



Keio University  
Human Biology-Microbiome-Quantum Research  
Center (Bio2Q)

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## WELCOME TO Bio2Q CONNECT VOL. 2

At Bio2Q, we are passionate about seeking connections - connections between microbiome, human biology, and quantum computing research, and connections with a community that shares our interests and values.

Bio2Q Connect is a glimpse into the research center we try to define by scientific excellence, sharing of knowledge, transparency, diversity, and a commitment to the missions of the World Premier International Research Center Initiative (WPI).

Here, you may discover some of the exciting research questions driving us forward, the challenges in our quest for innovation and globalization, and the stories of the members and collaborators shaping Bio2Q.

Thank you for your interest and support and for being an essential part of our journey toward an exciting future.

Oltea Sampetean  
Administrative Director, Bio2Q



Source: Bio2Q 2024. Original Photos.

## WELCOME ON BOARD!

We are pleased to welcome Dr. Haowei Li as a postdoctoral fellow at Bio2 core of Bio2Q. Haowei is from Beijing, China, and has a background in Clinical Medicine from Shandong University. Driven by a desire to explore the mysteries of life and push the boundaries of know-



Source: Howei Li. Used with Permission.

ledge, he pursued a Ph.D. in Integrated Biosciences at the University of Tokyo, focusing on hippocampal neurogenesis and functional brain imaging (fMRI). As he approaches his sixth year in Japan as a member of Prof. Yuzaki's team at Bio2Q, he is eager to explore the gut-brain axis and neuro-regulation to uncover new insights into brain function and its connection to overall health.

## WPI-Bio2Q EVENT FEATURING PROF. TSUTOMU SUZUKI OF UNIV. OF TOKYO (SEP. 10)



Source: Bio2Q 2024. Original Photos.

Prof. Tsutomu Suzuki recently delivered a seminar on "RNA Modifications in Health and Disease" at Bio2Q. As a pioneer in the field of epi-transcriptome, he explored how RNA modifications can influence cellular function. This can be highlighted with the success of RNA vaccines during the COVID-19 pandemic, where N1-Methylpseudouridine (m1Ψ) played a key role in reducing mRNA immunogenicity.

His team employs Mass-spectrometry and NMR to uncover new RNA modifications. Large-scale isolation of RNA is first conducted using a specialized separation system, followed by purification using traditional

HPLC, an approach very effective in identifying modifications across a wide range of organisms. They also pinpoint the enzymes responsible for these biochemical processes. Using Cryo-EM, they identify how modified bases in tRNA affect their function. During the seminar, the role of Taurine in mitochondrial tRNA was highlighted, as well as its link to mitochondrial diseases and potential anti-aging benefits.

Prof. Suzuki's talk truly opened the eyes of researchers at Bio2Q to the profound impact of single RNA modification on health and disease. His insightful response to our questions hinted at exciting new possibilities for future research linking it to microbiome!

Fun Fact: Did you know that modified nucleosides were explored for their ability to enhance umami flavor in the past? Interestingly, this research also ended up playing a role in the fight against COVID-19! (Vinodh, Postdoc)

## INTRODUCTION TO Bio2Q RESEARCH

Series #4:  
Dr. Therese Solberg  
(Bio1 Core,  
Genome Dynamics  
team)

Source: Therese  
Solberg. Used with  
Permission.



Nearly half of our genome consists of transposable elements.

These elements are also known as “jumping genes” because they can move around in the genome and insert themselves in new locations.

Although these insertions may cause disease, transposons are not simply parasites that need to be silenced; they are also important regulators of many different processes. For instance, transposons are essential for early

embryonic development, and they also mediate crosstalk between the host and the microbiota to initiate host-immune responses.

My research investigates both the beneficial role and the harmful impact transposons have on our bodies, with a particular emphasis on their roles during early embryonic development.

## WPI-Bio2Q EVENT FEATURING PROF. GABRIEL NÚÑEZ OF UNIV. OF MICHIGAN (SEP. 11)



Source: Bio2Q 2024. Original Photos.

One of the major advances in medicine of the 21st century has been the discovery that built-in immune “check points” to prevent run-away reactions can be pharmacologically inhibited to stimulate the immune system to fight cancer. This novel therapeutic strategy, termed cancer immunotherapy, recruits our body’s own immune cells to find and attack cancerous cells.

However, in their overstimulated state the immune cells may also attack healthy cells, causing “off-target” damage. These side effects limit tolerability of cancer immunotherapy and until now their mechanism was unknown.

Prof. Gabriel Núñez and his team discovered the mechanism behind one of the most common side effects of check point blockade immunotherapy, an inflammatory disorder of the lower intestine termed colitis, and propose how the side effects can be limited in the study published in *Science* entitled “Microbiota-dependent activation of CD4+ T cells induces CTLA-4 blockade-associated colitis via Fcγ receptors.”

Through a series of elegant experiments, the authors discovered that the colitis is caused through “off-target” binding of the check point blockade inhibiting anti-CTLA-4 antibody. The authors identified the part of the molecule responsible for the side effects and engineered an immunotherapeutic agent that doesn’t cause colitis in their animal model of the disease.

This work proposes a strategy to improve tolerability of all types of check point blockade immunotherapy, not only of anti-CTLA-4 flavor, and therefore, is of great importance for both cancer medicine and immunology.

(Timur Tuganbaev, Jr. PI)

## NOTES FROM EDITING STAFF

It is an honor for me to be part of the editing team of this first issue of the external edition, Vol. 2. As we have decided to publish Bio2Q Connect, we have been publishing the internal edition Vol. 1 monthly as a trial since April, aiming to our content to be accessible for the general public.

We would appreciate any comments on this issue or about Bio2Q.

Also, we would like to extend our gratitude to the researchers and colleagues who kindly agreed to write articles for the publication.

(Midori Yanase)

## UPCOMING Bio2Q EVENTS

Oct. 2 (Wed) 14:00-15:00

WPI-Bio2Q 2<sup>nd</sup> General  
Assembly

@ Lounge, 1F, Center for  
Integrated Medical Research,  
Shinanomachi Campus  
\*Hybrid (ZOOM and onsite)

Oct. 7 (Mon) 16:00-17:30

@ 1F Lounge, Center for  
Integrated Medical Research,  
Shinanomachi Campus  
\*Hybrid (ZOOM and onsite)  
Brain Club Seminar  
(Host: Yuzaki Lab, Co-host:  
Bio2Q)

Peter Scheiffele, Professor,  
Univ. Basel, Biozentrum,  
Switzerland

Oct. 16 (Wed) 14:00-15:00

Science Meeting Series #7  
Affiliated PI Dr. Fujimoto

Oct. 23 (Wed) 14:00-15:00

Science Meeting Series #8  
Affiliated PI Dr. Hase

Oct. 30 (Wed) Time TBD

Brain Club Seminar  
Valentin Naegerl, Professor,  
Interdisciplinary Institute for  
Neuroscience, University of  
Bordeaux, France

Nov. 16 (Sat) 11:00-16:30

WPI Science Symposium  
@ Kyoto University WPI-  
ASHBi

Jr. PI Dr. Sasabe invited  
speaker

<https://symposium.ashbi.kyoto-u.ac.jp/13th-wpisymposium/>