



## **Biomembranes; Molecular Structure and Function**

Lecturer: prof. Rajendra Prasad (Jawaharlal Nehru University, India)

### **Course description:**

Biomembranes are the outermost boundary of a cell which separates cellular interior from exterior environment. Their primary function, therefore, should not be considered as an inert cellular covering. Their importance is evident from the fact that one can have a cell without DNA, or cytoskeleton or nucleus or cell wall but not without a plasma membrane. The membranes which constitute predominantly lipids and proteins are very dynamic structure. The compartmentalization by membrane provides morphological identity to the cell and organelles. The selective barrier properties of membrane ultimately control the internal milieu. The bilayer matrix provides a surface for specific distribution, orientation and sidedness for a variety of functional molecule. The communication and stimulus response coupling across and along the membrane provides a basis for functions such as excitability, adhesion, immune response and hormone action. Lipids act as barriers, solvents, anchors, activators and conformational stabilizers for proteins that carry out specific catalytic and translocation functions. The diversity of membrane functions arises from qualitative and quantitative differences in their composition giving rise to heterogeneity in lateral and trans bilayer organization. The course is planning to highlight as to how environmentally sensitive topographic heterogeneity, transverse asymmetry and functional complexity of membranes are achieved and maintained

### **Syllabus of the lecture:**

- The structure and composition of membrane
  - Diversity of Membranes
  - Membrane morphology
  - X ray diffraction
  - Electron Microscopy
  - Membrane Isolation
  - Composition of membranes
- The structure and properties of membrane lipids
  - Behavior of membrane lipids
  - Lipid phase transition
  - Model Membrane system



- Characterization of structural principles of membrane proteins
  - Overview of protein structure
  - Purification of membrane proteins
  - Detergents Intrinsic membrane protein topology
  - Three dimensional structures
- Lateral and transverse asymmetry in membranes
  - Transverse lipid asymmetry
  - Methodology to study membrane lipid asymmetry
  - Lateral heterogeneity in membranes
  - Lipid micro domain Lipid transporters
- Membrane dynamics and lipid protein interaction
  - Membrane fluidity
  - Physiological behaviour of membrane fluidity
- Pores channels and transporters
  - Facilitated diffusion
  - ATPases
  - Kinetics of transport
  - Energetics of transport
  - Bacterial transport
  - Drug transporters
- Cell surface receptors and signal transduction

TERMINY WYKLADÓW			
Data	Dzień tygodnia	Godzina	Sala
26 maja 2014	Poniedziałek	9.00-12.00	LUWR
27 maja 2014	Wtorek	9.00-12.00	LUWR
28 maja 2014	Środa	9.00-12.00	LUWR
29 maja 2014	Czwartek	9.00-12.00	LUWR
30 maja 2014	Piątek	9.00-12.00	LUWR