# The 7th Japan-US Science Forum in Boston

## - Resilience from the Pandemic -

November 5, 2022
Northwest Building, Harvard University &Virtual Meeting

Consulate General
of Japan in Boston

# The 7th Japan-US Science Forum in Boston (2022)
## - Resilience from the Pandemic -

**Program**

**< Poster registration >**
11:00 am-12:00 pm
**< Registration and Poster session>** Refreshments will be served
12:00 pm-1:00 pm
**< Opening Remarks >**
1:00 pm - 1:20 pm **Kohji Hirata** (Director of JSPS Washington Office)
**Kotaro Suzuki** (Consul General of Japan in Boston)
**Jun Nishida** (Director, UJAW)
**Mark C. Elliott** (Vice Provost, Harvard University)
**Takao Hensch** (Center for Brain Science Harvard University, WPI-IRCN)
**< Overview >**
1:20 pm – 1:30 pm **Yusuke Tsugawa** (University of California)
**< Lecture 1 >**
1:30 pm – 2:00 pm **Mai Uchida** (Massachusetts General Hospital, Harvard Medical School)
**"Scientific Advances in Pediatric Psychiatry: The Optimism, Hardship and Reality of the Child Mental Health Crisis in the Pandemic"**
**< Break >**
2:00 pm – 2:10 pm
**< Lecture 2 >**
2:10 pm – 2:30 pm **Margarita Estévez-Abe** (Maxwell School, Syracuse University)
(Online) **"The Resilience of the Japanese Eldercare System under the Pandemic"**
**< Panel Discussion and Q&A >**
2:30 pm - 3:00 pm **Dr. Tsugawa, Lectures, and Audience (online and onsite)**
**< Flash Talk and Photoshoot >**
3:10 pm - 4:00 pm
**< Introduction of sponsor companies (video) and Coffee break>**
4:00 pm - 4:10 pm
**< Networking >**
4:10 pm - 4:50 pm
**< Closing and Award>**
4:50 pm - 5:00 pm

Consulate General of Japan in Boston

# Important Notice

## How to ask questions

**-in the Panel Discussion and Q &A session (2:30 pm- 3:00 pm)-**

**Request for Onsite Audience:**
**Raise your hand and ask a question.**

**Request for Zoom Audience:**
**Questions will be collected via Slido.**

Join at
**slido.com**
**#92392**

See more detailed information on the following pages.

## Please take a survey after the forum from

https://forms.office.com/r/CMBLdNCf1s

You can also sign up for a lottery for sponsored goods at the end of Survey !

# Resilience from the Pandemic

## The 7th Japan-US Science Forum in Boston

**Saturday, November 5, 2022,**
12:00PM-1:00PM Poster presentations from broad disciplines
1:00PM-5:10PM Keynotes lectures and discussions

**Harvard University, Northwest Bldg., Room B103,**
**52 Oxford Street, Cambridge, MA 02138 & Virtual (Zoom meeting)**

**Dr. Mai Uchida, Massachusetts General Hospital**
"Scientific Advances in Pediatric Psychiatry"

**Dr. Margarita Estévez-Abe, Maxwell School, Syracuse University**
"The Resilience of the Japanese Eldercare System under the Pandemic"

**Dr. Yusuke Tsugawa, University of California, Los Angeles**
Moderator

Consulate General of Japan in Boston

UJA

Conte Center @Harvard
Developmental Origins of Mental Illness

IRCN
International Research Center for Neurointelligence

JSPS

https://jspsusa.org/wp/jusf-boston/2022-2/

# *Foreword*

"The Japan-US Science Forum in Boston" was created in 2016 to be held annually in the Boston area by the collaboration of JSPS Washington Office, Consulate-General of Japan in Boston, and United Japanese Researchers Around the World (UJA).

Japan Society for the Promotion of Science (JSPS) is the largest research funding agency in Japan for the purpose of contributing to the advancement of science in all fields of the natural and social sciences and the humanities. While supporting Japan-based researchers by the Grants-in-Aid for Scientific Research (KAKENHI) and other programs, JSPS encourages international academic networking.

The Forum is composed of three parts:
(1) Lectures on cutting-edge topics from Japan, America and other areas, (2) A discussion with the participants, the moderator, and the lecturers, and (3) Poster sessions where many participants can share their interests and experiences. The event is meant to enhance the human-network of researchers including JSPS postdoctoral fellows coming from Japan, JSPS alumni members who once were awarded JSPS fellowships for their research in Japan, and local researchers in Boston and New England.

For 2022, we organized it as an in-place meeting after the long and difficult period caused by COVID-19. It is certainly important to have direct and face to face communication. The forum will also be shared by people from all around the world through on-line communication. It will be a standard manner soon

I would like to thank especially Professor Takao Hensch of Harvard University who has been supporting us from the first Forum in 2016. He is also the Director of the International Research Center for Neurointelligence (IRCN), The University of Tokyo.

Kohji Hirata
Director, JSPS Washington Office

# *Foreword*

Welcome to the 7th Japan-US Science Forum in Boston 2022. Thank you for coming to one of the greatest scientific forums held in Boston.

It is our privilege to jointly host the forum with JSPS Washington Office, and United Japanese Researchers Around the World (UJA) for the 7th year in a row. We are also delighted that we have great support from the Conte Center at Harvard University, International Research Center for Neurointelligence (IRCN) and JSPS Alumni Association.

Every year, the forum invites young, talented, and distinguished researchers from Japan and the United States together to discuss a variety of scientific topics, such as "Aging Societies" and "Advanced Body Mechanisms." I strongly believe that these scientific dialogues among intellectuals are of paramount importance for all mankind to tackle global issues that challenge our survival on this planet, such as the current Covid-19 pandemic. By strengthening and deepening scientific cooperation across the globe, we will be able to overcome problems and continue to thrive in this world.

This year, the forum came up with the theme, "Resilience from the Pandemic." As you are aware, every time mankind has faced outbreaks such as the bubonic plague and the Spanish flu, we overcame them and our society rebuilt itself and flourished yet again. Even though this time the pandemic has inflicted a great wound on our society, we are now on the way of recovering from that damage as our ancestors somehow did in the past when they were put in a similar biological predicament.

In contrast to the past, we now have great scientific and technological advantages for solving these types of challenges and thankfully, we have been developing and evolving day by day due to the effort and dedication of talented, ambitious people. I hope that this forum can be another opportunity for us to move scientific discussion forward and unite researchers not only from Japan and the United States, but also throughout the world for the challenges we are now facing and future challenges which will surely arise sooner or later.

Kotaro Suzuki
Consul General of Japan in Boston

# *Foreword*

We are pleased to cosponsor the 7th Japan-US Science Forum in Boston.

Together with JSPS and the Consulate General of Japan in Boston, we inaugurated this science forum in 2016, intending to enhance Japan's presence in science and technology, communicate Japanese culture, and foster global young researchers with their families. The outcomes of the past six forums are outstanding: introducing cutting-edge sciences, breaking the boundary of the fields, and promoting novel network formations. Especially this year, it is the first time in three years that participants can interact in person. In addition, it is expected that people from all over the world will be able to participate online, further expanding the opportunities for interaction smoothly.

With the ever-changing landscape surrounding the Japanese and global research scene, growing diverse talents with unprecedentedly innovative vision and skills is more critical than ever. United Japanese Researchers Around the World (UJA) supports researchers by providing the resources to advance their research and expertise. UJA aims to spur exchanges of ideas and collaborations among researchers to accelerate scientific discoveries while strengthening Japan's knowledge base and research activities. The organization's goals include fostering the next generation of Japanese scientists with global perspectives who can promote the country's status as a world leader in science and technology.

The theme of this year is "Resilience from the pandemic." This year, we invited Dr. Mai Uchida from Massachusetts General Hospital and Dr. Margarita Estévez-Abe from Syracuse University as lecturers and Dr. Yusuke Tsugawa from the University of California as a moderator.
Dr. Uchida will give a lecture on how the mentality of children who have experienced the pandemic has changed and what problems have arisen from the perspective of children's mental health. On the other hand, Dr. Margarita Estévez-Abe will give a lecture that focuses on the elderly.

We have learned myriads from the Covid-19 pandemic and are now moving past it. Both talks focus on the challenges we face in recovering from the pandemic and are valuable in helping us solve problems for the future. We hope distinguished lectures will stimulate discussion for practical collaboration and invigorate our research mindset for serendipity.

With best wishes,

Takeya ADACHI, M.D., Ph.D.
President, UJA-JAPAN and UJA-United States

# Yusuke Tsugawa

Associate Professor, Health Policy and Management, University of California, Los Angeles

Associate Professor, Division of General Internal Medicine and Health Services Research, David Geffen School of Medicine at UCLA

## My current research activities and interest

Yusuke Tsugawa, MD, MPH, PhD is an Associate Professor of Health Policy and Management, as well as an Associate Professor of Medicine at UCLA. His current research interests include health services research on physician and health system factors associated with the quality of care received by older adults. He has extensive experience conducting research on older adults using Medicare claims data linked to the physician and health system databases. In his prior work, he has demonstrated several physician factors—such as age, gender, medical education, and training received—were associated with the quality and costs of care delivered to older adults. Dr. Tsugawa's research has been published in leading medical and health policy journals including *JAMA Internal Medicine*, *BMJ* and *Lancet*. The Altmetric selected Dr. Tsugawa's paper comparing the quality of care between male and female physicians as the 3rd most widely-read article in 2017 (https://www.altmetric.com/top100/2017). Dr. Tsugawa's research has also been featured in several media outlets including *The New York Times*, *The Washington Post*, and *National Public Radio*.

## Education

| | |
|---|---|
| 1999-2005 | Medical Student at the School of Medicine,<br>Tohoku University (Sendai, Japan), Obtained Doctor of Medicine (M.D.) |
| 2005-2010 | Resident, Internal Medicine, 2005-2008<br>Chief Resident, Internal Medicine, 2008<br>Clinical Fellow, Nephrology, 2008-2010<br>Chief Fellow, Medicine, 2009<br>St. Luke's International Hospital (Tokyo, Japan) |
| 2010- 2012 | Master's Student at the Health Policy and Management<br>Harvard School of Public Health, Obtained Master of Public Health (M.P.H.) |
| 2010- 2013 | Research Fellow at Beth Israel Deaconess Medical Center/Harvard Medical School<br>General Medicine Research Fellowship in General Medicine and Primary Care |
| 2012-2016 | Doctoral Student at the Graduate School of Arts and Sciences<br>Harvard University, Obtained Doctor of Philosophy (Ph.D.)<br>(Thesis Advisors: Dr. Ashish Jha, Dr. Joseph Newhouse, Dr. Alan Zaslavsky, Dr. Anupam Jena) |

# Yusuke Tsugawa

## Academic Career

| | |
|---|---|
| 2015-2017 | Research Associate of the Department of Health Policy and Management,<br>Harvard T.H. Chan School of Public Health |
| 2017-2021 | Assistant Professor of the Department of Medicine,<br>Division of General Internal Medicine & Health Services Research<br>UCLA David Geffen School of Medicine |
| 2018-present | Faculty Associate<br>UCLA Center for Health Policy Research |
| 2019-2021 | Assistant Professor of the Department of Health Policy and Management<br>UCLA Fielding School of Public Health |
| 2020-present | Faculty Associate<br>UCLA Terasaki Center for Japanese Studies |
| 2021-present | Associate Professor of the Department of Medicine<br>Division of General Internal Medicine & Health Services Research<br>UCLA David Geffen School of Medicine |
| 2021-present | Associate Professor of the Department of Health Policy and Management<br>UCLA Fielding School of Public Health |
| 2021-present | Physician Policy Researcher, Affiliated Adjunct<br>RAND Corporation |
| 2021-present | Director of Data Core, Department of Medicine Statistics Core (DOMStat)<br>UCLA David Geffen School of Medicine |

## Academic awards

| | |
|---|---|
| 2011-2013 | Joint Japan/World Bank Graduate Scholarship |
| 2013 | Young Investigator Award, Japan Medical Education Foundation |
| 2013 | Junior Investigator Recognition Award<br>Annals of Internal Medicine and American College of Physicians |
| 2019 | Award for Excellence in Clinician Investigation<br>Society for General Internal Medicine California-Hawaii Region |
| 2018-2019 | Delegate, United States-Japan Leadership Program |
| 2022 | Top Reviewer of 2021, Annals of Internal Medicine |

# Mai Uchida

## Scientific Advances in Pediatric Psychiatry: The Optimism, Hardship and Reality of the Child Mental Health Crisis in the Pandemic

Assistant Professor of Psychiatry,
Massachusetts General Hospital, Harvard Medical School
Director, MGH Child Depression Program

## Abstract

Since late 2020, I have been active as a scientific communicator with the aim to target the widespread misinformation about COVID and the COVID vaccines, particularly for pregnant and lactating people and children. Although my advocacy was generally met with appreciation, there also were overwhelmingly negative responses that came from preconceived biases particularly putting blame and shame on mothers for the outcomes of their children. This was all too familiar to me as a child psychiatrist where many parents are blamed and shamed for their children's mental health even though the science proves that approaches of parenting are often not the cause of them. Societal crises such as pandemics, war, and political change are known periods where the prolonged state of anxiety and fear affect a large population that could impact them in making poor judgments such as believing and spreading of misinformation. Not only the adults were impacted by the pandemic, but the U.S. surgeon general as well as three major national pediatric associations have declared a national state of emergency in regard to the children's mental health in 2021. Indeed the numbers of children needing emergency psychiatric care and ongoing psychiatry care have dramatically increased during the pandemic. School closures, social isolation, and dependency on social media as well as online communications are considered the driving forces that have contributed to the children's mental deterioration. Psychiatric and psychological approaches such as "reappraisal" and "altruism" are neurobiologically proven methods that could help in these situations.

## My current research activities and interest

Dr. Mai Uchida is a dedicated pediatric psychiatrist, a committed neuroscience researcher and an internationally acclaimed advocate for mental health, scientific literacy, and gender equality.

During the COVID-19 pandemic, Dr. Uchida made significant impact as a scientific communicator addressing the strong vaccine hesitancy in Japan. She was awarded the 2022 Japanese Minister of Health, Labour and Welfare Award for the health impact that she was able to make through her advocacy as part of CoV-Navi, a non-profit aimed to disseminate scientifically accurate information about COVID vaccines to the public. Discussing her own experience of receiving the mRNA vaccine during pregnancy, she particularly led the efforts in increasing vaccine acceptance among pregnant and lactating people, and was integrally involved in the federal vaccine rollout as well as media

communication. Her community outreach was a large part of how Japan achieved one of the highest vaccination rates among the international society.

In her advocacy for mental health, she shares her experiences as a parent in discussing issues such as racism, gender inequality and emotional regulation. She has articulated her thoughts in a number of international media, including the International Herald Tribune, the Boston Globe, NHK, ABC.com, TBS, WHDH and Buzzfeed. Particularly, her articles that voiced the challenges of being a Japanese female physician in America as well as her thoughts on the psychological experiences of Olympian athletes have received international acclaim.

Her research career has focused on the clinical and neural biomarkers of unipolar depression, bipolar disorder and ADHD in children. In collaboration with Massachusetts Institute of Technology, she has published on the functional and structural MRI based biomarkers of the risk for major depression and ADHD, and various clinical studies examining the longitudinal course of disorder development. She is a K23 Awardee from the National Institute of Mental Health. Other research awards she has received include Dupont Warren Fellowship, Livingston Award and Milton Award from Harvard Medical School, Elaine Schlosser Lewis Award from the American Academy of Child and Adolescent Psychiatry, The Best Paper Award from the Journal of Attention Disorder and the Louis V Gertsner Scholar Award.

She is also a clinician to both children and adults. As a mother of 3 children herself, her passion to help families is not only professional, but deeply personal.

## Education

2001-2007 Medical Student in Hokkaido University School of Medicine, Obtained M.D.
2007-2011 Resident Physician in the Department of Psychiatry, Yale School of Medicine
2011-2013 Fellow Physician in the Division of Child and Adolescent Psychiatry, Harvard Medical School/ Massachusetts General Hospital/ McLean Hospital

## Academic Career

2013-2015 Instructor of Psychiatry, Harvard Medical School
2015-2022 Assistant Professor of Psychiatry, Harvard Medical School
2022- Associate Professor of Psychiatry, Harvard Medical School

2013- Attending Physician, Department of Psychiatry, Massachusetts General Hospital
2014-2018 Director, Center for Early Identification and Prevention of Pediatric Mood Disorders, Massachusetts General Hospital
2018- Director, MGH Child Depression Program, Massachusetts General Hospital

## Academic awards

2022 Minister of Health, Labour and Welfare Award for Medical Communication, Japan
2018 Milton Award, Harvard University
2018 MassGeneral for Children Pilot and Feasibility Award, Massachusetts General Hospital
2014 Dupont Warren Award, Harvard Medical School
2014 Livingston Award, Harvard Medical School

# Margarita Estévez-Abe

## The Resilience of the Japanese Eldercare System under the Pandemic

Associate Professor, Political Science Department
Maxwell School, Syracuse University

## Abstract

Japan's initial response to COVID-19 was similar to that of the US. However, the number of deaths in Japan has remained very low. Japan also stands out for the relatively low incidence of viral transmission in Long-Term Care Facilities (LTCFs) compared to both European countries and the United States. We argue that Japan's institutional decision to lockdown Long-Term Care facilities as early as mid-February—weeks earlier than most European countries and the US— contributed to lowering the number of deaths in LTCFs. We highlight a few lessons from the Japanese experience: (i) the presence of hierarchically organized government agencies whose sole missions are elderly care; (ii) the presence of effective communication channels between LTCFs and the regulatory authorities; and (iii) the well-established routine protocols of prevention and control in LTCFs.

## My current research activities and interest

She taught at Harvard University before joining Syracuse and served as the first chair of Public Policy at Collegio Carlo Alberto in Turin, Italy. Her research explores the intersection of welfare states, electoral systems and the models of capitalism. She's the author of the award-winning book on Welfare Capitalism in Postwar Japan (Cambridge University Press) and is most well known for her work on Social Protection and the Varieties of Capitalism and Gendering the Varieties of Capitalism (articles published in *World Politics* and *Social Politics*). She's the editor of *Outsourcing of Domestic and Care Work* (Special Issue, *Social Politics*) and *Beyond Familialism* (Special Issue, *Journal of European Social Policy*). She is currently finishing a book *Globalizing the Family in East Asia* based on an original survey of marriage migrants in Taiwan, Japan and Korea, and is wrapping up research for a book project on *Political Economy of Demographic Aging: Lessons from Germany, Italy and Japan*.

# Margarita Estévez-Abe

## Education

1999 Harvard University, Government Department, Ph.D.

## Academic Career

1998・・2000 Assistant Professor of Political Science, University of Minnesota at Twin Cities.
2000・・2004 Assistant Professor of Government, Harvard University
2005・・2008 Paul Sacks Associate Professor of Government, Harvard University
2009・・ Present Associate Professor of Political Science, Maxwell School, Syracuse University
2012-2014 Chair of Public Policy, Collegio Carlo Alberto, Italy.

## Academic awards

2009 Masayoshi Ohira Memorial Award
2022 O'Hanley Fellowship

# The Japan-US Science Forum in Boston

## Poster and Flash Talk Award

The Japan-US Science Forum in Boston Poster Award, hereafter "award," recognizes three presenters in the following format and criteria.

**Award and Evaluation:**

Awards will be given to remarkable presentations. The applicants are also expected to attend the Award Ceremony at the end of the forum.

**Poster Awards**

- JSPS Washington Office Award

  The judges consisting of UJA members review all submissions based on the criterion of Interdisciplinary impact.

- Consulate General of Japan Award

  The judges consisting of UJA members review all submissions based on the Scientific novelty and excellence.

> Please note that only posters displayed in the designated area at the venue by 12:00 pm on November 5 by presenters will be judged.

**Flash talk Awards**

- UJA Award

  This award will be determined by voting for the best presentation (flash talk) by all participants on the day. Both slide and flash talk will be considered for this award.

| | | |
|---|---|---|
| 1 | Name | Casey Stevens |
| | Field of Interest | Sustainable Development |
| | Affiliation | Providence College |
| | Poster & Flash Talk Title | Environmental Treaties after COVID: A constitutional moment for transformative governance? |

Abstract

The enthusiasm for big transformational efforts at addressing sustainability challenges had waned by the early 2000s. The Rio decade (1992-2001) saw the expansion of multiple, large environmental treaties dealing with a range of different issues from chemical pollution, to biodiversity loss, to climate change. Since then there have been some significant outcomes, but much of international environmental politics has become specialized politics. This poster will present a forecasting analysis focused on three different pathways for international environmental law following the COVID pandemic. These different pathways are all based on the ongoing global environmental negotiations (biodiversity beyond national jurisdiction, the sustainable development goals, and climate change) and the various ways in which those processes can develop going forward. The finding is that the transformative pathway will require significant institutional changes, while the business as usual pathways will be fully attainable but with less positive impact.

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| 2 | Name | Sakurako Okuzono |
| | Field of Interest | life-course epidemiology, positive epidemiology, child development |
| | Affiliation | Harvard University Graduate School of Art and Sciences |
| | Poster & Flash Talk Title | Disaster, childhood adversities, and cognitive disability: A natural experiment from the 2011 Great East Japan Earthquake and Tsunami |

Abstract

Identifying subpopulations that are particularly vulnerable to long-term adverse health consequences of disaster-related trauma is needed to achieve an efficient and equitable allocation of resources following disasters. We examined whether adverse childhood experiences (ACEs) potentiate the association between disaster-related traumas and subsequent cognitive disability among disaster survivors. We used a prospective cohort study of older adults (≥65 years) who survived the 2011 Great East Japan Earthquake. The baseline survey predated the disaster by 7 months. We included participants who completed follow-up surveys (2013 and 2016) and did not have a cognitive disability before the disaster (n=602). Disaster-related traumas (home loss, relocation, loss of relatives/friends/pets, job loss, and worsening economic condition) and ACEs were retrospectively assessed in 2013. Cognitive disability levels (range: 1-8) in 2016 were obtained by in-home assessment by a trained investigator. After adjusting for pre-disaster characteristics using a doubly-robust Targeted Maximum Likelihood Estimation combined with machine learning algorism (SuperLearner), home loss and relocation were associated with a greater cognitive disability, while loss of relatives and worsening economic condition were associated with less severe levels of cognitive disability. Among individuals with ACEs, home loss was associated with even higher cognitive disability levels. Loss of friends and pets were associated with higher cognitive disability levels only among those with ACEs. Specific disaster-related traumas were associated with increased cognitive disability levels after the disaster, particularly among individuals with ACEs. Our findings suggest that individuals with a history of ACEs may be vulnerable to adverse health consequences of specific disaster-related traumas.

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| 3 | Name | Shiva Razavi |
| | Field of Interest | Synthetic biology, bioengineering |
| | Affiliation | Massachusetts Institute of Technology |
| | Poster & Flash Talk Title | Screening RNA Sequences for Drug Targets in Mammalian Cells |

Abstract

RNA sequences that respond to drug targets are of interest in both therapeutics and in developing small-molecule control elements for RNA devices in mammalian cells. Decades of research has been devoted to screening large combinatorial sets of RNA sequences and drug candidates to identify sequences that change conformation in response to a drug. Despite the great advancements, the results of such screens do not translate well in a mammalian context where the cellular environment is different than the test tube or bacteria, where most such screens are performed. Here, we report our efforts in deploying an RNA library of high complexity in mammalian cells as a chassis for an RNA-drug screen. We will couple the findings on sequence-drug pairs to a machine learning pipeline to leverage the RNA structural information for development of a new class of RNA drugs.

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| 4 | Name | Norio Tomita |
| | Field of Interest | Muslockeletal, biomedical, ultrasound, alternative manual therapy, Japanese traditional medicine(Kampo) |
| | Affiliation | Laboratory of Biorheology and Medical Ultrasonics(LBUM), University of Montreal Hospital Research Center(CRCHUM), University of Montreal, QC Canada |
| | Poster & Flash Talk Title | Thoracolumbar fascia shear strain analysis using the Lagrangian speckle model estimator: clinical evaluation in patients with lower back pain |

Abstract

Background: Nonspecific low back pain (NSLBP) is a musculoskeletal disorder with an estimated prevalence of 38% for which the thoracolumbar fascia (TLF) is considered a potential source of pain. To address the TLF mechanical properties and potential therapeutic effects of manual therapy, we used the Lagrangian speckle model estimation method(LSME) applied to ultrasound radiofrequency(RF) cine loops to analyze the TLF shear strain. intended to calculate

Methods: In this prospective randomized study, 64 subjects (32 NSLBP patients, 32 asymptomatic volunteers) underwent an ultrasound exam before and after a standardized massage intervention. RF cine loops of the TLF were acquired on the paraspinal muscles were scanned at the L2-L3 level during passive flexion of the subject's lumbar. On the cine loop, a region of interest encompassing the TLF and the epimysium was traced, and RF image tracking and shear strain analysis were performed with the LSME. Shear strains were normalized by the acquisition's duration. A mixed effects model was used for statistical analysis.

Results/Discussion: Preliminary results of the first 20 subjects before massage (15 NSLBP and 5 control, Age: 58.5 ±9.1 vs 47.8±5.9) show lower shear strain values in NSLBP patients compared to the control group (19.05 ± 13.02% vs 33.40 ± 18.03%, p=0.02). This indicates that the TLF shear deformation is reduced in NSLBP. Results also demonstrate that the LSME developed for vascular elastography is also applicable to musculoskeletal ultrasound. Further analysis will compare both groups before massage and the within-group data pre and post massage.

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| 5 | Name | Kimitoshi Kimura |
| | Field of Interest | Neuroimmunology / Medicine |
| | Affiliation | Department of Neurology, Brigham and Women's Hospital |
| | Poster & Flash Talk Title | Novel regulatory mechanism of microglia in Alzheimer's disease |

Abstract

Currently, more than 3.5 million Japanese, and 6 million Americans live with Alzheimer's disease, which is a major cause of disability and dependency among elderly people. We have no efficacious disease-modifying therapy, though a lot of resources have been spent in this field. Recent accumulating evidence suggests that microglia, which are brain-resident macrophages, play a pivotal role in Alzheimer's disease (AD). Microglia quickly respond to environmental change such as emergence of neurotoxic amyloid beta (Abeta), which is a pathogenic molecule in AD. However, the regulatory mechanism of microglial function is poorly understood. We found microglial activation is suppressed by molecule X, which has been studied mainly in T cells. X-deficient microglia showed increased ability of phagocytosis and clearance against Abeta. The gene expression profile of X-deficient microglia resembled that of phagocytosing microglia and of MGnD (microglia in neurodegeneration), a specific type of microglia observed in AD models. Importantly, microglia-specific deletion of X resulted in enhanced clearance of neurotoxic Abeta from the brain and improvement of cognitive function in a mouse model of AD. Mechanistically, X binds an intracellular signaling molecule and helps its phosphorylation, which then functions as a transcription factor to induce a unique transcriptome. It is of note that gene X was recently found as a susceptibility gene in AD in a large genome-wide association study (GWAS). This study sheds light on a novel aspect of microglial regulation and may lead to development of new treatment strategy for this devastating neurodegenerative disease.

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| 6 | Name | Sayuri Hashimoto |
| | Field of Interest | Polymer Chemistry, Polymer Physics, Material Engineering |
| | Affiliation | Laboratory for Chemistry and Life Sciences, Institute of Innovative Research, Tokyo Institute of Technology |
| | Poster & Flash Talk Title | Formation of novel surface topographies on liquid-crystalline polymer films by photopolymerization with structured light |

Abstract

Control of surface topography of polymeric materials has attracted much attention in various fields of materials engineering such as super-wettable coatings, adhesion switching, and diffractive optical elements. Among current topographical control methods, photoinduced topographical control have great advantages because light stimuli has remote influence and high spatiotemporal resolution, leading to microfabrication and non-contact operation. However, the photo-based technology still has some challenges that (i) needs to utilize photoresponsive dye molecules and irradiate with polarized light and (ii) limit the height of surface structures ranging from hundreds of nanometers to a few micrometers. Here we report a novel fabrication system to control surface topography of polymer films by using our developed method of photopolymerization with structured light. Simply by irradiating with UV grating patterns, various topographies such as of canal and well structures were formed in the surface of polymer films when the photopolymerization of anisotropic liquid-crystalline monomer was conducted. Real-time observation of the formation process of the topographical structures has revealed that anisotropic molecular diffusion is the key to structural formation. We believe that this novel approach for forming surface topographies have great potential to realizing advanced optical and mechanical applications.

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| 7 | Name | Kenichi Yuasa |
| | Field of Interest | Psychology / Neuroscience |
| | Affiliation | Department of Psychology, New York University |
| | Poster & Flash Talk Title | Alpha Oscillations in the Human Brain Are Spatially Tuned for Visual Perception |

Abstract

The alpha oscillation (8-13 Hz) is a pronounced neuronal signal measured from the human brain, especially from the occipital lobe, which is the location of visual cortex. Alpha oscillations become large while people close their eyes or look at blank screens, and are reduced by seeing visual patterns. The oscillations are therefore thought to reflect general cognitive states like decreases in attention or alertness. Consistent with this global function, alpha oscillations are believed to be synchronized across a large expanse of cortex. However, some evidence suggests that alpha oscillations can be modulated independently in small patches of cortex. To investigate the functional role of alpha oscillations during visual perception, we measured neuronal signals using intracranial electrodes (ECoG) in 9 human subjects. The subjects viewed simple contrast patterns masked by a bar-shaped aperture that swept across the visual field. While previous studies computed alpha power change as a difference of spectral power in the alpha range from a baseline condition, we noticed non-oscillatory signals overlap in the alpha range. Therefore, we used a model-based approach to quantify oscillatory power for each stimulus location, and fit the data across stimulus locations with a population receptive field model. We find that alpha oscillations are suppressed by visual stimulation in a spatially specific manner. The spatial specificity is in agreement with the underlying retinotopic map. This finding supports the conclusion that alpha oscillations play an important role in sharpening visual responses, rather than being limited to global functions such as arousal or alertness.

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| 8 | Name | Yuki Kitahara |
| | Field of Interest | Microbiology, Quantitative biology, Antimicrobial Resistance |
| | Affiliation | Faculté de Médecine, Université de Montréal |
| | Poster & Flash Talk Title | How do bacteria coordinate cell-size growth and biomass growth? |

Abstract

Bacterial cells must become larger in response to an increase of cytoplasmic biomass, because they need to maintain the concentration of cytoplasmic biomass components in an appropriate range for cell physiology. Thus, biomass density (cell biomass per cell volume) is widely believed to be kept constant during growth. Although it is not proven due to difficulty in quantification, this assumption is often used to build bacterial growth models.

Here, we developed a novel microscopic method to quantify the size and biomass of live single cells and demonstrated that both models of Gram-positive and Gram-negative bacteria maintain the ratio of cell surface area and biomass constant rather than biomass density, leading to an interesting consequence that biomass density varies according to the cell shape.

This surface-to-mass coupling raises the next question: How do cells regulate surface growth in response to biomass growth? To expand the cell surface, cells need to enlarge the peptidoglycan cell wall. We thus focused on its synthesis process and found that inserting new cell-wall materials is required for proper surface expansion in Gram-positive bacteria. More specifically, arresting cell-wall insertion reduces surface expansion while biomass growth continues, which breaks the surface-to-mass coupling. However, to our surprise, Gram-negative bacteria keep increasing cell surface area at the same rate as biomass growth even without cell-wall insertion until lysis.

In conclusion, bacteria maintain the surface-to-mass ratio rather than biomass density contrary to the previous assumption, but the coordination process is mechanistically different between Gram-positive and Gram-negative bacteria.

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| 9 | Name | Momoka Sunohara |
| | Field of Interest | Cultural Psychology, EDI (Equity, Diversity, and Inclusion), mental health of immigrants and minorities |
| | Affiliation | Concordia University |
| | Poster & Flash Talk Title | What Brought You to Canada? How Canadian Have You Become? Mixed-Methods Study of Immigration Stories, Cultural Adaptation, and Psychological Well-Being among Japanese living in Canada. |

Abstract

The number of Japanese emigrating overseas increased 22.24% during 2010-2019, with 37% of them reside in North America (NA). Adapting to life in NA, in which new language acquisition, adjustment to different cultural values, and building new social networks are required and can be highly stressful. Furthermore, COVID-19 pandemic-fueled racism, discrimination, and violence against East Asians (EAs), has exacerbated the psychological distress within this marginalized community in NA. Despite numerous studies on EA immigrants, little research has examined the immigration experiences and psychosocial well-being of Japanese that recently moved to Canada. Our study applied a mixed-methods design to elucidate the experiences of cultural and psychosocial adaptation processes among Japanese.

A total of 58 Japanese living across Canada completed self-reported measures of cultural adaptation and psychological well-being. We then conducted a semi-structured interview following McAdam's (1985) life story approach with additional 16 participants to gain in-depth insights on their pre-immigration, post-immigration, present, and future lives. We coded the transcribed interviews using thematic analysis.
Statistical analysis indicated that maintaining higher levels of Japanese cultural values, as opposed to Canadian cultural values, were related to higher levels of psychological well-being. Interview data revealed themes and patterns that are culturally and historically unique about recent Japanese immigrants, as compared with other EAs.

Our results challenged existing theory by suggesting that holding both dominant and heritage cultural values may not insulate all immigrants equally from psychosocial resilience. Refinement of theory and its practical implications for supporting immigrant mental health may be warranted, pending further study.

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| 10 | Name | Maria Ong |
| | Field of Interest | STEM education, physics education, social science |
| | Affiliation | TERC |
| | Poster & Flash Talk Title | The Effects of University Closures Due to COVID-19 on Black Undergraduates in Physics |

Abstract

What were the effects of the COVID-19 pandemic on the experiences of Black physics undergraduates? With funding from the National Science Foundation, a national task force studied Black students' learning and social experiences, as well as the departmental contexts that informed these experiences, in the year following the closures. Data collection included interviews with students, faculty, and chairs during virtual site visits to two physics departments with historically strong records of graduating above-average numbers of Black students in physics. One department is located in a predominantly black public university in the midwestern United States, and the other is in a predominantly white research university on the east coast.

Findings included strong supports that enabled learning to continue, such as caring and supportive faculty; dynamic online teaching and lenient grading; and tutoring. Remote learning also enabled students to learn at their own pace and to have fewer exposures to daily microaggressions. Challenges for students included COVID-related anxiety and dealing with the deaths of loved ones; social isolation; non-ideal situations for remote learning (e.g., noisy siblings, unreliable connectivity); reduced lab experiences; lack of mental health support; and lack of social support from faculty or the institution, especially with regard to racial trauma. The pandemic and murder of George Floyd motivated students to be socially active, including calling for departmental DEI committees and workshops and materials that include more people of color. At one institution, students created a summer program for high school and community college students interested in physics.

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| 11 | Name | Yuichiro Adachi |
| | Field of Interest | nutrition, RNA, molecular biology |
| | Affiliation | Department of Clinical Nutrition and Food Management, Graduate School of Nutrition and Bioscience, Tokushima University |
| | Poster & Flash Talk Title | Chronic stress exposure induces stress granule formation disorder in cells |

Abstract

Stress granules (SG) are membranelles ribonucleoprotein-based cellular compartments that assemble in response to stress. Even though aberrant assembly or disassembly of SG has pathological implications in cancer and neurodegeneration, SG research is generally limited to studies with acute stress, and the ability of SG to form under chronic stress exposure remains unclear. Here we focused on endoplasmic reticulum stress, a type of SG-induced stress in which chronic exposure can cause various diseases, and examined the effects of long-time exposure to endoplasmic reticulum stress inducer thapsigargin on the formation of SG in cultured cells.

While most SG induction experiments use stress inducers for a few minutes to 3 hours, we treated thapsigargin in the human osteosarcoma cell line U2OS cells for 24 hours and observed SG markers G3BP1, eIF4G, and eIF3b with immunofluorescent staining. Endoplasmic reticulum stress induces translational repression via phosphorylation of eIF2a, leading to SG formation, but interestingly, 24 hours of reagent treatment did not form SG despite inducing phosphorylation of eIF2a. 1 hour of treatment with sodium arsenate, the most common known SG inducer, after 24 hours of treatment with thapsigargin treatment, also did not induce SG formation. However, the Ribopuromycilation assay did not show translational inhibition by those treatments. These results indicate that long-time exposure to endoplasmic reticulum stress does not affect the translational repression function of the cells, but induces SG formation disorder. Since SG formation generally occurs under translational repression, our results suggest the existence of a novel mechanism required for SG formation.

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| 12 | Name | Yuzuru Kanda |
| | Field of Interest | Chemistry, Drug discovery |
| | Affiliation | Novartis Institute for BioMedical Research |
| | Poster & Flash Talk Title | Two-Phase Synthesis of Taxol |

Abstract

Taxol is widely regarded as amongst the most famed natural isolates ever discovered and has been the subject of innumerable studies in both basic and applied science. Its documented success as an anticancer agent coupled with early concerns over supply stimulated a furious worldwide effort from chemists to provide a solution for its preparation through total synthesis. Those pioneering studies proved the feasibility of retrosynthetically-guided access to synthetic Taxol in minute quantities with enormous effort. In practice, all medicinal chemistry efforts and eventual commercialization relied upon the naturally- (plant material) or biosynthetically-derived supply (synthetic biology). Here we show how a synthetic approach that is holistically patterned off of biosynthetic machinery for terpene synthesis can be used to arrive at Taxol.

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| 13 | Name | Ryunosuke Amo |
| | Field of Interest | Neuroscience |
| | Affiliation | Harvard University |
| | Poster & Flash Talk Title | A gradual temporal shift of dopamine responses mirrors the progression of temporal difference error in machine learning |

Abstract

A large body of evidence has indicated that the phasic responses of midbrain dopamine neurons show a remarkable similarity to a type of teaching signal (temporal difference [TD] error) used in machine learning. However, previous studies failed to observe a key prediction of this algorithm: that when an agent associates a cue and a reward that are separated in time, the timing of dopamine signals should gradually move backward in time from the time of the reward to the time of the cue over multiple trials. Here, we demonstrate that such a gradual shift occurs both at the level of dopaminergic cellular activity and dopamine release in the ventral striatum in mice. Our results establish a long-sought link between dopaminergic activity and the TD learning algorithm, providing fundamental insights into how the brain associates cues and rewards that are separated in time.

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| 14 | Name | Sayaka Kochiyama |
| | Field of Interest | Mechanics of Materials |
| | Affiliation | Brown University, School of Engineering |
| | Poster & Flash Talk Title | The role of interfaces in stiff biomaterials: toughness vs strength |

Abstract

Some materials in nature have remarkable properties, such that they become a source of inspiration for engineering structural materials. One of the well-known examples is the nacre, whose fracture toughness measures a surprisingly high value considering that its primary constituent is brittle aragonite. This apparent enhancement owes to its internal lamellar architecture consisting of alternating arrangement of brittle ceramic layers and compliant organic layers. This has motivated the studies of other materials in nature with similar lamellar design. Spicules, which are the rod-like structural components of marine sponges consisting primarily of ceramic material, such as silica, is one of such materials that have attracted attention in the past decade. It has been tacitly assumed that the spicule's lamellar design also served to enhance its fracture toughness like in nacre. To make quantitative assessment of this notion, direct fracture toughness measurements were conducted on spicules from the species Euplectella Aspergillum. It was shown that the enhancement due to its lamellar design was orders of magnitude smaller compared to that of nacre. Furthermore, the sequence of force-drops observed in the flexural tests of spicules, which has often been attributed to a toughening mechanism, was found to be an artifact of the flexural test configuration. These results lead us to believe that the primary purpose of the lamellar structure in spicules is not the fracture toughness enhancement. Our findings suggest that instead, the lamellar design benefits their load carrying capacity in tension and in bending loading regime.

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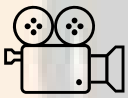

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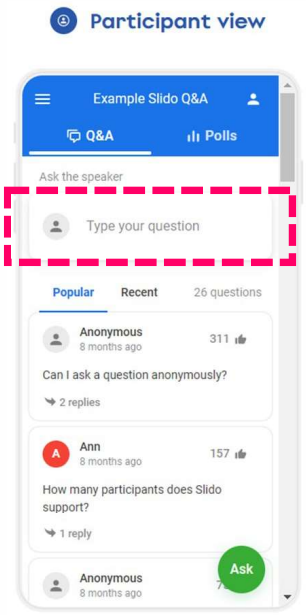


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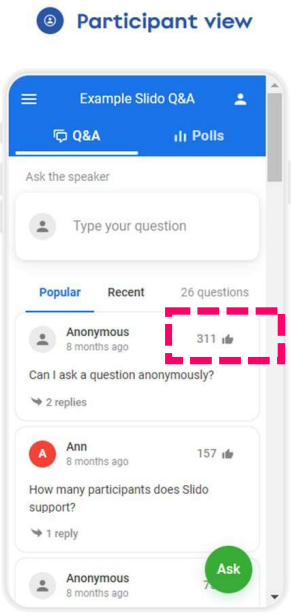


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## -Resilience from the Pandemic-

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