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Meeting report for the 2025 UC Irvine Center for Neural Circuit Mapping conference: The Changing Brain

The 5th annual conference of the UC Irvine Center for Neural Circuit Mapping (CNCM), "The Changing Brain," was held August 18–20, 2025, at the Irvine Marriott in Irvine, California, followed by additional conference-associated workshops on spatial transcriptomics and viral-genetic tools on August 21 at UCI. With over 380 participants from academia and industry, the meeting highlighted recent advances in neural circuit mapping across evolution, development, function, and disease. The meeting featured strong trainee engagement through travel awards and poster sessions. The UCI CNCM annual meeting series continues to grow as a leading forum for advancing neural circuit research relevant to normal brain function and psychiatric and neurological disorders.

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The University of California, Irvine (UCI) Center for Neural Circuit Mapping (CNCM) held its 5th annual international conference, *The Changing Brain*, on August 18–20, 2025, at the Irvine Marriott in Irvine, California, with additional post-conference workshops on spatial transcriptomics and viral-genetic tools hosted at UCI's Interdisciplinary Science and Engineering Building on August 21, 2025. The conference was co-sponsored by UCI CNCM, the Cajal Club, and the Allen Institute for Brain Science. The scientific program was organized under the leadership of Dr. Liqun Luo, together with Drs. Paola Arlotta, Xiangmin Xu, and Hongkui Zeng (Fig. 1A-D) and featured 26 invited lectures, 9 competitively selected short talks, and 160 poster presentations. Here, we provide a Meeting Report highlighting the scientific program, trainee engagement, outreach activities, and the broader significance of this growing conference series.

Following the success of prior conferences [1–3], the 2025 UCI CNCM meeting marked the largest annual gathering to date since the meeting's inception in 2021, with notable growth in international participation. The conference attracted over 380 registrants representing 104 academic institutions and 16 industry organizations, with international attendees comprising approximately 7% of participants. This expansion highlights UCI CNCM's increasing recognition as an emerging hub for neuroscience research spanning genes, cells, circuits, systems, and brain disorders.

The meeting started with welcoming remarks by Christine Gall (Distinguished Professor and Chair, Department of Anatomy & Neurobiology, UCI), followed by an opening address by Dean Michael J. Stamos (UCI School of Medicine) (Fig. 1E, F). Keeping with the tradition established in 2021, Chuck Ribak of the Cajal Club called the meeting to order with the Cajal Club gavel. The scientific program was organized around six thematic sessions, each designed to capture different aspects of brain research and transformation: *The Evolving Brain* — exploring evolutionary perspectives on neural circuits, cross-species comparisons, and genetic underpinnings of brain cell-type diversity; *The Developing Brain* — focused on mechanisms of neurodevelopment, synaptic assembly, and developmental disorders; *The Learning Brain* — addressing plasticity, memory, and adaptive circuits; *The Dynamic Brain* — highlighting real-time neural activity, state transitions, and circuit reconfigurations; *States of the Brain* — investigating sleep, consciousness, and neuromodulatory control; *The Disordered Brain* — covering translational research into psychiatric, neurodegenerative, and neurological disorders. By structuring the program to move from evolution and development through function and disorder, the organizers provided a conceptual arc that mirrored the theme of "The Changing Brain".

Invited speakers included Hongkui Zeng (Allen Institute for Brain Science), Tom Nowakowski (University of California, San Francisco), Vanessa Ruta (Rockefeller University), Pierre Vanderhaeghen (Université Libre de Bruxelles/VIB, Belgium), Sten Grillner (Karolinska Institute, Sweden), Paola Arlotta (Harvard University), Guillermina López-Bendito (Instituto de Neurociencias, Spain), Josh Huang (Duke University), Larry Zipursky (University of California, Los Angeles), Michelle Monje (Stanford University), Hailan Hu (Zhejiang University, China), Li-Huei Tsai (Massachusetts Institute of Technology), Guoping Feng (Massachusetts Institute of Technology), Xiangmin Xu (University of California, Irvine), Karel Svoboda (Allen Institute for Neural Dynamics), Elizabeth Buffalo (University of Washington), Bernardo Sabatini (Harvard Medical School), Nelson Spruston (HHMI Janelia Research Campus), Liqun Luo (Stanford University), Catherine Dulac (Harvard University), Anne Churchland (University of California, Los Angeles), Edward Chang (University of California, San Francisco), Ishmail Abdus-Saboor (Columbia University), Zhigang He (Harvard University), and John Ngai (NIH BRAIN Initiative). This broad group of leading investigators ensured comprehensive coverage ranging from molecular and cellular mechanisms to systems-level function and translational neuroscience (Fig. 2). The Cajal Club-sponsored PJ Harman Lecture was delivered by Michelle Monje (Fig. 1G). She discussed glia–neuron interactions in brain development and cancer. John Ngai (Fig. 1H) gave the final concluding address and provided an exciting update on NIH BRAIN Initiative's large-scale efforts to map brain circuits and advance neurotechnology (full program book available at the UCI CNCM website: https://cncm.medschool.uci.edu/2025-cncm-conference/).

The 2025 UCI CNCM Conference featured a strong emphasis on trainee involvement, made possible in part by an R13 Conference Grant from the National Institute of Mental Health (NIMH). From a pool of 65 applicants, the Organizing Committee awarded 14 travel fellowships and 17 registration fee waivers, ensuring broad accessibility and enabling promising young scientists to present their work, engage in networking, and form collaborations. Twelve

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Fig. 1 UC Irvine Center for Neural Circuit Mapping 2025 Organizers, Welcome and Keynote Presenters. (A) Liqun Luo (Stanford University), **(B)** Paola Arlotta (Harvard University), **(C)** Hongkui Zeng (Allen Institute for Brain Science), **(D)** Xiangmin Xu (University of California, Irvine), **(E)** Christine Gall (Distinguished Professor and Chair, Department of Anatomy & Neurobiology, UCI School of Medicine), **(F)** Dean Michael J. Stamos (UCI School of Medicine), **(G)** Michelle Monje (Stanford University), **(H)** John Ngai (NIH BRAIN Initiative).

Fig. 2 UC Irvine Center for Neural Circuit Mapping 2025 Conference Speakers and Special Guests. Top row, from left to right: Nelson Spruston, Charles "Chuck" Ribak, Larry Swanson, Ian Wickersham, Paola Arlotta, Xiangmin Xu, Hongkui Zeng, Yves De Koninck, Larry Zipursky, Balázs Rózsa, Kelly Jin, Kuan Hong Wang, Lomax Boyd, Scott Owen, and Josh Huang. Bottom row, from left to right: Kei Igarashi, Edward Chang, John Ngai, Liqun Luo, Catherine Dulac, Anne Churchland, Ishmail Abdus-Saboor, Vanessa Ruta, Elizabeth Buffalo, Karel Svoboda, and Cheng Lyu. Not pictured: Tom Nowakowski, Pierre Vanderhaeghen, Sten Grillner (virtual), Guillermina López-Bendito, Guoqiang Bi, Michelle Monje, Hailan Hu (virtual), Li-Huei Tsai, Guoping Feng, Bernardo Sabatini, Zhigang He, and Ed Callaway.

Fig. 3 UC Irvine Center for Neural Circuit Mapping 2025 Poster Presentation Awardees. From left to right: Maximiliano Garduño, Tatsuki Nakagawa, Jon Rink, Anjali Chawla, Yufei Huang, Haoyang Huang, Fangming Xie, Shuyun (Alina) Xiao, Daniel Pederick, Mable Lam, and Caitlin Goodpaster. Not photographed: Matthew G. Heffel.

judged poster presentation awards were given (Fig. 3) to recognize outstanding scientific contributions by junior investigators and trainees. This emphasis on training and mentorship reflects UCI CNCM's recognition that the future of neuroscience depends on building a strong pipeline of young and early-career investigators.

A new addition this year was a "Meet the Editors" session, which gave attendees the opportunity to engage directly with leading journal editors. Noah Gray (*Nature*), Ann Goldstein (*Cell*), Mariela Zirlinger (*Neuron*), and Julio Licinio and Ma-Li Wong (*Molecular Psychiatry*) shared perspectives on the review process, editorial decision-making, peer review, and effective publishing strategies. The session was well attended and provided valuable information for all attendees. Additionally, a highlight of this year's meeting was a public outreach event titled "The Art of Science" (August 19, 2025). This evening program celebrated the interface of science and creativity through art exhibitions, live performances, and interdisciplinary talks. A string quartet from the Pacific Symphony's Music Therapy Program performed following scientific presentations, underscoring the shared creativity at the heart of science and art.

To conclude an exciting week, on August 21, two workshops were held at UCI's Interdisciplinary Science and Engineering Building. One focused on spatial transcriptomics (including MERFISH and Stereo-seq platforms), and the other on viral-genetic tools (covering design strategies and applications). These sessions offered invaluable technical training and cross-institutional collaboration opportunities, particularly for trainees.

Since its inception in 2021, the UCI CNCM conference series has expanded dramatically in scope, scale, and impact. The 2025 meeting nearly doubled attendance from the prior year, broadened its thematic coverage, and added a major public engagement event. Building on this momentum, UCI CNCM has already announced two upcoming meetings: 1) UAMAA 2026 Conference (Unconventional Animal Models of Alzheimer's Disease & Aging), February 9-11, 2026, Irvine, CA. 2) UCI CNCM 2026 Annual Conference: Neural Circuits in Health & Disease, August 17-19, 2026, Irvine, CA. The 2026 UCI CNCM conference will be jointly sponsored by the UCI Center for Neural Circuit Mapping, Max Planck Florida Institute for Neuroscience, Center for Advanced Pain Studies, Broad Institute and Harvard Medical School. Dr. Gord Fishell (Harvard University/Broad Institute), Drs. Lin Tian (Max Planck Florida Institute for Neuroscience), Ted Price (University of Texas at Dallas), and Xiangmin Xu (University of California, Irvine) are the co-organizers. With its growing international reach, strong institutional support, and deep commitment to training and education, UCI CNCM is poised to remain a leading force in advancing our understanding of neural circuits and their role in health and disease.

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AUTHOR CONTRIBUTIONS

J.A., T.C.H. and X.X. prepared the figures and wrote the report.

COMPETING INTERESTS

The authors declare no competing interests.

ADDITIONAL INFORMATION

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