NEWSLETTER

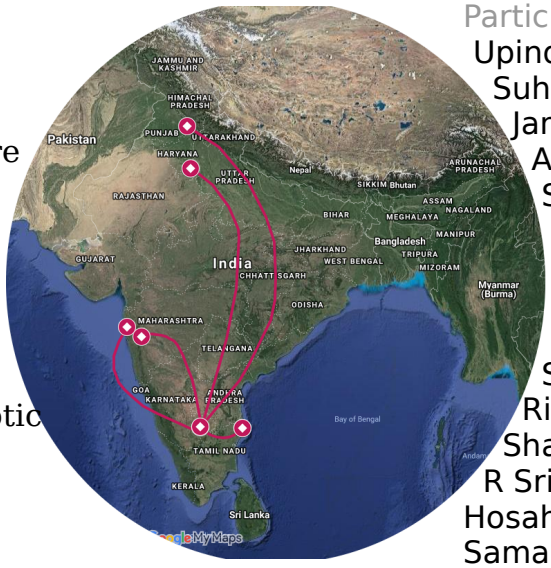
SANKET

Signaling And Neurophysiology Knowledge-resource for Experiments and Theory

Volume 1, Issue 8, Page 1 Date: 13 July 2019

Highlights...

- FindSim on NSG portal
- SANKET as a keynote lecture at INCF meet.
- Local SANKET meeting to discuss grants and outreach efforts.
- Updates on FindSim
- "Studying role of post-synaptic proteins using molecular replacement approach."
  - Dr. Samarjit Bhattacharya



Participating labs:
Upinder Bhalla, NCBS
Suhita Nadkarni, IISER Pune
James Chellaiah, JNCASR
Aditi Bhattacharya, InStem
Sayak Mukherjee, IBAB
Rohit Manchanda, IITB
Sourav Bannerjee, NBRC
Raghu Padinjat, NCBS
Deepak Nair, IISc
Srinivasa Chakravarthy, IITM
Rishikesh Narayanan, IISc
Shailesh Appukuttan, CNRS
R Srivatsan, IBAB
Hosahalli Subramanya, IBAB
Samarjit Bhattacharya, IISER Mohali

General Consortium News

➢ Discussions of integrating FindSim to the NeuroScience Gateway (NSG) portal are underway. We have recieved positive responses from the NSG team. They liked and encourage the idea of having extended applications for native tools/ softwares such as MOOSE.

➢ The CAMP-2019 workshop has successfully ended! We have introduced FindSim database and interface to the students as part of the workshop curriculum.

➢ SANKET abstract submitted for poster to INCF meeting in Warsaw has been promoted to a keynote lecture.

➢ A local meeting for SANKET was held at short notice on 11 July, 2019 to discuss future plans, grants and outreach efforts. Dr. Aditi Bhattacharya, Dr. Suhita Nadkarni, Dr. James Clement, Dr. Rishikesh Narayanan, Dr. Raghu Padinjat and Dr. Upinder Singh Bhalla were present.

Various grants were identified that would be suitable for the SANKET consortium and the various sub-projects that were put forth in the previous meetings:

- Post-synaptic processes/ Synaptic plasticity induction and maintenance (Participants: Aditi, James, Upi, Deepak, Shailesh, Sayak, Subramanya, Sourav)
- Pre-synaptic processes (Participants: Suhita, Deepak, Rishikesh, Sourav)

Various funding sources were identified and responsibilities to pursue them further were allocated to different members.

The key technologies and cost centres for proposals were also identified:

- Phosphoproteomics time series
- Electrophysiology in animal models and IPSCs
- Imaging in slice and IPSCs
- Personnel
- Computing
- IPSC physiology

Updates on Websites

More than 200 literature-curated experiments added to the FindSim database.

FindSim users can now edit and run experiments as a guest user. However, the edits are session-based and will not be saved unless logged in. The user can also change the default model used for the experiment.

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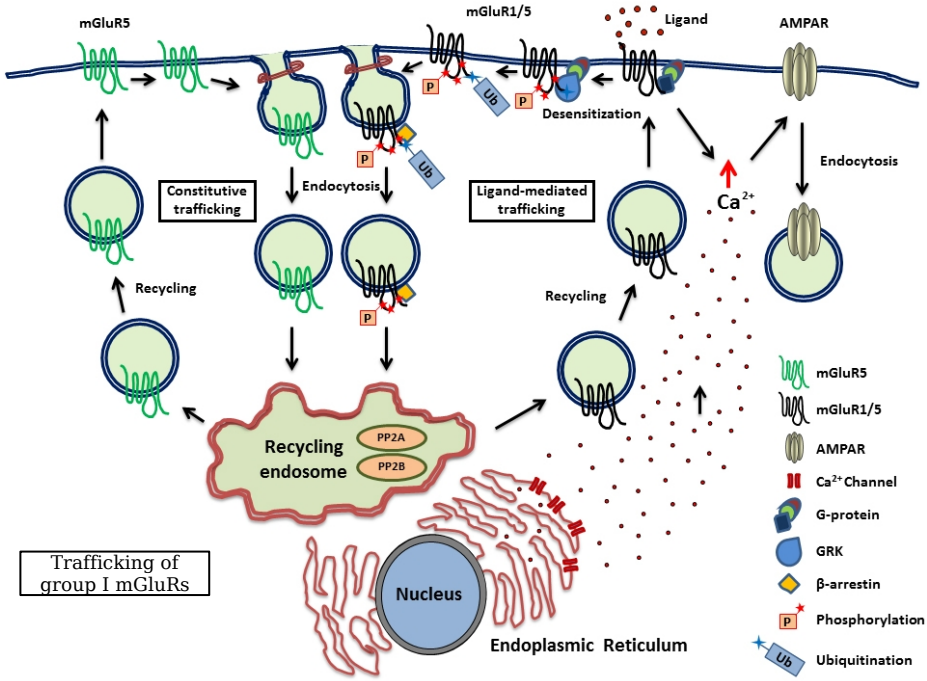
Work from particitpating labs

In the brain, a variety of neurotransmitters and neuromodulators act on target receptors to activate cellular signaling events which transfer information from one cell to the next. G- protein coupled receptors (GPCRs) respond to a variety of chemical and sensory stimuli to regulate important physiological processes. Receptor-ligand interaction initiates the second messenger pathways, as well as, various other regulatory events such as desensitization, endocytosis, resensitization and downregulation of the receptor. The study of GPCR regulation and trafficking has got serious attention in the last few years as aberrant regulation of GPCR signaling and trafficking often leads to various diseases. These processes are critically regulated in neurons, since appropriate targeting of the receptor is a crucial step to place these receptors at the specific region of the neuron for proper signaling.

"Despite this obvious significance very little is known about the protein machineries that control the trafficking events, the regulatory mechanisms that control the protein machineries and the physiological significance of these regulatory mechanisms", says Dr. Samarjit Bhattacharya, Assosciate Professor from IISER Mohali.

The major excitatory neurotransmitter glutamate activates two types of receptors, viz., ionotropic glutamate receptors and metabotropic glutamate receptors (mGluRs) in the central nervous system. mGluRs are members of class C GPCR family. Group I mGluRs(mGluR1 and mGluR5) have been demonstrated to play crucial roles in various forms of synaptic plasticity, including learning and memory. They have also been implicated in various neuropsychiatric disorders like Fragile X syndrome, schizophrenia, autism etc.



The appropriate delivery of group I mGluRs to the cell surface is a crucial step to place these receptors at the specific region of the neuron for proper signaling. In addition, like many other GPCRs, group I mGluRs undergo desensitization and internalization upon ligand binding. Regulation of mGluR trafficking would therefore provide a powerful means to modulate many synaptic functions.

Ongoing research efforts in Dr. Bhattacharya's lab, attempts to understand the cellular and molecular mechanisms that regulate mGluR trafficking and its physiological significance, specifically, mGluR-mediated AMPAR endocytosis, which is the cellular correlate for mGluR-dependent synaptic plasticity as shown in the figure. We study the role of various post-synaptic density proteins in these processes using "molecular replacement" approach. This method includes the acute knockdown of the protein of interest in the neuron and subsequent replacement with various mutated/ deleted forms of the protein. We employ multi-disciplinary approaches ranging from biochemistry and molecular biology to cell biology, imaging, and mouse genetics to address these questions.