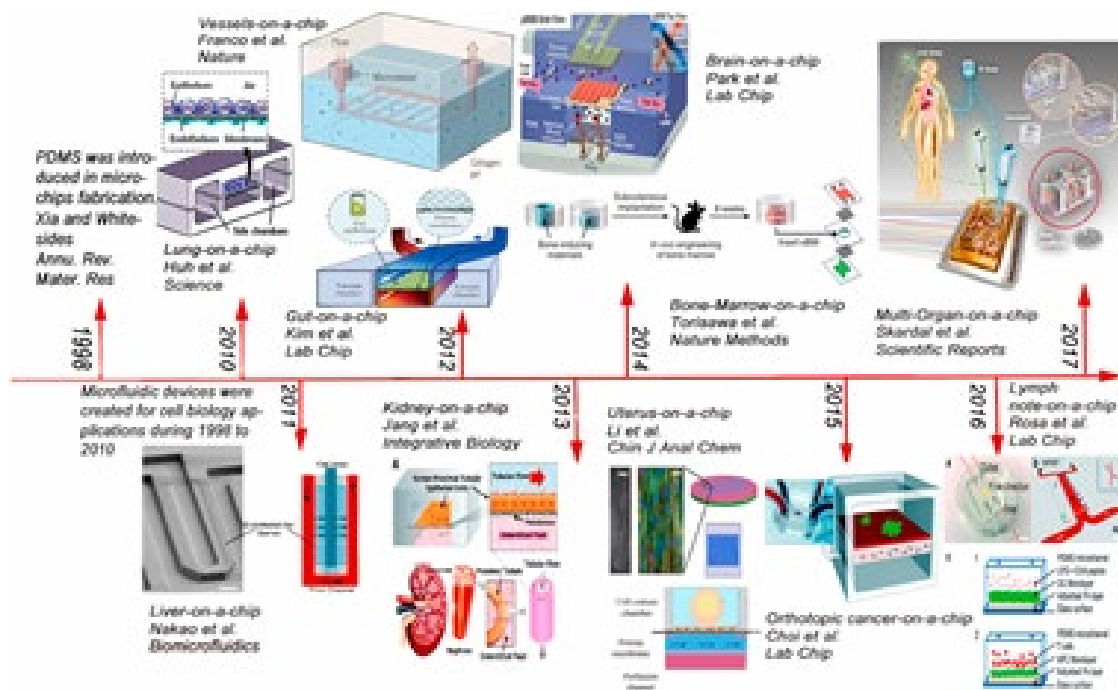




## -Executive Summary

The title of seminar was “**DEVELOPMENT OF DISEASE MODELS USING ORGAN ON A CHIP**”. The keynote speaker of the seminar was Dr. Ken Takahashi, Faculty of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University. The seminar was organized by Dr. Mohammad Nasir Uddin, Texas A&M University School of Medicine in collaboration with Cardiovascular Research Institute (CVRI) at TAMU School of Medicine. Seven distinguished speakers including the keynote speaker Dr. Takahashi presented their research works related to organ on a chip and related topics. The one-and-a-half-day seminar was opened by welcome address of Mariappan Muthuchamy, PhD, Director, Cardiovascular Research Institute, Texas A&M Health and Introductory Remarks by Mohammad Nasir Uddin, PhD, FAHA, followed by a JSPS informational session by Junji Urakawa, PhD Director, JSPS Washington DC Office and Keiko Kabashima, International Program Associate, JSPS Washington DC Office. US-Japan JSPS Alumni Association Director; Timothy P. Devarenne, PhD, Department of Biochemistry and Biophysics, Texas A&M University also attended and delivered a talk in the seminar. Henry Fadamiro, PhD, Associate Vice President for Research, Strategic Initiatives, Professor, Department of Entomology, Texas A&M University addressed at the opening session. At the second day of the seminar JSPS Indonesian Alumni Komariah, S. TP, PhD, Sebelas Maret University, Indonesia delivered her talk. The seminar was concluded with a round table discussion and a closing remark by David C. Zawieja, PhD, Regents Professor and Department Head, Department of Medical Physiology, Texas A&M University School of Medicine.

In the last 20 years, the organ-on-a-chip technology has been expanded gradually to encompass several organs as well as diseases, including the lung, liver, blood vessel, gut, heart, uterus, brain, bone marrow, and tumor/cancer [10.1016/j.bioactmat.2020.09.022]. These organ-on-a-chip models are expected to be applied to the use in the pharmaceutical and cosmetics industries as well as personalized medicines.



**Development of organ-on-a-chip technology. [10.1016/j.bioactmat.2020.09.022]**

The audience of the seminar were Medical School faculties, scientists, Graduate students, and postdoctoral fellows. The seminar addressed the benefit of organ-on-a-chip technology to reduce the use of animals. The merits and demerits of the technologies have been discussed. The JSPS Washington Office Director and international program associate explained the JSPS programs to the audience.

## **-Topics Discussed with Outcomes & Future Challenges**

The strength of this research group is that the experience and knowledge of diverse human resources in various fields can be used to carry out organ-on-a-chip research.

On the other hand, there is still a limit to the recapitulation and duration of organ functions of each organ-on-a-chip. Factors responsible for the problems include the environment of the scaffold to which cells adhere, the mechanical environment, and the cell-cell communication via exosomes. The factors that determine the scaffold of cells include the types and amount of extracellular matrix proteins, its three-dimensional structure, and the stiffness of the scaffold. The mechanical environment is composed of stretch, pressure, and shear stress. The material and three-dimensional design of the microchannels in which cells are seeded has a profound effect on the stiffness of the scaffold and the mechanical environment of the cells. Therefore, there is room for improvement in the microchannel materials and the 3D design of the microchannels used for organ chips.

An international collaboration between USA, Japan and Indonesia has been initiated from the seminar. Dr. Uddin of Texas A&M University (USA) is developing a therapeutic agent for cardiac fibrosis. He is also the CEO of a company and has experience and track record in medical industry-academia collaboration in the United States. Dr. Ken Takahashi is an expert in the development of disease models using organs on a chip has already started collaborative research with Dr. Ken Takahashi. Dr. Eguchi of Okayama University is an exosome expert and has already conducted joint research on cancer-on-a-chip that reproduces the microenvironment of cancer using organ chips. Dr. Fujii of Department of Respiratory Medicine, Okayama University, is an expert in respiratory diseases and can provide important clinical advice for the development of an interstitial pneumonia model using a lung-on-a-chip.

In addition to this, the challenge is to develop a huge number of disease models, such as cardiac fibrosis, kidney ischemia-reperfusion injury, and lung cancer, applying the organ-on-a-chip technology mentioned above.

-Workshop/Seminar Agenda



TEXAS A&M UNIVERSITY  
Cardiovascular Research  
Institute



TAMU Cardiovascular Research Institute (CVRI)  
and  
Japan Society for the Promotion of Science (JSPS)  
Mini Symposium  
“Development of Disease Models using Organ on a Chip”  
October 26<sup>th</sup> and 27<sup>th</sup>, 2023

Location: Texas A&M University, Health Science Center, Bryan campus, Health Professionals  
Education Building, room LL11B

**Thursday, October 26, 2023**

11:00 AM Registration and Lunch

12:00 – 12:45 PM **Welcome Address: Mariappan Muthuchamy, PhD**

Director, Cardiovascular Research Institute, Texas A&M Health

**Introductory Remarks: Mohammad Nasir Uddin, PhD, FAHA**

US – Japan Alumni, Research Associate Professor Department of Medical Physiology, Texas A&M  
Health

**Junji Urakawa, PhD**

Director, JSPS Washington DC Office

**Keiko Kabashima**

International Program Associate, JSPS Washington DC Office

**Henry Fadamiro, PhD**

Associate Vice President for Research, Strategic Initiatives, Professor, Department of Entomology,  
Texas A&M University

**Session Chair: Mohammad Nasir Uddin, PhD, FAHA**

12:45 – 1:30 PM **Keynote speaker:**

**Ken Takahashi, PhD**

Faculty of Medicine, Okayama University, Japan

*"Development of disease modeling using organ-on-a-chip"*

1:30 – 1:50 PM Break

1:50 – 2:30 PM **Abhishek Jain, PhD**

Department of Biomedical Engineering, Texas A&M University

*"Pumps, pipes and AI: Engineering vascular physiology with organ-chips"*

2:30 – 3:10 PM **Sanjukta Chakraborty, PhD**

Department of Medical Physiology, Texas A&M Health

*"Tumor-lymphatic interactions in metastasis: Emerging Paradigms and Unexplored Challenges"*

3:10 – 3:50 PM **Timothy P. Devarenne, PhD**

Department of Biochemistry and Biophysics, Texas A&M University

*"Hydrocarbon Biosynthesis in the Green Microalga *Botryococcus braunii*"*

3:50 – 4:30 PM **Joseph Rutkowski, PhD**

Department of Medical Physiology, Texas A&M Health

*"Targeting lymphatics for the treatment of kidney inflammation"*

4:30 – 6:00 PM Social, Hors D'oeuvres

**Friday, October 27, 2023**

7:30 – 8:30 AM Breakfast

**Session Chair: Mohammad Nasir Uddin, PhD, FAHA**

8:30 – 9:10 AM **Komariah, S. TP, PhD**

Sebelas Maret University, Indonesia

*"The Effects of Environmental Stress on Medicinal Plants in Indonesia"*

9:10 – 9:50 AM **Peter P. Nghiem, PhD**

Department of Veterinary Integrative Biosciences, Texas A&M University

*"Gene Therapy Development: Are We on the Right Track?"*

9:50 – 10:00 AM **Concluding Remarks:**

**David C. Zawieja, PhD**

Regents Professor and Department Head,

Department of Medical Physiology, Texas A&M Health

10:00 – 11:00 AM Round Table discussion