

Completion Report of the organized Research Internship
(Vritika)

Date: 31.12.2022

SERB Sanction / File No: SERB/F/6565/2022-2023

1. **Name of Academic Institution:** Institute for Communicative and Cognitive Neurosciences (ICCONS)
2. **Title the Research Internship (RI):** Cognitive Neuroepigenetics
3. **Duration / Period of the organized event:** 01.11.2022 to 15.12.2022
4. **Name and Affiliation of the Invited Expert(s):** There were no external experts. All the classes were handled by subject experts at the host institution.
5. **Grant Sanctioned:** Rs. 1,50,000/-
6. **Summary of the RI (Max. 1000 Words):**

VRITIKA training and skill internship program was organized by Department of Neurogenetics, ICCONS, Shoranur from 01.11.2022 to 15.12.2022. The program was held physically at ICCONS, Shoranur. A total of 18 students, pursuing their M.Sc. degrees, applied for the program. Five students were selected from them based on an interview. The selected students were provided food and accommodation in our students' hostel. The program was inaugurated by Dr. Sanjeev V. Thomas, Director, ICCONS on 01.11.2022. The classes and practical sessions were handled by Dr. Anitha Ayyappan Pillai, Associate Professor, Department of Neurogenetics.

The program was aimed at providing an exposure to the advanced molecular and bioinformatics techniques in the field of Neuroepigenetics. The students were trained in the following techniques,

- Genomic DNA extraction from whole blood
- miRNA extraction from serum
- Quantification of DNA and RNA
- PCR amplification of selected genes
- Agarose gel electrophoresis
- Use of gel documentation system for visualizing and quantifying electrophoretic bands
- Direct DNA sequencing (Sanger Sequencing)
- cDNA synthesis
- Real-time PCR
- DNA methylation analysis (Bisulfite conversion, methylation-specific qPCR)
- microRNA analysis
- Bioinformatics
 - Primer design for PCR
 - Primer design for methylation mapping (e.g., methylation-specific PCR)
 - *In silico* PCR
 - Identification of CpG islands in genes
- Data analysis (statistics)

The students were given hands-on training in all the wet lab experiments and bioinformatics analysis.

The students worked in the following short-term projects,

- Methylome data mining
Our lab has a vast amount of methylome data. The students were taught data handling, data mining, identification of differentially methylated loci, identification of genes located near the differentially methylated loci, classification of loci according to their distance from the nearest gene into either belonging to CpG islands, shelves or shores, and functional term enrichment (gene ontology analysis) to identify the functions that are significantly affected.

- Differential DNA methylation analysis by quantitative PCR (qPCR)
Epigenetic factors such as DNA methylation have been found to modulate gene expression during early development. The students were trained to analyze differential DNA methylation of genes (case-control comparison) by qPCR.
- Differential expression of circulating microRNAs (miRNAs)
miRNAs are epigenetic modulators that influence the protein levels of target messenger RNAs without modifying the gene sequences. They serve as crucial regulators of gene expression. The students were taught to identify the differential expression of circulating serum miRNAs (case-control comparison) by qPCR.

All students attended about 99% of the training sessions. At the end of the internship, all of them prepared and submitted a report of the work done in our lab. They were given participation certificates in the format specified by the SERB. We got good feedback from the students about the program.

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(Event Organizer Signature)

Photographs Section: Please paste high resolution photographs in given spaces below or may be submitted directly on online / email in JPEG format

1. Inaugural Session



2. DNA extraction



3. Quantitative PCR



4. Centrifugation for RNA extraction



Anitha

(Event Organizer Signature)

Feedback Form

The Event Organizer (EO) may provide the feedback / suggestions to us for the Research Internship program.

1. If there is sufficient time between approval of application and date of start of the program, it will be possible to inform a greater number of students.
- 2.
- 3.
- 4.
- 5.

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(Event Organizer Signature)