BB101
Prof. Sanjeeva Srivastava
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**Summary of today's session – Lecture 11 – Protein Techniques & Preamble to Metabolism**

Dear Students,

In today's class, we discussed few fundamental concepts related to Techniques to study proteins.

**Summary:**

**Section 1: Re-cap - Overview of Protein Separation Techniques**

- Gel filtration columns: composed of porous beads (polyacrylamide, dextran, agarose)
- Gel filtration chromatography: separates proteins based on size (smaller molecules retained longer)
- Separation based on charge differences:
- Proteins interact based on overall charge (positive vs. negative)
- Net charge influenced by varying amounts of positively/negatively charged amino acids and pH
- Separation based on affinity to other molecules:
- Ligand-coupled matrix beads for specific protein interactions
- Protein desorption by excess ligand
- Introduction to protein expression and purification in genetic engineering.

**Section 2: Advanced Protein Separation Techniques and Applications**

- SDS-PAGE: Separation based on MW
    - Smaller proteins migrate further through gel pores
    - Used for determining subunit composition and MW, comparing with known standards
- Two-dimensional gel electrophoresis (2DE):
    - First dimension: separation based on isoelectric point (pI)
    - Second dimension: separation based on MW using SDS-PAGE
- Mass spectrometry (MS):
    - Protein identification and analysis based on mass-to-charge ratio (m/z)
    - Genome databases aid in identifying gene sequences
- High-throughput (HT) platforms for biomolecular interactions:
    - Microarrays: thousands of discrete proteins for biomarker discovery, protein-protein interactions, and functional characterization
    - Surface plasmon resonance (SPR): measures changes in refractive index for analyzing protein interactions.

**Data analysis demonstration**

- Short demonstration of R-programming based data analysis

- Application in analyzing and visualizing protein microarray data
- Illustration of computational tools' importance in processing and interpreting biological data
- Emphasis on interdisciplinary nature of modern biological research.

**Resource Update:**

The course handout and reference materials have been updated and are accessible through the provided Google Drive link:
https://drive.google.com/drive/folders/1FgzzCom1n6WKIgheQrFLA1U8rkJuISGT

Our next lecture will discuss metabolism.

Best wishes,
Sanjeeva