National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Integrative Genomics for Advancing Therapies in Renal Cell Carcinoma and Adamantinomatous Craniopharyngioma
Speaker	: Dr. Akhilesh Mishra
Supervisor	: Santosh Kumar #2787
Venue	: LS Seminar Hall
Date and Time	: 13 Mar 2025 (14:00 hrs)
Abstract	: My research focuses on deciphering the parameters involved in Protein-DNA interaction through various scientific endeavors. Initially, the studies aimed at analyzing DNA sequences and identifying potential drug targets for cancer and pathogens, leading to the development of two computational tools - Onco-Regulon, and Pathogen Specific DNA Drug Finder. Subsequently, the research shifted towards exploring the energetic aspects of DNA, highlighting the role of Solvation Energy, Stacking Energy, and Hydrogen Bonding Energy in differentiating functional units within the genome. The investigation then expanded to the structural analysis of DNA, explicitly predicting transcription start sites (TSS) in prokaryotes and intron-exon boundaries in eukaryotes. Notably, a genome annotation software, ChemGenome2.1, was developed based on these physicochemical properties. Additionally, I contributed to the development of India's most cost-effective COVID-19 Diagnostic Kit, approved by ICMR. In my postdoctoral research, I worked on multiple projects, including a) Estimating the Time of Active Surveillance in metastatic renal cell carcinoma (RCC). b) Studying HIF2 inactivation and tumor suppression using a tumor-directed RNA-targeting drug. c) Investigating the mechanism of resistance to rapalogs in renal cancer. d) Investigating the mechanism of progression in pediatric translocation RCC. Currently, my lab focuses on the genomic and molecular profiling of Adamantinomatous Craniopharyngioma (ACP) to understand intratumor heterogeneity and intercellular interactions in tumor progression. We also study tumor grade progression mechanisms in Renal Cell Carcinoma and assess therapeutic potential using single-cell multi-omics approaches. By integrating six fundamental aspects of the genome—sequence, energetics, structure, expression, variation, and epigenetics—we aim to uncover mechanisms of disease progression and identify new therapeutic targets. Keywords: Computational Oncology, Cancer, Single-Cell RNA-Seq, Multi-Omics, Renal Cell Carcinoma and Craniopharyngioma