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Progress Seminar

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Seminar Title	: Role of Liquid-liquid phase separation in chromatin modifications and gene regulation associated with cancer
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Supervisor	: Samir Kumar Patra
Venue	: LS Office Room
Date and Time	: 01 May 2025 (9:30)
Abstract	: Liquid-liquid phase separation (LLPS) is the emerging concept, that describes many biochemical processes, the existence and integrity of membraneless organelles. Intrinsically disordered regions (IDRs) are the most important sticking regions, that fuel the formation of such condensates. Nucleolus, nuclear speckles, paraspeckles, promyelocytic leukemia (PML) bodies, Cajal bodies play crucial roles in cellular physiology. Most importantly phase separated condensates are also involved in epigenetic regulation of gene expression, chromatin remodeling, heterochromatinization. Epigenetic marks on DNA and histones co-operate with DNA and RNA-binding proteins, which in turn interact with other IDR containing protein molecules to form condensates, that eventually modulate gene expressions and activity of specific TADs (topologically associating domains). Phase separation coalesces with mutant oncoproteins, tumor suppressor genes and cancer associated signaling pathways. In our studies our point of interest is the phase separation events, which put influence on the expression and activity of the epigenetic modifier enzymes and their action on chromatin modification, also the focus will be on the importance of phase separation in regulating cellular stemness. So far in our works, we have checked the potential of phase separation of epigenetic modifier enzymes like DNMT1, DNMT3A, DNMT3B, HDAC1, KDM5A etc. and effect on their expression both in the presence and absence of phase separation blocker. We further predicted possible involvement of LLPS mediated involvement of DNMT1 in replication fork and involvement of EGFR signalling pathway in a different manner to regulate cellular stemness.