

Japan-U.S. Brain Research Cooperation Program
Information Exchange Seminar Program FY2012: Report

Field: 1) Molecular/Cellular; and 2) Development/Plasticity/Repair

1. Seminar title:

Growth Cones and Axon Regeneration: Entering the Age of Informatics

2. Dates, from/to (mm/dd/yyyy)

From 10/10/2012 to 10/12/2012

3. Location:

Hilton New Orleans: St. Charles, 333 Saint Charles Avenue, New Orleans, LA, USA

4. Coordinators:

Japanese Coordinator

Name: Michihiro Igarashi, M.D./Ph.D.

Title: Vice Dean, Professor and Chair

Affiliation: Department of Neurochemistry and Molecular Cell Biology, Niigata University
Graduate School of Medical and Dental Sciences

U.S. Coordinator

Name: Vance P. Lemmon, Ph.D.

Title: Professor of Neurological Surgery, Walter G. Ross Distinguished Chair in
Developmental Neuroscience

Affiliation: Miami Project to Cure Paralysis, Dept. of Neurological Surgery, University of
Miami

5. Participants:

Japan: Invited participants: 12 people

Others 0 people

(Please give names, titles and affiliations of invited participants)

A. Japanese side

1) Senior Investigators

1. Michihiro Igarashi, M.D./Ph.D. (Professor and Chair, Niigata Univ Grad Med Dent
Sci, Niigata)

2. Yuichi Sakumura, Ph.D. (Associate Professor, Aichi Prefectural University Nagakute, Aichi)

3. Takeshi Nakamura, Ph.D. (Professor and Chair, Tokyo Sci Univ, Inst Life Sci,
Noda, Chiba)

4. Hiroyuki Kamiguchi, M.D./Ph.D. (Team Leader, RIKEN, Brain Sci Inst, Wako)

5. Tatsumi Hirata, Ph.D. (Associate Professor, Natl Inst Genet, Mishima)

6. Yoshio Goshima, M.D./Ph.D. (Professor and Chair, Yokohama City Univ, Med Sch,
Yokohama)

7. Michisuke Yuzaki, M.D./Ph.D. (Professor and Chair, Keio Univ Sch Med, Tokyo)

8. Mineko Kengaku, Ph.D. (Associate Professor, Kyoto Univ, Kyoto)

2) Young Investigators

1. Mariko Nishibe, Ph.D. (Osaka University, Osaka)

2. Yohei Shinmyo, Ph.D. (Kumamoto University, Kumamoto)

3. Takashi Namba, Ph.D. (Nagoya University, Nagoya)

4. Izumi Oinuma, Ph.D. (Kyoto University, Kyoto)

U.S.: Invited participants_22 people Others_0_ people
(Please give names, titles and affiliations of invited participants)

Senior Investigators

1. Vance Lemmon, Ph.D. (Professor of Neurological Surgery, Univ. Miami Miller Sch Med, Miami, FL)
2. Paul Forscher, Ph.D. (Professor, Cellular, Molecular and Developmental Biology, Yale University, New Haven, CT)
3. Oswald Steward, Ph.D. (Director, Reeve-Irvine Research Center, University of California at Irvine School of Medicine, Irvine, CA)
4. Binhai Zheng, Ph.D. (Associate Professor, Neurosciences, Univ California San Diego, La Jolla, CA)
5. Xiao-Ming Xu, Ph.D. (Professor, Indiana University)
6. John L. Bixby, Ph.D. (Professor of Pharmacology and Neurological Surgery, Univ. of Miami Miller School of Medicine, Miami, FL)
7. Jeffery L Twiss, M.D., Ph.D., (Professor & Department Head, Biology, Drexel University, Philadelphia, PA)
8. Carol Mason, Ph.D.* (Professor of Pathology and Cell Biology, Neuroscience, and Ophthalmic Science, Columbia University, New York, NY)
9. Zhigang He, Ph.D. (Professor, Harvard Medical School)
10. Christine Beattie, Ph.D.* (Professor, Neuroscience, The Ohio State University, Columbus, OH)
11. Phillip Popovich, Ph.D., (Professor, Director - Center for Brain and Spinal Cord Repair, The Ohio State University, Columbus, OH)
12. Trent Watkins, Ph.D. Genentech
13. Adam R. Ferguson, Ph.D. (Assistant Professor, Neurosurgery, University of California, San Francisco, San Francisco, CA)
14. Alison Callahan (Carleton University, Ottawa, Canada)

Ontogeny investigators

1. Ubbo Visser, Ph.D., (Associate Professor of Computer Science, University of Miami)
2. Nigam Shaw, MBBS, Ph.D., (Assistant Professor National Center for Biological Ontologies, Stanford)

Young Investigators

1. Laura Anne Lowery, Ph.D.(Harvard Med Sch, Boston, MA)
2. Miguel Santiago-Medina (Univ. of Wisconsin).
3. Ken Kadoya, M.D., Ph.D. (UCSD, San Diego, CA)
4. Nassir Mokarram, M.S. (Georgia Inst Tech, GA)
5. Shweta Mandrekar, Ph.D. (Ohio State University, OH)
6. Ben Harrison, Ph.D. (Univ. of Louisville, KY)

6. Seminar Outline and Significance:

Purpose: The goal of the workshop is to bring together a diverse group of neuroscientists and information scientists from the U.S. and Japan to review the advances in axon growth and regeneration and to consider them in the context of the latest approaches in informatics, from principle component analysis to semantic web technologies and ontologies. The goal will be to develop two immediate deliverables: proposed standards for 1) a minimal information to describe an in vitro growth cone growth/guidance experiment and 2) a minimal information to describe an in vivo spinal cord injury experiment. These standards will be invaluable tools to allow information scientists to begin to build frameworks to allow

data mining of the enormous but presently un-mineable data scattered in laboratories and the literature. Thus the workshop is both significant and innovative.

Workshop participants will include an all-star team of scientists who study growth cone behavior, axon growth and axon regeneration in a variety of model systems (Aplysia, zebrafish, chick embryos, mammals). Their work will be facilitated by professional information scientists with a track record of working on relevant biological problems (modeling growth cone behavior and ontology development related to biological assays). In addition, several participants have a track record of collaboration between Japan and the U.S., helping to ensure that the workshop's mission will be extended productively in the immediate future.

7. Seminar Results and Future Implications:

There were some differences between the planned speakers and the participants. Two Japanese speakers, Drs. Toshihide Yamashita and Kosei Takeuchi, could not participate in the meeting for personal reasons. Nonetheless, there is no doubt that this meeting was quite valuable to all of the participants. As for the young investigators, we invited four Japanese and six American researchers. In the case of the Japanese side, we selected Assistant Professors whose ages are middle thirties, from the labs related to our meeting theme by recommendation of their supervisors. A young investigator, Dr. Ken Kadoya was originally a Japanese clinical doctor specialized in orthopedics, but is currently working in a laboratory at UCSD and was a member of the American side.

On the American side, most of the senior speakers are quite famous researchers in the field of nerve growth and axon guidance (Forscher, Bixby, Lemmon, Mason (president of the US Society for Neuroscience)), and axon regeneration (He, Steward, Popovich, Zheng, Twiss, Xu). It is rather difficult to gather these high-visibility scientists at one place even in the US. In the case of typical symposiums held in Japan, including those in my experiences, only one or two scientists from the US can participate in them. In contrast, I myself who planned this seminar was impressed with both the number and the very high quality of the invited speakers of both sides, particularly to the US side.

When developing the plan for this seminar, the US side proposed including informatics presentations.

For example, A. Ferguson, proposed that by analyzing primary data from experiments and clinical data related to spinal cord injury (SCI) from many laboratories it will be possible to identify robust treatments that improve recovery after SCI. From the Japanese side, we could not invite a speaker using similar approaches. In the near future we will expect to develop this approach in Japan by establishing new collaborations between basic neuroscientists and computer scientists.

Each young investigator presented summaries of their own studies for 10-min, and after that six senior investigators (three each from both Japanese and American sides) voted to the best presenter. As a result, two young investigators won the first prize. From the Japanese side, Dr. Yohei Shinmyo, was given the prize. Dr. Takashi Namba won the second best one.

Most of the Japanese participants told me that each of them felt very excited about the value of this meeting. The only problem was that the schedule was very tight. However, considering the substantial content of this seminar, this seemed a small problem.

8. Other (implementation issues, feedback, etc.)

Due to the limitations of the budget, we could not support all of the Japanese participants interested in attending this meeting. As a result, we gave financial priority to young investigators.