National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: RRM2 REDUCES CISPLATIN RESPONSE IN ORAL CANCER BY REGULATING CELLULAR ROS PRODUCTION AND MITOCHONDRIAL DNA STABILITY
Speaker	: Priyajit Biswal (Roll No. 521ls2001)
Supervisor	: Santosh Kumar #2787
Venue	: LS Seminar Hall
Date and Time	: 24 Jan 2025 (10:00 AM)
Abstract	: Introduction Cisplatin has long been used as a standard and effective first-line chemotherapy for oral cancer treatment. However, it shows resistance in due course of treatment, leading to tumor relapse. Therefore, there is an urgent need to identify new therapeutic targets to enhance the response to cisplatin-based chemotherapy. From our previous study, we found that miR-203a mediated downregulation of Ribonucleotide reductase subunit M2 (RRM2) increases cisplatin-induced cell death in cisplatin-resistant oral cancer cells. This motivated us to verify how exactly RRM2 modulates the cisplatin response in this malignancy. Objective To investigate how RRM2 modulation affects cisplatin-induced DNA damage repair, mitochondrial function, and apoptotic pathways in oral squamous cell carcinoma cells. Materials and Methods We assessed the impact of RRM2 on cisplatin response using molecular assays including qRT-PCR, Western blotting, MTDNA content analysis, fluorescence imaging (DCFHDA, Rhodamine 123, DHE, AO/EB staining), DAPI staining, and γ-H2AX accumulation assay. Results and Conclusions Upon cisplatin treatment, RRM2 expression is increased in SCC9 and H357 oral cancer cells, with RRM2 localizing to the nucleus, likely to support DNA repair. Intriguingly, we found that RRM2 significantly reduces cisplatin-induced apoptosis and DNA damage response. We also observed that RRM2 reduces cisplatin-induced ROS production, mitochondrial depolarization, and mitochondrial DNA content, indicating decreased mitochondrial DNA damage from cisplatin exposure. Taken together, our study revealed that RRM2 is a promising therapeutic candidate for the effective treatment of cisplatin-based chemotherapy.