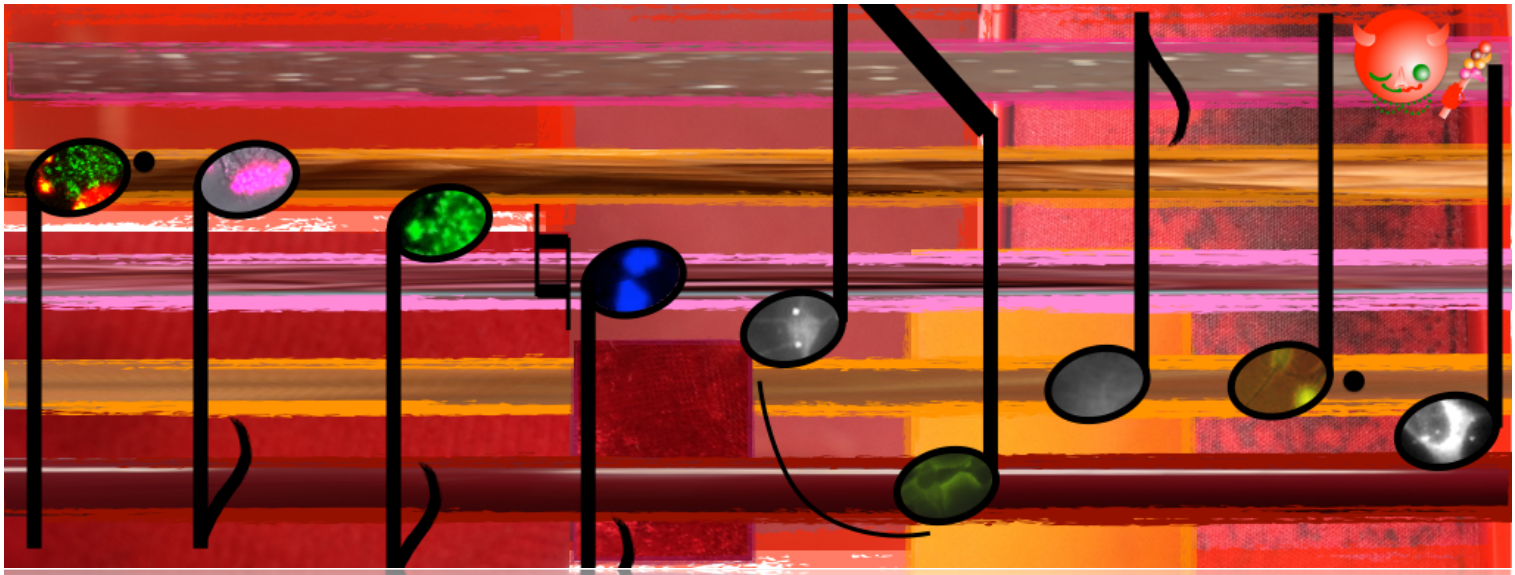
1st Biothermology International meeting

on Jun 21st, 2016, 19:00 to 22:00
Parc 55 SanFrancisco Hotel
Fillmore meeting room at 4th Floor

This event is acceppted as an ancillary meeting by ISSCR2016 CEO, Nancy Witty on May 10th.



This meeting is sponsored by IKEDA SCIENTIFIC Co., Ltd, and Keio University. We deeply thank to Dr. Jason Shoemaker (Univ. Pittsburgh, USA) for his kind helps to organize this meeting.

Presenters

Hiroki Ota (University of California Berkeley, USA)

Hirohide Saito (CiRA, Kyoto University, Japan)

Shinji Masui (CiRA, Kyoto University, Japn)

Alex Dann (Stanford University, USA)

and moderator Noriko Hiroi (Keio University, Japan)

Aim of this Meeting

This meeting focuses mainly about Biothermology, which has just launched in Japan by researchers of Biophysics and Cell/Molecular Biology.

Our plan is to bring together the interesting target and new technology at one place and try to find solutions for biological problems, for example, how to analyse the intracellular dynamics of temperature to estimate the impact of it on neural differentiation etc.

Target Audience

Biophysics people who are interested in differentiation process of stem cells, especially who explore new indexes to investigate, including temperature of cells/tissues or intracellular spaces and organelles are expected. Engineering people who develop sensors/detectors of temperature and so on may find collaborating opportunities at the meeting. Medical/pharmaceutical researchers may have interest the quantitative indexes for their applications.

Environment gives forces, cells produce energy; how their combinations affect the fate of a cell?

Presenter and Moderator *Noriko Hiroi (Keio Univ. Japan)*

Abstract: Analysing intracellular temperature is a nowadays topic under the development of detection technologies. The heterogeneity of temperature at each subdomain of a cell shocked researchers because the discovered difference of temperature between subdomains was unexpectedly large to explain based on the assumption that a cell is a water vacuole. I will start this talk by sharing basic knowledge about Biothermology and will show how far this knowledge may bring us to the exit of 105 gap issue. The discussion among the presenters should be expanded to the effect of the temperature at cellular differentiation and its combination with forces, including shear stress and tension between a cell and its environment. My talk will close by presenting the probable effect of the combination of force and temperature distribution on cellular differentiation.

References

[1] Tanimoto R, Hiraiwa T, Nakai Y, Shindo Y, Oka K, Hiroi N, and Funahashi A."Detection of Temperature Difference in Neuronal Cells" Scientific Reports(2016)Vol.6, Article number 22071, doi: 10.1038/srep22071

Highly deformable devices and systems using liquid metal for healthcare and medical application

Presenter *Hiroki Ota (UC Berkeley, USA)*

Abstract: Mechanically deformable devices and sensors enable conformal coverage of electronic systems on curved and soft surfaces. Sensors utilizing liquids confined in soft templates as the sensing component present the ideal platform for such applications, as liquids are inherently more deformable than solids. However, to date, liquid-based devices have been limited to metal lines based on a single liquid component given the difficulty in the fabrication and system integration. Here we demonstrate a platform for the fabrication of liquid- devices and 3-D liquid-state system, presenting an important advancement for expanding liquid electronics. The device architecture and fabrication scheme we present are generic for different sensing liquids, enabling demonstration of sensors responsive to different stimuli. As a proof of concept, we demonstrate temperature, humidity and oxygen sensors by using different ionic liquids, exhibiting high sensitivity with excellent mechanical deformability arising from the inherent property of the liquid phase and 3-D liquid system having active and passive liquid devices by 3-D printer.

References

[1] Hiroki Ota,Kevin Chen,Yongjing Lin,Daisuke Kiriya,Hiroshi Shiraki,Zhibin Yu,Tae-Jun Ha & Ali Javey. "Highly deformable liquid-state heterojunction sensors" Nature Communications(2014)Vol. 5, Article number 5032, doi:10.1038/ncomms6032

MicroRNA switches that identify and isolate target cells in high-resolution

Presenter *Hirohide Saito (CiRA, Japan)*

References

[1] Liliana Wroblewska, Tasuku Kitada, Kei Endo, Velia Siciliano, Breanna Stillo, Hirohide Saito, and Ron Weiss. "Mammalian synthetic circuits with RNA binding proteins for RNA-only delivery" Nature Biotechnology(2015)Vol.33(8):839-41. doi: 10.1038/nbt.3301.

Regulation of cellular identity by a transcriptional mechanism responding to physical force

Presenter *Shinji Masui (CiRA, Japan)*

Abstract: Multicellular organisms are maintained by homeostasis of cellular differentiation states. However, many are still unclear about the mechanisms how these states are maintained. Previously we have shown that transcription factors maintaining expression of cell type-specific genes inhibit reprogramming to pluripotency. Taking advantage of this mechanism, in this study we performed screening for genes maintaining cell states using reprogramming system in neural progenitor cells. As a result, we found that β-actin, specifically its monomer, maintained cell type-specific gene expression through suppressing the activity of a transcription factor Srf. We further show that suppressing the β-actin-Srf pathway contributes to the maintenance of cell states in multiple cell types of diverse lineages. We discuss a possible mechanism how Srf regulates cell type-specific genes through their regulatory elements.

References

[1] Kitazawa K, Hikichi T, Nakamura T, Mitsunaga K, Tanaka A, Nakamura M, Yamakawa T, Furukawa S, Takasaka M, Goshima N, Watanabe A, Okita K, Kawasaki S, Ueno M, Kinoshita S, Masui S. "OVOL2 Maintains the Transcriptional Program of Human Corneal Epithelium by Suppressing Epithelial-to-Mesenchymal Transition" Cell Rep.(2016)Vol. 15(6),pp1359-68.

Fluorescent molecular tension sensors measure force transmission by single integrins in living cells

Presenter *Alex Dann (Stanford Univ, USA)*

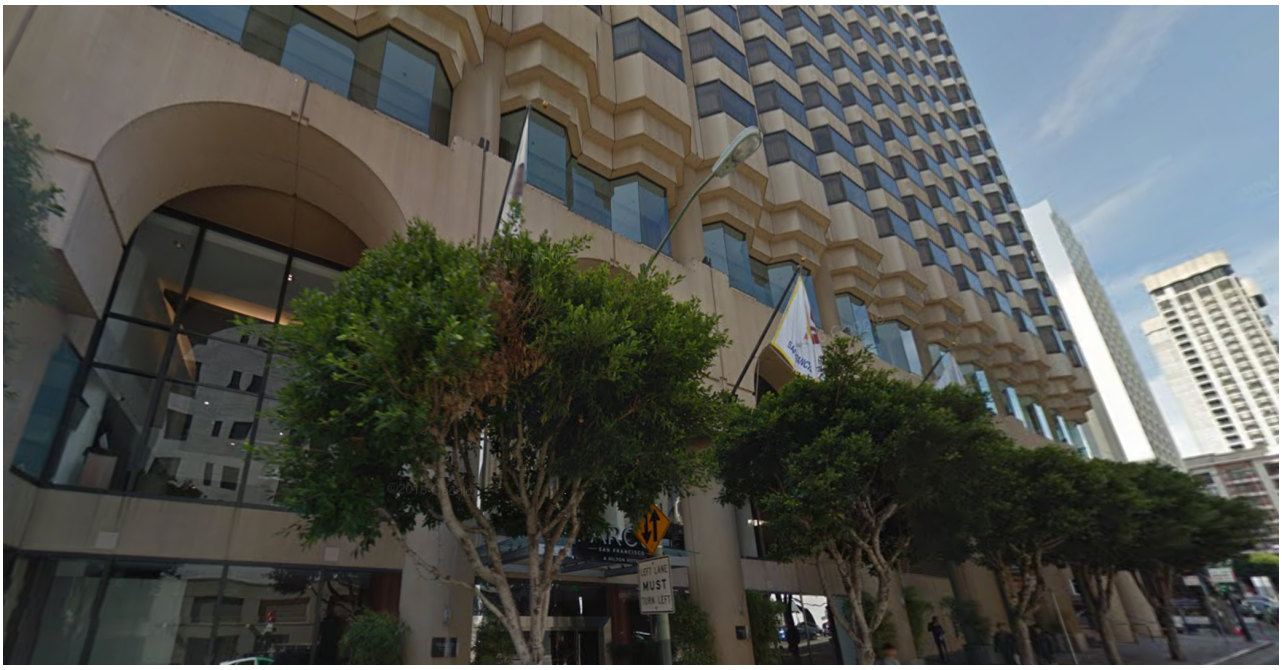
Abstract: Integrins mediate cell adhesion to the extracellular matrix and enable the construction of complex, multicellular organisms, yet fundamental aspects of integrin-based adhesion remain poorly understood. Notably, recent estimates of the load experienced by integrins span two orders of magnitude, a discrepancy arising from limitations inherent to existing techniques. Here we use FRET-based molecular tension sensors (MTSs) to directly measure the distribution of forces experienced by individual integrins in living cells. We find that a large fraction of integrins bear modest loads of 1-3 pN, while subpopulations bearing higher loads are enriched within adhesions. Further, our data indicate that the synergy site, a secondary binding site thought to reinforce the fibronectinα5β1-integrin bond, affects biochemical recognition but not overall force generation in our system. We suggest that a substantial population of integrins exerting forces well below their load-bearing capacities can provide cells and tissues with physical resiliency.

References

[1] Nakayama KH, Surya VN, Gole M, Walker TW, Yang W, Lai ES, Ostrowski MA, Fuller GG, Dunn AR, Huang NF. "Nanoscale Patterning of Extracellular Matrix Alters Endothelial Function under Shear Stress" Nano Letters. (2016) 16 (1), pp 410-419. doi: 10.1021/acs.nanolett.5b040280

Access

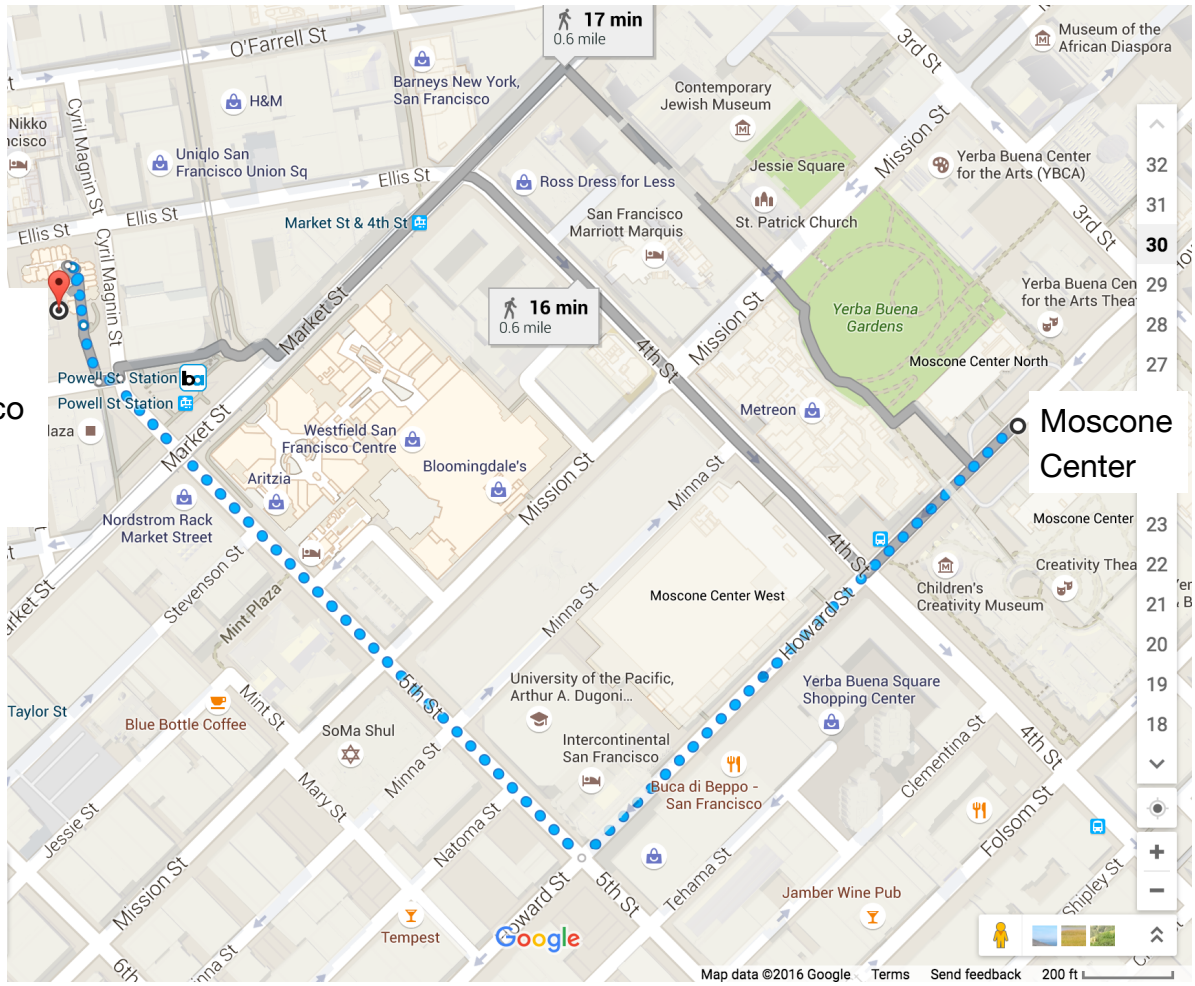
Parc 55 San Francisco - A Hilton Hotel

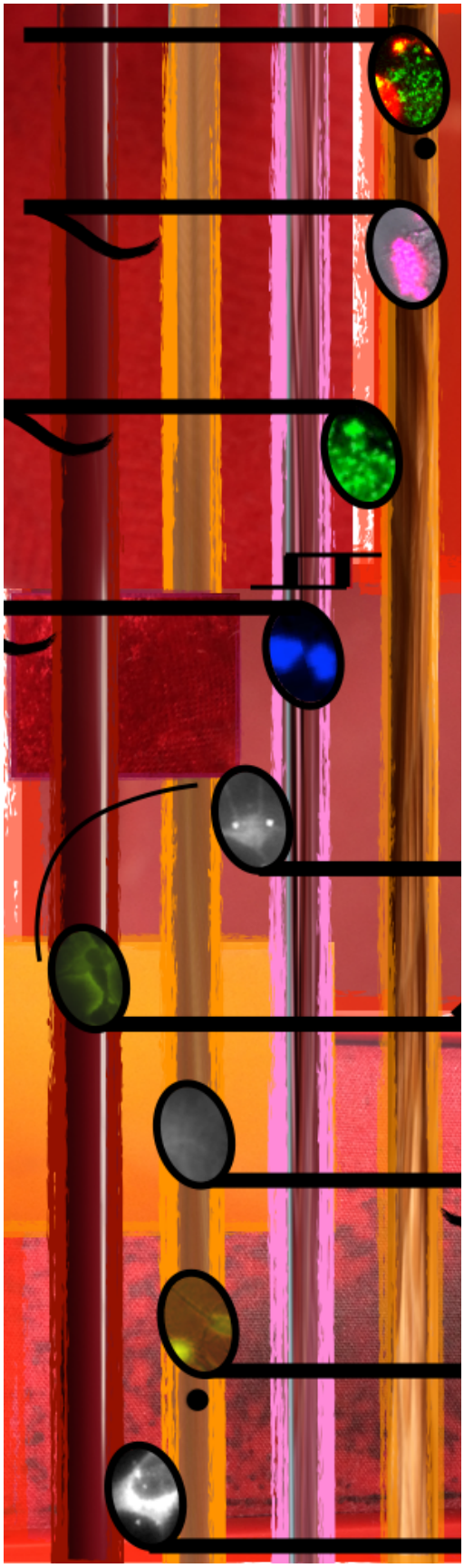


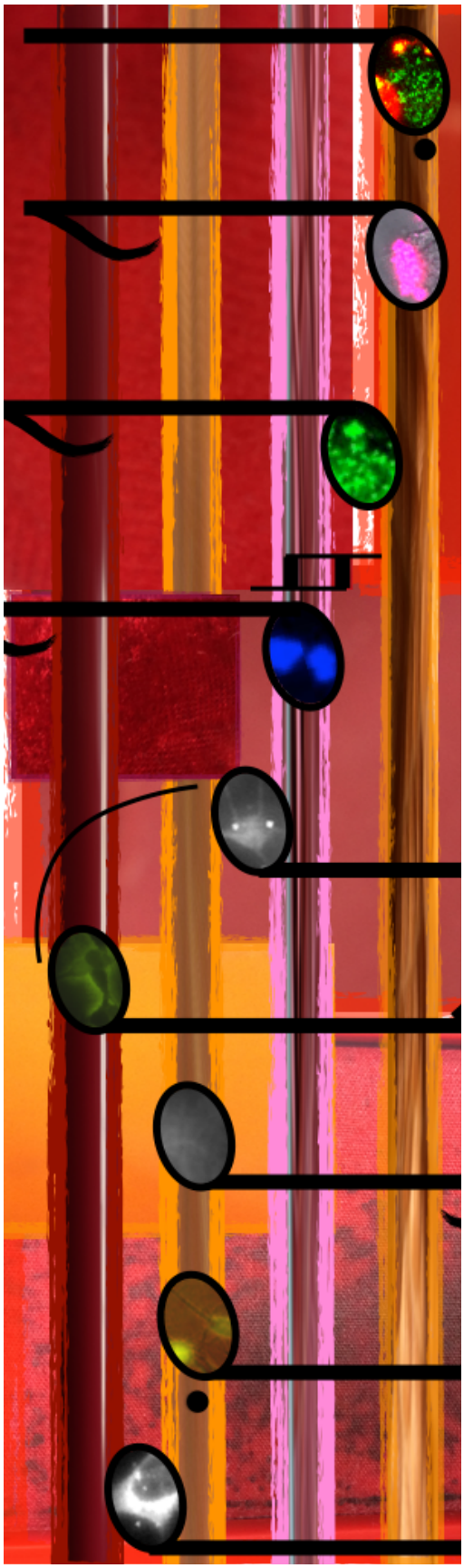
Address: 55 Cyril Magnin St, San Francisco, CA 94102

Phone:(415) 392-8000

Parc 55 San Francisco Hilton Hotel







1st Biothermology International meeting

Jun 21st, 2016

San Francisco, USA

sponsored by IKEDA SCIENTIFIC Co. Ltd

and Keio University