NBRP Zebrafish News Letter March 2026

Thank you for your continued support of the National BioResource Project (NBRP) Zebrafish. We are pleased to distribute this newsletter from RIKEN Center for Brain Science, Core Center. The fourth year of the fifth phase of the NBRP Zebrafish Research Project is almost over. Next fiscal year will be the final year of the fifth phase. We sincerely appreciate your continued cooperation.

User's Voices

Dr. Yuhei Nishimura of Mie University gave us an article on zebrafish research and his comments on NBRP Zebrafish.

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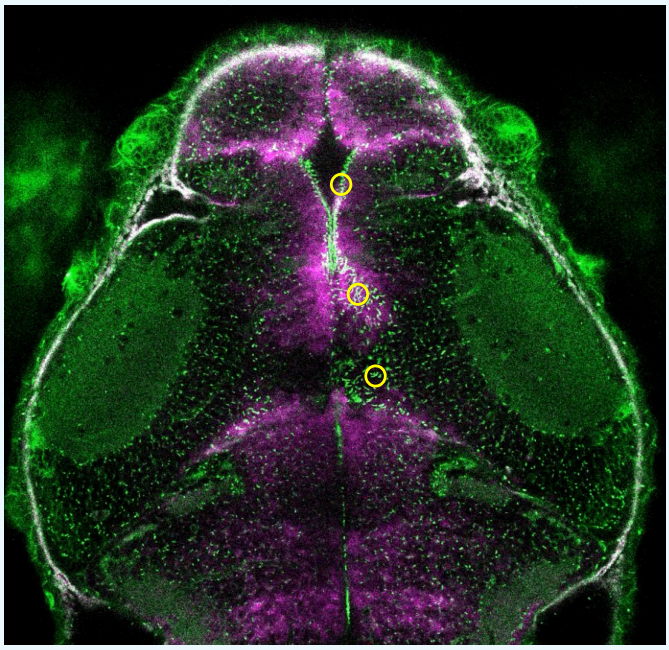
My name is Yuhei Nishimura. I have been leading Department of Integrative Pharmacology at Mie University Graduate School of Medicine since 2017. My research goal is to elucidate the pathophysiology of developmental disorders and develop therapeutic drugs using zebrafish. Our laboratory is running with diverse graduate students. I am very pleased to have this opportunity to share my history of why I started studying my research using zebrafish.

With doctoral students (1st to 3rd year) (front row). The author is on the left in the back row.

I grew up with younger brother who has a developmental disorder. He struggled to control his emotion and such circumstances inspired me to pursue treatments for developmental disorders. Eventually I was enrolled in Mie University Faculty of Medicine in 1987. At Mie University, Professor Hiroyoshi Hidaka led a laboratory where world-leading academic drug discovery studies were carried out by a group of ambitious medical students. During my first year of university, Dr. Toshio Tanaka, who was serving as a lecturer in the Hidaka Lab, was appointed to Professor of Pharmacology. Dr. Tanaka brought various ideas to reality to advance new pharmacological research. Under his guidance, I was able to be involved in the research based on omics-analysis through my career from undergraduate student to lecturer. In 2004, I had the opportunity to study at the UCLA Center for Autism Research and Treatment. Under the mentorship of Dr. Daniel Geschwind, I discovered novel genetic associations with autism using omics-analysis of autistic patients' blood.

In 2007, I returned to work as a lecturer in the Tanaka Laboratory and was given the opportunity to start pharmacological research using zebrafish. First, I compared the omics data from adipose tissue of the diet-induced obesity zebrafish established in the Tanaka Lab with the omics data from adipose tissue in obese animals such as humans, mice, and rats. This study demonstrated the effectiveness of zebrafish in analyzing the pathology of obesity. This paper has been cited over 350 times. Next, in a collaborative study with Canon Inc., we conducted chemical biology research. This involved adding diverse fluorescent dyes developed by Canon to a breeding water. Zebrafish larvae were cultured and analyzed by a whole-body imaging with a fluorescence microscope to study dynamics of fluorescent dyes taken up by the larvae. Through this research, we identified various fluorescent dyes which are suitable for live-imaging of zebrafish retina and cerebral

vascular structure. This work was featured on the cover page of ACS Chemical Neuroscience. After being appointed to Professor of Pharmacology in 2017, I am studying the pathophysiology of developmental disorders and trying to find candidate therapeutic drugs through multi-omics analysis of zebrafish harboring mutations in disease-associated genes identified by genomic analysis of patients with developmental disorders. This study is carried out in collaboration with Dr. Kenji Kurosawa (National Center for Child Health and Development), Dr. Kenjiro Kosaki (Keio University), Dr. Atsuo Kawahara (University of Yamanashi), and others. Additionally, we also aim to elucidate the mechanisms of developmental neurotoxicity and developmental toxicity of chemicals and apply these findings to regulatory science. This is achieved through imaging analysis of zebrafish embryos and larvae exposed to chemicals. In this research we are collaborating with Dr. Hiromi Hirata (Aoyama Gakuin University), Dr. Hiroki Teraoka (Rakuno Gakuen University), and Dr. Akira Mizoguchi (Mie University).



Live brain imaging of Tg(ubb:arl13b-EGFP,gfap:mCherry)
Cilia from various cell types (e.g., yellow circles) are visualized.

While experiencing the advantage of zebrafish, which enables us to study the phenotypic consequences of gene-knockout or chemical exposure in genetic (omics-analysis), cellular (image analysis), and organismal (behavioral analysis) levels, I started a research project on primary cilium, a cellular organelle, under the guidance of Dr. Masaki Inagaki, who headed the Department of Molecular Physiology and Cardiovascular Biology, Faculty of Medicine, Mie University. Through the collaborative research with Professor Inagaki, I learned that altering primary cilia length can regulate cell proliferation and differentiation, and this fact led me to choose primary cilium as a therapeutic target. We are trying to isolate small-molecule compounds that can inhibit protein interactions suppressing primary cilia formation at the centriole, which is the basal body of the primary cilium. By regulating the length of primary cilia length, we are able to develop novel treatment which might relieve disease symptoms. With support from AMED-BINDS, we identified the small chemical compounds that inhibit protein interaction and thereby suppressing primary cilia formation. We found that these compounds extend primary cilia in preadipocytes and suppress their differentiation into adipocytes. The protein-protein interactions targeted by these compounds are used beyond adipocyte precursors, thus this finding can be applied to develop therapeutic agents for various diseases. Zebrafish larvae serve as a powerful tool for drug efficacy analysis, as they allow evaluation of systemic effects of a compound with minimal quantity. Under the guidance of Dr. Takaaki Matsui and Dr. Yasumasa Bessho (Nara Institute of Science and Technology), who are conducting primary cilia research using zebrafish, we learned various research techniques and generated transgenic zebrafish suitable for live imaging of cilia in cells throughout the body. Currently, using these transgenic zebrafish, we are developing various imaging analysis techniques to quantitatively evaluate ciliary function and advancing phenotypic analysis of pathologies arising from ciliary dysfunction. We are experiencing a big advantage of zebrafish, which allows us to analyze the effects of compounds in an organism at the organelle, cell, and tissue levels. Furthermore, mutations in genes related to ciliary function cause congenital disorders known as ciliopathy. Patients with ciliopathy such as Joubert syndrome and Bardet-Biedl syndrome often exhibit developmental disorders. We are also investigating the potential of the compounds we have identified to improve the pathophysiology of these syndromes.

In conducting zebrafish research, we have received tremendous support from the NBRP Zebrafish. Dr. Hitoshi Okamoto and Ms. Akiko Ishioka provided guidance on deposits, distribution, and husbandry of zebrafish. At Zebrafish Neurobiology 2025 held in Cold Spring Harbor, Dr. Okamoto provided invaluable instruction in my research. Dr. Koichi Kawakami supported us with Tol2-related tools. I was also very impressed by the Cro/OR3 system introduced by Dr. Kazuhide Asakawa earlier this year. One of our graduate students, who participated in the “Practical Training in Microscope Optics from Fundamentals” supervised by Dr. Shin-ichi Higashijima, has been devising unique imaging analysis techniques one after another. I am once again deeply appreciative of the benefits of the strengthened research infrastructure within the community. I would like to take this opportunity to express my sincere gratitude to all NBRP Zebrafish personnel and collaborators. I look forward to your continued support.

New Strains

We are pleased to present the newly deposited and released strains as a resource.
You can order strains from our website (https://shigen.nig.ac.jp/zebra/).

Tg(10×UAS:Vegfc) ncv556Tg
angpt1 ncv109
angpt2b ncv131
Tg(hsp70l:noggin3-Flag, myl7:Nls-mCherry) ncv524Tg
Tg(fli1:loxP-Nls-mCherry-loxP-TagBFP-2A-NTR2.0) ncv553Tg
Tg(eef1a:mCherry-pHluorin-GPI) ncv537Tg
TgBAC(esm1:dEGFP) ncv543Tg
VRK2
hoxba cluster sud113 ; hoxbb cluster sud114
barhl1b ex1-7
eomesa ex1-5
eomesb ex2-14
eomesb ex2-11
neurod1 ex2-5
chrng
scn4aa ; scn4ab
cxcl12a ncv148
Tg(hsp70l:mKO2-T2A-SmoCA) isi36
Tg(hsp70l:GFP-zBcl2a) isi37
Tg(foxo3b:GFP) Line1 isi38
Tg(foxo3b:GFP) Line2 isi39
Tg(foxo3b:mCherry) Line2 isi40
foxo3b isi41
foxo3b isi42
Tg(hsp70l:mKO2-2A-Gli3R) isi43
Tg(UAS:GFP-2A-SmoCA) isi44
Tg(8xGliBS-miniP:zScarletI-NLS) isi45
ebf1b ex1+4
ebf1b ex1+7
lhx9 ex3-16
lhx9 ex3+11
Tg(cbln12:SCAT3)
Tg(cbln12:SCAT3DEVG)
nfixa chi24; nfixb chi25
atp13a2+17
cgas Δ16
scml4 Δ5
scml4+1
purg Δ2
purg Δ10
slc25a20+2
Tg(coRREL1.1:creERt2) tyt241;
Tg(Ola.Actb:LOXP-DsRED2-LOXP-EGFP) tyt201
marcksl1a rk23; marcksl1b rk24
cdh6 ncv147
TgKI(cdh6-EGFP) ncv301
TgKI(cdh6-mCherry) ncv304
TgKI(cdh5-EGFP) ncv308
Tg(hsp70:zGrad)ncv561Tg ;
TgKI(cdh5-EGFP) ncv308
Tg(fli1a:lifeact-kikGR) ncv563Tg
Tg(fli1a:myl9b-HaloTag) ncv565Tg
Tg(fli1a:golgi-HaloTag) ncv566Tg
dnmt3bb.2 obu1
dnmt3ba obu4; dnmt3ab obu5;
dnmt3aa obu6; dnmt3bb.1 obu2;
dnmt3bb.2 obu1; dnmt3bb.3 obu3

Call for Deposit

- Would you like to be a depositor?-

RIKEN Center for Brain Science (RIKEN CBS) is Core center for zebrafish strain conservation and has a facility that can accommodate 200,000 fish. We are willing to accept deposits of strains from external research institutions, so please do not hesitate to deposit your strains with us. When depositing, the intellectual property rights of the depositor are protected.

- Sperm cryopreservation is available-

Sperm cryopreservation is the best way to back up your strain. Send us your fish and we will process and preserve a sample as soon as possible. We recommend 3-5 healthy male fish for processing, which will provide enough sperm for 45 IVFs.
Frozen sperm samples are backed up and stored at RIKEN CBS and National Institute for Basic Biology to prevent loss in disasters. We will be able to respond to your needs as much as possible.
Please feel free to contact us for more information. We look forward to working with you.

Organizations

NBRP Zebrafish is conducted by the following three institutes.

- Core center-
RIKEN Center for Brain Science
Principal Investigator Hitoshi Okamoto

-Sub-Core center-
National Institute of Genetics
Principal Investigator Kazuhide Asakawa

-Sub-Core center-
National Institute for Basic Biology
Principal Investigator Shin-ichi Higashijima

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