive and physical benefits of a game-like dual-task exercise among the oldest nursing home residents in Japan. *Alzheimer's & Dementia-Translational Research & Clinical Interventions* **8**(1):e12276. doi:10.1002/trc2.12276
47. Katori M, Shi S, Ode KL, Tomita Y, Ueda HR (2022) The 103,200-arm acceleration dataset in the UK Biobank revealed a landscape of human sleep phenotypes. *Proc. Natl. Acad. Sci. U.S.A.* **119**(12): e2116729119. doi:10.1073/pnas.2116729119
48. Komagamine T, Kanbayashi T, Suzuki K, Hirata K, Nishino S (2022) "Atypical psychoses" and anti-NMDA receptor encephalitis: A review of literature in the mid-twentieth century. *Psychiatry Clin. Neurosci.* **76**(2):62-63. doi:10.1111/pcn.13317

#### (4) Other English Articles

49. Yanagawa T, Hirayama A, Osada K, Kuno A, Takahashi S (2022) Sufficient liver erythropoietin synthesis is induced in hemodialysis patients not requiring erythropoiesis-stimulating agents. *Clin. Nephrol.* **98**(3):167-170. doi:10.5414/CN110749

## 2021

### (1) Original Articles

50. Motomura Y, Kitamura S, Nakazaki K, Oba K, Katsunuma R, Terasawa Y, Hida A, Moriguchi Y, Mishima K (2021) The Role of the thalamus in the neurological mechanism of subjective sleepiness: An fMRI study. *Nature and Science of Sleep* 899-921. doi:10.2147/NSS.S297309
51. Doki S, Sasahara S, Hori D, Oi Y, Takahashi T, Shiraki N, Ikeda Y, Ikeda T, Arai Y, Muroi K, Matsuzaki I (2021) Comparison of predicted psychological distress among workers between artificial intelligence and psychiatrists: a cross-sectional study in Tsukuba Science City, Japan. *BMJ Open* **11**(6). doi:10.1136/bmjopen-2020-046265
52. Shiraki N, Doki S, Ikeda Y, Ikeda T, Takahashi T, Andrea CS, Hori D, Oi Y, Sasahara S, Matsuzaki I (2021) Differences in psychological distress between managers and non-managers in female workers: a cross-sectional study in Tsukuba Science City, Japan. *Nagoya Journal of Medical Science* **83**(1): 63-74. doi:10.18999/nagjms.83.1.63
53. Inada K, Enomoto M, Yamato K, Marumoto T, Takeshima M, Mishima K (2021) Effect of residual insomnia and use of hypnotics on relapse of depression: a retrospective cohort study using a health insurance claims database. *Journal of Affective Disorders* 539-546. doi:10.1016/j.jad.2020.12.040
54. Motomura Y, Katsunuma R, Ayabe N, Oba K, Terasawa Y, Kitamura S, Moriguchi Y, Hida A, Kamei Y, Mishima K (2021) Decreased activity in the reward network of chronic insomnia patients. *Scientific Reports* **11**(1). doi:10.1038/s41598-020-79989-2
55. Ishizuya A, Enomoto M, Tachimori H, Takahashi H, Sugihara G, Kitamura S, Mishima K (2021) Risk factors for low adherence to methylphenidate treatment in pediatric patients with attention-deficit/hyperactivity disorder. *Scientific Reports* **11**(1). Doi:10.1038/s41598-021-81416-z
56. Narisawa H, Inoue Y, Kobayashi M, Okajima I, Kikuchi T, Kagimura T, Matsui K, Inada K, Mishima K (2021) Development and validation of the Benzodiazepine Hypnotics Withdrawal Symptom Scale (BHWSS) based on item response theory. *Psychiatry Research* **300**. doi:10.1016/j.psychres.2021.113900
57. Jeon H, Asano K, Wakimoto A, Kulathunga K, Tran MTN, Nakamura M, Yokomizo T, Hamada M, Takahashi S (2021) Generation of reconstituted hemato-lymphoid murine embryos by placental transplantation into embryos lacking HSCs. *Scientific Reports* **11**(1). doi:10.1038/s41598-021-83652-9
58. Daitoku H, Someya M, Kako K, Hayashi T, Tajima T, Haruki H, Sekiguchi N, Uetake T, Akimoto Y, Fukamizu A (2021) siRNA screening identifies METTL9 as a histidine N pi-methyltransferase that targets the proinflammatory protein S100A9. *Journal of Biological Chemistry* **297**(5). doi:10.1016/j.jbc.2021.101230
59. Inada K, Enomoto M, Yamato K, Mishima K (2021) Prescribing pattern of hypnotic medications in patients initiating treatment at Japanese hospitals: A nationwide, retrospective, longitudinal, observational study using a claims database. *Drugs-real World Outcomes* **8**(3): 277-288. doi:10.1007/s40801-021-00244-9
60. Kulathunga K, Wakimoto A, Hiraishi Y, Yadav MK, Gentleman K, Warabi E, Sakasai T, Miwa Y, Mizuno S, Takahashi S, Hamada M (2021) Albino mice with the point mutation at the tyrosinase locus show high cholesterol diet-induced NASH susceptibility. *Scientific Reports* **11**(1). doi:10.1038/s41598-021-00501-5

61. Yamato K, Inada K, Enomoto M, Marumoto T, Takeshima M, Mishima K (2021) Patterns of hypnotic prescribing for residual insomnia and recurrence of major depressive disorder: a retrospective cohort study using a Japanese health insurance claims database. *BMC Psychiatry* **21**(1). doi:10.1186/s12888-021-03046-z
62. Shimizu Y, Tamura T, Kemmochi A, Owada Y, Ozawa Y, Hisakura K, Matsuzaka T, Shimano H, Nakano N, Sakashita S, Oda T, Ohkohchi N (2021) Oxidative stress and Liver X Receptor agonist induce hepatocellular carcinoma in Non-alcoholic steatohepatitis model. *Journal of Gastroenterology and Hepatology* **36**(3): 800-810. doi:10.1111/jgh.15239
63. Ishii S, Suzuki T, Wakahashi K, Asada N, Kawano Y, Kawano H, Sada A, Minagawa K, Nakamura Y, Mizuno S, Takahashi S, Matsui T, Katayama Y (2021) FGF-23 from erythroblasts promotes hematopoietic progenitor mobilization. *Blood* **137**(11): 1457-1467. doi:10.1182/blood.2020007172
64. Hashimoto M, Kumabe A, Kim JD, Murata K, Sekizar S, Williams A, Lu WZ, Ishida J, Nakagawa T, Endo M, Minami Y, Fukamizu A (2021) Loss of PRMT1 in the central nervous system (CNS) induces reactive astrocytes and microglia during postnatal brain development. *Journal of Neurochemistry* **156**(6): 834-847. doi:10.1111/jnc.15149
65. Suzuki T, Ishii S, Shinohara M, Kawano Y, Wakahashi K, Kawano H, Sada A, Minagawa K, Hamada M, Takahashi S, Furuyashiki T, Tan NS, Matsui T, Katayama Y (2021) Mobilization efficiency is critically regulated by fat via marrow PPAR delta. *Haematologica* **106**(6): 1671-1683. doi:10.3324/haematol.2020.265751
66. Matsugu S, Shiokawa H, Kitagawa H (2021) Fast algorithm for attributed community search. *Journal of Information Processing* **29** 188-196, doi:10.2197/ipsjip.29.188
67. Bou S, Kitagawa H, Amagasa T (2021) CPIx: Real-time analytics over out-of-order data streams by incremental sliding-window aggregation. *IEEE Transactions on Knowledge and Data Engineering* **34**(11): 5239-5250. doi:10.1109/TKDE.2021.3054898
68. Dong Y, Xiao C, Chen H, Yu JX, Takeoka K, Oyamada M, Kitagawa H (2021) Continuous top-k spatial-keyword search on dynamic objects. *The International Journal on Very Large Data Bases* **30** 141-161. doi:10.1007/s00778-020-00627-4
69. Bedont J, Toda H, Shi M, Park CH, Quake C, Stein C, Kolesnik A, Sehgal A (2021) Short and long sleeping mutants reveal links between sleep and macroautophagy. *eLife* **10**, e64140. doi: 10.7554/eLife.64140
70. Seol J, Fujii Y, Inoue T, Kitano N, Tsunoda K, Okura T (2021) Effects of morning versus evening home-based exercise on subjective and objective sleep parameters in older adults: A Randomized controlled trial. *Journal of Geriatric Psychiatry and Neurology* **34**(3):232-242. doi: 10.1177/0891988720924709
71. Kizawa T, Hosokawa K, Nishijima T, Takahashi S, Shimizu T, Ono T, Han G, Kanbayashi T, Sakurai S, Kondo H (2021) False-positive cases in multiple sleep latency test by accumulated sleep debt. *Neuropsychopharmacology Reports* **41**(2):192-198. doi: 10.1002/npr2.12169. Epub 2021 Mar 21

## (2) Review articles

72. Hashimoto M, Fukamizu A, Nakagawa T, Kizuka Y (2021) Roles of protein arginine methyltransferase 1 (PRMT1) in brain development and disease. *Biochimica et Biophysica Acta-General Subjects* **1865**(1). doi:10.1016/j.bbagen.2020.129776