

Paper III

UNIT 1:

ER ASSISTED PROTEIN FOLDING:

- Sequence specifies structure: Anfinsen's experiment and Levinthal's paradox.
- Protein folding, folding kinetics, folding mechanisms (the nucleation model, the diffusion model, the hydrophobic collapse model); energy landscape and funnel theory.
- Molecular chaperones and their role in protein folding.

UNIT 2

CELL SIGNAL TRANSDUCTION PATHWAYS AND UNFOLDED PROTEIN RESPONSE:

- Cell signaling pathways; PI3Kinase pathway, Ras-MAPK pathway, TGF-B and IP3-DAG pathway.
- Unfolded protein Response; Induction of UPR, UPR signalling network and transcriptional control, Branches of UPR- IRE1, PERK, ATF6; control of synthesis of UPR transcription activators.

UNIT 3

STRESS SENSING BY IRE1:

- Mechanism of sensing unfolded proteins in the ER .
- IRE1 assisted decay in mammalian cells: dependence on mRNA sequence, structure activation status, Regulation of RNase splicing activity of IRE1 through phosphor-regulation.
- IRE1-mediated apoptosis mechanism (RIDD and ERAD machinery), Non canonical functions of IRE1.

UNIT 4

UPR IN DISEASES:

The impact of the unfolded protein response in human disease; Diabetes, metabolic syndrome infectious and inflammatory Disease, cancer and neurodegenerative disorders

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