| | |
|---|---|
| Title: | **One bioinformatician to study the Evolution of piRNA clusters in neural stem cells and implications for neural diseases** |
| Tutors: | Davide De Pietri Tonelli |
| Tutors Affiliation: | Neurobiology of MIRNA (https://ncrna.iit.it/) – Istituto Italiano di Tecnologia |

Project Description: *Background:* The project aims at investigating a novel pathway of noncoding RNAs recently identified by our lab in mammalian brain, which plays a role in the maintenance of neural stem cell fitness (Gasperini et al. 2023), and implicated in neurological diseases including neurodegeneration and brain cancers (Sun et al, 2022; Pan et al., 2024).

*Description:* You will be working in a multicultural group, mainly composed by Life scientists (Biologists, Biotechnologist; biomedical scientists, etc), who work in close collaboration with the multi-disciplinary staff of IIT having strong expertise on -omics, bioinformatics, material science, imaging, neuro-physiology and neuro-electronics. "The neurobiology of miRNA" Research Line is coordinated by Davide De Pietri Tonelli, who has extensive experience in the control of neural stem cell fate by noncoding RNAs in developing and adult mammalian brain. The research focuses on small noncoding RNAs in basic aspects of neurogenesis and its translational applications to RNA-based therapy for brain diseases, using rodents and human cells as models.

The main responsibilities will be to:
• To manage large amount of NGS data and to set up some standardized RNAseq/DNAseq analysis pipelines and software infrastructure required for the team.
• Interact with the Life Scientists in the team to define best strategies to implement semi-automated pipelines for small noncoding RNA analyses
• Identify genomic sources and targets of the small noncoding RNAs in various rodents/human cell models of neurological diseases, including brain cancers.

Requirements:
*Essential expertise:*
   i)   Master in Bioinformatics, computational biology, or a related field
   ii)  Documented experience in the bioinformatics field
   iii) Documented experience with the analysis of NGS RNA sequencing data (and related computational tools, ideally in the clinical context).
   iv)  Strong knowledge of the main bioinformatics data types and formats and Proficiency in programming (python, R, Linux and Bash etc).
   v)   Good communication skills and ability to work in team: the successful candidate will interact extensively with experimental life scientists of the team

*Desirable expertise*
   i)   Background in (molecular) biology (BSc or certified Experience)
   ii)  A good proficiency analysis tools such as Blast; MAFFT CD-HIT; HMMER softwares ABRicate Prokka; E-utilities (Entrez Direct)
   iii) Experience with version control systems and repositories (e.g. Git, GitHub and/or GitLab)
   iv)  Ability to work in a challenging and international environment

References: Gasperini C, Tuntevski K, Beatini S, Pelizzoli R, Lo Van A, Mangoni D, Cossu RM, Pascarella G, Bianchini P, Bielefeld P, Scarpato M, Pons-Espinal M, Sanges R, Diaspro A, Fitzsimons CP, Carninci P, Gustincich S, De Pietri Tonelli D. Piwil2 (Mili) sustains neurogenesis and prevents cellular senescence in the postnatal hippocampus. EMBO Rep. 2023 Feb 6;24(2):e53801. doi: 10.15252/embr.202153801. Epub 2022 Dec 6. PMID: 36472244;

Sun YH, Lee B, Li XZ. The birth of piRNAs: how mammalian piRNAs are produced, originated, and evolved. Mamm Genome. 2022 Jun;33(2):293-311. doi: 10.1007/s00335-021-09927-8. Epub 2021 Nov 1. PMID: 34724117

Pan X, Dai W, Wang Z, Li S, Sun T, Miao N. PIWI-Interacting RNAs: A Pivotal Regulator in Neurological Development and Disease. Genes (Basel). 2024 May 21;15(6):653. doi: 10.3390/genes15060653. PMID: 38927589;

Contacts:          davide.depietri@iit.it