

COURSE REPORT

NAME OF EVENT:- GIAN-MHRD sponsored Course on "Molecules to Humans: Applications of Multidimensional NMR in Deciphering Bio-molecular Structures, Functions and Cellular Mechanism"

DATE & VENUE OF EVENT:- 2-7th December 2019 organized by Department of Chemistry, National Institute of Technology, Hamirpur

COURSE CONTENT:-

1. Central dogma of molecular biology and current advances on mechanism of eukaryotic transcription.
2. Chromatin and hormonal regulation of gene expression.
3. Cellular metabolism under different conditions.
4. Basic principles of NMR, FT-NMR and Multi-dimensional NMR.
5. Applications of NMR to study structures of DNA and proteins.
6. Applications of NMR to study metabolism.

Expected Benefits Derived and Applications:-

Nuclear Magnetic Resonance (CW, FT-NMR, COSY, NOESY, TOCSY) methods have been useful to decipher 3-D structures of proteins, DNA, enzymes and other biomolecules. Moreover metabolism of carbohydrate, fat, lactate, ketone bodies, protein can also be studied along with kinetic and thermodynamic aspects of interactions. This course covers all molecular biology processes like transcription, initiation, elongation, termination, mRNA processing, export, translation, CHIP, FRET, GFP and current advances on mechanism of eukaryotic transcription. Regulation of gene expression by chromatin, peptide and steroid hormones, outside signaling molecules is covered along with pathways like Hedgehog, G-protein, Ras, TOR etc. Special focus is laid upon thyroid, estrogen, androgen, progesterone, insulin hormones.

Basic principle of NMR, different parameters like chemical shift, spin-spin splitting, coupling constant, dipolar coupling, relaxation rates, NOE along with difficulties are discussed along with role of multi-dimensional NMR to study biomolecules and

its interactions. Applications of NMR in regulation of gene expression and cellular metabolism is elaborately presented in this course. NMR also helps in molecular understanding of different biological processes. Since gene expression is important for cellular process functioning and mutation of gene can lead to cell cancers.



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