Cell Identity and gene expression regulation

Course organised by:

Dr Jean-Paul Concordet Inserm researcher at MNHN (jean-paul.concordet@mnhn.fr) Pr Délara Sabéran-Djoneidi, Professor at UPCité, researcher in Epigenetic and cell fate unit (delara.saberan@u-paris.fr), in collaboration with Pr Moussa Benhamed (moussa.benhamed@uparis.fr)

Teaching objectives

Acquire knowledge in gene expression regulation and on techniques related to this study. Develop scientific critical thinking skills on enhancer definition and on how single cell level analysis change the paradigm of cellular identity definition. Develop ease of interaction.

Teaching outline

Students will learn the basis of single cell experiment techniques in order to be able to challenge the question of cell identity definition. Few introductory lectures on the main principles of gene expression regulation and single cell techniques are followed by workshops on figures interpretation and lectures by researchers presenting their work in their field of research in different model organism. To prepare the students for these meetings, a bibliographic work is proposed

Monday 8th December

9.30 - 12p.m. Historical overview on Cell ID concepts and tools available Moussa Benhamed, UPCité (moussa.benhamed@u-paris.fr)

1.30p.m – 3.30 p.m.

Brainstorming and definitions, Délara Sabéran-Djoneidi, UPCité (delara.saberan@u-paris.fr) **Student presentation on various enhancers** (based on Noordermeer and Duboule 2013 paper), 5min presentation /group of students

3.45p.m – 5.15p.m

Workshop on understanding figures on papers the students have to present: what are the techniques used, what is represented on figures? Délara Sabéran-Djoneidi

Tuesday 9th December 9.a.m- 11 a.m Quantitative approaches to model cell identity, Jean-Paul Concordet (jeanpaul.concordet@mnhn.fr) 11:15- 12:45 p.m Introduction to single cell RNAseq and Cell browser tools, Max Haeussler (mhaeussl@ucsc.edu)

2p.m. 3:15p.m Workshop using USCC Cell Browser and Loupe tools. Délara Sabéran-Djoneidi, UPCité & Max Haeussler

3:30 -5:00 Work by small groups on articles

Wednesday 10th December 9:00 a.m – 10:30 a.m. How LADs regulate cell fate Guillaume Velasco (guillaume.velasco@u-paris.fr)

10:45- 12:30 p.m Work by small groups on articles

2pm -4pm Molecular mechanism of cell memory Michel Wassef (michel.wassef@curie.fr)

4:00- 5:00 Work by small groups on articles.

Thursday 11th December 9 a.m-12:00 a.m Student presentations: groups #1 to #3 on articles given by Merlin Lange 2p.m.- 4:30 p.m Merlin Lange (merlin.lange@inserm.fr)

Friday 12th December 9 a.m-12:00 a.m Student presentations: groups #4 to #7 on articles given by Pablo Navarro-Gil

2p.m.- 4:30 p.m Pablo Navarro-Gil (pablo.navarro-gil@pasteur.fr)

4:15 – 5p.m Take Home message from the students

Student assignments:

- 5' Presentation on an example of gene regulation based on WIREs Dev Biol 2013, 2:615–630. doi: 10.1002/wdev. (10% of final mark)
- Short report on cell cluster analysis based on loupe browser not mark
- Article presentation (70% of final mark)
- Participation during the week (20% of final mark)