



Invitation to M.Tech. Thesis Defense of Sidrah Maryam : August 20, 2021 (Friday): 10.30-11.30 IST

In Partial Fulfilment of the Requirements for the Degree of

M.Tech. CB

Sidrah Maryam (MT19220)

Will defend her thesis

Title: "RNA based lineage tracking in olfaction and aging"

IIIT-D Faculty and Students are invited

Date: August 20, 2021 (Friday)

Time: 10.30-11.30 IST

Online over Google meet (<https://meet.google.com/wex-drcf-tor>)

Examiner: Internal: Ganesh Bagler
External/Internal: Debarka Sengupta
Advisor: Gaurav Ahuja

Abstract

Single-cell transcriptomics entails profiling of a complete set of RNA transcripts of each cell in a given population. It also provides an efficient way to quantify the internal state of individual cells and hence determine the dynamic process that cells undergo, and finally, allows arrangement of the cells along their differentiation kinetics (pseudotime analysis). RNA velocity is such a powerful concept that provides a high-dimensional vector which could be used to predict the future transcriptional state of each cell on the basis of the ratio of spliced and unspliced messenger RNAs. Of note, unspliced transcripts refer to the immature state of mRNA whereas spliced transcripts are the mature mRNA state. Trajectory inference using RNA transcript information can be used to address the most potential questions in olfaction and aging. In case of olfaction, we have used single cell transcriptomics to delineate the molecular basis of Odorant Receptor (OR) selection choice. Of note, among 1000 different possibilities, a mature olfactory sensory neuron expresses only a single receptor. This rule is known as the "one-neuron-one-receptor" rule. We* developed euclidean distance index(EDI) to identify the molecular model governing the 'one-neuron-one-receptor' rule. We find that the winner-takes-all model to be the most plausible approach for OR choice selection rather than silence-all-activate-one. Secondly, in case of aging research, we** exploited spliced/unspliced information of the transcripts and measured homeostatic diverge scores(HDS). With the help of HDS scores, it was observed that with age, there was a decline in HDS score thereby suggesting the reduced age-related homeostatic nature. In summary, we used single cell and transcriptomic information to address two of the most concerning questions in olfaction and aging research.

*EDI method is developed, coded and executed by Sanjay Kumar Mohanty and Sidrah Maryam

** HDS method is developed, coded and executed by Krishan Gupta

